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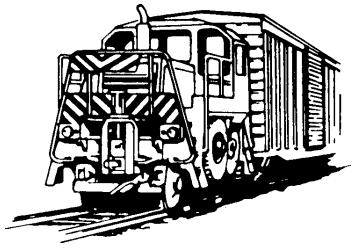
TRACKMOBILE®



4500TM
MAINTENANCE MANUAL

SERIAL NO.

ALL MODELS

FORWARD

All information and specifications in this manual are based on the latest data available at the time of publication. TRACKMOBILE reserves the right to make additions to or improvements in its products without imposing any obligations upon itself to install them on its products previously manufactured.

Proper maintenance, service, and repair are essential to the safe and reliable operation of the 450OTM and -will pay for themselves many times over in the expense saved through the avoidance of major breakdowns and resulting downtime.

When replacement of components becomes necessary in the repair of the unit, only TRACKMOBILE parts, as indicated in the Parts Catalog, are recommended for use. Use of "will-fit" or non-approved parts may endanger proper operating and performance of the unit.

This manual contains recommended methods for performing proper maintenance, service, and repair. Use of improper methods could lead to damage of the unit and render it inoperable and unsafe, or even lead to personal injury.

This manual does not contain standard workshop safety procedures. It does contain WARNINGS for some service procedures that could cause personal injury and CAUTIONS for some procedures that could damage the unit or its components. Shown below are the three warnings used in this manual.

WARNINGS

Within the manual, we have highlighted unsafe practices and identified hazards with a warning indicator intended to alert your personnel to the safety information provided. WARNING SIGNS and SAFETY INSTRUCTIONS have been attached to the TRACKMOBILE.

The seriousness of the hazard is identified as follows:

DANGER Contact with the hazard will result in severe personal injury or death.

WARNING Contact with the hazard could result in severe personal injury or death.

CAUTION Contact with the hazard could result in minor personal injury and/or failure to follow instructions could damage equipment.

It is important that you instruct your personnel in the proper maintenance and use of the TRACKMOBILE and require adherence to the instructions provided.

ACKOWLEDGEMENTS

Composition of this manual required the assistance of the following manufacturers whose componetry is incorporated into the design of the new and progressive **450OTM TRACKMOBILE.**

SAVER-SUNSTRAND-Ames, IA
Hydrostatics and Hydraulics

Fairfield Manufacturing Co., Inc., Lafayette, IN
Hydrosatic Hubs

Kelsey-Hayes, Kelsey Axle and Brake Division, Mequon, WI
Rail Axle Brake Calipers

Rockwell International Corporation, Automotive Businesses, Troy, MI
Road Axle Brakes

In addition, the Design Engineering, Industrial Engineering, Product Support, Sales and Technical Publications departments of **TRACKMOBILE** deserve credit for the assistance they rendered in the production of this manual.

IMPORTANT SAFETY NOTICE

Proper service and repair is important to the safe, reliable operation of all **TRACKMOBILES**. The service procedures recommended and described in this service manual are effective methods for performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.

It is important to note that this manual contains various Cautions and Notices which should be carefully read in order to minimize the risk of personal injury to service personnel or the possibility that improper service methods will be followed which may damage the machine or render it unsafe. It also is important to understand that these Cautions and Notices are not exhaustive. The manufacturer would not possibly know, evaluate, and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, the manufacturer has not undertaken any such broad evaluation. Accordingly, anyone who uses a service procedure or tool which is not recommended must first satisfy himself thoroughly that neither his safety nor machine safety will be jeopardized by the service method he selects.

GENERAL INFORMATION

HOW TO USE THIS MANUAL

Organization

This manual is divided into the major parts of the **450OTM TRACKMOBILE**. The manual index, which immediately follows this explanation, indicates the major parts and their corresponding chapter numbers. Locater tabs, organize according to chapter number, divide the manual according to the major parts. To locate a desired part, simply find the part in the index and turn to the corresponding chapter's locater tab.

Each chapter begins with an index of the subjects covered in that chapter. Locate the desired subject and turn to the appropriate page.

Illustrative figures used in each chapter are also indicated at the beginning of each chapter. Please note that the figures used in this manual are for illustrative purposes only. Components on a particular unit may differ from that represented by a figure depending upon the availability of that particular component during the unit's production.

Unit Orientation

Component locations are referred to at various points in the manual in order to assist with the maintenance of the unit. The figure following indicates the front and the rear of the unit. Note that the steering wheel is at the front of the unit and that the engine faces the rear of the unit.

REAR

FRONT

Service Manual Improvements

You are encouraged to comment on this publication and to offer any suggestions and recommendations you have in regards to its improvement by completing and submitting the form provided at the end of this chapter.

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READERS' COMMENTS

4500TM Technical Service Manual

TRACKMOBILE desires field feedback. Critical evaluation from the field will assist us in our continuous effort to improve the quality and usefulness of this service manual.

What is your general reaction to this manual? In your judgement is it complete, accurate, well organized, and well written? Is it easy to use?

What features are most useful?

What faults are present in the manual?

Does this manual satisfy your needs?_____Why?

Please indicate any errors you have found in the manual.

Thank you for your assistance.

Name _____ Distributor/Customer _____

Occupation _____ Street _____

City _____

State _____ Zip _____

ALL COMMENTS BECOME THE PROPERTY OF TRACKMOBILE

450OTM SPECIFICATIONS

FRAME
Heavy-duty, all welded from preformed steel plate and structural shapes. 2 1/2" (63.5 mm) thick slab frame.

ENGINE
Detroit Diesel, 6V-53,6 Cylinder, V-Type,2 Cycle

Cummings Diesel, 6BTA5.9,Inline 6 Cylinder, 4 Cycle

RAIL DRIVE
Through transmission and rail drive gearcase.

TORQUE CONVERTER and TRANSMISSION
2.13:1 torque multiplication ratio. Clark, Model HR28000 series, constant mesh spur gearing, dual range (Low-orHigh). 3 Speeds power shift each range.6 Speeds forward and reverse.

TRANSFER GEARCASE
Heavy-duty hardened alloy steel spiral bevel and helical gears, positive flow oil bath lubrication.

BRAKES
Rail- 1 8.6"[472 mm] diameter disc, air over hydraulic power actuated, on all four (4) railwheels, 6 calipers. Train Braking-32 CFM [.90 cu.m/min]compressorcapacity. Roadwheel- Drum and shoe air over hydraulic power actuated, on steering wheels. Parking - Disc on rail axle yoke.

RAILWHEELS
30"[762 mm] diameter heat treated cast steel tapered tread profile, mounted on tapered shafts.

ROADWHEELS
Heavy duty retractable suspension.

TIRES
12.00 x 20, 16 ply tractor service tires.

ROAD DRIVE
Hydrostatic, with planetary drive hubs located in driving wheels.

RAIL GAUGE
Available in all gauges,39 3/8"[1000 mm],42"[1067 mm],561/2"[1435 mm],60"[1524 mm],63"[1600 mm], 66"[1676 mm].

POWER STEERING
Hydraulically powered, truck-type linkage and spindles.

HYDRAULIC SYSTEM
Constant pressure system with engine running, to insure maximum traction and braking ability and to maintain set posions. Finger-tip hydraulic controls through electric solenoids.

COUPLERS
Two heavy-duty cast steel,TRACKMOBILE pioneered weight transfer design. Positive coupling assured with AAR contour. Hydraulic controlled from cab for easy coupling and uncoupling. Air cylinder knuckle release.

CAB
Driver conditioned, totally enclosed, 360° visibility, easily accessible instruments and controls. 1 80° rotating seat, one on each side of unit with pivoting control panel console. Four (4) electric windshield wipers, rearview (road) mirror, defroster fan and heater. 90 dBa sound suppression.

SANDERS
Eight air operated, flow-adjustable sanders mounted on body frame. Sanding both front and rear at all railwheels.

LIGHTS
Front and rear tail/stop lights. Sealed beam halogen front and rear headlights. Cab operator light, instrument lights, front and rear track lights for night operation.

WARNING SIGNALS
Blast type air horns. Automatic back-up alarm for road operation.

AIR CLEANER
Farr heavy duty air cleaner standard equipment.

INSTRUMENT PANEL
Pivots for operation in either side of cab and includes all gauges for both rail and road operation and rail controls.

TABLE OF PERFORMANCE

MAXIMUM SPEEDS* (Both Directions)

Rail Operations:

	Low Range	High Range
Low	1.8 MPH [2.9 Km/h]	4.4 MPH[7.0 Km/h]
Intermediate	3.5 MPH [5.6 Km/h]	8.3 MPH [1 3.4 Km/h]
High	9.5 MPH [15.3 Km/h]	22.3 MPH [35.8 Km/h]

Road Operation: 8.0 MPH [1 2.9 Km/h] Either Direction

DIMENSIONS

	On Rail (AAR Clearance Pattern Maintained)	On Road
Wheelbase	138" [3505 mm]	68' [1727 mm]
Length	188" [4775 mm]	188" [4775 mm]
Width	121" [3073 mm]	121" [3073 mm]
Height	145" [3683 mm]	155" [3937 mm]

RAIL CLEARANCE: 4 1/2"[114 mm] AAR Standard is 2 1/2".

ROAD CLEARANCE: 9'[229 mm] at railwheel flange

WEIGHT: 42,OOO Ibs.[19,050 kg]

MAXIMUM TRACTIVE EFFORT:**
Using 46,000 lbs. [20,866 kg] weight transfer and coefficient of friction of .33.
One Coupler: 30,OOOIbs.[13,600 kg]
Two Couplers: 45,OOOIbs.[20,400 kg]

TURNING RADIUS: (Road Mode)
Outside: 20 ft. [6.1 m]
Inside: 10 ft. [3.0 m]

*Actual speeds obtained will depend on grade, load, altitude, and other factors.
** Actual tractive effort obtained varies with rail conditions, sanding, and weight transfer.

COLD STARTING AIDS

STARTING AIDS RECOMMENDED

32°F	ETHER START
	DIESEL FUEL"ANTI-GEL"ADDITIVE ADDED AND/OR NO.1 FUEL
	HEATED AIR DRYER-IF NOT ALREADY EQUIPPED
	HYDRAULIC OIL-LOW VISCOSITY (TEXACO RANDO HD-Z22)
	RADIATOR SHUTTERS OR CLUTCHED FAN (IF AVAILABLE)
	HEATED AUTOMATIC AIR TANK SPITTER VALVES (12V)
	ENGINE OIL PAN HEATER (110V)
	HEATED FUELWATER SEPARATOR (12V)
	ENGINE BLOCK HEATER (I 10V)
	BATTERY WARMER (11 OV)
	HYDRAULIC TANK HEATER (110V)
0°F	REPLACE SYNFLEX HOSES WITH STANDARD HOSE
	TRANSMISSION HEATER (11OV)
	AXLE AND T-CASE PAD TYPE HEATERS (11OV)
	ENGINE COOLANT HEATED HYD TANK AND FUEL TANK
	AUXILIARY CAB HEATER (WEBASCO AIR HEATER)
	INSULATED BATTERY COMPARTMENT WIWARMER
	AUXILIARY COOLANT HEATER (WEBASCO WATER HEATER)
-30°F	ARTIC OIL IN TRANS, ENGINE,AXLES,AND T-CASE

CHAPTER 01

AIR COMPRESSOR

Air compressor maintenance instruction covers the removal and replacement of the components used with the standard 32 CFM air system. The maintenance procedure is written with right and left sides determined by viewing the engine from the fly wheel.

REMOVAL

1. Relieve all pressure in the air system.
2. Remove compressor access plate in rear cab wall behind compressor.
3. Disconnect cooling lines between compressors and remove cooling line adapters.
4. Remove two (2) inside compressors-to-engine mounting bolts on each compressor using a ratchet and extension and universal joint adapter. Access is obtained through cab wall access hole.
5. From engine compartment access, disconnect compressor cooling and return lines at compressor.
6. Disconnect air compressor discharge lines. Disconnect right compressor at discharge fitting and left compressor at air line coupling.
7. Remove transmission filler neck at elbow (3 2 CFM only).
8. Disconnect governor crossover tube between compressors.
9. Disconnect compressor oil lube line(s) at compressor(s).
10. Remove four (4) remaining compressor mounting bolts (two per compressor). Access to the bolts on the right compressor can be gained from either above or below the unit's deck. Remove left-hand compressor bolts from above deck.
11. Remove compressor(s) by moving them backwards toward the cab until the compressor coupling clears the spacer plate on the engine accessory drive. Tilt compressor back and remove it with coupling. The right-hand compressor is most easily removed from below the unit's deck. The left-hand compressor must be removed from above deck.

    NOTE: Remove and discard gasket. A new gasket must be used.

ASSEMBLY:

Assembly of the compressors to the engine is the reverse of the above process. Exercise care when installing the gasket and when matching the coupling splines and adapter teeth. It is recommended that the gasket be attached to the compressor before the compressor is installed.

DISASSEMBLY:

See Midland Compressor Manual furnished separately from this manual for compressor disassembly.

REASSEMBLY:

The following procedure is for new compressor mounting preparation and final mounting procedures:

1. Assemble hub to compressor shaft with nut.
2. Position and install breather at inside of rear of compressor with screws and lockwasher.
3. Position and install oil line adapter in lower rear compressor port.
4. Position and install the cooling line adapters and reducer adapters into rear upper port(s) of both compressor(s).
5. Install unloader adapter at inside front compressor port of left compressor and adapter in unloader “port D” of righthand compressor(s).
6. Install cooling line adapters in compressor cooling inlet and out ports.
7. Position and install discharge fittings and gaskets to compressor(s).
8. Install compressors and connect air, cooling lubricating and unloader lines.

CHAPTER 02

Air Sander System

The front and rear air sander system is actuated by a toggle switch located on the main console next to the transmission speed shifter.

The toggle switch electrically actuates either the front or rear sander solenoids which are located in the solenoid bank on the lefthand side of the cab's center support channel. Moving the switch to the front or rear sander allows a regulated air pressure of 40 psi to flow to the TRACKMOBILE sand trap bodies. The sand is gravity fed into two throats in each sand trap body where it rests on baffle plates until a 40 psi air charge blows it out of the sand trap bodies and into the sander tubes.

Cleaning of the sand trap bodies is accomplished by loosening the two retaining screws on the underside of the sand trap body and pivoting the sand trap cover plate.

It is recommended that trakite sand be used in the sanders because of its low moisture absorption rate and traction enhancing granular structure.

Sand Box Assemblies

There are four sand box assemblies on the unit, two on the front and two on the rear. Besides holding sand for the attached sander body, each sand box assembly also separately houses headlights, tail and stop lights, track lights and an electrical terminal block. The sand capacity is approximately 50 lbs. in front sand boxes and 100 1bs. in rear sand boxes.

FRONT SAND BOX

REMOVAL:

1. Remove sand from sander box.
2. Disconnect electrical wires at terminal block-mark for reattachment.
3. Disconnect sander tubes from sander body.
4. Disconnect air lines running to sander body at sander body.
5. Remove sander box assembly-to-support channel mounting bolts and remove sandbox.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

CHAPTER 03

Air System

A 32 CFM Air System is standard on the 4500TM. Two engine mounted 16CFM compressors pressurize the system. The compressors are governor controlled to unload at 125 psi. The relief is set at 150 psi.

The air system is monitored by an air reservoir pressure gauge/low air buzzer switch warning light assembly mounted on the console. Normal operating pressure indicated on the gauge should be 110-125 psi. The low air buzzer switch/warning light, mounted on the back of the air pressure gauge, is activated at 60 psi or lower.

The air system operates the following functions through the air reservoir located underneath righthand side of cab, front and rear knuckle release, high and low range transmission shifter, air horn, front and rear sanders, air throttle, console hand brake, foot brake, and optional air bell. All of these functions are solenoid activated to operate on system pressure or regulate system pressure except the air throttle, foot brake and console hand brake. The air throttle, foot brake, and console hand brake operate off of regulated reservoir pressure.

This reservoir is located beneath the cab mounted on the righthand side of the rear cab support channel. It is divided into a primary and secondary reservoir. Each reservoir has its own pressure regulator valve, air drain cock and a check valve in its charging line.

The primary reservoir supplies air pressure to the console air gauge, air throttle, and two banks of solenoid valves. The solenoid valve banks are also mounted on the rear cab channel support on the lefthand side of the unit.

The first bank of solenoid valves in line from the main reservoir controls the front and rear knuckle release and high and low transmission range shifter.

The second bank of solenoid valves control the air horn, front and rear sanders and optional air bell. A pressure regulator valve mounted on this solenoid bank regulates sander line pressure - set at 40 psi by turning the T-handle in to increase and out to decrease air pressure.

In addition, a pressure regulator mounted directly off of the primary reservoir supplies the air throttle and primary ports of the console hand brake and floor mounted foot treadle valve-set at 85 psi. Adjust the valve in the same manner as just described for the sander air pressure regulator.

The secondary reservoir acts as a back up air supply to the primary reservoir should a line running off the primary reservoir leak or rupture. It supplies air pressure to the secondary ports of the console hand brake and foot treadle valve through a tank mounted air regulator valve which is set at 85 psi.

NOTE: See Section 4521 of parts manual for illustrations.

Brake Reservoir

REMOVAL:

1. **Relieve all air pressure in system at drain cocks on reservoir.**

CAUTION: MOISTURE ACCUMULATION MAY BE DISCHARGED WITH AIR

2. **Disconnect all charge and supply lines at tank. Mark lines for correct reinstallation.**

3. **Support reservoir and remove flexloc nuts retaining the reservoir support-straps.**

4. **Remove tank.**

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

Air Compressor

Reference Air Compressor, Chapter 01.

Air Pressure Regulator Valves

The aforementioned air pressure regulator valves are used in the standard air system. The valve regulates air pressure through a spring loaded diaphragm. Air pressure is adjusted at the valve by turning the T-handle in for an increase in pressure and out for a decrease in air pressure. The valve is non-serviceable. If an air leak is detected, check the line fittings for tightness and the valve for a leaking diaphragm. Replace the valve if its diaphragm is determined to be leaking.

Relief Valve

To set relief valve loosen jam nut, turn adjusting screw in/clockwise to increase pressure and out/ counterclockwise to decrease pressure. The correct pressure setting is 150 psi.

Solenoid Valves

The solenoid valves may be replaced individually depending upon which valve is determined to be defective. Check the electrical lines to the suspected solenoid for proper connections as well as electrical current.

1. **Disconnect air and electrical lines to solenoid - mark for reattachment.**

CAUTION: AIR LINE MAY BE UNDER COMPRESSION.

2. **Remove retaining nut on solenoid valve and remove solenoid.**

ASSEMBLY:

1. Assembly is the reverse of the above. For maintenance of the 32 CFM train air system and its components, reference Train Air System, Chapter 22.

CHAPTER 04

Brakes - Trackmobile

Reference Section 4551 of parts manual.

Brakes

Trackmobile Brakes

Brakes are applied on both railwheels and roadwheels through the brake pedal on the floor board and the TRACKMOBILE brake control handle mounted on the console.

Rail Axle Brakes

Braking for the TRACKMOBILE itself while on rail is provided by air-over-hydraulic actuate disc brakes. The front and rear rail axles each receive braking through three calipers and two steel rotors.

Air actuated power clusters located behind the coupler beams on the front and rear of the unit control the braking action. The power cluster on the rear of the unit also controls the application of the drum and shoe type brakes used on the roadwheel steering axle.

The following instructions indicate the service and maintenance procedure for the disc brake system.

ROUTINE MAINTENANCE

IMPORTANT! The routine inspection presented below is suggested to keep the brake system in good working order.

1. Check fluid level in master cylinders. Add new fluid to within 1/2" of the top.

2. Check for fluid leakage at all connections under maximum pedal pressure.

3. Check to see that caliper assembly is firmly attached to anchor plate.

4. Check the hub and rotor braking surface for deep scores, cracks, and bent checks. Also, check that lateral runout (wobble) does not exceed 0.010" runout.

5. Check both inboard and outboard shoes and linings. Replace when lining equals backing plate thickness.

REPLACEMENT OF BRAKE LININGS

The brake linings are replaced only in sets.

1. Remove about 2/3 of the operating fluid from the master cylinder.

WARNING: Protect eyes from fluid.

2. Remove retainer plate mounting screws and remove the keeper plates.

3. Lift caliper unit away from anchor plate.

4. Remove inner shoe and lining assembly.

5. Remove outer shoe and lining assembly from caliper housing by tapping on it lightly.

6. Install new inner shoe and lining assembly in caliper housing.

7. To provide clearance for new outer shoe and lining assembly, pistons must be pushed to the bottom of the piston bores in caliper housing. This is done as follows:

   a. Place a small block of wood over pistons and boots.

   b. Using a “C” clamp, compress pistons back into the cylinder bores.

8. Install new outer shoe and lining assembly with the lower flange end against the caliper leg abutment and the upper flange over the shoulder on the caliper legs. Secure the shoe and lining tightly using a tool such as a vice grip.

9. Install caliper unit over the hub and disc and position securely into slide rails in anchor plate.

NOTE: Be sure caliper unit is firmly and completely seated on the top and bottom adapter plate slide rails. Clean and grease slide rails.

NOTE: Take care not to pinch dust boots between pistons and the inward shoe and the hub and disc.

10. Install keeper plates with screws. Torque screws to 17-22 ft.-lbs. dry.

11. Add operating fluid to bring level back up to 1/2" from top of master cylinder. If any hydraulic lines were disconnected, bleed the system. A thorough brake check should be made every 60 days under normal conditions. As the brake pads wear, fluid fills the area behind the piston, lowering the fluid level in the reservoir. Under hard usage, check fluid level more often.

DISASSEMBLY

1. Remove the retainer plate mounting screws and remove the keeper plates.

2. Lift the caliper unit away from anchor plate.

3. Remove both inner and outer shoe and lining assemblies.

4. Disconnect the hydraulic hose and cap or tape the fitting to prevent dirt from entering the line.
5. Drain operating fluid from caliper.

WARNING: Protect eyes from fluid.

6. Provide padding around caliper pistons by using a small wood block (2" thick) and a clean shop towel.

7. Remove piston by directing compressed air into the caliper fluid inlet.

CAUTION: Use just enough air pressure to ease the pistons out of the bores. Do not blow out or damage may occur even though padding was provided.

WARNING: TO AVOID POSSIBLE SERIOUS INJURY, DO NOT PLACE FINGERS IN FRONT OF THE PISTONS IN AN ATTEMPT TO CATCH OR PROTECT THEM WHEN APPLYING COMPRESSED AIR.

8. Remove and discard piston dust boots.

9. Using a pointed piece of wood or plastic, remove piston seals from their grooves in the caliper bores and discard.

NOTE: Do not use a metal tool to remove piston seals or damage to the caliper bores might result.

CLEANING AND INSPECTION

Check all parts for wear or damage. Replace any found defective.

1. Check the inside of the caliper for hydraulic fluid leaks. If evidence of leaks are noted, correct the cause.

2. Clean all parts with denatured alcohol and wipe dry with a clean, lint free cloth. Using an air hose, blow out all passages and bores.

NOTE: Do not use mineral base cleaning solvents such as gasoline, kerosene, carbon tetrachloride, acetone or paint thinner to clean the caliper. These fluids will cause rubber parts to become soft and swollen in an extremely short time.

3. Inspect casting cylinder bores for scoring, pitting, or corrosion. A corroded or deeply scored casting should be replaced; light scores and stains may be removed.

4. Polish any discolored or stained area with crocus cloth only. Use finger pressure and rotate the crocus cloth in the cylinder bore. Do not use any other kind of abrasive or abra sive cloth. Black stains on the bore walls are caused by piston seals and do not harm.

5. Clean pistons with denatured alcohol and wipe dry with a clean, lint free cloth. Using an air hose, blow dry.

6. Carefully examine each piston O.D. for scoring, nicks, corrosion, and worn or damaged chrome plating. If any surface defects are detected, replace the piston. The piston O.D.is the primary sealing surface in the caliper assembly. It is manufactured and plated to close tolerances.

7. Check the brake hose for worn spots, cracks or other signs of deterioration. Discard the hose if damaged.

ASSEMBLY:

Reassembly is the reverse of disassembly. Be sure that all parts are clean and serviceable before reassembling the unit.

1. Dip each new piston seal in clean brake fluid and install in cylinder groove. Gently work each seal around cylinder bore with finger until it is properly seated. Make sure the seals are not twisted or rolled in the grooves.

2. Install dust boots in cylinder grooves using same technique as used above to install piston seals.

3. Coat the outside of each piston with operating fluid.

4. Insert pistons into caliper piston bores as follows:

   a. Using a small flat plastic rod, work dust boot around the closed end of piston as piston is inserted into bore.
   b. Press piston straight into caliper piston bore until it bottoms. The boot I.D. should slide up the piston and come to rest in the boot groove in the piston.

5. Install new shoe and lining assemblies.

6. Install the caliper unit over the hub and disc and position into slide rails in anchor plate.

NOTE: Take care not to pinch the dust boots between the pistons and the inward shoe and the hub and disc.

7. Install keeper plates with screws. Torque screws to 17-22 Ft-lbs. dry.

8. Connect the hydraulic hose to the caliper unit.

9. Add operating fluid to bring level back up to 1/2" from top of master cylinder.

10. Bleed the system and add fluid as needed.

11. Pump the brake pedal several times to actuate the piston seals and to position the shoe and lining assemblies.

12. Check for fluid leakage at all connections under maximum pedal pressures. Refill system reservoir as needed.

BLEEDING INSTRUCTIONS:

Each hydraulic brake is fitted with one or more bleeder valves. This is a special valve which seals when turned in tight but allows air or fluid to pass out through a hole in the valve nipple when the valve is loosened one turn.

1. Remove cap from top of master cylinder.

2. Attach a flexible tube to the nipple of the valve (top valve if there is more than one).

   NOTE: To eliminate air pockets in the system while bleeding the unit, the centerline of the bleeder valve used must be within 10 degrees of vertical.

3. Place the other end of the flexible tube into a jar containing a small amount of clean fluid. See that end of tube is below fluid surface to prevent breathing air back into the system.

4. Loosen valve one turn.

5. Slowly operate brake and check for air bubbles rising in the fluid, indicating air is being forced out of the system.

6. Retighten the bleeder valve as the pedal is being depressed and reaching end of stroke.

7. Repeat steps 4, 5 and 6 until air bubbles stop, adding new fluid to reservoir as needed.

8. Add new fluid to reservoir to bring level back up to within 1/2" of top and replace cap.

9. Recheck the system for proper operation and for leaks.

10. Repeat the above procedure at all other caliper units supplied from the same actuation system.

11. Discard fluid in jar. This fluid contains air and should not be reused. This completes bleeding the system. It now can be placed into normal operation.

Roadwheel Brakes

Air over hydraulic actuated drum and shoe type brakes are used on the rear steering road axle of the unit to assist the hydrostatic motors in braking the unit while it is on roadwheels. The unit is also equipped with a “Brake Lock” feature in the roadwheel brake system. See section 4551 in parts manual.

The brake assembly is a two shoe type brake mounted on a backing plate which also serves as a dust shield. Adjustable anchor pins provide a means of centering the brake shoe arc in relation to the drum and secondary or minor adjustments are made by rotating the eccentric cam which bears on the brake shoe web or pin in the shoe web.

IMPORTANT!

A schedule for the periodic adjustment, cleaning, inspection and lubrication of brake equipment should be established by the operator on the basis of past experience and severity of operation. Linings and drums are parts particularly subject to wear depreciation. To compensate for this wear, brakes should be adjusted as frequently as required to maintain satisfactory operation and maximum safety. Adjustments should provide uniform lining clearance, correct travel of levers and proper equalization.

IMPORTANT!

Brakes should be cleaned, inspected, lubricated and adjusted each time the hubs are removed.

During a major overhaul, the following parts should be carefully checked and replaced with genuine TRACKMOBILE replacement parts as required:

INSPECTION

1. Backing plates for distortation, loosenes, or sheared rivets.

2. Anchor pins for wear or misalignment.

3. Brake shoes for wear at anchor pin holes.

4. Eccentric cams for wear.

5. Shoe return springs should be replaced at time of overhaul.

6. Brake linings for grease saturation, wear and loose rivets or bolts.

7. Drum for cracks, scoring or other damage.

8. Wheel cylinders should be checked for leaks and damaged boots replaced.

9. It is recommended that on rebuild all new lock rings be installed.

10. Wheel bearings should be properly adjusted before making brake adjustments.

11. Linings should not be allowed to wear to the point where rivets may contact brake drums.

DISASSEMBLY

Refer to Roadwheel Steering Axle, Chapter 19, Disassembly points 1-7, for instruction concerning access to the brake assembly.

1. Disconnect brake shoe return spring.

2. Remove anchor pin “C” washers and guide pin locks and washers.

3. Remove brake shoe and lining assemblies.

4. Remove anchor pin lock nuts, lock washers and anchor pins.

5. For complete disassembly remove cap screws, washers and wheel cylinder assembly and disconnect hydraulic lines.

REASSEMBLY

1. Position wheel cylinder, install cap screws and lock washers and tighten securely. Recon nect hydraulic lines.

2. Insert anchor pins and install washers and lock nuts. (Punch marks must be together and wrench flats in line).

3. Position shoe and lining assemblies and install washers and lock rings.

4. Back off adjusting cams and position shoes on push rods in wheel cylinder.

5. Hook shoe return spring in brake shoe web holes.

ADJUSTMENT

Following overhaul or when new linings are installed, the initial adjustment should be carefully made to both properly locate the curvature of the lining to the drum and obtain the proper clearance.

Each shoe must be adjusted to center the brake shoe arc in relation to the drum. Adjust cam to bring lining into contact with the drum and rotate anchor pin sufficiently to relieve drag. Repeat until additional rotation of anchor pin will no longer relieve drag. Lock anchor pin lock nut and back off cam sufficiently to permit wheel to turn freely.

Subsequent adjustments to compensate for lining wear are made with the eccentric cam only. Turn cam to bring lining into contact with the drum. Back off sufficiently to permit free rolling drum. Repeat on opposite shoe.

Parking Brake

The parking brake assembly is mounted on the input of the rear rail axle gearcase. Disc type braking is achieved through two spring applied - hydraulic released calipers mounted to a disc brake rotor.

A console mounted light and buzzer which are in turn activated by a pressure switch mounted to the back of the parking brake valve indicates when the brake is on or off.

The parking brake is actuated by a console mounted valve. Turning the valve to the “OFF” position allows hydraulic pressure to release the braking achieved through the calipers. Turning the handle to the “ON” position relieves hydraulic pressure and allows the belleville spring washers to apply the brakes.

When parking the unit, turn the parking brake valve handle to the “ON” position to assure parking brake application. (On rail wheels only).

NOTE: A total loss of hydraulic pressure in the unit will apply the parking brake. The parking brake may be released by loosening the locknut and backing out the adjusting screw to relieve spring pressure.

WARNING: BLOCK MACHINE BEFORE SERVICING THE PARKING BRAKE TO AVOID POSSIBLE SERIOUS BODILY INJURY AND DAMAGE TO THE UNIT.

REMOVAL:

1. Raise unit on roadwheels and block securely under frame. Retract roadwheels and turn off engine.

WARNING: It is imperative that the unit’s transmission be in the neutral position in order to avoid serious injury through contact with an engaged drive shaft.

2. Turn ignition switch to “ON” position and work all hydraulic functions to relieve system pressure.

3. Turn parking brake valve to “ON” position. Turn ignition switch off.

4. Disconnect hose going to parking brake from console mounted valve. Plug port in valve.

5. Drain hydraulic fluid being careful not to soak rotor or calipers.

6. Remove four (4) capscrews and lockwashers attaching caliper mounting assemblies to parking brake bracket.

7. Disconnect rear U-Joint assembly at the rear rail axle gearcase yoke.

8. Remove eight (8) capscrews and lockwashers securing brake disc to brake yoke and remove disc and calipers (Remove as assembly to preclude readjustment of spring tension).

9. Remove parking brake bracket by removing eight (8) capscrews and lockwashers.

NOTE: Reinstall capscrews and lockwashers snuggly to protect spiral pinion and bearings.

ASSEMBLY:

1. Assembly is the reverse of the above procedure. Bleed each caliper after reinstalling parking brake assembly by turning console valve to “OFF” and loosening caliper bleed screws. Check for leaks.

NOTE: Engine must be running to adjust and bleed calipers.

DISASSEMBLY:

NOTE: It is not necessary to remove the entire parking brake assembly when servicing the calipers (new lining kit or seat kit).

Rotor replacement or service requires removal up to the parking brake bracket.

Minimum thickness of rotor is .500".

Caliper

REMOVAL:

1. Perform parking brake assembly removal up to and including point #6.

2. Disconnect brake hose between calipers.

3. Relieve spring applied brake application by loosening the lock nut and backing out the adjusting screw.
Remove caliper(s). Drain fluid from brake before proceeding.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

NOTE: Spring tension on calipers will require readjustment for proper pad-to-rotor clearance.

Brake Adjustment

A. While the unit is still on blocks, start engine and retract the roadwheels.

WARNING: TRANSMISSION CONTROL MUST BE IN NEUTRAL POSITION TO PREVENT TRACKMOBILE FROM MOVING.

B. Turn parking brake valve handle to “OFF” position which pressurizes system.

C. Bleed parking brake system.

D. Place .012 shim between lining and disc. Tighten adjusting screw until shim can be moved.

E. Holding screw stationary, tighten locknut. Remove shim and release hydraulic pressure by turning parking brake valve handle to “ON” position.

F. Stop Engine.

LINING CHANGE PROCEDURE:

1. Perform caliper removal procedure.

2. Place brake in soft jawed vise with disc clearance slot facing up, clamping on the two machined surfaces.

3. Remove cap screws. Using a thin blade tool, pry lining from housing. Remove lining through disc clearance slot.

4. Force lining assembly from housing bore by advancing adjusting screw. Remove lining assembly through disc clearance slot.

5. Remove locknut and adjusting screw.

6. Install new piston and lining assembly by inserting through disc clearance slot.

7. Through disc clearance slot, reinstall lining assembly into housing bore.

8. Install inserts into new lining pad. Then install pad into housing through disc clearance slot. Line up holes in lining with holes in housing. Secure lining to housing using capscrews.

9. Turn adjusting screw into piston until approximately 1/2" of thread engagement is obtained. Tighten locknut until piston retracts enough for installation. Push lining assembly back - brake is ready to be mounted.

10. Reinstall brake on vehicle and connect fluid lines.

11. Bleed the system making sure all air is eliminated. Apply hydraulic pressure and check for leaks.

12. Adjust linings as described in BRAKE ADJUSTMENT SECTION.

Seal Replacement Procedure

NOTE: When removing seals and back-up rings be careful not to scratch or mar pistons. When installing new seals in the brake, assure that the seal kit used is compatible with the system fluid used.

1. Perform caliper removal procedure.

2. Position caliper in a soft jawed vise clamping on machined surfaces. Remove end cap by loosening the bolts. Loosen the bolts evenly and in a criss-cross sequence, until spring preload is released. Remove end cap and bolts.

3. Using a thin blade tool, remove seal from end cap.

4. Remove belleville spring washers (NOTE STACK ARRANGEMENT).

5. Remove piston from caliper bore. Then remove O-ring and back-up rings from piston.

6. Wash pistons and caliper bore thoroughly and allow to dry.

7. Lubricate all O-rings and back-up rings, from seal kit, in clean system fluid.

8. Install new seal,O-rings, from seal kit. Make sure back-up rings are installed in proper position in grooves.

   NOTE: When installing back-up rings it is essential that the surfaces of diagonal splice match with each other after back-up ring is installed in groove.

9. Lubricate caliper bore and pistons with clean system fluid.

10. Reinstall piston into caliper bore.

    NOTE: When inserting piston, be careful not to pinch O-ring on inlet ports.

11. Make sure push rod is in bore of piston. Then install piston assembly into caliper bore.

12. Install belleville spring washers following stacking sequence, noted in removal.

13. Install end cap and 4 bolts. Tighten bolts to 10-12 ft-lbs.

14. Refer to Caliper “Assembly” for remounting calipers.

Roadwheel Holding Brake

The unit is equipped with a brake lock system for the roadwheel brakes which utilizes the existing roadwheel service brake system to provide a TEMPORARY HOLDING BRAKE.

WARNING: THE BRAKE LOCK SYSTEM IS NOT A PARKING BRAKE AND THEREFORE IS NOT INTENDED TO BE USED AS ONE.

The brake lock system is essentially an electronically actuated, hydraulically held one-way check valve. When applied, the brake lock holds pressure in the brake system. The amount of pressure held depends upon the amount of braking the operator applied through the brake system when the brake lock system was actuated.

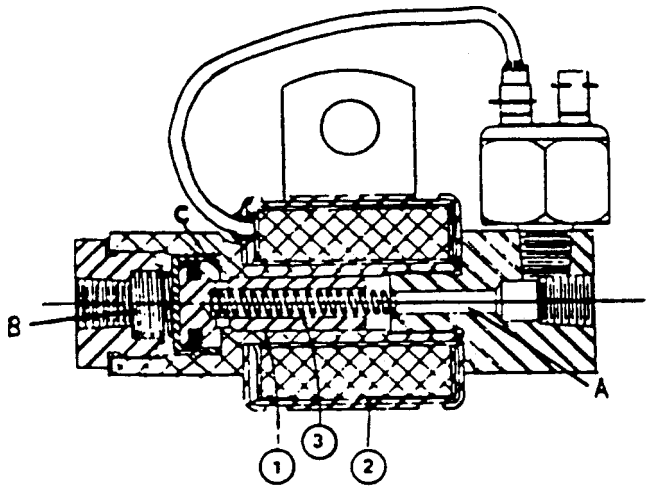
The system is actuated by a toggle switch located on the side of the hydrostatic console facing the operator. Up is “OFF” and down is “ON”.

When moving the toggle switch down/”ON” current is supplied to the pressure switch at the inlet end of the one-way check valve. Steping on the brake pedal charges the system and also closes the pressure switch on the valve, which energizes the coil and pulls the valve shut in the direction of the return flow of the hydraulic fluid. Releasing the pedal pressure breaks the circuit at the pressure switch and hydraulic pressure holds the check valve closed, i.e. the check valve, which was closed in the direction of the return flow by the solenoid, holds the hydraulic pressure in the service brake system. No current is drawn except during the moment the valve is actuated.

To release this holding pressure, the dash toggle switch is turned “OFF” and the brake pedal is depressed until pressure equal to the locked pressure is attained. The spring loaded, one way check valve snaps to the full open position and the brakes are released.

NOTE: Releasing park brake normally required depressing brake pedal for 4 to 5 seconds.

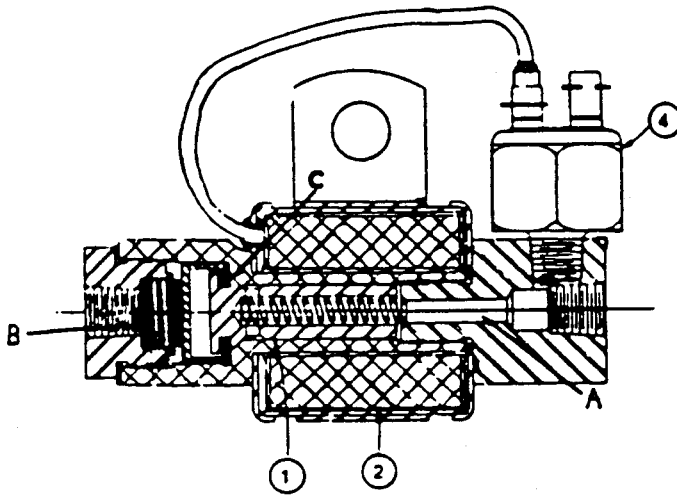
When the brake lock control switch is restored to the “OFF” position and effort is applied to brake pedal, fluid pressure in area A pushes the valve (1) off seat and, since the solenoid (2) is not activated because the switch is in the “OFF” position, the valve spring (3) holds the valve (1) off seat so that, when effort on brake pedal is released, previously held fluid in area B is permitted to flow through area A into the reservoir, releasing the brakes. See Figure 4.14



BRAKE LOCK IN “OFF” POSITION

FIG. 4.14

When the brake lock dash control switch is in the “ON” position and brake pedals applied, hydraulic pressure in area A closes the pressure switch (4) which activates the solenoid (2) drawing the valve (1) against seat C. Brake fluid becomes trapped in area B. Pressure in area B will depend on degree of effort applied on the brake pedal and will hold brakes accordingly. When the brake pedal is released, pressure in area B remains but pressure drops in area A, the pressure switch (4) opens and current flow through the solenoid (2) stops. (See Figure 4.15).



BRAKE LOCK IN “ON” POSITION

FIG 4.15

The brake lock is not servicable. Replace the brake lock if it is inoperative due to a defective pressure switch, a defective solenoid, or a poor seat/leaking check valve allowing gradual fluid leakage.

Power Cluster

Reference Section 4551 of parts manual.

Two power cluster assemblies are employed on the unit to apply the TRACKMOBILE road and rail brakes. One each of power clusters are located behind the front and rear coupler beams.

The power cluster assembly includes an air power cylinder and hydraulic master cylinder.

The air power cylinder converts the variable air pressure received from either the floor mounted treadle valve or console mounted treadle valve into mechanical force and motion. Air pressure entering the unit forces the cylinder piston to carry its push rod outward, compress the air piston return spring, and stroke the hydraulic cylinder, which in turn causes fluid pressure in the brake lines applying the brakes. The power cluster provides a 15 to 1 pressure ratio so that a maximum 1275 psi hydraulic pressure is applied through the 85 psi brake air line pressure.

The piston also strokes a spring loaded stroke indicator rod which extends through one of the air cylinder mounting bolts (drilled bolt). The stroke indicator rod indicates the length of piston travel in the air power cylinder. Since the piston acts upon the master cylinder, the longer the rod stroke, the more brake fluid the master cylinder is displacing to obtain air brake operation. Increased fluid displacement for braking action translates into worn/wearing brake pads and shoes (replace or adjust as necessary), a leak, or air in the brake system. Therefore, the stroke indicator rod can be used as a “sentry” for the unit’s brake system.

NOTE: Visual inspection of the stroke indicator rod should not replace daily visual and operating inspection of the unit’s brake system.

The cylinder shell wall is sealed by a cup carried on the piston, which also carries a felt wiper that cleans and lubricates the wall. A boot is stretched between the rod and cylinder head, covering the rod clearance to exclude dirt and water. Air displaced on the atmospheric side of the piston passes through a filtered breather port located in the cylinder head. When air pressure is released, piston and rod resume their static position because of the action of the return spring. The static position is attained before the advance of the hydraulic master cylinder. The stroke indicator rod follows the piston.

In static position fluid by-passes to compensate the closed hydraulic system for temperature expansion and contraction or seepage.

During an application, initial piston movement seals off the by-pass, then the stroke displaces fluid through an outlet check valve into the system, building pressure when the fluid movement ceases. A primary cup, ahead of the piston, seals the pressure system and the piston carries a secondary seal cup which prevents fluid loss at the open rear of the cylinder.

Upon release, a return spring forces the piston back to its stop faster than the displaced fluid can unseat the check valve and return, forming a vacuum. Reservoir fluid ahead of the secondary cup is sucked through passages in the piston face, supercharging the system, and the fluid excess by-passes into the reservoir. The return spring also seats the outlet check valve to trap up to 18 psi residual pressure in the system. Residual pressure assists the system sealing and raises the fluid boil point. The check valve also assists the service ‘bleeding’ operation.

Trouble Shooting The Power Cluster

POWER CYLINDER:

An air leak, except one at the air inlet fitting, occurs because of a blow by a worn piston seal cup or a piston loose on its rod.

WARNING: With even a small leak (slow bubbling at openings and joints covered with soapy suds) the unit should be shutdown FOR IMMEDIATE BRAKE REPAIR to avoid the possibility of a hazardous sudden complete failure.

MASTER CYLINDER:

An internal pressure leak in the hydraulic cylinder occurs because of a worn primary cup, pitted cylinder or corrosion and is indicated by a creep of the stroke travel indicator during an extended holding application at low pressure.

WARNING: WITH A HYDRAULIC LEAK, THE UNIT SHOULD BE SHUT DOWN FOR IMMEDIATE BRAKE REPAIR.

If hydraulic pressure builds and fails to release - a brake ‘lock-up’ - either the hydraulic by-pass port is blocked by dirt or corrosion or a swollen primary cup has extended over it. A swollen cup indicates improper or contaminated fluid.

Poor brake operation may also be caused by air trapped in the master cylinder and must be bled from the system.

Other points to check when a problem occurs at the master cylinder:

- Low fluid level-below reservoir ports.

- Blocked filler cap vent which produces a vacuum causing air to be sucked past the piston secondary cup.

- A worn or pitted secondary cup.

- A residual valve (check valve) that either fails to retain residual pressure in the brake system or doesn't release pressure due to blockage by dirt or contamination.

For service or maintenance of the power cluster, it is recommended that it be removed from the unit. Proceed to Removal-Assembly-Disassembly-Reassembly.

Maintenance Of The Power Cluster

AT LUBE OR OIL CHANGE

Clean dirt from the filler cap area. Remove cap and fill reservoir to within 1/2" of top.

WARNING: Protect eyes from fluid.

AT BRAKE ADJUSTMENT/INSPECTION

Check cylinder shell for dents and leaks and hose or pipe connections for leaks and wear. Check cylinder linkages for wear, binding, and alignment balance on left and right hand brakes: lubricate.

Check hydraulic cylinder for internal pressure leak and check the amount of piston travel indicated by the stroke indicator rod.

NOTE: Brake lining clearing adjustment is required when the stroke of the indicator rod approaches 2" to 2 1/4".

AT BRAKE RELINING

A teardown inspection of the air power cylinder and a complete inspection of the master cylinder and brake line connections is recommended. A new piston cup or repair kit should be installed in the air cylinder at this time.

REMOVAL:

1. Block wheels securely. Move rear coupler to extreme left or front coupler to extreme right to facilitate access to the power cluster.

2. Disconnect brake tubing lines, hoses and air hose at power cluster. Mark for reattachment; protect from contamination while disconnected.

3. Remove capscrews mounting power cluster to rear of coupler beam.

4. Remove power cluster.

ASSEMBLY

1. Assembly is the reverse of the above procedure.

   NOTE: Bleed brake system when reinstalling power cluster.

Disassembly Of Power Cluster

POWER CYLINDER DISASSEMBLY

1. Remove bolts fastening power cluster to mounting bracket.

2. Remove eight capscrews attaching cylinder shell to head and slide shell from head and piston.

3. Pull piston, spring, boot from head.

4. Replace or repair as necessary.

POWER CYLINDER REASSEMBLY

NOTE: Before reassembling, lubricate the shell interior and saturate the piston cup and air cylinder wiper with a light engine oil.

1. Install boot in piston groove.

2. Align piston and spring with head and compress them in order to snap boot into the groove on the head.

3. Install shell over piston and head by passing a small drift through the shell air inlet in order to hold the spring compression while guiding the shell over the piston and head. Fasten shell to head with eight capscrews.

4. Reattach power cylinder assembly to bracket with mounting bolts and piston stroke indicator rod bolt.

MASTER CYLINDER DISASSEMBLY

1. Remove power cylinder from mounting bracket. Reference preceeding Power Cylinder Removal.

2. Pick lock ring from the groove in the end of the hydraulic cylinder bore.

3. Remove internal parts. Inspect and replace as necessary.

   note assembly of internal components for reinstallment.

NOTE: Do not overlook the check valve in the end of the bore.

MASTER CYLINDER ASSEMBLY

NOTE: Before reassembly, lubricate cylinder bore and internal components with brake fluid.

1. Reassembly is the reverse of the above procedure. Be sure that lock ring is fully seated in groove and that the piston returns against the stop plate.

Air Application Valve - Treadle (Floor Mtg.)

RAILWHEEL BRAKES

REMOVAL

Reference section 4551 of parts manual.

1. Exhaust reservoir tank of compressed air.

CAUTION: Protect eyes and body from compressed air blast.

2. Remove tubings connected to valve. Plug tubing and open valve ports to prevent contamination. Mark tubing for reattachment.

3. Remove 3 capscrews holding valve to floorboard.

4. Valve may be removed for further disassembly or replacement.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

Air Application Valve Treadle (Console)

REMOVAL

1. Exhaust reservoir tank of compressed air.

CAUTION: Protect eyes and body from compressed air blast.

2. Disconnect pin at valve aim.

3. Remove tubings connected to valve. Plug tubing and open valve ports to prevent contamination. Mark tubing for reattachment.

4. Remove capscrews holding valve to console.

5. Valve may now be removed for further disassembly or replacement.

ASSEMBLY

1. Assembly is the reverse of the above procedure.

How The Valves Work

The Dual (Tandem) type DA application valve provides the means to “split” an air system into two isolated, fully controllable sections. The valve is designed so that metering control and resulting “feel” remain with the operator even in event of failure of one section of the total system.

The valve has separate “Primary” and “Secondary” sections which operate in tandem. These sections are connected only by a push rod having no function in normal operation, installed in sliding fit between the two reaction pistons, and by a by-pass air passage between the primary delivery chamber and the secondary piston cavity.

Controlling force applied against the spring retainer is transferred to the metering spring which in turn strokes the primary reaction piston against its return spring. During this stroke, the piston picks up a spring loaded inlet-exhaust valve poppet. The exhaust port chamber is sealed off as the piston meets the poppet and the continuing stroke then depresses the poppet, permitting compressed air to flow into the primary delivery port chamber and application system. In a synchronized simultaneous action, the buildup of primary delivery pressure by-passes through the air passage into the secondary reaction piston cavity and forces this piston to stroke. The piston picks up the secondary inlet-exhaust valve poppet, closing its exhaust and opening its inlet in the same manner, and pressure from the secondary reservoir passes the valve and flows through delivery lines. Braking pressure beneath the reaction pistons force them to lap. The primary piston, compressing the metering spring to balance between forces, assumes a position which permits its spring loaded poppet valve to seat the inlet while holding the exhaust closed. The secondary reaction piston comes to a balance between two opposed air pressures, permitting its inlet-exhaust valve poppet to seal in the same manner. The unit now remains poised in holding position until a change in controlling force unbalances it, either to admit increased air pressure or to exhaust the sectionalized system.

System Section Failures - Air loss failure is limited to one section of the system. Should the secondary section fail, the primary section continues to meter air pressure. In the event the primary section fails, controlling force passes through the primary piston and loosely fitted push rod to the secondary reaction piston. By this means the secondary piston now laps to a balance against the metering spring and continues to provide metered air pressure.

Servicing The Valve

Normal operating sequences test the type DA application valve.

Should an internal leak develop, it can be detected at its primary or secondary section exhaust port and it must not be confused with normal exhaust. A leak, while brakes are released, indicates a valve poppet is not sealing its inlet while applied, the poppet is not sealing the exhaust. Nominal leakage (slow bubbling when covered with suds) has little consequence. Should pedal feel seem eratically light, then suddenly heavy and severe acting, the large O-ring on the primary reaction piston may be leaking.

The primary inlet-exhaust valve and secondary reaction piston can be reached by removing piping interference and taking out the four capscrews (1/4" - 20 x 7/8") and separating the upper from the lower valve body. The secondary inlet-exhaust valve can be inspected by removing the retaining ring and shield at the bottom of the valve. Guide seal friction tends to hold the parts assembled. However, the spring will gradually force the parts out.

The primary reaction piston can be inspected by removing the spring retainer from the top of the valve. On the treadle model, separate the body from the mounting flange by removing the three screws (3/8" - 16 x 1" flat hd), pull the treadle fulcrum pin and lift off the treadle in order to reach one mounting screw.

Should the operation of the valve become slow or hesitant after prolonged service, it would be good preventive maintenance to dismantle and clean the unit. When reassembling the valve, it is advisable to replace all rubber parts. Then cover bearing surfaces with a thin film of grease. The use of a repair kit is recommended, as it contains all of the parts necessary for complete reconditioning.

Adjustment Of Operating Linkage

Linkage is adjusted correctly in full released position with the primary reaction piston against its stop when the valve plunger had little or no lash. On the treadle model, the treaded stop and jam nut provide means for adjustment.

NOTE: Air line pressure should be set at 85 psi maximum. Insert gauge at port provided in regulator valve located on the main reservoir’s primary and secondary tanks.

DISASSEMBLY AND REASSEMBLY

Maintenance and seal kits are available for both the floor and console-mounted brake treadle valves. Reference section 4551 for the floor-mounted brake treadle valve and the console-mounted brake treadle valve.

CHAPTER 05
Cab And Deck Assembly

Right Hand Deck And Hand Rail Assembly

1. Remove hood (see Hood Assembly, Chapter 12).
2. Remove air reservoirs.
3. Remove hoses mounted beneath deck.
4. Remove 10 mounting capscrews and remove deck with overhead lift.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

Left Hand Deck And Rail Assembly

REMOVAL:

1. Remove hood (see Hood Assembly, Chapter 12).
2. Disconnect electrical lines running beneath deck at their termination points - mark for reattachment.
3. Remove 10 mounting capscrews and remove deck with overhead lift.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

Cab

REMOVAL:

1. Remove exhaust system (see Exhaust System, Chapter 10).
2. Drain hydraulic tank and disconnect all hydraulic hoses - mark for reattachment.
3. Disconnect transmission/torque converter fill tube and dipstick tube and remove.
4. Remove fuel tank (see Fuel Tank, Chapter 11).
5. Remove foot brake treadle valve, remote transmission filter - mark for reattachment.
6. Disconnect all hoses, air lines, and electrical lines mounted on or in cab at their termination points as they are to be removed with cab - mark for reattachment.

7. Remove sixteen capscrews securing cab to front and center support channels.

8. Insert lifting chain through eyelets on top of cab and lift cab from supports with an overhead crane or other lifting device.

ASSEMBLY:

1. Assembly of the cab to the front and center channel assemblies is the reverse of the above procedure.

NOTE: Tighten capscrew to compress pads to 1/4" thickness.

Front Channel Support Assembly

Removal:

1. Remove Cab.

2. Remove slide channels.

3. Disconnect sand tubes and air lines from ejector valves. Disconnect wires and mark for reattachment.

4. Remove capscrews mounting channel to frame and remove channel with a lifting device.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

DISASSEMBLY:

1. Remove capscrews securing sand boxes to channel and remove sander box.

REASSEMBLY:

1. Reassembly is the reverse of the above procedure.

3 Piece Center Channel Support Assembly

NOTE: Center Channel may be removed as a complete assembly or either of the three sections can be removed separately.

Left Hand Section (Drivers Side of Unit)

REMOVAL:

1. Remove the capscrews securing the two side panels to the channel.

2. Remove the capscrews securing the cab to the channel section and loosen the capscrews securing the cab to the other two sections.

3. Remove solenoid valves mounting brackets from the channel.

4. Lift and secure cab approximately 1/4".

5. Remove the capscrews securing the left section to the center section.

6. Remove the capscrews securing the left section to the frame.

CAUTION: Some type of support must be used before completing step 7 as this will completely free the channel.

7. Remove the capscrews securing the left deck and handrail assembly to the left channel.

8. Remove channel section.

ASSEMBLY:

Assembly is the reverse of the above procedure.

Center Section

REMOVAL:

1. Remove the capscrews securing the cab to the center section and loosen the capscrews securing the cab to the other two sections.

2. Lift and secure the cab approximately 1/4".

CAUTION: Some types of support must be used before completing step 3, as this will completely free the channel section.

3. Remove the capscrews securing the center section to the left and right section.

4. Remove the channel section.

ASSEMBLY:

Assembly is the reverse of the above procedure.

Right Hand Section (Passenger Side)

REMOVAL:

1. Remove the capscrews securing the cab to the right hand section and loosen the capscrews securing the cab to the other two sections.

2. Remove the air reservoir from the channel.

CAUTION: Be sure engine and radiator is cool and remove the radiator cap to relieve pressure before completing step 3.

3. Remove heater hoses and plug hoses and fittings.

4. Lift and support the cab approximately 1/4".

5. Remove the capscrews securing the two side panels to the channel section.

6. Remove the capscrews securing the right section to the center section and the capscrews securing the right section to the frame.

CAUTION: Some type of support must be used before completing step 7 as this will completely free the channel.

7. Remove the capscrews securing the right section to the deck and handrail assembly.

8. Remove the channel section.

ASSEMBLY:

Assembly is the reverse of the above procedure.

Rear Channel Support & Grill Assembly

REMOVAL:

1. Remove hood (see Hood Assembly, Chapter 12).

2. Remove top radiator supports.

3. Remove hydraulic cooler (see Cooling Systems, Chapter 06).

4. Disconnect sander tubes and air lines at sand ejector valves. Disconnect wires and mark for reattachment.

5. Remove right and lefthand deck and handrail assemblies.

6. Remove rear steps and sand box assemblies left hand and right hand.

7. Remove capscrews securing channel support and grill assembly to frame and remove with an overhead lifting device.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

CHAPTER 06
Cooling Systems

RADIATOR

The heavy duty radiator with its bottom tank mounted cooler provides cooling for the engine and transmission/torque converter.

REMOVAL:

1. Drain Cooling System.
2. Remove radiator hoses and converter cooling hoses. Plug converter cooling hoses.
3. Remove hydrostatic cooler (See Hydrostatic Cooler).
4. Remove bottom bolts holding radiator to frame.
5. Move radiator forward to obtain shroud-to-fan clearance. Radiator may now be removed from unit.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

HYDROSTATIC COOLER:

The air to oil hydrostatic cooler is located in front of the radiator and provides cooling for the hydrostatic system.

REMOVAL:

1. Disconnect and plug cooling lines at the cooler.
2. Remove top radiator support brackets.
3. Remove four (4) capscrews, nuts and clamps.
4. Remove cooler assembly from unit.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

NOTE: Install cooler with check valve arrow pointing toward bottom part.

Trouble Shooting The Cooling System

The cooling system can be visually checked at the following points for causes of overheating:

1. Check for a clogged radiator, low coolant level and low engine RPM. Check coolant level when system is cool.

2. Check for coolant leaks or steam exiting the overflow tube when the engine is stopped.

3. Check the accuracy of the water temperature gauge with a replacement gauge or a coolant thermometer.

4. Check for a restriction of air flow in the radiator cores, i.e. dirt or debris.

5. Check the radiator fins for damage (bent) or leaks. If the unit is equipped with shutters, check to be sure that the shutters are not continuously closed.

6. Check engine stall speed.

7. Check for loose, worn, or slipping fan belts. Fan belts in this condition cause the engine to overheat because of slower fan speed. Also check for worn pulleys or oil/grease on the belts or pulleys.

   NOTE: Replace belts in sets since new belts stretch after a few days of operation. And readjustment will be necessary.

8. If the unit is equipped with shrouds, make sure it is installed correctly. The shroud must be near the fan blade tips to prevent air recirculation around the ends of the fan.

9. Check the condition of the hoses. A collapsed hose indicates that the water pump cannot pump enough coolant because of a radiator restriction. Also check for leaks around the water pump.

Trouble Shooting Chart

PROBLEM	CAUSE
1) Low coolant level	A. External leaks caused by loose hose connections, or defective radiator cap. B. Internal leaks caused by cracked cylinder head, cracked cylinder block, loose cylinder heads, damaged cooler core, damaged after-cooler, damaged gaskets.
2) Restricted air flow through radiator.	A. Plugged radiator core. B. Damaged or bent radiator fins. C. Low fan speed because of low engine high idle speed. D. Fan is damaged or installed backwards.

			NOTE: Pusher style fan on diesel engines.
		E.	Loose or worn fan belts and pulleys; oil or grease on belts and pulleys.
		F.	Damaged fan shroud.
		G.	Incorrect fan blade position. (Fan projection out of the shroud must be approximately 50°b).
		H.	Excessive fan tip to shroud clearance. Should be .38" maximum clearance.
		I.	Closed shutter (if equipped).
3)	Insufficient cooling system pressure	A.	Defective radiator cap gasket.
		B.	Leaky top tank neck.
4)	Coolant overflow	A.	Air in cooling system because of incorrect cooling system fill. (See cooling system fill).
		B.	Combustion gases in cooling system from loose cylinder head, crack in cylinder head, loose or defective precombustion chamber, defective cylinder head gasket, worn cylinder liner counter-bore.
		C.	Steam in cooling system because of engine torque converter overload or low coolant level.
5)	Insufficient coolant flow	A.	Low stall speed.
		B.	Loose water pump impeller.
		C.	Radiator plugged on inside.
6)	Low heat transfer	A.	Hot air for radiator caused by overheating hydraulic oil cooler. Check for a leaky piston in the hydraulic cylinders or a relief valve set too low (check by raising pump pressure and taking system pressure reading.)
		B.	Scale on cylinder liners or cylinder head.
7)	Exhaust restriction	A.	Plugged air cleaner.
		B.	Restriction in exhaust pipes.
		C.	Water in muffler.
		D.	Loose baffle in muffler.

Filling The Cooling System

1. Select the correct mixture of water and antifreeze required to protect the cooling system from exposure to the temperature extremes prevalent in the work and storage area. System capacity is 10 gallons.

   NOTE: Check water for high mineral content. Contact your local city Water Department or an agricultural agent for water analysis. Add corrosion inhibitors as necessary to protect the system.

2. Close all drain plugs and be sure all hoses are properly attached to prevent leakage.

3. In order to prevent the development of air pockets in the cooling system, fill the system slowly at a rate of no more than 5 gallons (19 liters) per minute.

4. After filling the radiator, run the engine for several minutes without the radiator cap. After several minutes, install the radiator cap and allow the coolant to warm up with the engine at idle.

5. Check the coolant level in the top tank. Add additional correct coolant mixture if necessary. Also check for leaks at this time.

WARNING: Make all system checks when engine is cool to prevent personal injury through contact with
hot coolant.

CHAPTER 07

Front & Rear Coupler & Coupler Carrier

Reference Section 4517 of Parts Manual.

COUPLER - REMOVAL

1. Place bar through 1 1/2" diameter holes in carrier to serve as stop.

2. Lower coupler cylinder to full “down” position so that coupler is resting securely against the bar.

3. With ignition switch “ON” move control switch back and forth to relieve pressure.

4. Remove pin and cotters holding traversing cylinder to coupler.

5. Remove coupler retainer bar.

6. Attach chain or cable around bar inserted for coupler support and pivot coupler and carriage assembly outward from bottom. Support assembly in this position for coupler-to-gearcase clearance.

7. Disconnect air hose to knuckle release cylinder.

8. Remove roll pin, cylinder rod nut, and bushing retainer. This frees cylinder from coupler assembly.

   NOTE: Be sure that roll pin is not driven all the way through nut - only enough to clear coupler cylinder rod.

9. With chain or cable around coupler, remove bar inserted in point 1 and lower coupler (slide) from bottom of carrier.

CARRIER-REMOVAL:

1. Remove lift cylinder as described in Hydraulics, Chapter 13.

2. Disconnect hoses to traversing cylinder. Plug hoses and cylinder parts. Mark for reattach ment. Remove pin and cotters and attaching traversing cylinder to coupler and remove cylinder.

3. Disconnect air hose to knuckle.

4. Screw eyelets in lift cylinder mounting holes and attach chain or cable.

5. Remove snap ring retainers holding two rear upper rollers and remove retaining bar on bottom of coupler behind beam.

6. Remove shafts and rollers.

7. Lift carrier slightly and pivot outward from bottom. Carrier can now be lowered to floor or working area.

ASSEMBLY:

1. Assembly is the reverse of above procedure.

COUPLER DISASSEMBLY:

1. With coupler knuckle in “OPEN” position, remove capscrew and keeper plate holding the knuckle pin in position.

   NOTE: Pin is under tension from torsion spring at bottom. Remove carefully.

2. Remove knuckle pin by lifting from top side.

3. Remove knuckle.

4. Depress plunger and remove capscrews and front keeper plate.

5. Remove air cylinder mounting nut.

6. Slowly remove plunger and spring.

7. Remove capscrews and rear keeper plate.

8. Unscrew air cylinder from keeper plate.

9. Remove capscrews and backing plate.

10. Remove bumper retainers and bumper rings.

11. Remove lockwasher and locknut from shafts and slide off rollers.

REASSEMBLY:

1. Reassembly is the reverse of above procedure.

   NOTE: Be sure to turn knuckle pin counterclockwise about 1/2 to 3/4 turn and make certain the keeper plate fits in the slot in the knuckle pin.

CHAPTER 08

Electrical System

Reference Section 4516 of Parts Manual.

The 12 volt, negative ground electrical system receives its initial current from two 12 volt batteries located next to the engine on the left side main frame member.

The batteries are rated at 110 reserve capacity (minutes), 525 cranking performance (amps) at 0 degrees F. They are charged by a standard 65 Amp alternator with a built-in regulator. A 105 Amp alternator/ regulator is optional.

The electrical system itself is composed of five (5) wiring harnesses. These are the front main harness, rear main harness, 2 crossover harnesses and a jumper harness.

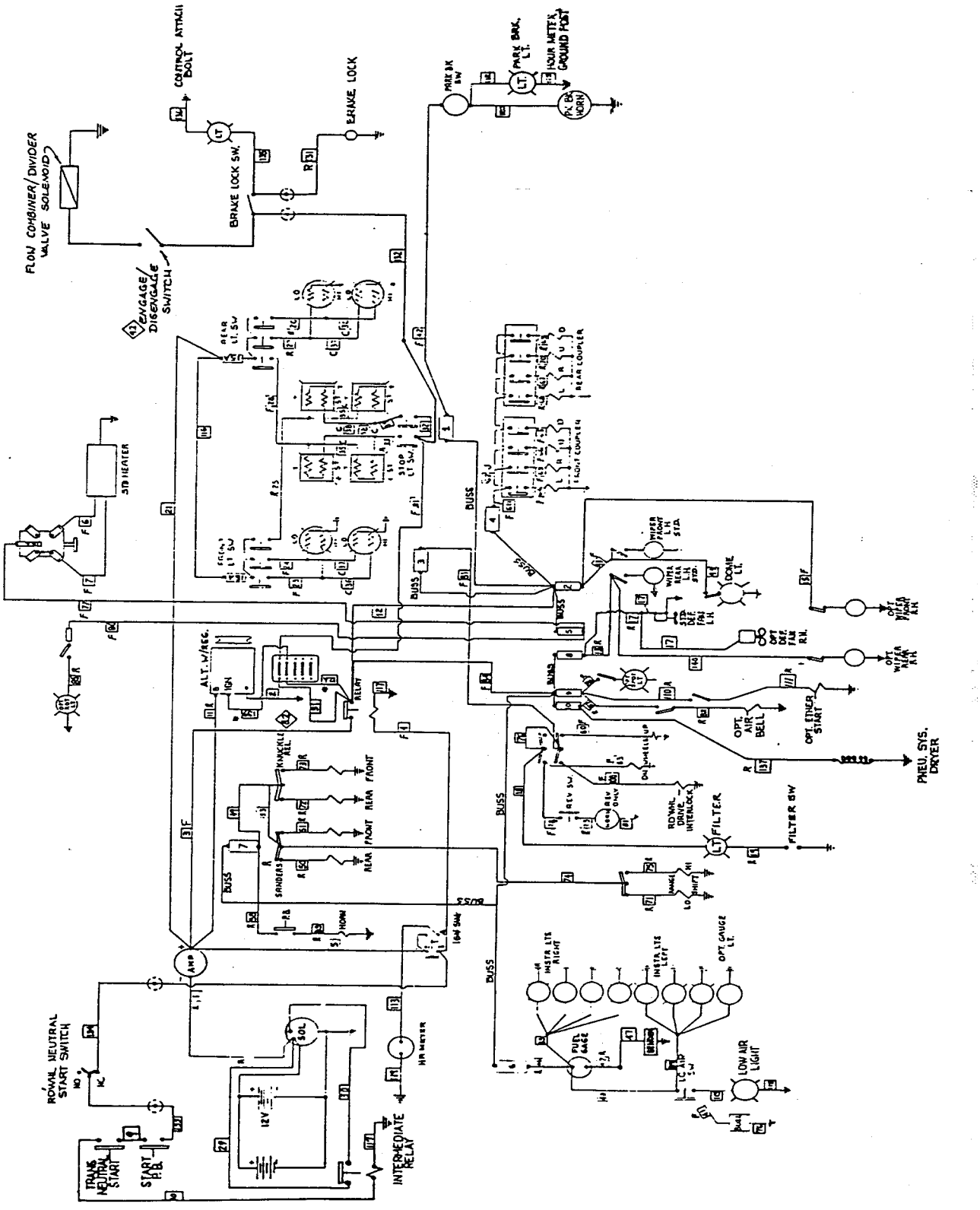
NOTE: Wires on electrical illustrations are numbered according to their connections.

The crossover harnesses are located on the front and rear of the unit in the support channels and provide electrical current between the terminal blocks for the left and right hand headlights, stop and tail light and rail light on each end of the unit.

The jumper harness is located in the console and is essentially a hot lead connecting the front and rear coupler joystick switches.

NOTE: The electrical system and filters for the hydraulic and hydrostatic systems through indicator lights on the instrument console. When the light monitoring parking brake is illuminated, it indicates that the parking brake is applied. The indicator light for the air system becomes illuminated when the air pressure is low in the reservoir(s) - less than 60 psi. The filter change lights are activated by pressure switches which sense 80% bypass pressure in the filters and thus signal the resulting need for replacement.

4500TM ELECTRICAL SCHEMATIC
Sundstrand Hydrostatic System



CHAPTER 09

Engine/Transmission Torque Converter

Engine, Transmission/Torque Converter

Because of the extensive amount of work required to remove these assemblies from the TRACKMOBILE it is advisable for any problem to be diagnosed correctly before proceeding with the removal. Refer to the manufacturer's manuals, furnished separately from this manual, for trouble shooting procedures. Internal assembly and disassembly will not be covered in this manual but are covered by the separate manuals. This section will cover only removal of the whole assemblies from the TRACKMOBILE.

Engine

REMOVAL:

1. Position unit under a crane or in an area where a heavy lifting device is available.

2. Disconnect exhaust system from exhaust cab mount (Reference Exhaust System, Chapter 10).

3. Drain and remove hydraulic tank (see Hydraulic System, Chapter 13).

4. Remove air compressors (See Air Compressor, Chapter 01).

5. Remove radiator and hydraulic cooler (See Cooling System, Chapter 06).

6. Disconnect all wiring, hoses and air throttle linkage. Mark for reattachment.

7. Attach chains from overhead lifting device to engine's lifting mounts and snug up.

8. Support torque converter from beneath the unit.

9. Remove front engine mount-to-frame bolts.

10. Remove engine to transmission mounting bolts and lift engine from engine compartment.

ASSEMBLY:

1. Assembly is the reverse of the above procedure. Tighten front engine-to-frame mounting bolts to compress isomode mounting pads to 1/4" thickness.

DISASSEMBLY AND REASSEMBLY:

1. Refer to the manufacturer's manual for engine disassembly instructions.

Transmission/Torque Converter

The transmission is a constant mesh spur gearing design with an air actuated dual range (high to low) controlled by a console mounted switch. It has three speeds forward and reverse that, when combined with the dual range, provides six speeds forward and reverse.

The engine and transmission must be removed as an assembly when transmission maintenance is required.

REMOVAL:

1. Position unit under a crane or in an area where a heavy lifting device is available.

2. Drain and remove hydraulic tank and disconnect hoses at tank. Plug hoses to prevent contamination and mark for reattachment.

3. Remove radiator and hydrostatic cooler (See Cooling System, Chapter 06).

4. Disconnect transmission/Torque converter dipstick tube and fill tube.

5. Disconnect exhaust system from exhaust cab mounts (Reference Exhaust System, Chapter 10).

6. Disconnect all wiring, hoses, and pneumatic and cable throttle linkage from engine - mark for reattachment.

7. Remove batteries, cables and battery tray.

8. Disconnect all hoses attached to the hydrostatic pump/piggy back hydraulic pump and transmission charging pump at the pumps and mark for reattachment. Plug hoses to prevent contamination. Use access door in cab floor for easier accessibility.

9. Remove center section of 3 piece channel.

10. Disconnect front and rear universal joint assemblies from transmission dropcase.

11. Attach lifting device to engine and transmission assembly - snug up.

12. Remove engine and transmission mounting bolts and lift assembly from frame.

13. Remove hydrostatic pump/hydraulic piggy back pump assemblies from torque converter. Place in protected storage area which is free of contamination.

14. Separate engine and transmission/torque converter assemblies.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

NOTE: When installing new ring gear, torque capscrews 30-33 ft-lbs. and lock wire in place.

DISASSEMBLY & REASSEMBLY:

Refer to the manufacturer's transmission/torque converter manual for disassembly instructions.

20 GPM Charging Pump

Reference Section 4511 of Parts Manual.

REMOVAL:

1. Remove access plate in cab floor.

2. Disconnect remote filter hoses at charging pump and console pressure gauge line. Plug hoses to prevent contamination and mark for reattachment.

3. Remove charging pump to regulating valve stud nuts.

4. Remove pump.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

DISASSEMBLY & REASSEMBLY:

1. Pump is not broken down into service parts. Pump shaft seals, pump drive shaft seal and charging pump-to-pressure regulator gasket may be replaced at this time.

Pressure Regulator

REMOVAL:

1. Remove charging pump assembly as directed in transmission manual.

2. Remove pressure regulator from charging pump.

ASSEMBLY:

1. Assembly is the reverse of the above procedures.

Control Valve

Reference Section 4511 of Parts Manual

REMOVAL:

1. Disconnect transmission shifting linkage and neutral start switch wires - mark for reattachment.

2. Remove transmission control cable hanger from control valve.

3. Remove control valve bolts and washers.

4. Remove control valve. Use caution as not to lose detent springs and balls.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

DISASSEMBLY & REASSEMBLY:

1. Consult transmission manufacturer’s manual for further service and maintenance procedures.

Shift Control Assembly - High & Low Range

The High & Low Range Shift Control Assembly is operated by a small pneumatic cylinder mounted on the back of the transmission mounting plate. The solenoids actuating the high and low range are located on the left hand side of the center support channel and are in the same bank as the front and rear knuckle release solenoids.

REMOVAL:

1. Relieve pressure in air system.

2. Disconnect air lines - mark for reattachment.

3. Remove air cylinder, air cylinder mounting plate, and spacer.

4. High and low range shift control assembly is now accessible - consult transmission manufacturer’s manual for removal and further disassembly.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

CHAPTER 10

Exhaust System

Reference Section 4508 of Parts Manual.

REMOVAL:

WARNING: Maintenance of the exhaust system should only be attempted when exhaust assemblies are cool in order to avoid injury from contact with hot exhaust tubes.

1. Remove top clamp on flexible exhaust tubing.

2. Remove U-clamp attaching muffler and exhaust pipe to bracket at top of cab.

3. Remove exhaust pipe and muffler from cab and flexible tubing junction by removing mounting and capscrews.

4. Remove bottom clamp and remove flexible exhaust tubing.

5. Unscrew exhaust extension pipe and remove.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

CHAPTER 11

Fuel Tank

Reference Section 4510 of parts manual

REMOVAL:

DANGER - FIRE HAZARD - Use extreme caution when handling diesel fuel.

1. Raise unit on its roadwheels and block securely under frame. Remove left front roadwheel (see Roadwheel Tires, Chapter 20, for removal instructions).

2. Remove pipe plug from bottom of tank and completely drain fuel.

3. Disconnect fuel lines at tank. Mark for reattachment.

4. Disconnect wire from fuel gauge tank unit - mark for reattachment.

5. Disconnect pressure hose running to power steering unit at the hydraulic pump tee and remove from beneath tank. Plug to prevent contamination.

6. Disconnect air line from foot air treadle valve and remove from beneath tank. Plug port in Air Treadle Valve.

7. Support tank while removing flexloc nuts from U-clamps.

8. Lower tank and move toward rear of unit to obtain filler neck and front channel support clearance. Rotate front of tank (end facing front of unit) to the right or toward the inside of the unit. Remove tank.

9. If fuel sender unit requires replacement, remove five round head screws holding fuel sender in place and remove fuel sender.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

CHAPTER 12

Hood

Reference Section 4519 of the Parts Manual.

REMOVAL:

1. Open hood to its full extent and extend hood hold bars.

2. Support hood with overhead lift.

3. Disconnect hood from spring rod by removing yoke pin at the top of the assemblies.

WARNING: Use care in removing yoke and pin since tension is applied to springs.

4. Remove two mounting bolts from hood pivot point.

5. Remove hood from unit.

ASSEMBLY:

1. Assembly is the reverse of the above process.

CHAPTER 13

Hydraulic System

Reference Section 4515 of Parts Manual

Components, Function and Operation, Maintenance and adjustments
- Hydraulic Pump Description
- Hydraulic Pump Adjustment
- Hydraulic Pump Removal
- Hydraulic Pump Trouble Shooting

Hydraulic Tank Description, Removal and Assembly
Roadwheel Cylinder
- Removal and Assembly
- Disassembly and Reassembly

Coupler Traversing Cylinder
- Removal and Assembly
- Disassembly and Reassembly

Tips on Checking Hydraulic Cylinders for Internal Leakage
A Word About the Hydraulic System
- 450OTM Filter Circuit Description

Solenoid Actuated Directional Control Valve
- Removal and Assembly
- Disassembly and Reassembly

Roadwheel Spool Lock Valve
- Disassembly and Reassembly

Hydraulics

Components, Functions & Operation, Maintenance & Adjustment

The hydraulic system of the TRACKMOBILE is vital to the unit's performance. A thorough knowledge of the system will help assure proper operation. In addition, scheduled and careful maintenance is most important. Adjustments should be attempted only after complete familiarity with the system is acquired.

COMPONENTS:

The hydraulic system is composed of five major assemblies:

1. Hydraulic pump - mounted piggy-back on the hydrostatic pump.

2. Tank Assembly - mounted under hood on cab firewall.

3. Roadwheel, Lift Coupler and Coupler Traversing Cylinder Assemblies.

4. Solenoid Control Valves - located behind front and rear coupler beams.

5. Console - electrical controls to regulate control valve (solenoid) operations.

Flexible hydraulic hose assemblies interconnect the system. Reference Hydrostatic & Hydraulic Schematic.

FUNCTION & OPERATION:

The most important function of the hydraulic system is to raise the TRACKMOBILE coupler so that when coupled to a car, a portion of the railroad car's weight is transferred to the TRACKMOBILE to increase its tractive effort**.** When coupled to a heavily loaded car, the tractive effort is 30,000 lbs. when single coupled and 45,000 lbs. when double coupled.

The second function is to raise and support the unit on its rubber-tired wheels for hydrostatically driven off-track transportation between car moving jobs or to the maintenance area.

The third function is to retract the roadwheels when the unit operates on rail. Both the second and third functions are controlled by a console mounted toggle switch.

An important advantage of the hydraulic system is its constant pressure feature. This prevents settling of the unit or coupler. When the unit is coupled to a railroad car, the constant pressure feature automatically compensates for any minor track height variations and thus provides maximum possible traction and braking ability.

The flow created by the variable displacement pump produces the constant pressure feature. With the TRACKMOBILE engine running, the variable displacement, pressure compensated pump will maintain a pressure in the system of 1600 to 1650 psi.

Hydraulic control of the couplers is achieved through "joy stick" type switches mounted on the rotating console. These switches actuate solenoid valves which control coupler lifting/lowering and traversing movements. The coupler release operation is provided for by a toggle switch which actuates solenoid valves on the left hand side of the middle cab support channel. These solenoids direct air to the air cylinder(s) on the coupler(s). Each coupler has individual controls. The "joy stick" switch has a spring return to the center in its traversing position. Thus, if the switch is held in operating position, the hydraulic cylinder will continue to function until the stroke is complete. The "joy stick" switch has a detent in the coupler lifting/lowering position. If the switch is returned to the center at any time, the cylinder stops and is held until the "joy stick" is again moved. The "closed center" type valve in the hydraulic lift circuit prevents the return of oil to the tank until the switch is again energized and moved. This is particularly important in maintaining coupler vertical position under load. The traversing circuit cannot, by necessity, have a closed center type control valve. Therefore, the cylinder is open to the tank when the switch is in the centered position. In effect the coupler must be free to operate in a back and forth motion as the TRACKMOBILE moves through curves, switches, etc., without hydraulic restriction.

To protect the system, a factory present relief valve is built into the rear solenoid control valve. It prevents overloading the system by bypassing oil back to the tank whenever the system pressure rises above the 2200 psi factory present relief pressure. Reference Two Spool Solenoid Actuated Directional Control Valve.

MAINTENANCE

The capacity of the hydraulic system is about 22 gallons. When properly filled and with all cylinders retracted, the oil level in the tank should be at or near the full mark on the hydraulic tank dipstick.

To fill the system, first fill the tank with the engine off: then start the engine and extend and retract all cylinders repeatedly while still pouring oil until oil stays at the proper tank level with all cylinders retracted.

NOTE: When filling system or adding oil, use HYDRAULIC OIL - TYPE C-310W.

Type C-3 10W oil will give the benefit of rust and oxidation inhibition to the TRACKMOBILE'S hydraulic system. Furthermore, in most cases the use of this oil eliminates the need for seasonal oil changes - this oil is made to perform well over a wide range of temperature conditions - from +150F to -10F.

Inspect the hydraulic system frequently. Check oil level daily and rinse the hydraulic breather cap filter in kerosene. Check for leaks, tighten connections and mountings. Change oil and remove and clean or replace the oil filter mounted on the reservoir tank every 1,000 hours or when the rotating console filter changer indicator light becomes illuminated. Check thoroughly for worn or damaged parts.

ADJUSTMENTS:

The pump pressure and relief valve pressure settings are critical to the proper function of the hydraulic system.

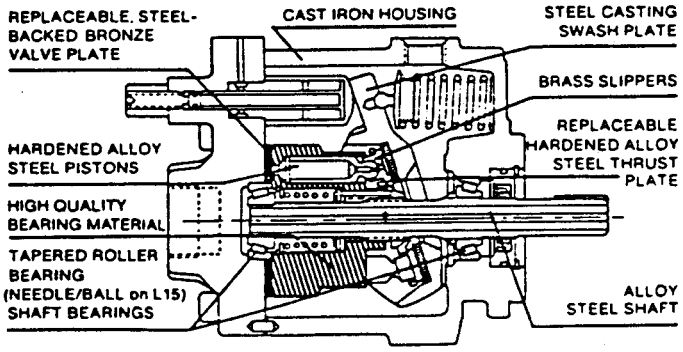
The system pressure for the unit is 1600 - 1650 psi. This is adjusted at the hydraulic pump pressure compensator.

Use a good quality hydraulic pressure gauge that has been recently calibrated and is known to be precise. The gauge should have a maximum pressure reading of approximately twice the desired system pressure. This assures two things:

1. The gauge will not be damaged by moderated accidental high pressure.
2. The gauge will be used in the middle one-quarter of its total range which is its most precise calibration range.

NOTE: The following recommendations are offered to assure safe, precise adjustment and maintenance of the hydraulic system and therefore its trouble-free operation.

1. When a gauge hose is used, it should be capable of withstanding 3-4 times the normal pressure setting.



WARNING: Wear safety glasses to avoid eye injury from pin hole high pressure leaks.

2. When disconnecting hoses from components, ALWAYS plug hoses and the components open ports. CLEANLINESS IS ESSENTIAL to the correct operation of the hydraulic system.

3. Acquaint yourself with the system and location of components.

4. Operate the unit and note any abnormal noises, smells, or operation actions.

5. Check for leaks at loose fittings or defective hoses. Check condition of oil and filters.

6. List possible causes of failure and evaluate them. Test your conclusions.

7. Follow the recommended maintenance procedures presented in the “Operator’s and Preventive Maintenance” Manual. A properly maintained machine will save money in regards to repairs and downtime.

Hydraulic Pump

DESCRIPTION:

The heart of the hydraulic system is the hydraulic pump. It converts the mechanical energy that drives it into fluid energy applied in the hydraulic system. The fluid energy is harnessed by the system’s components and is used to
do work, which in this case is mainly raising and lowering the TRACKMOBILE and lifting railcars to take weight transfer. Power steering, coupler traversing, and rail parking brake release are also possible through the hydraulic system function.

The pump used on the unit is a variable displacement pressure compensated pump. By adjusting the pump, the pressure flow and power in the hydraulic system are affected. Contrary to a popular misconception, the pump does not create pressure; it creates fluid flow. Pressure occurs as the result of the hydraulic system’s resistance to flow. This resistance is created by work being attempted or by the internal components in the hydraulic system such as hoses, elbows, valves, cylinders, etc.

Figure 13.02 illustrates the various component parts of the pump. Following is a brief explanation of these components.

PUMP HOUSING: The corrosion resistant housing is one piece cast iron. The cylinder barrel rotates in the housing on a hydrodynamic or moving film of oil - no barrel bearings are required.

CYLINDER BARREL: The cylinder barrel has a built-in centrifugal pumping element which gives the pump a self-priming feature. Essentially this amounts to a built-in supercharger. The cylinder barrel rotates in the direction of and as the drive shaft turns.

DRIVE SHAFT: In order to protect the pump from external contamination, the bearing on the drive shaft is sealed.

PISTONS: The pistons reciprocated, move inward and outward, in the cylinder barrel as it rotates. They move in a parallel manner to the drive shaft. The pump is designed so that each piston is retracted or drawn inward as it passes the inlet port on the port plate. This increases the volume or displacement capability of the piston permitting hydraulic fluid to flow in through the inlet port into the "pumping chamber." The pistons then extend or move outward as they approach the outlet port of the port plate. This decreases the volume in the piston forcing the fluid out of the piston through the outlet port.

SWASH PLATE: The swash plate controls the extend of the pistons retraction and extension and therefore fluid displacement of the pump according to its angle of position within the pump. These pistons are grouped within the shoe plate and their shoes or slippers are supported hydrodynamically on the swash plate.

The rotating cylinder barrel, driven by the pump drive shaft, moves the pistons in a circular path against the swash plate. When the swash plate is in a vertical position, perpendicular to the centerline of the piston barrel and pump drive shaft, there is no piston stroke and consequently no fluid displacement. When the swash plate angle is increased the pistons' extension and retraction travel is increased, which directly increases their fluid displacement. Simply the greater the angle of the swash plate, the greater the piston stroke and fluid displacement. Reference Figures 13.03 and 13.04.

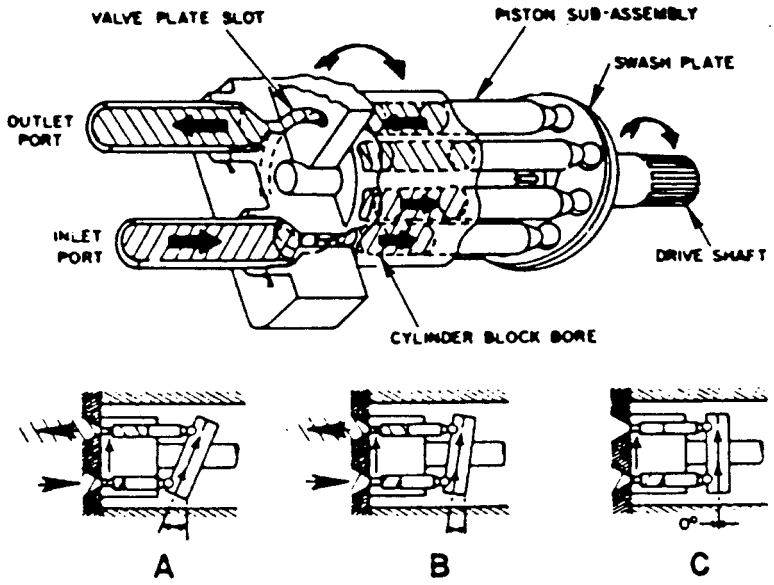
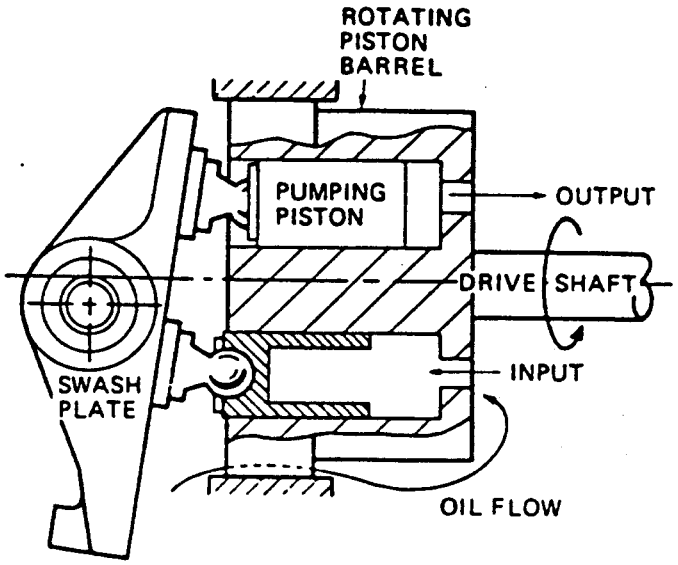


Fig. 13.03 - In-line axis piston pump. A. Maximum swash plate angle for maximum displacement. B. Decreased swash plate angle for partial displacement. C. Zero swash plate angle for zero displacement.

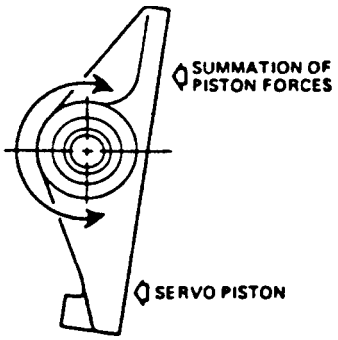


PUMPING ACTION
FIG. 13.04

SHOE PLATE: This plate restrains the piston shoes/slippers as they are hydrodynamically supported by the swash plate.

PORT PLATE: The port plate contains two kidney shaped holes. These are the intake and discharge ports. The small round holes at either side of the discharge port allow oil to be released into the port gradually, reducing pump vibration.

CONTROL SPOOL & SERVO/MASTER CONTROL PISTON: The control spool, reacting to pump pressure, system pressure, and the pressure compensator adjustment, regulates the servo/master control piston. The servo/master control piston inturn controls the angle of the swash plate and the resulting fluid displacement of the pump. It works against the offset centerline of the pumping piston assembly whose effective working or summation force tends to destroke the swash plate to a vertical or neutral position (no fluid displacement). In effect, the servo/master control piston balances the swash plate and the pumping piston assembly at the angle required for the desired fluid displacement. Reference Figure 13.06. Working together, the control spool and servo/master control piston react to changes in system pressure demand (load service) and accordingly reduce or increase the pump displacement.



Swash plate & Servo/master Control Piston Balance - Fig. 13.06

HYDRAULIC PUMP ADJUSTMENT:

1. Raise the unit up on its roadwheels and shut the unit down.

2. Remove the rear panel of the rotating console and connect the hydraulic pressure gauge to the quickdisconnect fitting located on the parking brake valve.

3. Start unit and maintain a 3/4 throttle speed through the remainder of the adjustment procedure.

4. Loosen jam nut at pump pressure setting point. Turning the adjusting nut in, or clockwise, will increase pressure; turning the adjusting nut out, or counterclockwise, will decrease pressure.

5. Turn the adjusting nut in, or clockwise, to check the relief setting of 2200 psi. When increasing the pressure, a reading of no higher than 2200 psi should be attained if the relief is correctly set. Contact your authorized TRACKMOBILE distributor if the relief appears to be incorrectly set.

6. After checking the relief, turn the adjusting nut out, or counterclockwise, until a pressure of 1600 - 1650psi is indicated on the test gauge. Tighten the locknut. The system pressure is now set. Remove testgauge and reattach panel to the rotating console.

PRESSURE COMPENSATOR ADJUSTMENT:

The hydraulic system pressure is set at this point. Turning the screw in, or clockwise, increases pressure, whereas turning the screw out, or counterclockwise, decreases system pressure.

NOTE: The pressure compensator adjustment is the only pump adjustment to be made in the field. Other pump adjustments are factory preset and are not field adjustable.

HYDRAULIC PUMP REMOVAL:

1. Shut down engine. Turn ignition switch to “ON” position and move “joy stick” control levers and roadwheels “UP/DOWN” switch to relieve hydraulic pressure.

2. Drain hydraulic tank through drain hose.

3. Remove access plate from cab floor located above the hydrostatic pump/hydraulic pump assembly.

4. Disconnect the suction hose, drain line hose, pressure hose, and power steering hose at the pump. Mark for reattachment and plug hose ends.

5. Remove two flat washers and lock nuts mounting hydraulic pump to hydrostatic pump at relief block. Remove pump. Plug port IN PUMP.

ASSEMBLY:

Assembly is the reverse of the above procedure. Install new O-ring between hydraulic and hydrostatic pump when reinstalling hydraulic pump.

DISASSEMBLY:

The pump itself can only be serviced with a seal kit. Further field repair is not recommended beyond this point.

Trouble Shooting

TROUBLE: PUMP NOT DELIVERING FLUID

1. Reservoir fluid level low.
REMEDY: Add fluid and check level on both sides of reservoir baffle to insure pump intake line is submerged.

2. Air leak in inlet line prevents priming and causes irregular control circuit action.
REMEDY: Pour fluid on intake connections while listening for change in sound of operation. Tighten asrequired.

3. Coupling or shaft sheared or disengaged.
REMEDY: Disassemble pump and check shaft, and rotating group for damage. Replace necessary parts.

TROUBLE: SYSTEM NOT DEVELOPING PRESSURE

1. Contamination in actuating control.
REMEDY: Clean Control.

2. Pump not delivering fluid for any of the above reasons.
REMEDY: Check circulation by watching fluid in reservoir.

3. Relief valve setting not high enough.
REMEDY: Consult authorized TRACKMOBILE distributor.

4. Relief valve sticking open.
REMEDY: Consult authorized TRACKMOBILE distributor.

5. Leak in hydraulic control system (cylinder or valves).
REMEDY: Test independently by progressively blocking off the circuit.

6. Free re-circulation of fluid to reservoir.
REMEDY: Insure that directional valve is not in open center (neutral) position or that fluid is not discharging to tank through an open line or improperly adjusted valve.

TROUBLE: PUMP MAKING EXCESSIVE NOISE

1. Partly clogged inlet line.
REMEDY: Check inlet line. Check the fluid condition and if necessary drain and flush system. Refillwith clean fluid.

2. Air leak at pump intake plumbing connections.
REMEDY: Tighten as required. Pour fluid on connection while listening for change in sound of operation.

3. Air bubbles in fluid; cavitation taking place.
REMEDY: Check oil level in reservoir. Check fittings for looseness, especially sump inlet. Use correct oil. Check filters for clogging.

4. Reservoir air vent plugged.
REMEDY: Must be open through breather opening or air filter.

5. Coupling misalignment.
REMEDY: Check for damaged shaft bearing or other parts. If necessary, replace and realign the coupled shaft.

Hydraulic Tank

The hydraulic tank assembly is located under hood on the cab fire wall. It serves as a reservoir or sump for the unit's hydraulic system, hydrostatic drive system and power steering system. Its purpose is to cool and deairate the hydraulic fluid circulated in the system. The hydraulic filter and dipstick and breather assembly are located above the tank.

REMOVAL:
1. Open hood to gain access to tank.
2. Drain tank by removal of plug on bottom of drain hose.
3. Remove all hoses connected to the tank. Mark for reattachment and plug to prevent contamination.
4. Support the tank from below and remove four capscrews, lockwashers and nuts.
5. Tank can now be removed.

ASSEMBLY:

1. Assembly is the reverse of the above procedures.

NOTE: If the hydraulic tank requires cleaning due to rust or contamination it is recommended that it be flushed with a caustic solution.

Roadwheel Cylinder

The TRACKMOBILE is equipped with two roadwheel cylinders, front and rear, which raise it on its roadwheels for hydrostatic road drive or lower it and retract the roadwheels for operation on rails.

REMOVAL:

1. Raise unit on its rubber wheels and block securely under frame. Shut engine down but leave ignition switch in the "ON" position.

2. Move roadwheel “UP/DOWN” toggle switch up and down until system pressure is relieved.

3. Disconnect two hoses at cylinder. Plug hoses and cylinder ports to prevent contamination.

4. Support cylinder and remove hex screw, lock nut and clevis tube holding the cylinder rod end clevis to the axle arm.

5. Remove hex screw, lock nut, and clevis tube holding the cylinder’s barrel end clevis to the frame.

6. Remove cylinder from unit.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

DISASSEMBLY:

With the cylinder removed from the machine, cleaned, retracted, and drained of oil, proceed as follows:

1. Secure the cylinder in a vise or other method to prevent rotation. Rotate cylinder so the slot in barrel is positioned for easy access. Insure immediate area is clean so parts can be layed out.

2. USING PIN SPANNER WRENCH, rotate gland counterclockwise - square wire should back out of slot on side of cylinder body. If retaining ring does not back out (rotate gland until end of wire can be seen in slot) insert screwdriver into slot under end of square wire and then rotate gland counterclockwise and remove retaining ring.

3. Pull on piston rod to remove gland and piston from tube.

NOTE: If seals catch in retaining ring groove, it may be necessary to cut seal through slot in tube and pull out with needle-nose pliers.

4. Restrain piston rod and remove piston in order that gland can be removed.

5. Remove seals and check all parts for nicks, scratches, cracks, and abnormal wear. Before reassembly check that new seals have been installed and all internal parts are free of visible contamination.

REASSEMBLY:

1. Reassemble gland and piston on rod.

2. Coat piston OD and gland seal area with light grease and apply light coat of hydraulic oil to tube ID.

3. Insert piston, gland and rod assembly into tube. Line up hole in gland retaining groove with slot in cylinder barrel.

4. Insert new retaining ring in hole in gland and rotate gland clockwise until ring is completely in tube.

5. Test cylinder - cylinder is now ready for reassembly in machine.

Coupler Traversing Cylinder

The coupler traversing cylinder controls the horizontal movement of the coupler assembly.

REMOVAL:

1. Shut off engine. Turn ignition to “ON” position.
2. Actuate “joy stick” switch levers until the hydraulic pressure is relieved.
3. Remove hoses. Plug to prevent contamination and mark for reattachment.
4. Remove pin and cotter pins from clevis and support end.
5. Remove cylinder assembly from TRACKMOBILE.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

DISASSEMBLY:

1. Place cylinder in vise.
2. Unscrew rod clevis from piston rod retaining ring then slide out.
3. Insert two dowel pins in spanner pin holes and use bar to unscrew retainer washer from barrel assembly.

   NOTE: If gland nut turns in barrel assembly use air pressure in bottom port to force piston against gland nut to hold it in place. If still turns, apply heat to area to soften sealant.
4. Remove retaining ring and slide out head.
5. Inspect bore of barrel and rod for scratches, nicks, etc. Remove defects with hydraulic oil applied to crocus cloth.
6. Remove from head, rod packing and expander, backup washer and rod wiper.
7. Unscrew locknut from piston and remove piston.
8. Inspect piston rod for scratches, nicks, etc. Remove defects with hydraulic oil applied to crocus cloth.
9. Remove head, O-ring, U-cup packing and expanders.

REASSEMBLY

1. Reassembly is the reverse of the above procedure.

Coupler Lift Cylinder

COUPLER LIFT CYLINDER

The coupler cylinders are used to transfer weight from railroad cars to the TRACKMOBILE by lifting the railroad car coupler.

REMOVAL:

1. Place bar between lower 1 1/2" diameter holds in carriage block.
2. Lower coupler cylinder until coupler assembly rests on the bar.
3. Shut off engine and actuate “joy stick” lever until the hydraulic pressure is relieved.
4. Remove roll pin, cylinder rod nut and bushing retainer. This frees cylinder from the coupler assembly.
5. Disconnect hydraulic hoses from cylinder. Plug cylinder ports and hoses to prevent their contamination.
6. Insert pipe plug in fittings to prevent loss of oil.
7. Remove capscrews holding cylinder to coupler carrier.
8. Lift cylinder free of coupler carrier and the TRACKMOBILE.

ASSEMBLY:

1. Assembly is the reverse of above procedure.

DISASSEMBLY:

With the cylinder removed from the machine, cleaned, retracted and drained of oil, proceed as follows:

1. Secure the cylinder in a vise or other method to prevent rotation. Insure immediate area is clean so parts can be layed out.
2. USING A SPANNER WRENCH, unthread gland in a counterclockwise direction. (If the gland has been sealed with an adhesive then heat will have to be applied to threaded area before unthreading.)
3. Pull rod assembly from tube, taking care not to damage threads or rod.
4. Slide gland off rod.
5. Remove all seals from piston and gland.
6. Inspect parts for damage (nicks, scratches, cracks, etc.)

Before assembly install new seals on piston and gland. Insure all parts are free of contamination (dirt, etc.)

ASSEMBLY:

1. Coat ID of gland with light grease and replace on rod.

2. Coat OD of piston and seal area on gland with light grease. Apply light coat of hydraulic oil to ID of tube. Insert rod assembly into tube taking care not to damage threads, rod or seals.

3. Rotate gland clockwise until shoulder bottoms or until flush with end of tube, depending on design. (Apply adhesive to threads if unit originally had been sealed. Loctite 242 or equivalent).

4. Test cylinder - cylinder is now ready for reassembly in machine.

Tips On Checking Hydraulic Cylinders For Internal Leakage

Leakage inside a hydraulic cylinder may show itself in any of several ways:

A gradual or sudden loss of either power or speed.
Stalling under light load.

These problems occur when too much oil bypasses the piston during its stroke. Excessive bypass may occur if the piston rings or seals are worn or broken, or if there is heavy scoring of the piston or cylinder bore.

This doesn't mean you should expect zero bypass though. (Cylinders with cast iron piston rings will normally bypass one to five cubic inches of oil even when new.) It's the excess bypass, slipping through the worn of broken area, that causes problems.

Here are some simple ways to check for excessive oil bypass.

A. To check for LARGE VOLUME leaks

1. Retract the rod until the piston is bottomed against the cap-end.
2. With the pump running, feel the return line for temperature rise or oil flow.
3. If no flow is detected, repeat the test with the cylinder rod in the fully extended piston.
4. If excessive flow is detected, remove the cylinder from the machine, check the position and the rings and seals and replace as needed.

B. To check for SMALL VOLUME leaks

1. Bottom the piston against one end and maintain operating pressure. Make sure the return line of the cylinder is open to reservoir and is not pressurized.

2. Loosen a fitting in the return line and check for oil flow (The line is full of oil and will drain when you loosen the fitting; or, if the fitting is below reservoir oil level, siphoning may occur. Don't mistake drainage oil for bypass oil.)

3. After normal drainage flow has stopped, remove the fitting to isolate the line so you can observe or measure bypass oil.

4. Repeat the test by running the piston to the opposite end of the cylinder. Check again for bypass flow.

The preceeding method is highly reliable, because it is performed with the cylinder isolated from other components in the circuit.

C. To check for leakage at VARIOUS POINTS IN THE STROKE. Checking for excessive bypass flow at various points in the stroke (in addition to checking at full stroke) will reveal the presence of heavy pitting or scoring in the cylinder bore. You'll need a metering valve (needle valve) and a pressure gauge to perform this test.

1. With the cylinder rod fully retracted, and the rod-end full of oil, install the metering valve and gauge at the rod-end port.

2. Close the metering valve and apply pressure to the cap-end port.

a. If the cylinder is in good condition, the gauge will show intensified pressure at the rod end, but the rod will not move.

b. If excessive oil is bypassing the intensified rod-end pressure will leak into the cap end and the rod will extend at a rate proportionate to leakage.

3. If the rod is extending because of leakage, slowly open the metering valve until rod movement stops. The rod will stop when flow through the valve equals bypass (leakage) flow.

4. Alternately open and close the metering valve, testing the cylinder through its entire stroke. As you do this, mark (on the outside of the cylinder body) the points or areas of leakage.

5. Remove the cylinder from the machine, dismantle it and check the bore. If it's heavily pitted or scored, the body should be replaced.

A Word About The Hydraulic System

As was stated earlier, the hydraulic system on the TRACKMOBILE is vital to the units performance and operation. The hydraulic system enables the unit to raise itself on roadwheels for road transportation, as well as lift railcars with the coupler to facilitate weight transfer aided railcar moving. Power steering, coupler traversing and rail parking brake release are all possible through the hydraulic system function.

Following are a number of interrelated circumstances and factors which could impede the correct operation of the hydraulic system and consequently affect the TRACKMOBILE's performance.

DIRT: Dirt is the number one enemy of the unit's hydraulic system. The hydraulic system's components are precise with tight tolerances, small orifices, and honed or plated surfaces. Dirt and contamination in the system causes wear in these components, which leads to leaking and heat (to be covered later) resulting in inefficiency and eventual failure.

Dirt can be introduced into the system through obvious carelessness. Being aware of these "mediums" will help prevent hydraulic system contamination and the resulting expense of repair and downtime.

Dirt is often introduced into the system through the use of dirty containers used for carrying and pouring the new fluid. KEEP FLUID CONTAINERS COVERED AND SEALED.

LEFTOVER FLUID COLLECTS DIRT. If the fluid cannot be completely sealed and stored safely, THROW IT AWAY. It isn't worth the chance of contamination.

Rust can form in the hydraulic reservoir if the fluid level is low. The vibration inherent in rail travel will shake this rust loose over time and contaminate the hydraulic system. KEEP THE RESERVOIR FULL TO PREVENT THE FORMATION OF RUST.

Dirt can easily enter the hydraulic system when servicing a component in the system. Exercise extreme care when servicing a component. PLUG DISCONNECTED HOSES AND OPEN PORTS. CLEAN THE COMPONENT BEFORE REMOVAL. Wiping internal parts clean with rags leaves lint on them - CLEAN WITH OIL BEFORE REINSTALLATION. THIS REMOVES THE LINT AND LUBRICATES THE PARTS. PROTECT THE SYSTEM FROM BLOWING DIRT WHILE SERVICING IT.

Loose component mounting on the unit will cause excessive vibration which will shake rust and metallic particles into the oil. CHECK COMPONENT MOUNTINGS FOR LOOSENESS AND TIGHTEN AS NEEDED.

Dirt will be left in a hydraulic system if it is only partially cleaned. FLUSH THE ENTIRE SYSTEM HOSES, CYLINDERS, RESERVOIR, ETC., IF IT IS FOUND TO BE CONTAMINATED. USE A 50/50 MIX OF HYDRAULIC OIL AND DIESEL FUEL TO FLUSH THE SYSTEM (THIS PRECLUDES HIGH SYSTEM WEAR AND MORE DAMAGE DURING FLUSH).

DIRT CAN ALSO BE INTRODUCED INTO THE SYSTEM BY COMPONENT WEAR. Components will naturally wear with time, however, this wear and its natural snowballing effect can be slowed through the use of clean hydraulic fluid and good preventive maintenance practices.

Following is a description of the 450OTM filter circuit which was designed to keep the hydraulic fluid as contaminant free as possible.

4500 Filter Circuit Description

The hydraulic filters on the 450OTM are manufactured to TRACKMOBILE specifications by a leading national filter manufacturer. Using the National Fluid Power Association “Beta” ratios to indicate filtering efficiency, the TRACKMOBILE filter is 50°.6 efficient on particles of 9 micron size and 95% efficient on particles of 19 micron size. At the 10 micron size, considered the “normal” limit for servo valves and piston pumps, the TRACKMOBILE filter is 60% efficient.

The filtering circuit is designed to boost the individual efficiencies of each filter. The hydrostatic charge circuit filters up to 12 gallons per minute of oil whenever the engine is running, directs that oil through the cooler and then returns it to the tank through additional filtering at the tank mounted filter. The tank mounted filter filters all oil returning to the tank including the varying flow from main circuit pump. This circuit flow varies due to the compensation feature on the pump. Because of the varying flow, the total efficiency resulting from the series/parallel plumbing of both filters is difficult to quantify, although representatives of TRACKMOBILE’s filter manufacturer feel that the total efficiency is reasonably estimated at 96% for 10 micron particles.

Other filter circuit features are also important to the customer. The tank mounted filter head has a build-in electrical switch to alert the operator to the need to change the elements. This switch actuates at a pre-set pressure level - well below the bypass setting of the tank filter - to light the “filter” light on the instrument console. IF THE CONSOLE “FILTER” LIGHT IS ON CHANGE BOTH FILTERS. In addition, colorcoded gauges are mounted to the filters to indicate a go/no-go condition.

The hydrostatic charge circuit filter will not bypass if it clogs. This protects the hydrostatic components, as low charge circuit flow resulting from a clogged filter will not allow the pump to strike in either direction. The tank mounted filter will bypass at approximately a 25 psi drop across the filter.

Significant effort has been put forth to give the 450OTM high quality filtration at competitive prices - the use of “willfit” elements endangers those goals, and may lead to shortened component life.

HEATING HYDRAULIC FLUID:

Hydraulic fluid is the life blood of the hydraulic system. The problems dirt causes in the system have been presented. But dirt isn't the only culprit which causes trouble in the unit's life blood ...heat or hot oil causes damage as well.

The hydraulic fluid performs two functions in the system: transfer power and lubricate components. Heat causes problems for both of these functions. When oil becomes hot it begins to break down into acid, varnish and sludge and loses its viscosity and lubricating properties. Varnish and sludge clog small orifices and cause slow reaction of close tolerance parts which inturn create heat. Acid corrodes metal and accelerated component wear which we know further contaminates the system.

The loss of viscosity and lubrication also causes undesired system speed and contributes to scoring between moving parts. Depending on the metal composition, some parts may enlarge or contract during extreme heat. The resulting wear causes leaks in sealing areas and loss of performance. Further heat is in turn generated by this leaking.

The whole problem snowballs as seals deteriorate in the excessive heat allowing further pressure drops because of leaks reduced performance and increased friction and heat.

HOW HOT IS TOO HOT? Maximum operating temperature is 150 degrees F. At 150 degrees F, reduced oil life begins to occur which can translate into reduced component life. The system temperature should be measured at the hydraulic reservoir at the return line. This temperature is indicative of system temperature although components such as pumps and valves will reach much higher temperatures. Hot oil also smells burnt and looks dark because of the varnish present in it.

What causes hot oil? A combination of factors, one of which is dirt and its associated leaking problems. Following are a number of sources of heat which could occur on the TRACKMOBILE.

EXCESSIVE PUMP SLIPPAGE AND LEAKAGE DUE TO WORN SEALS AND PARTS. If this condition exists, replace the seals in the pump or replace the pump. Clean the system.

RELIEF VALVE BYPASSING TOO MUCH OIL. The relief may be set too low or the hydraulic pump pressure may be too high. Consult an authorized TRACKMOBILE distributor if a problem with the relief is suspected. Check pump pressure.

EXCESSIVE LEAKING IN HYDRAULIC CYLINDERS. Check the charge and return lines for heat or excessive flow when the cylinder is fully extended and retracted. Repack the cylinder if necessary. (See "Tips on Checking Hydraulic Cylinders For Internal Leakage" starting on page 16).

LOW FLUID LEVEL: The fluid is cooled in the reservoir. Too little oil means that the oil cannot remain in the reservoir long enough to cool as required. The hot oil is recirculated while still being hot and its temperature, therefore, increases even more. Check the fluid level with all cylinders retracted. Add fluid as necessary as indicated on the dipstick.

NOTE: TRACKMOBILE recommends the usage of C-3 lOW oil in the hydraulic system.

AERATION AND CAVITATION

The final factor to be discussed which can cause hydraulic system malfunction is aeration and cavitation. Aeration is the presence of “small” air bubbles in the hydraulic fluid. Cavitation results when the hydraulic components, specifically the pump, operate “on” air and the void it creates in the fluid.

Aeration and cavitation are caused by too low an oil reservoir level, air leaks at the pump inlet line, too thick an oil, water in the oil, plugged oil filters, and a partially clogged or fully clogged pump inlet.

How is aeration detected? Check the oil in the reservoir. If it looks milky and frothy, it is aerated. Also, aeration causes an increase in system noise but it will not be as pronounced as the noise created by cavitation. Aeration may build up gradually through the whole system.

Cavitation usually occurs quickly. It is characterized by a loud staccato hammering - usually at the pump or motors. Again, the hydraulic fluid will appear milky and frothy.

Vibration accompanies the noise created by aeration and cavitation. In the section on oil heat, you read that vibration causes leaks and loose particles in the system. Leaks allow more air in the system. Loose particles create obvious contamination problems.

But vibration isn’t the “big killer” caused by aeration and cavitation. The collapse of the air bubbles as they are compressed damages - severely pits - the system’s metallic surfaces. This results in contamination and dirt in the system.

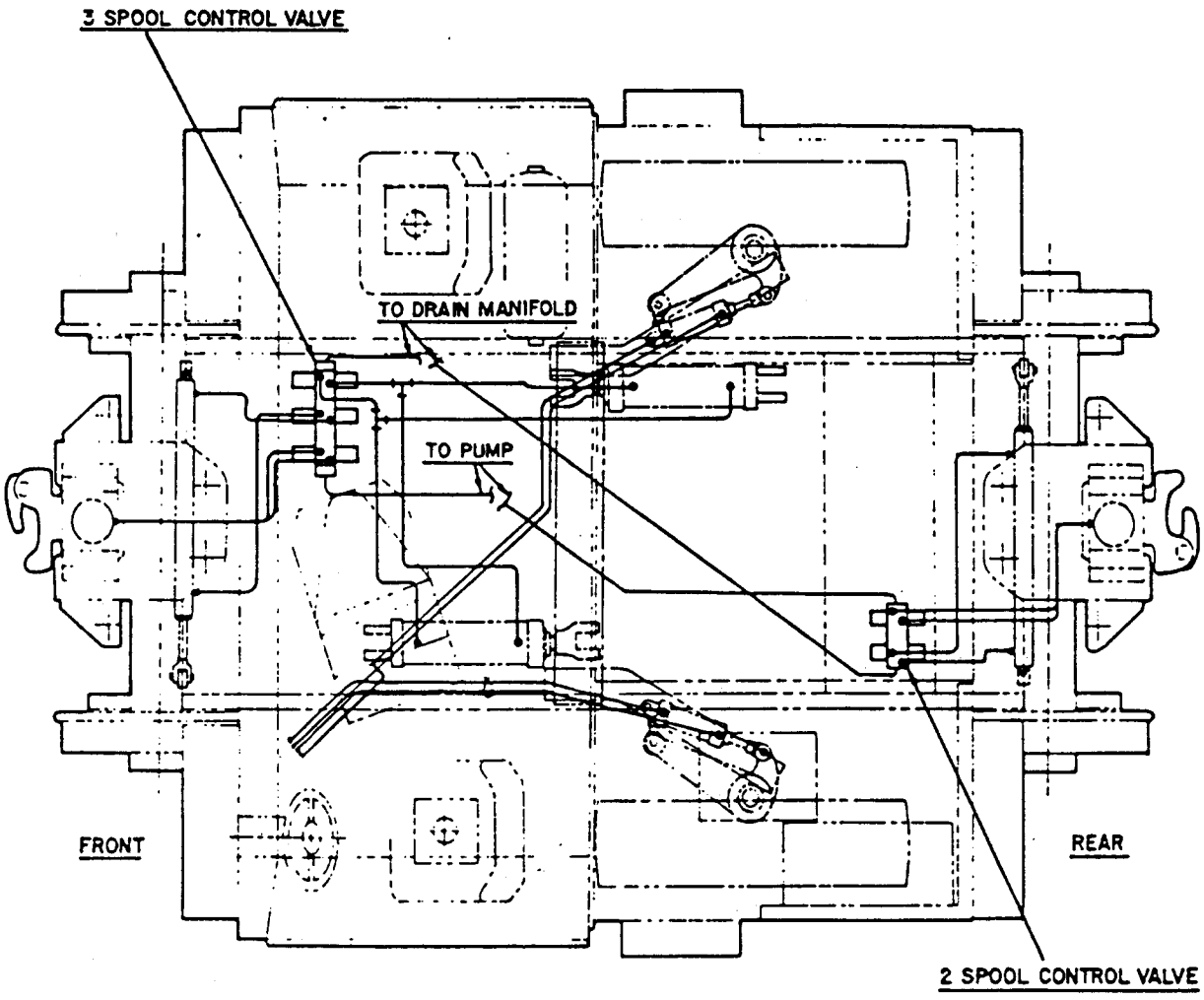
The presence of air in the system also allows the oil to slip or leak around close tolerances and the “old nemisis” heat shows up again because of friction and tolerance loss.

The solutions to the causes of aeration and cavitation are obvious and simple - maintain the correct oil level in the reservoir, periodically check fittings for looseness especially the pump inlet line, use the recommended oil, and change the filters at the recommended intervals or when the console filter change light becomes illuminated.

Solenoid Actuated Directional Control Valves

Solenoid Actuated Directional Control Valves, located behind both front and rear coupler beams, direct hydraulic flow to the unit's hydraulic cylinders. Reference Figure 13.12.

The solenoids are actuated by a console mounted toggle switch for roadwheel spool valve control, and joy stick switches for coupler lift and traversing spool valve control.



Control Valve Locations
Fig. 13.12

Two Spool Solenoid Actuated Directional Control Valve:

The two spool solenoid control valve located behind the rear coupler beam controls the rear coupler lift and traversing cylinders. A factory preset 2200 psi hydraulic system relief valve is also located at this valve bank. It is not field serviceable. Contact your local TRACKMOBILE distributor if relief valve problems are suspected.

Three Spool Solenoid Actuated Directional Control Valve:

The three spool solenoid control valve, located behind the front coupler beam, controls flow to the coupler lift and traversing cylinders as well as both roadwheel cylinders. A cylinder lock valve is used on the roadwheel solenoid valve. See Lock Valve.

REMOVAL: (applies to both solenoid valve assemblies)

1. Lower the front and rear couplers to a full DOWN position.

2. Lower the unit so that all eight wheels (rail and road) rest on the ground.

3. Shut engine down.

4. With the ignition switch in the “ON” position, activate the joystick controls and roadwheels toggle switch to relieve hydraulic system pressure.

5. Disconnect and CAP hoses attached to solenoid valves. PLUG open ports in solenoid valves to prevent contamination. Mark for reattachment.

6. Disconnect wires leading to solenoids. Mark for reattachment.

7. Remove bolts attaching solenoid valve assembly to frame mounting plate and remove valve assembly.

ASSEMBLY: (applies to both solenoid valve assemblies).

1. Assembly is the reverse of the above procedure.

DISASSEMBLY: (applies to both solenoid valve assemblies).

NOTE: Disassembly should be preformed in a contaminate-free environment. Disassembled pieces should be protected from contamination after removal.

1. Remove four mounting screws and end plate.

2. Slide solenoid coil off inner and outer flux sleeves and sleeve spring.

NOTE: If the solenoid has been determined to be defective, it may be replaced at this time. Solenoid replacement requires no further disassembly.

3. Slide outer flux sleeve, spring and inner flux sleeve from guide tube assembly.

4. Gently work and pull guide tube from valve tube assembly in valve body.

   NOTE: The components housed in the guide tube assembly are not serviced separately in the field**.** Replace the guide tube assembly if defective.

5. Inspect the following components and replace as necessary.

   A. Inspect “O” ring for cut or tear. Replace if necessary.

   B. Inspect guide tube assembly for scoring burrs, nicks and leaks. If not too badly scored or nicked, the tube assembly exterior may be cleaned with crocus cloth. Replace tube assembly if leaks are detected.

   C. Inspect inner and outer flux sleeves for scoring, nicks, or burrs. Clean or replace as necessary. Inspect spring.

6. If the spool is to be inspected for wear, disassemble the opposite end of the valve as directed in points 1-4.

7. Slide spool from valve body. Clean and inspect for scoring or wear. Replace as necessary.

REASSEMBLY: (applies to both solenoid control valves)

1. Reassembly is the reverse of the above procedure. CLEAN components before reassembly.

Roadwheel Spool Lock Valve

The roadwheel cylinder spool has a cylinder lock valve at its cylinder ports. With the roadwheel directional control valve spool in neutral, flow from both ends of the hydraulic cylinders is blocked by the double cylinder lock valve. When the fourway valve is activated to send flow to one end of the roadwheel cylinders, pressure opens the poppet and simultaneously moves the piston over to the opposite poppet, opening the poppet and allowing free flow to the directional control valve. Reference Figure 13.17

REMOVAL

1. Perform points 1-5 presented for solenoid control valve removal.

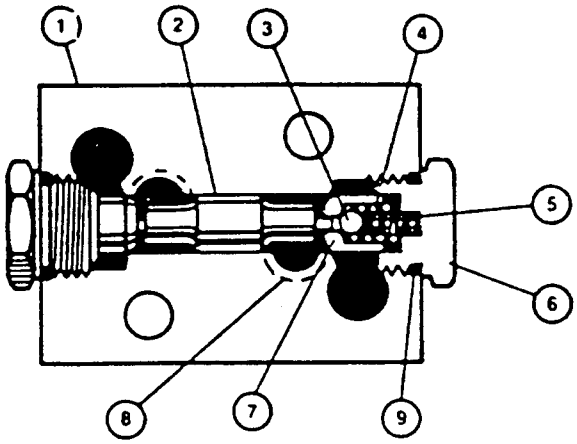
2. Remove two bolts attaching lock valve to valve body and remove lock valve.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

DISASSEMBLY AND REASSEMBLY:

A service kit is available for field service of the lock valve. Reference Figure 13.17 for an illustration of the
lock valve and the parts catalog for part number information.



Ref No.	Description	Req'd.
1	Body	1
2	Piston	1
*3	Ball	2
*4	Spring	2
*5	Spring	2
6	Plug	2
*7	Poppet	2
8	O Ring	2
9	O Ring	2

* Included in repair kit. Items 8 & 9 make up seal kit.

Lock Valve - Roadwheel Spool
Fig. 13.17

CHAPTER 14
Hydrostatic System

Reference Section 4515 of Parts Manual.

Hydrostatic System

The 450OTM is propelled on its roadwheels by a hydrostatic transmission system. The system is composed of a variable displacement axial piston pump which includes piston motors located on the hydrostatic road drive axle, a hydrostatic console which activates a pump mounted air cylinder, and air-to-oil hydraulic cooler mounted in front of the radiator, high pressure hydraulic hoses and a fluid system shared with the unit's hydraulic system. Reference Hydraulic Hydrostatic Drive Schematic in Chapter 13.

Operation

The hydrostatic transmission uses a closed circuit hydraulic system capable of "over-center" operation. High pressure hoses connect the inlet and discharge parts of the hydrostatic motors. When the pump is moved off-center(out of neutral position) by the pump control, oil flows to the motors and causes them to rotate and drive the unit.

The pump control assembly mounted on the left hand side of the hydrostatic pump consists of a low pressure servo operating a power assist cylinder which controls the direction and speed of the transmission output shaft. The control changes the volume and direction of flow by varying the length and direction of the pump piston stroke through a change in the angularity of the pump arm.

The control's lever is actuated by the pump mounted air cylinder which is in turn controlled by the threeway air valve in the hydrostatic console. The air cylinder moves the control lever into neutral, forward and reverse.

When the control is in neutral, the pump's cam is vertical. Therefore, there is no piston stroke and no flow from the pump and consequently no drive of hydrostatic motors.

When the control is moved out of neutral into either forward or reverse, the pump's cam angle is moved off center and oil flows from the pump to the motor through the closed circuit hydrostatic hoses and causes the motors to rotate and propel the unit. The further the control is moved off center, the greater the fluid volume created by the pump and the faster the hydrostatic motors rotate. Oil discharged from the motors is returned to the pump in the closed circuit system.

Moving the control back through neutral into the opposite direction utilizes the pump's over-center capability and causes the pump to reverse its flow. The reversal of flow causes the motors to operate in the reverse direction.

The pump control features a mechanical feedback connection between the pump and the controls which overrides the servo when the desired speed is attained or when the preset horsepower control limit is reached.

This horsepower torque input limiter is a control feature which will not allow the operator to lug or stall the unit's engine since it doesn't allow the hydrostatic transmission to absorb an input pressure and power in excess of a preset limit. It also allows the unit to operate at a constant horsepower level under varying working conditions since any input horsepower is limited at any given input speed.

Troubleshooting, Maintenance, and Repair

The following are troubleshooting, maintenance, and repair procedures for the hydrostatic system's components.

The repair procedures presented cover minor repair of the system's components. Major repair is not presented because of special tools, shop equipment and expertise required.

It is suggested that the hydrostatic pump and control assembly be removed as an assembly if service of such is required.

Cleanliness is of utmost importance during the service of these components.

NOTE: Operating the system without an adequate supply of oil can lead to damage of the hydrostatic system components. The hydraulic reservoir should be checked daily for an adequate supply of oil and for the presence of water in or emulsification of the oil. If contamination is present, completely drain and flush the system and refill with new oil per specification.

Trouble Shooting Guide

This chart is designed to provide a quick diagnosis of the malfunction and the corrective action to be taken. Its use will shorten maintenance time appreciably.

MALFUNCTION	PROBABLE CAUSE	HOW TO DETERMINE	CORRECTIVE ACTION	REPAIR CLASSIFICATION
1. Loss of Oil. Inspect for external leakage under load	Fittings	Check for loose hose fittings	Tighten fittings	Minor
	Hose or Tubing	Check for cracked or worn spots in hose or tubing	Replace hose or tubing	Minor
	Gaskets			
		Check gasket between pump housing and control assembly	Replace gasket as necessary	Major
		Check gasket between control housing and control arm assembly	If leakage is noted, replace gasket and control seal	Major
	Seals	Remove motor shaft seal assembly and check seal	Replace seal as necessary	Minor
		Remove pump shaft seal assembly and check seal	Remove seal as necessary and gasket	Minor
		Remove control seal plate and check seal	Replace seal as necessary	Major
	O-Rings			
	O-Rings on high pressure relief block plugs	Remove plug and check O-Ring (2 plugs)	Replace O-Ring	Minor
	O-Ring on shaft seal retainer assembly on pump or motor	Remove seal retainer and inspect for cuts or abrasions	Replace O-Ring	Minor
2. Loss of Control	Low Oil Level	Check reservoir	Replenish to proper level	Minor
	Plugged Oil Filter	Remove filter housing and check filter	Replace filter element	Minor

MALFUNCTION	PROBABLE CAUSE	HOW TO DETERMINE	CORRECTIVE ACTION	REPAIR CLASSIFICATION
2. Loss of Control Continued	O-Ring between pump housing and control assembly	Remove control assembly from pump housing and check O-Ring	Replace O-Ring	Major
	Air Cylinder out of adjustment	Creeping when in neutral	Adjust the air cylinder	Minor
	Insufficient oil supply	Check for plugged lines or dirty filter	Clean or replace as necessary	Minor
		Check oil level in reservoir	Add oil as necessary	Minor
	Check valve malfunction	Check for sticking valves	Rework or replace as necessary	Minor
	Control linkage malfunction	Check external linkage for loose or broken connections. Check for correct operation of air cylinder	Repair or replace as necessary	Minor
	Internal failure	Check internal mechanism. Actuate control lever. If no response, check for:		
		A. Broken lever arm or pin	Replace lever arm assembly	Major
		B. Feed back lever broken or not properly assembled on cam lever pin	Replace cam follower	Major
		C. Broken cam follower	Replace spring	Major
		D. Broken override spring	Replace spring	Major
		E. Broken sleeve spring	Replace spring	Minor
		F. Sticking valve sleeve	Rework or replace valve sleeve	Major
		G. Sticking pressure sense pin	Rework or replace sense pin	Major
		H. Damaged Piston O-Rings	Replace O-Ring	Minor
3. Excessive noise, cavitation and internal damage	Filter	Check for dirty filter	Replace filter	Minor
	Inlet line	Check inlet line for collapsed wall or other rest?	Clean hose or replace as necessary	Minor

MALFUNCTION	PROBABLE CAUSE	HOW TO DETERMINE	CORRECTIVE ACTION	REPAIR CLASSIFICATION
3. Excessive noise, cavitation and internal damage Continued	Oil	Check oil for excessive viscosity	Replace as necessary	Minor
		Check for water in oil	Replace as necessary	Minor
	Contamination	Check case drain line for steel or brass particles. Reference Hydrostatic Pump & Motor for case drain. Check procedure	Unit probably beyond field repair. Remove and overhaul	Check Minor Repair Major
	Air in oil	Check inlet line for leaks	Tighten fittings or replace as necessary	Minor
		Check oil level in reservoir	Add oil as necessary	Minor
			Maintain oil level above level of return line	Minor
4. Overheating	Excessive internal wear	Check case drain. See Hydrostatic Pump.	Unit probably beyond field repair. Remove and overhaul	Major
	Heat exchanger-air type	Check coils for excessive dirt.	Clean as necessary	Minor

Hydrostatic Motor

REMOVAL & ASSEMBLY:

Reference Hydrostatic Road Drive Axle, Chapter 15, for removal and assembly of the hydrostatic motor.

DISASSEMBLY & REASSEMBLY:

Further field service and repair is not recommended. Contact your local TRACKMOBILE distributor for further information.

HYDROSTATIC MOTOR CASE DRAIN:

Case drain may be checked on the hydrostatic motors by disconnecting the case drain hose at the concerned hydrostatic motor. While in neutral with the parking brake set, accelerate the engine. Case drain in excess of 1.5 GPM indicates internal motor wear or defect. Contact your local TRACKMOBILE distributor for further instruction.

Fixed Displacement Motor Minor Repair

INTRODUCTION:

Minor repair can be used to remedy a number of motor malfunctions as indicated in the Trouble-shooting Chart. The instructions in this section are divided into several procedures, each of which is designed to correct a specific problem. Step-by-step instructions are listed under each procedure. For all other malfunctions, it is recommended that the local TRACKMOBILE distributor be contacted.

SPECIAL TOOLS:

Torque Wrench, Arbor Press

MINOR REPAIR PROCEDURES:

1. Correct external leakage at shaft seal of O-ring by replacing defective parts.

   A. Remove Screws holding retainer plate and seal carrier.

   B. If the seal carrier does not move from its bore upon removal of the screws, pry it from its bore,using a screwdriver or lightly tap the end of the shaft with a soft mallet.

   C. Place seal carrier in arbor press and press out old seal. Inspect the seal carrier for any damage or nicks.

   D. Using the arbor press, press the new seal into seal carrier. Be careful not to damage seal.

   NOTE: The outside diameter of the seal may be lightly coated with a Loctite sealant prior to installation.

E. Replace the O-ring on the O.D. of the seal carrier.

NOTE: Prior to assembly, lubricate the O-ring on the O.D. of the seal carrier and the I.D. of the seal with petroleum jelly.

F. Assemble the seal carrier and seal over the shaft and into the housing bore.

G. Install the retainer plate and screws. Torque screws.

Hydrostatic Pump

REMOVAL:

1. Shutdown engine. Turn ignition on “ON” position and move hydraulic system joystick control levers and roadwheel up/down toggle switch to relieve hydraulic pressure.
2. Drain hydraulic tank through drain hose.
3. Remove access plate from cab floor located above the hydrostatic/hydraulic pump assembly.
4. Disconnect air hoses and electrical wires on control lever air cylinder. Mark for reattachment.
5. Disconnect all hoses attached to the hydrostatic pump and hydraulic pump. Mark for reattachment and plug hose ends and parts to protect system from contamination.
6. Support hydrostatic/hydraulic pump assembly from above with sling and remove four mounting bolts attaching hydrostatic/hydraulic pump assembly to the torque converter pump adapter. Lift assembly up through cab floor.
7. Locate assembly in a clean area for further disassembly or repair.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

IMPORTANT NOTE: Before restarting the system, check fluid supply. The system can be damaged without an adequate supply of fluid.

DISASSEMBLY & REASSEMBLY:

Reference Minor Repair Procedure for service and repair of pump. Further field service and repair is not recommended. Contact your local TRACKMOBILE distributor for further information.

HYDROSTATIC PUMP CASE DRAIN:

Case drain on pump is not to exceed 1.5 GPM. Flow in excess of 1.5 GPM indicates internal pump wear or defect. Contact your local TRACKMOBILE distributor for further instruction.

Control Assembly

There are no adjustable elements in the control assembly. All functions are pre-set at the factory.

Hydraulic Cooler

The air-to-oil Hydraulic cooler is located in front of the radiator at the rear of the unit.

Field service of the cooler is limited to the cleaning of dirt and debris from the cooling fins to assure full cooling efficiency and capacity.

REMOVAL AND ASSEMBLY:

For removal and assembly of the hydraulic cooler, reference cooling system, Chapter 06.

Air Cylinder Assembly

The pump mounted air cylinder assembly positions the hydrostatic pump's control assembly lever into the desired direction of travel: forward, neutral or reverse. It is actuated by the 3-way air valve located in the hydrostatic console.

For removal, assembly and service, reference Throttle System, Chapter 21.

Hydrostatic Console

The hydrostatic console, located to the left of the unit's steering wheel, controls the direction of the hydrostatic transmission. The control of the hydrostatic transmission is achieved through the use of a three position, four way air valve which directs air flow to the hydrostatic pump mounted air cylinder. When actuated by the valve, the air cylinder moves the hydrostatic control assembly lever into the desired direction of travel forward, neutral, reverse.

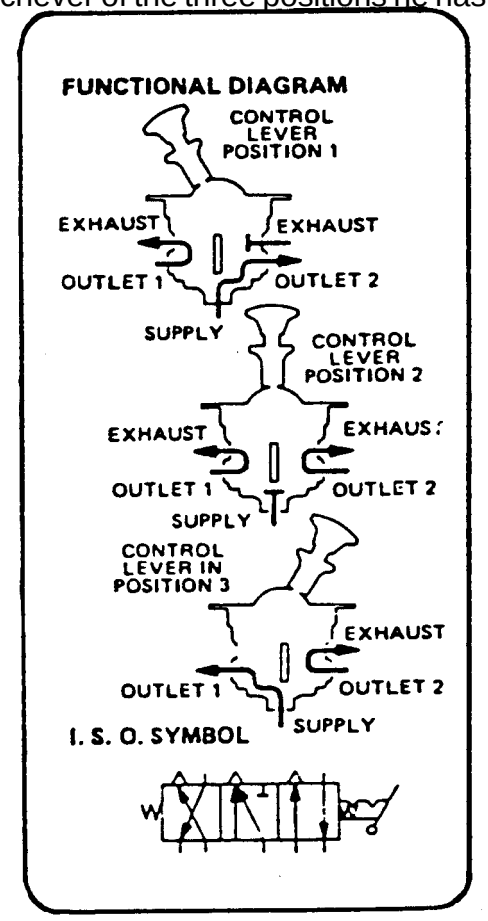
The hydrostatic console also houses the roadwheel holding brake actuating switch and indicator light. Ref. TRACKMOBILE Brakes, Chapter 4, for information regarding the roadwheel holding brake.

Three Way, Four Position Valve

The air valve is a non-compensating, four-way control valve with three functional positions. The control lever which actuates the valve is equipped with a spring loaded lockout safety device which locks in all three positions to prevent unintentional lever movement. The yellow lockout device is a visual indicator of the safety latching feature of this control valve series.

OPERATION:

When the valve's control lever is in Position 1 (refer to Functional Diagram Figure 14.16) outlet part 2 receives supply pressure and outlet 1 is exhausted. Both outlet ports are exhausted in Position 2, which is the neutral or "hold" position, and in Position 3 outlet port 1 receives supply pressure and outlet 2 is exhausted. In order to move the control lever from one functional position to an adjacent position, the operator must pull up on the lockout device and move the lever approximately 45 degrees. When he releases his hold on the lockout device, a spring will lock the control lever into whichever of the three positions he has selected.



Three-Way Four-Position Valve
Fig. 14.16

CHAPTER 15

Hydrostatic Drive Road Axle

Hydrostatic Road Drive Axle

Reference Section 4502 of Parts Manual

AXLE REMOVAL:

1. Raise unit on roadwheels and block securely under frame.

2. Remove roadwheels (See Roadwheel Tires).

3. Disconnect hydrostatic CASE drain hose from manifold MTP Drain Line. Plug to prevent contamination.

4. Disconnect hydrostatic charge and return hoses from hydrostatic motor. Plug to prevent contamination.Plug all open ports on motor.

5. Disconnect roadwheel lift cylinder from axle by removing clevis tube, capscrew, washer, and nut at axle-to-cylinder attachment point.

6. Place floor jack under center of axle and snug up.

7. Remove capscrews and bearing caps from main frame to remove axle assembly.

   NOTE: Each bearing cap and frame mounting point are matched. Before removing caps, mark each cap and frame to assure the correct placement of the caps to their original position on the frame during the assembly process.

AXLE ASSEMBLY:

1. Assembly is the reverse of the above procedure.

   NOTE: Install matched bearing caps to frame. Reference 7 in axle removal.

2. Grease axle before reinstallation. Crisscross tighten all roadwheel nuts to 50 ft.-lbs. then crisscross retighten to 450-500 ft-lbs. torque.

AXLE **DISASSEMBLY:**

NOTE: It is only necessary to remove the whole axle assembly when the axle is being replaced. All other service can be performed with the axle on the TRACKMOBILE.

1. Disconnect hydrostatic case drain hose from underside port of hydrostatic motor. Plug to prevent contamination.

2. Disconnect hydrostatic charge and return hoses from rear of hydrostatic motor. Plug to prevent contamination. Plug all open ports on hydrostatic motor.

3. Disconnect hydrostatic motor from drive hub by removing four lock nuts and washers. Support motor with sling and remove from hub.

4. Remove torque hub from flange by removing eight flat washers and locknuts. Support with sling when removing.

AXLE REASSEMBLY:

Reassembly is the reverse of the above procedure.

NOTE: When reinstalling hydrostatic motors, centerline of charge and return ports must be in line with centerline of axle. Centerline will then be parallel with ground with roadwheels down. Case drain hose must be at bottom underside motor when it is reinstalled.

CHAPTER 16

Power Steering System

The power steering system is fully fluid linked, meaning that there is no mechanical connection between the steering control unit in the console, the pump, and the steering cylinders on the rear roadwheel steering axle.

The steering control unit, or orbitrol, consists of a manually operated directional control valve (steering wheel provides manual operation) and servo feedback meter element. It is a non-load, closed center design.

The non-load design blocks the cylinder ports in neutral, holding axle position should the operator release the
steering wheel.

With the closed center feature, the unit's hydraulic pump maintains pressure to a closed center valve. When steering is inactive, the valve is closed to center flow. For steering the system flow is controlled according to valve opening and load pressure through the load circuit.

The power steering system operates in conjunction with the hydraulic system. It operates off a tee at the hydraulic
pump and uses the hydraulic system oil supply as well as the 2200 psi hydraulic system relief. It utilizes its own independent hydraulic system relief. It utilizes its own independent hydraulic hose system.

Power Steering Orbitrol

REMOVAL

1. Turn on ignition and work switches back and forth to relieve hydraulic pres sure in the lines.

2. Remove round head screws on console for access to hoses.

3. Disconnect hoses from steering unit.

4. Remove dummy horn cap.

5. Remove nut holding steering wheel in place.

6. Remove steering wheel with wheel puller.

7. Remove two (2) capscrews attaching steering unit to console.

8. Lower unit and remove through console access assembly.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

NOTE: The orbitrol is assembled by the manufacturer in a controlled environment. Contact TRACKMOBILE for the name and telephone number of a factory authorized representative for repair of the orbitrol.

POWER STEERING CYLINDERS

Reference Rear Roadwheel Steering Axle Disassembly, Chapter 19.

CHAPTER 17

Front & Rear Rail Axle And Gearcase

Reference Section 4504 of Parts Manual

The rail drive axles are mounted to the frame with spherical, self aligning roller bearings. The wheels at each end are driven by an axle mounted reduction gearcase. A double set of gears, a spiral bevel gear set and a helical gear set provide the necessary reduction.

REMOVAL:

1. Raise unit to sufficient height for railwheels to clear floor.

2. Block machine securely at all corners and traverse coupler assembly to extreme right or left.

3. If unit is equipped with train brakes, remove brake hose at 45 degree elbow next to air cocks.

4. Remove sander tube brackets and sander tubes from main frame and bumper.

5. Remove bumper.

6. Support railwheel.

7. Flatten bent corners on locking plates and loosen capscrews and railwheel retainer on railwheels.

8. Break taper fit on railwheel and key with pry bar by bumping the railwheel at various points around its circumference.

9. Remove capscrews, locking plates and railwheel retainer.

10. Remove railwheel with soft sledge hammer.

11. Support axle with jack, crane or lift truck.

12. Disconnect U-joint at rail axle gearcase brake yoke. The parking brake assembly is mounted on the input of the rear rail axle gearcase. It requires removal before the rail axle and gearcase assembly are lowered from the unit. Refer to TRACKMOBILE Brakes - Parking Brake, Chapter 04.

13. Disconnect rail brake line hose at power cluster.

14. Disconnect gearcase to frame tie link.

15. Remove rail axle retaining bars and lower axle down and remove from under unit.

NOTE: Two suspension springs are positioned above bearing housings in frame. These must be in place above the bearing housings when reinstalling the axles.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

2. When reattaching U-joint and drive shaft, torque capscrews to 110-120 ft. lbs. dry thread.

3. When reinstalling railwheels, tighten capscrews to 260 ft. lbs. and bend tabs on locking plates.

GEARCASE AND AXLE DISASSEMBLY:

The spiral bevel pinion and bearing capsule and associated bearing cones, cups and oil seals may be serviced without removing the axle from the unit and disassembling the gearcase. The shims which are removed from the brake yoke and bearing capsule must be reused in order to assure correct backlash between the spiral bevel pinion and spiral bevel gear.

Further service requires the complete disassembly of the rail axle and gearcase assembly as follows:

1. Drain gearcase assembly and remove breather from gearcase.

2. Remove outer and inner oil seals and bearings housing from axle.

3. Remove bearings and bearing spacers with a soft hammer.

4. Remove three brake calipers by bottoming out the pistons and removing the caliper bolts. ReferenceTRACKMOBILE Brakes - Rail Axle Brakes, Chapter 04.

5. Remove disc brake rotor.

6. Position gearcase and axle assembly in a vertical position with the gearcase cover facing upwards.

7. Remove axle oil seals on both sides of gearcase and remove axle bearing re tainer and shim pack.

   NOTE: Save shimpack.

8. Remove spiral bevel gear bearing adjustment cap and shim pack.

   NOTE: Save Shimpack for reassembly.

9. Remove Capscrews and lockwasher from gearcase cover. Break fit of gearcase with pry bar in the area of the two dowel pins. Remove gearcase cover. The cups for the spiral bevel pinion gear and rail axle will come off with cover.

10. Remove axle assembly from gearcase with crane.

11. Locate gearcase housing on bench with open side facing upwards. Internal gearcase components may now be serviced as needed.

NOTE: When removing the spiral bevel gear, save the shims under the cone in the gearcase journal bearing housing. These are required for reinstallation when reassembling the gearcase in order to achieve proper gear backlash.

The spiral bevel gear and spiral bevel pinion must be a matched set. If the spiral gear must be removed from the rail axle pinion press it off with a 50 ton press.

12. Further disassembly of the rail axle is now possible. Removal of the rail axle gear from the rail axle requires the use of a 200-250 ton press.

ASSEMBLY:

1. Locate rail axle on horizontal press. Be sure mounting locations for rail axle gear, bearing and brake rotors are clean. Clean rail axle gear I.D. and teeth.

2. Coat axle area and I.D. of gear with grease. Position gear on axle with collar to long end of axle and key in slot. Press to shoulder with 200-250 ton press.

3. If necessary, build up new spiral bevel gear and shaft. Clean gear and shaft and coat gear and shaft I.D. with grease. Locate gear on shaft with teeth toward spline of shaft. Press to shoulder with 50 ton press.

4. Obtain bearing capsule and new bevel pinion. Clean I.D. of bearing capsule and coat bearing journals with lubricant. Clean O.D. of bevel pinion and coat bearing journals with lubricant.

5. Mount cleaned and lubricated large bearing cone to shoulder of bevel pinion. Install matching bearing cup to the shoulder of the bearing capsules large I.D.

6. Clean and lubricate small bearing cup and locate to the shoulder of the bearing capsule's small I.D.

7. Place bearing capsule in a horizontal position in a vice and install bevel pinion in bearing capsule.

8. Install bearing cone on end of pinion.

9. Lubricate oil seal and install it in the small end of bearing capsule.

10. Install brake yoke on end of pinion and tap it down until there is a slight bearing drag. Remove yoke and reinstall shims removed during disassembly, on top of bearing. Reinstall brake yoke with lock plate, capscrews and lockwashers. Tighten and check bearing drag.

NOTE: If shim pack was not saved, use a depth micrometer to measure the distance between the pinion shaft end and brake yoke shoulder after the yoke has been taped on to obtain a slight bearing drag. The shim pack used should equal the reading of the depth micrometer. Install shims as directed above.

11. Locate gearcase on bench with open side up. Clean bearing journals and coat with lubricant.

12. Install shims removed during disassembly, in bearing housing journal for spiral bevel gear. Install cup in journal and install spiral bevel gear in gearcase housing.

13. Install bearing capsule and pinion assembly and shims, removed during disassembly, to gearcase with two capscrews and lockwashers.

NOTE: When holding pinion firm, there should be some backlash between pinion and bevel gear. If not, remove bearing capsule and pinion assembly, remove bevel gear and bearing cup and shim pack under bearing cup. Reinstall as directed from point 12 without shims. Proceed to item 14 for determining correct shim pack and resulting backlash for spiral bevel gear.

14. Locate magnetic base with indicator on side of housing with indicator in contact with a tooth on bevel gear. Hold pinion firm and rotate bevel gear. Take backlash reading and compare with backlash as called for on bevel and pinion gears. Take the difference between the number on the gear and reading with indicator and multiply by 1.364. This is the shim required under the bearing cup under bevel gear. Remove bearing capsule and spiral bevel gear and cone and repeat step 12 & 13. Proceed to point 15.

15. Install bearing cone on ends of large bevel gear shaft.

16. Install large bevel gear assembly in gearcase.

17. Reinstall bearing capsule and shim pack and secure with 8 capscrews and lockwashers.

18. Install bearing cones on both sides of gear mounted on rail axle.

19. Lift axle assembly with crane and lower into gearcase.

20. Position gearcase cover on bench and clean I.D.'s. Lubricate I.D.'s.

21. Install bearing cup in axle I.D. and bearing cup in bevel gear I.D.

22. Apply coating of #2 permatex to cover seal area of gearcase. Install cover over axle and down onto gearcase. Secure with capscrews and lockwashers and two dowel pins.

23. Obtain clean bevel gear bearing cup. Tap bearing cup down against bearing. Install cap and secure with bolts until cup seats against bearing. Check by rotating pinion. Remove cap and reinstall shims removed during disassembly. If shims are not available measure gap between cap and cover with feeler gauges. This dimension is the required shim pack thickness. Remove cap and install shim pack and replace cap and tighten bolts.

24. Obtain clean axle bearing cone. Follow same procedure as directed in item 23.

25. Lubricate oil seal and install over axle into bearing retainer.

26. Lubricate oil seal for gearcase housing and rail axle and install over axle into gearcase housing.

27. Reinstall gearcase breather.

28. Obtain brake disc and clean LD. Coat LD. with lubricant.

29. Locate gearcase assembly on horizontal press. Position brake disc on axle with key in slot and press to shoulder. Repeat second brake disc.

30. Reinstall brake caliper mounting adapters. Torque nuts to 150 ft. Ibs. torque.

31. Reinstall calipers and pads. Reference TRACKMOBILE Brakes, Chapter 04.

32. Reinstall bearing spacers and inner oil seals then reinstall the bearings.

33. Obtain outer oil seals and bearing housing and reinstall on axle.

34. Refill gearcase with 6.5 gallons SAE EP80W-90 API Service GL-5 classification lubricant.

Procedure For Setting Backlash In 450OTM Gearbox

1. Locate gearbox in vertical position with cover side up. Breakdown gearbox. Remove covers, remove bull gear and axle. Remove capsule - NOTE THICKNESS OF SHIM PACKET BETWEEN CAPSULE AND HOUSING. Remove large bevel gear, clean if necessary.

2. Press shaft out of old bevel gear - CHECK THAT NEW BEVEL GEAR AND PINION ARE MATCHED SET. Press shaft from old bevel gear into new bevel gear - install new bevel gear in housing.

3. Disassemble capsule and reassemble with new pinion - install in housing with SHIM PACKET REMOVED AT BREAKDOWN.

When holding pinion firm, there should be some backlash between pinion and bevel gear. If not, remove capsule, remove bevel gear, remove shims from under bearing cup under bevel gear, reassemble as previously done.

4. Locate magnetic base with indicator on side of housing with indicator in contact with a tooth on bevel gear. Hold pinion firm and rotate bevel gear. Take backlash reading. Compare with backlash as called for on bevel and pinion gears. Take the difference between number on gear and reading with indicator. Multiply by 1.364, that is shim required under bearing cup under bevel gear.

5. Reassemble gearbox.

CHAPTER 18
Railwheels

REMOVAL:

1. Raise unit to full height on roadwheels and block securely under frame at all corners.

2. Front roadwheels must be removed in order to remove front railwheels. Therefore, raise roadwheels so that they clear the ground. Remove front roadwheels. (See Roadwheel Tires). Rear railwheels clear roadwheels.

3. Remove sander tubes and brackets from frame and bumper and position them out of the way from the railwheels.

4. Support railwheels.

5. Flatten bent corners on locking plates and loosen capscrews and railwheel retainer on railwheels.

6. Break taper fit on railwheel and key with pry bar by bumping the railwheel at various points around it.

7. Remove capscrews, locking plates and railwheel retainer.

8. Remove railwheels with soft sledge hammer.

ASSEMBLY:

1. Position key in keyway on axle and slide railwheel onto axle.

2. Secure railwheel with retainer, locking plates and capscrews.

3. Torque capscrews to 260 ft. lbs. torque and bend up corners on locking plates.

4. Reinstall sander tube and brackets to frame and bumper.

CHAPTER 19

Roadwheel Steering Axle

Reference Section 4503 of Parts manual.

REMOVAL:

1. Raise unit on its roadwheels and, block securely under frame. Lower roadwheels to a resting position on the ground.

2. Remove roadwheels (see Roadwheel Tires, Chapter 20).

3. Disconnect brakelines.

4. Remove capscrew, clevis tube, and nut from roadwheel cylinder at its attachment point on the roadaxle.

5. Remove hoses from power steering cylinders. Plug hoses and steering cylinder ports to prevent contamination.

6. Place floor jack under the center of the axle and snug up.

7. Remove capscrews and bearing cap from main frame to remove axle assembly.

   NOTE: Each bearing cap and frame mounting point are matched. Before removing caps, mark each cap and frame to assure correct placement of caps to their position on the frame during reassembly.

8. Lower floor jack and move complete assembly from under unit.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

   NOTE: Install matched bearing caps to frame. Reference point 7 in axle removal. Bleed brakes after reassembly.

2. Grease axle before reinstallation.

DISASSEMBLY:

NOTE: It is only necessary to remove the whole axle assembly when the axle is being replaced. All other service can be performed with the axle on the TRACKMOBILE.

1. Raise unit on its roadwheels and block securely under frame.

2. Remove roadwheels.

3. Remove cover plate.

4. Remove spindle end nut, nut lock second end nut and thrust washer.

5. Remove hub and drum assembly.

6. Hub bearings may now be inspected or removed.

7. Remove hub oil seal.

8. The brake shoes may now be replaced or other work performed on the brake. See TRACKMOBILE Brakes, Chapter 04.

9. Remove power steering cylinder by removing its connecting screws and nuts and hydraulic hoses. Plug hoses and cylinder ports to prevent contamination.

10. Remove knuckle pin by removing the knuckle cap screws, knuckle cap and gasket.

11. Remove tie rod.

12. Remove knuckle pin retainers, expansion plugs and spacers.

13. Remove spindle lock pins by driving out tapered key.

14. Remove steering knuckle pin by tapping out spindle adapter and removing thrust bearing and shims.

15. Remove two bushings inside spindle adapter.

ASSEMBLY:

1. Reinstall bushings in top and bottom of spindle.

2. Position spindle to axle with thrust bearing at underside (Two men may be required).

3. Reinstall shims as required.

4. Reinstall knuckle pin with flats in proper locations.

5. Reinstall the spacer expansion plug and retainer from bottom of spindle.

6. Reinstall keys.

7. Secure gasket and cap on top of spindle w/knuckle capscrews.

8. Reinstall tie rod and power steering cylinder.

9. Replace hub oil seal.

10. Mount hub assembly.

11. Reinstall thrust washer second end nut, nut lock and end nut.

12. Reinstall cover plate and roadwheels. Crisscross tighten all roadwheel nuts to 50 ft.-lbs. torque and retighten in crisscross pattern to 450-500 ft.-lbs. torque.

NOTE: If tapered hub bearings are replaced, make certain that they are adjusted properly. “Snug up” bearings and back adjusting nut off one fourth turn.

NOTE: If steering cylinder or cylinders must be removed for service or replacement:

A. Raise the roadwheels to a point where they are just off the ground.

B. Block axle in this position and turn off engine.

C. Remove hoses. Plug hoses and cylinder ports to prevent contamination.

D. Remove screw and nut from clevis and barrel supports and remove cylinder. Reassembly is the reverse of the above.

POWER STEERING CYLINDER:

With the cylinder removed from machine, cleaned, retracted, and drained of oil, proceed as follows:

DISASSEMBLY:

1. Secure the cylinder in a vise or other method to prevent rotation. Rotate cylinder so that slot in barrel is positioned for easy access. Insure area is clean so parts can be layed out.

2. Using pin spanner wrench - rotate gland counterclockwise - square wire should back out of slot on side of cylinder body. If square wire does not back out; rotate gland until end of wire can be seen in slot, insert screwdriver into slot under end of square wire, and then rotate gland counterclockwise and remove square wire.

3. Pull on piston rod to remove gland and piston from tube.

   NOTE: If seals catch in retaining ring groove, it may be necessary to cut seal through slot in tube and pull out with needle-nose pliers.

4. If rod does not have a clevis, pull gland off end opposite piston. If clevis is treaded on, remove and then remove gland. If rod clevis is welded, the rod must be restrained and the piston must be removed to get the gland off.

5. Remove seals and check all parts for nicks, scratched, cracks and abnormal wear. Before reassembly, check that new seals have been installed and all internal parts are free of visible contamination.

REASSEMBLY:

1. Reassemble gland on rod, piston if removed, and secure clevis if it was removed or replaced.

2. Coat piston OD and gland seal area with light grease and apply light coat of hydraulic oil to tube ID.

3. Insert piston, gland and rod assembly into tube. Line up hole in gland retaining groove with slot in cylinder barrel.

4. Insert new retaining wire in hole in gland and rotate gland clockwise until wire is completely in tube.

5. Test cylinder - cylinder is now ready for reassembly in machine.

CHAPTER 20

Roadwheel Tires

REMOVAL:

1. Raise unit on roadwheels and block securely under frame.

2. Lower TRACKMOBILE onto blocks until roadwheels clear floor by 1/2".

3. Remove tires.

ASSEMBLY:

1. Assembly is the reverse of the above procedure. Tighten all capnuts using a criss-cross procedure to 50 ft.-lbs. torque. Retighten capnuts in same matter to 450-500 ft.-lbs. torque. Tires inflated to 105 psi.

WARNING: Some units equipped with tires filled with a calcium chloride solution. Exercise care when checking tire pressure. Check tire pressure with stem at 12 o'clock position to avoid high pressure fluid release into eyes and face. Total tire and wheel weight is approximately 435 lbs. Tire is filled with 225 lbs. calcium chloride solution and is inflated to 105 psi.

CHAPTER 21

Throttle System

Throttle System

Depending upon the unit's mode of travel, that is rail or road, throttle control acceleration and deceleration are achieved through either mechanical or pneumatic mediums.

ROAD:

When hydrostatically driven on road, the unit's engine as well as hydrostatic transmission are pneumatically controlled.

The pneumatic throttle control uses regulated air pressure 85 psi from the primary reservoir section of the brake reservoir to operate the various components of the pneumatic throttle system.

RAIL:

When driven on the rail the unit's engine throttle can be controlled by either the mechanical cable control mounted on the rotating console or the air controlled floor mounted valve.

Operation Of The Road Mode Pneumatic Throttle System

Reference Pneumatic Schematic, Chapter 03.

Air pressure from the brake reservoir is received at the accelerator foot treadle valve mounted on the cab floor to the right of the steering wheel. The accelerator treadle controls the supply and direction of air pressure to both the pneumatically controlled engine governor and pneumatically actuated hydrostatic transmission.

Pneumatic control of the engine governor is made possible through an engine mounted air throttle cylinder.

Air pressure used to actuate the hydrostatic transmission flows through a normally closed three-way solenoid valve into a flow control valve. At this point air is directed to the hydrostatic console mounted directional control air valve which directs air to the hydrostatic pump mounted hydrostatic actuator air cylinder. Depending upon the position of the directional control air valve, the air cylinder moves the pump's control assembly lever into either forward, neutral or reverse (forward, neutral and reverse correspond to the cam angle in the hydrostatic pump). The cam angle determines the direction of fluid flow to the hydrostatic motors and therefore the direction of travel when the unit is on its roadwheels.

Accelerator Treadle Valve

The accelerator treadle valve is a push rod actuated, self-relieving pressure modulator. As mentioned previously, the valve controls air pressure supply to the engine air throttle cylinder and the hydrostatic's pneumatic control system.

When the valve is in the deactuated position, the outlet pressure equals atmospheric pressure. Depressing the push rod closes the exhaust poppet and additional movement against the push rod unseats the inlet poppet. The output pressure rises to balance against an internal spring under the main piston. The main piston closes the inlet port to maintain the balanced condition. If the push rod is moved, a new balance point is established. As the push rod is released, the exhaust port opens to decrease the outlet pressure. When the push rod is fully released the valve exhausts and returns to the rest position. Reference functional diagram, Figure 21.04.

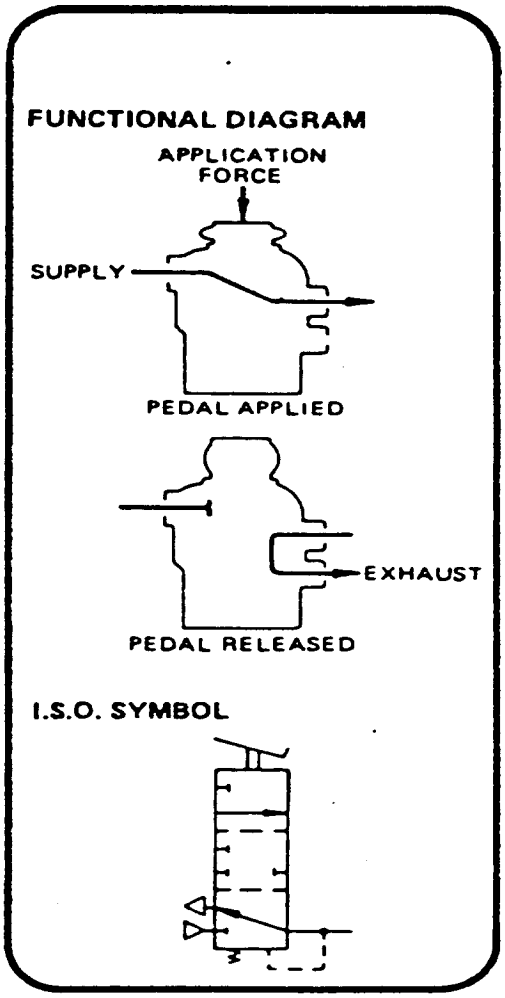


Fig. 21.04

REMOVAL:

1. Exhaust air pressure in system.

2. Disconnect air lines on valve and mark for reattachment. Plug lines and ports to prevent contamination.

3. Remove valve mounting bolts and remove valve. Service as necessary.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

DISASSEMBLY & REASSEMBLY:

Service kits are available for replacement of internal and external wear parts. Reference the parts catalog for kit part numbers. Replace parts as illustrated.

Engine Throttle Control Cylinder

The air pressure actuated throttle control cylinder is attached to the engine's fuel pump lever in order to regulate the position in direct proportion to the amount of air pressure received from the operator actuated accelerator foot treadle valve.

As the accelerator treadle valve is applied, air pressure extends the piston in the throttle control cylinder. The piston changes position in relation to the amount of pressure received from the treadle. While the piston modulates, the connected throttle lever also moves. When the treadle is released, an internal spring causes the piston to return to the idle position. Reference Functional Diagram, Figure 21.07

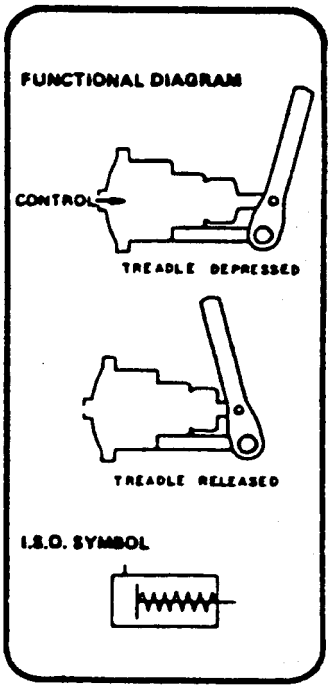


Fig. 21.07

REMOVAL:

1. Disconnect air line to throttle cylinder. Plug line & port to prevent contamination.

2. Remove nut attaching throttle cylinder connecting rod to throttle lever.

3. Remove two bolts and nuts mounting throttle cylinder to cable mounting plate and remove throttle cylinder.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

DISASSEMBLY & REASSEMBLY:

A service kit is available for field repair of the cylinder.

Three Way Solenoid Valve

The three way solenoid valve is normally closed, blocking air pressure supply to the components following it in the hydrostatic portion of the air throttle system. It is located beneath the cab under the steering console.

The solenoid valve is wired to the roadwheel “UP/DOWN” switch on the rotating console.

Flipping the roadwheel switch to a roadwheel “Down” position, activates the solenoid there by opening the valve and allowing air pressure supply to the remainder of the system.

When the roadwheel switch is in the roadwheel “UP” position, current flow to the solenoid stops and the valve remains closed. Therefore, the remaining air actuated components do not receive air pressure and are inoperative. This prohibits hydrostatic drive of the roadwheels when they are in the “roadwheel up” position.

REMOVAL:

1. Exhaust air pressure in the system.

2. Disconnect electrical wires on solenoid, marking for reattachment. Disconnect air lines and plug to prevent contamination.

3. Remove valve.

Adjust the unit’s deceleration as follows:

A. Close valve completely by turning knurled knob clockwise.

B. Open valve by turning knurled knob counterclockwise two complete revolutions.

C. Fine tune deceleration response to operator’s desire by turning knurled knob clockwise for quicker deceleration and counterclockwise for slower deceleration.

Hydrostatic Air Actuated Cylinder

The hydrostatic air actuated cylinder actuates the hydrostatic pump control assembly, shifting its control lever into the desired direction of travel - forward, neutral, or reverse.

It is a feathering cylinder with a 1" stroke that allows the operator infinite positioning of the control's lever from the neutral point into either the forward or reverse directions. The cylinder begins actuation at 0-15 psi and reaches full stroke at 65 psi.

To obtain variable positioning of its cylinder, the directional control air valve is used to modulate pressure delivery to the ports. When pressure is applied to one cylinder port, it is simultaneously exhausted from the other. From the center position, the piston can be positioned at any point between the full extension and retraction positions, depending on which port is pressurized and to what degree. Then pressure is released from both ports, a spring centers the piston in the normal position providing deactivation of the hydrostatic pump and therefore hydrostatic road drive.

REMOVAL:

1. Exhaust pressure in air system.

2. Disconnect air lines and reverse alarm switch wires. Mark for reattachment. Plug lines and ports to prevent contamination.

3. Remove nut attaching cylinder rod end to control lever boss.

4. Remove pin attaching cylinder rod butt to cylinder rod bracket and remove cylinder.

ASSEMBLY:

1. Install cylinder rod end on control lever boss.

2. Slide cylinder rod butt onto mounting pin and install cotter pin.

3. With control lever in neutral position, adjust cylinder.

4. Tighten all cylinder attaching hardware being careful to maintain the correct adjustment.

DISASSEMBLY AND REASSEMBLY:

A field service repair kit is available for the cylinder. Reference the parts catalog for the service repair kit part number.

Disassemble and service as necessary.

Flow Control Valve

The flow control valve, located after the normally closed three-way solenoid valve in the air line beneath the cab, controls air pressure flow to and from the directional control air valve in the hydrostatic console. It regulates the hydrostatic drive rate of deceleration. The flow control valve includes a check valve and an orifice. The check valve allows air pressure to travel to (free flow) the directional air valve in the hydrostatic console. The orifice restricts exhaust air flow from the directional control air valve in order to allow controlled, gradual deceleration of the hydrostatically driven unit.

REMOVAL:

1. Exhaust air pressure in the system.

2. Remove valve.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

DISASSEMBLY & REASSEMBLY:

The flow control valve is not field serviceable beyond disassembly and cleaning of the component should dirt or varnish clog the orifice or check valve. Further repair warrants replacement of the valve.

Directional Control Air Valve

Reference Hydrostatic Console, Chapter 14, for operational theory and maintenance procedure of this component.

CHAPTER 22

Train Air Brake System

Reference Section 4551 of Parts Manual.

Description of Components and Operation

Train Air Brake System Component Maintenance
Air Compressors - See Air compressor Chapter 01 Train
Air Reservoirs

Four Cubic Foot Reservoir

Two Cubic Foot Reservoir

220 Cubic Inch Reservoir

Air Pressure Regulator

Train Air Pressure Gauge

TRACKMOBILE Air Reservoir Pressure Gauge

Lever Controlled Brake Valve

Push-Pull/Emergency Stop Valve

Air Relay Valve

Train Air Brake System

DESCRIPTION:

The Preventive Maintenance and Operators Manual provided an explanation of the operating procedures for the train air system on the TRACKMOBILE and how it works upon and operates in conjunction with the railcar brake system.

In order to assist in the maintenance of the TRACKMOBILE train air brake system, an explanation follows which reiterates the functions of the system's components and explains how these components operate together in the system.

NOTE: A TRACKMOBILE equipped with a train air system actually has two air systems - the TRACKMOBILE air system and the train air brake system. Both of these systems operate off the same air supply. However, the systems operate separately from each other in all other respects.

TRAIN **A**IR BRAKE COMPONENTS:

Two 16CFM air compressors make up the 32 CFM air system on the TRACKMOBILE. They are mounted off of the rear engine power takeoffs and supply the air pressure necessary to operate the train air brakes as well as the air operated systems (Reference Air System, Chapter 3) on the TRACKMOBILE. The air compressors are controlled by a governor mounted on the right compressor. The governor is adjusted to unload at 125 psi.

Three air reservoirs are incorporated into the TRACKMOBILE train air brake system in addition to TRACKMOBILE reservoir (Reference Air System, Chapter 3 for TRACKMOBILE reservoir information). These are a two (2) cubic foot reservoir, a four (4) cubic foot reservoir, and a 220 cubic inch reservoir.

The four (4) cubic foot reservoir, located beneath the engine and rear U-joint assembly, is charged in conjuction with the TRACKMOBILE reservoir and the two (2) cubic foot reservoir through a tee at the top of the tank. A drain cock is located at the right end of the tank.

The two (2) cubic foot reservoir, located beneath the deck on the right rear of the unit, feeds the train air regulator valve - set at 90 psi maximum, the compressor unloader, set at 125 psi, and the air relay valve. The relief valve is also located on this tank - set at 150 psi.

The 220 cubic inch reservoir is located next to the 2 cubic foot reservoir. It acts as an air accumulator which, when incorporated in the train air system with the console mounted train brake control valve lever assembly, allows a gradual application (reduction in air line pressure) of the railcar brake system because of the increase volume of air it represents for exhaustion. Increased air exhaustion time, thus gradual braking. Without this increased volume the brakes would apply too rapidly.

An Air Pressure Regulator Valve, located beneath the deck on the right hand side of the unit next to the 220 C.I. air reservoir, controls the pressure of the air used in the train air brake system/railcar brake line. The train air system on the TRACKMOBILE begins at this regulator valve. The T-handled valve decreases the 110-125 psi air pressure received at its inlet port to the 70-90 psi outlet pressure required in most train brake lines. Increase pressure by turning “T-handle” in or clockwise. Decrease pressure by turning “T-handle” out or counterclockwise.

A train air pressure gauge, located in the upper left hand corner of the console, indicates the air pressure in the train line and air pressure on the TRACKMOBILE up to the air pressure regulator. It feeds off of the air relay valve. As previously mentioned, this pressure is usually 70-90 psi depending upon local railroad regulation.

The TRACKMOBILE air reservoir pressure gauge, located immediately below the train air pressure gauge, indicates the air pressure in only the TRACKMOBILE air system. This pressure should be 110 to 125 psi. High/Low Range Transmission shifting, air sanders, knuckle release, etc., run off of the TRACKMOBILE air system (See Air System, Chapter 3). The low air switch mounts off the back of the gauge.

TRAIN AIR BRAKE SYSTEM OPERATION:

At this point the explanation will focus on the components reacting to and upon the train air pressure received from the aforementioned starting point of the train air system, the air pressure regulator valve.

The lever controlled brake valve located on the console, may be described as “proportional” brake valve control lever since it proportionally controls the air system pressure through lever movement. When the lever is in the “UP” or “CHARGE” position, the air in the train brake system is equal to the pressure regulator valve’s outlet pressure. Moving the lever “downward” or “applying” the brake causes a proportional reduction in line pressure ultimately sensed by the air relay valve. The air is exhausted through an orifice in the valve.

Gradual application of the brakes through this reduction in line pressure initiated by lever controlled brake valve movement is possible because of the air accumulated in the 220 c.i. air tank (See 220 cubic inch reservoir).

The push-pull air/emergency stop valve is a 3-way manual valve. It is located to the left and above the lever controlled brake valve on the console and is located after it in the train air line system. The three functions of this valve are to: (1) inlet the pressure from the brake valve control lever, (2) exit same pressure to air relay valve when knob is manually “out” or in the open position, and (3) exhaust air line pressure rapidly in an emergency situation when the knob is manually closed by pushing it in.

The air relay valve is a “proportional” air relay valve. It is a three-way, self relieving compensating relay that requires a pilot control pressure for diaphragm accuation. This control pressure is received for the lever controlled brake valve and air push-pull/ emergency stop valve. The air relay sensed changes in control pressure and reacts proportionally against a supply pressure which in this case is the train air line pressure or the TRACKMOBILE air reservoir pressure. When control pressure is applied or increased, the valve proportionally delivers pressure to the train brake line from the TRACKMOBILE air reservoirs releasing the train brakes. When control pressure is released, the air relay valve proportionally releases or exhausts train brake line pressure through its exhaust port applying the train brakes. The relay valve reacts in a manner to equalize the control pressure and supply pressure.

In case of emergency braking, the push-pull air valve/emergency stop valve is manually pushed in. When the valve is pushed in, its “inlet” port is closed. Since the “inlet” port is closed, the larger air capacity supplied by the inlet line and 220 cubic in. accumulator tank is blocked off removing the gradually applied braking available when the “inlet” port is open. The small volume air capacity in the line between the “push-pull” air valve’s “exhaust” port. Accordingly, the air relay valve reacts in a proportionate manner and exhausts pressure through its exhaust port causing the rapid application of the train brakes.

The final component of the TRACKMOBILE train air brake system is the angle cock and the coupling hose. The coupling hose is connected to the railcar air brake hose. The angle cock, when open, allows air pressure to move between the TRACKMOBILE train air system and railcar brake system. It is open when its handle is in line with the coupling hose.

Train Air Brake System Component Removal

REMOVAL:

See Air Compressors, Chapter 0 1.

Train Air Reservoirs

FOUR CUBIC FOOT RESERVOIR

REMOVAL:

1. Raise unit on roadwheels and block securely under frame.

2. Relieve all air pressure in system by lowering the console mounted lever controlled brake valve completely, pushing in the console mounted push-pull/emergency stop valve and opening the drain cock on the 220 cubic inch reservoir.

3. Remove one roadwheel tire (See Roadwheel Tires) from the rear roadwheel axle. The reservoir will be removed through this aperature.

4. Disconnect air lines at tee.

5. Support reservoir and remove capscrews attaching reservoir to frame mounts.

6. Remove tank.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

TWO CUBIC FOOT RESERVOIR

REMOVAL:

1. Raise unit on roadwheels and block securely under frame.

2. Relieve all pressure in air system in same manner as prescribed for the four cubic foot reservoir.

3. Disconnect all air lines - mark for reattachment.

4. Support reservoir and remove mounting capscrews.

5. Remove reservoir.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

220 CUBIC INCH RESERVOIR:

REMOVAL:

1. Open drain cock to relieve pressure.

2. Disconnect air line running to push-pull valve on console at reservoir.

3. Remove mounting capscrews and remove reservoir.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

Air Pressure Regulator

REMOVAL:

1. Relieve pressure in system.

2. Disconnect inlet and outlet lines at the air pressure regulator.

3. Disconnect mounting screws and nuts.

4. Remove component.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

Train Air Pressure Gauge

REMOVAL:

1. Relieve pressure in system.

2. Disconnect air hose coupling and remove light bulb.

3. Disconnect mounting nuts and remove gauge.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

Lever Controlled Brake Valve

The lever controlled brake valve is a rotating console mounted, three-way compensating control valve which is normally closed. It is actuated by a handle which is equipped with adjustable stops so that the operator can establish minimum and maximum pressure limits within the train air systems operating range. When the stops are adjusted to allow maximum handle movement, the valve modulates through its entire output range and the handle has a rotation of 90 degrees.

OPERATION:

The valve is equipped with a friction adjustment which restricts or allows free movement of the control handle. The desired friction is obtained by adjusting the three screws located under the handle.

IMPORTANT: When these screws are loosened to produce minimum handle friction, the handle will return to the deactuated position whenever it is not manually held in an applied position by the operator. When the handle of the valve is applied, the valve opens to modulate pressure delivery to the outlet. As the handle is returned to the “normally closed” position, air pressure at the outlet port is released through the valve’s exhaust. Output pressure for the valve is basically linear and proportional to handle movement. Reference Functional Diagram Figure 22.03.

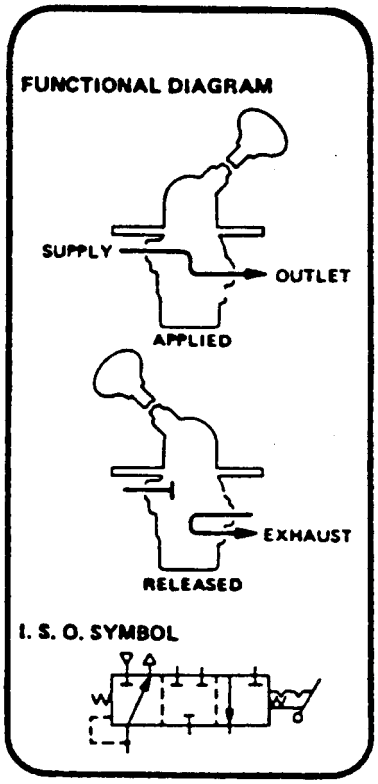


Fig. 22.03

REMOVAL:

1. Relieve pressure in system.

2: Disconnect all air couplings at valve and mark for reattachment. Plug ports in valve to prevent contamination.

3. Remove four mounting nuts.

4. Remove valve from front of console.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

DISASSEMBLY & REASSEMBLY:

A field service kit is available to service the cartridge and valve assembly. Kits are also available to separately service the cartridge asembly or to replace the springs. Reference the parts catalog for part numbers.

Push-Pull Air Valve/Emergency Stop Valve

REMOVAL:

1. Relieve pressure in system.

2. Disconnect all air couplings and mark for reattachment.

3. Unscrew coupling and remove valve.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

Air Relay Valve

The air relay valve is a three-way, self relieving, compensating relay valve that requires pilot control pressure for actuation. It is used to supply air pressure to the railcar brake chambers.

The valve is actuated by the lever controlled brake valve on the rotating console. A control pressure of 3 psi is required for actuation against a 100 psi supply. When pilot control pressure is applied, the valve delivers pressure to the railcar brake chambers. When the railcar brakes are released, pressure at the chambers is exhausted to the atmosphere through the exhaust port. Reference Functional Diagram, Figure 22.06.

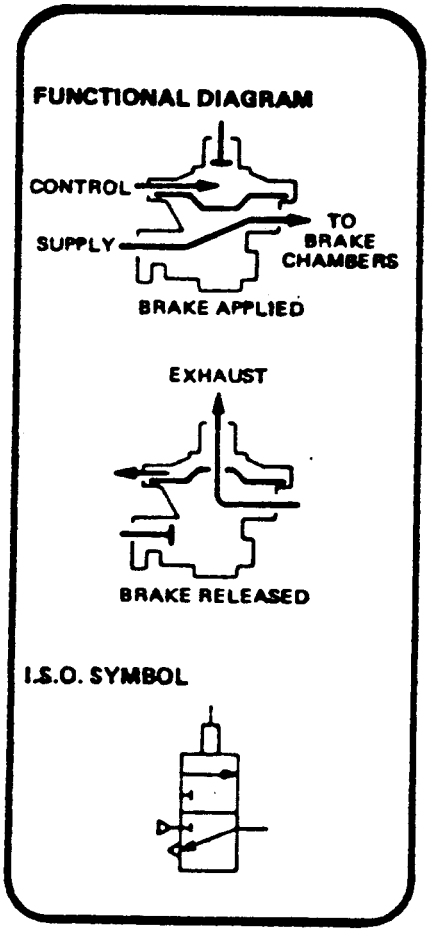


Fig. 22.06

REMOVAL:

1. Relieve pressure in system.

2. Disconnect hoses and lines and mark for reattachment. Plug open ports to prevent contamination.

3. Remove mounting capscrews and washers.

4. Remove valve.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

DISASSEMBLY & REASSEMBLY:

A field service kit is available to service the diaphragm and cartridge assemblies. A kit is also available to replace only the cartridge assembly. Disassemble and reassemble per illustration in the parts catalog - section 4551.

Angle Cock & Coupling Hose

REMOVAL:

1. Relieve pressure in system.
2. Remove hose - self explanatory.
3. Remove drain cock - self explanatory.

ASSEMBLY:

1. Assembly is the reverse of the above procedure.

ACHAPTER 23

Universal Joint Assemblies

REMOVAL:

1. Raise unit on roadwheels and block securely under frame.
2. Remove capscrews from U-joint at the transmission and gearcase.
3. Remove universal joint assembly.

ASSEMBLY:

1. Assembly is reverse of the above procedure.

   NOTE: Torque U-joint capscrews to 110-120 ft.-lbs. dry thread.

REAR UNIVERSAL JOINT ASSEMBLY:

REMOVAL:

1. Raise unit on roadwheels and block frame securely.
2. Move coupler to extreme right or left position.
3. Support U-joint assembly.
4. Remove capscrews from parking brake gearcase end of U-joint assembly.
5. Remove capscrews from transmission end of U-joint assembly.
6. Remove U-joint assembly past gearcase and out through rear of machine.

ASSEMBLY:

1. Assembly is reverse of the above procedure.

   NOTE: Torque U-joint carscrews to 110-120 ft.-lbs. dry thread.

CHAPTER 24

PREVENTIVE MAINTENANCE

The following schedule is for average usage under average weather and dust conditions. Remember, severe use and load, or extremely severe weather conditions, temperature, dust, etc. require more frequent maintenance. For example - the air cleaner filter element will have to be changed or cleaned more frequently in dusty or dirty work areas.

The 4500TM TRACKMOBILE is equipped with an hourmeter on the rotating console to help keep your maintenance schedule. Adjust your schedule as work load, weather, dust, etc., dictate.

CHECK THE FOLLOWING:

		INTERVALS				
ITEM DESCRIPTION	EACH SHIFT	50 HRS	100 HRS	500 HRS	1000 HRS	SPECIAL INSTRUCTIONS
Sand Level in Sandboxes	X					Fill as required (4 places)
Engine Coolant Level	X					Do not remove cap if it is Hot. Newer vehicles have sight gauge. Add as required
Engine Oil Level	X					Add as required
Oil Leak Inspection	X					Inspect machine for oil leaks in converter, engine, hydraulic and hydrostatic system and rail axle gearcase assemblies. Correct before operating the machine.
Gauges and Controls	X					Start engine and check all gauges and controls for proper operation, including the sanders.
Brakes	X					Road drum and rail disc. Check fluid level in reservoirs. Check for leaks. Inspect pads and linings for wear. Check to see that caliper assembly is firmly attached to anchor plate.
Hydraulic Tank	X					Add as required
Air Reservoir Tank	X					Drain condensation every 5 to 10 hours at 5 locations, through petcocks provided.
Roadwheel Lugnuts	X					On a new unit, check the roadwheel lugnuts for tightness every day for the first week of operation. Use crisscross procedure to tighten all nuts to 50 ft./lbs. then using the same procedure, final tighten all nuts to 320 torque ft./lbs.
Railwheel Retainer Bolts	X					On a new unit, check the rail axle and railwheel retainer bolts for tightness every day for the first week. Tighten rail axle retainer bolts to 260 torque ft./lbs. Railwheel retainer bolts 740 ft./lbs.
Transmission Oil Level	X					Add as required. Check oil level at operating temperature (180-200°F.) and engine at idle and transmission in neutral. Oil level dipstick and fill located under hood, on back side of cab.
Fuel	X					Add as required for each shift.

Engine Maintenance: Check engine support bolts front and rear for tightness. Retighten as necessary. Refer to respective engine manufacturer's manual (furnished with each TRACKMOBILE) for maintenance procedures and lubrication.

NOTE: ALWAYS REMEMBER TO BLOCK MACHINE TO SUPPORT WEIGHT PRIOR TO WORKING ON OR UNDER THE MACHINE.

NOTE: At least as often as every 25 or 50 hours, perform all of the previous listed maintenance checks and include the following:

ITEM DESCRIPTION	25 HRS	50 HRS	100 HRS	500 HRS	1000 HRS	SPECIAL INSTRUCTIONS
Hydraulic Filter	X					After the first 25 hours of operation, change the hydraulic filter. Thereafter change it every 500 hours or earlier if the console mounted filter change indicator light becomes illuminated. SEE 500 HOURS. Replace both the hydrostatic and hydraulic filters if the indicator light becomes illuminated since the systems operate from a common reservoir.
						NOTE: The TRACKMOBILE design filter is specifically made to meet the high filtration requirements of the hydrostatic and hydraulic systems.
Engine & Trans. Cooling System		X				Fill cap on top of radiator at rear of unit. Maintain coolant (water or anti-freeze solution) slightly below overflow tube.
Hydrostatic Cooling System		X				Air to oil type cooler. Keep assembly free of dirt and debris.
Engine Air Cleaner		X				Dry type. Clean with compressed air blast. Be careful not to rupture cartridge. Replace cartridge every 500 hours or more often under severe conditions.
Engine Oil		X				Refer to Fuel & Lubricant Specifications for specifications of oils to be used. Maintain engine oil level at or near the full mark on the stick gauge. NEVER allow oil to get below the add oil mark.
Rail Axle Gearcase		X				Remove drain plug located at bottom side of the gearcases. Replace plug and refill to capacity (to top level plug located above axle height on gearcase). Change oil every 500 hours thereafter. SEE 500 HOURS .
Hydraulic Tank		X				With all cylinders retracted (roadwheels up, both couplers up, traversing cylinders retracted) and oil warm, maintain hydraulic oil level to full level as indicated on dipstick.
Brake Master Cylinder		X				Located at left front and right rear corners of machine behind coupler beams. Maintain level within 1/2" of top of filler hole with specified fluid.
Battery		X				Located at left hand side of engine compartment. Fill to level. Check charge with hydrometer and maintain electrolyte level above plates and clean battery terminals.

NOTE: At least as often as every 50 to 500 hours, perform all of the previous listed maintenance checks and include the following:

ITEM DESCRIPTION	50 HRS	100 HRS	250 HRS	500 HRS	1000 HRS	SPECIAL INSTRUCTIONS
Tires	X					Maintain 105 psi air pressure on front and rear tires.
Sandboxes	X					On body frame at each corner of TRACKMOBILE. Keep filled with 20 mesh clean, dry sand. To clean sander valve, remove bottom plate.
Breathers	X					Service the breather caps for the hydraulic tank and rail axle gearcase. If breather is paper type, discard and replace. If breather is porous bronze, wash in solvent and replace.
Grease Fittings	X					Refer to Lubrication Chart for location of grease fittings.
Unit Inspection	X					Visually inspect unit. Work controls to test operation of brakes, roadwheels, couplers and transmission. Look for, and tighten, any loose mountings, fittings or connections. Check particularly the track wheels and engine/transmission, the road wheel system (including steering), the coupler, the cooling, hydraulic and engine air intake systems, the wiring and fuel line, the brake lines and brake mountings, and the control linkages.
Transmission		X				Wash breather filter in solvent and re-oil. Reinstall.
Air Compressor		X				Unscrew round filter retainer. Remove air filter element and clean with compressed air. Be careful not to rupture filter with air blast.
Engine - Cummins			X			Under normal conditions, change oil in crankcase at this time. At the same time change the engine oil filter. Replace fuel strainer and fuel filter elements with new strainer and filter elements.
Air Cleaner				X		Replace cartridge. Replace earlier if required by operational conditions.
Transmission				X		Drain and fill transmission per transmission manual.
Air Compressor				X		Replace air filter element. Replace earlier if required by operational conditions.
Rail Axle Gearcases				X		Remove drain plug on bottom side of gearcases and drain oil. Replace plug and refill to capacity (to top level plug located above axle height on gearcase) with specified fluid.
Hydrostatic System				X		Replace hydrostatic filter. Replace filter earlier if console mounted filter change indicator light becomes illuminated. Replace both hydrostatic and hydraulic filters if the indicator light becomes illuminated since the systems operate from a common reservoir.

At least as often as every 1000 hours perform all applicable previously listed maintenance checks and include the following at intervals shown:

ITEM DESCRIPTION	50 HRS	100 HRS	250 HRS	500 HRS	1000 HRS	SPECIAL INSTRUCTIONS
Unit Inspection					X	Steam clean unit. Blow dirt from radiator and hydrostatic system cooling fins with compressed air. Inspect unit thoroughly. Check carefully for worn or damaged parts which need replacement. Tighten all bolts, nuts, fittings, and connections.
Engine & Transmission Cooling System					X	Drain and flush thoroughly. Check and tighten all cooling system connections. Replace any doubtful hoses or fittings. Refill as seasonal requirements prescribe. When replacing anti-freeze solution with water as coolant, add rust and corrosion inhibitor.
Transmission & Torque Converter					X	Drain and refill as oil specifications and seasonal requirements prescribe. See Transmission Manual for instructions. Raise unit and block securely.
Hydraulics (Including Power Steering & Hydrostatic Systems)					X	Retract all cylinders (roadwheels up, couplers up, coupler traversing cylinder retracted). Remove plug from hydraulic tank drain hose to drain tank. Check all hydraulic component parts for leakage and repair as necessary. Check all mounting bolts and fittings for tightness. Reinstall pipe plug in drain hose.
Hydraulic Filters					X	Replace spin-on filter on the hydraulic tank return line. Replace filter earlier if console mounted filter change indicator light becomes illuminated. Replace both the hydrostatic and hydraulic filters.

NOTE: Above procedures does not change the oil in the lines or cylinders. If the oil has become contaminated, it is recommended that the hydraulic lines and cylinders also be drained of contaminated oil and the hydraulic tank removed and cleaned before new oil is added. After new oil has been added and before starting the engine, fill the hydraulic pump case with system fluid through the uppermost drain port. It may be necessary to bleed air from the pump outlet line to permit priming and reduce noise. Bleed by loosening an outlet connection until solid stream of fluid appears.

IMPORTANT: Whenever working with any hydraulic or transmission oils, it is the utmost importance that containers, area and oil be kept clean. Any fill points should be cleaned off before adding any new oil - only clean containers should be used and only clean oil.

Verify correct system pressures. See Maintenance Catalog for procedure.

A. Relief valve in rear coupler control valve is factory preset at 2500 psi. Valve should not need to be reset in the field. Contact TRACKMOBILE distributor for further instructions.

B. Hydraulic pump 1825 psi (quick disconnect in rotating console).

NOTE: Set pressure with engine at high idle (1500-2500 rpm).

NOTE: At least as often as every 2000 to 12,000 hours perform all applicable previously listed maintenance checks and include the following at intervals shown:

ITEM DESCRIPTION	2000 HRS	4000 HRS	12,000 HRS	SPECIAL INSTRUCTIONS
Air Reservoir	X			Remove and inspect air tanks for damage or corrosion (inside and outside). Repair as necessary.
Roadwheel Bearings		X		Grease inner and outer bearings with specified lubricant.
Engine			X	Rebuild under normal operating conditions.
Transmission			X	Rebuild under normal operating conditions.

Mail or Fax To:
TRACKMOBILE, INC.
Att: Service Dept.
1602 Executive Drive
LaGrange, Ga. 30240
706 884-6651
FAX(706)882-6753

4500TM

Customer _____
Serial # _____
Date _____

SCHEDULE OF COMPONENTS/AREAS TO BE CHECKED EVERY 250 HOURS

INITIAL AND DATE EACH APPROPRIATE ENTRY TO VERIFY OPERATION WAS PERFORMED AND FORWARD COPY OF THIS TO TRACKMOBILE AFTER EACH 500 HOURS.

Component/Area	Bolt Size	Torque Ft. Lbs.	Machine Installed 0 Hours	250 HRS. Date Intials	500 HRS. Date Intials	750 HRS. Date Intials	1000 HRS. Date Intials	1250 HRS. Date Intials	1500 HRS. Date Intials	1750 HRS. Date Intials	2000 HRS. Date Intials
Engine Mounts	5/8"-11	170									
Trans. Mounts	3/4"-10	280									
Drive Shaft Bolts*	1/2"-20	90									
Brake Caliper Mounting Bolts	5/8"-18	180									
Parking Brake Mounting Bolts	1/2"-13	80									
Railwheel Bolts*	1" - 12	740									
Rail Axle Gearcase Bolts	5/8"-11	170									
Roadwheel Lug Nuts	3/4"-16	320									
Hydrostatic Road-wheel Attach. Bolts	5/8"-18	180									
Engine Fan/Alt. Belts Tightness and Condition											

* USE LOCKTITE 290 IF BOLTS FOUND LOOSE

Mail or Fax To:
TRACKMOBILE, INC.
Att: Service Dept.
1602 Executive Drive
LaGrange, Ga. 30240
706 884-6651
FAX (706) 882-6753

4500TM

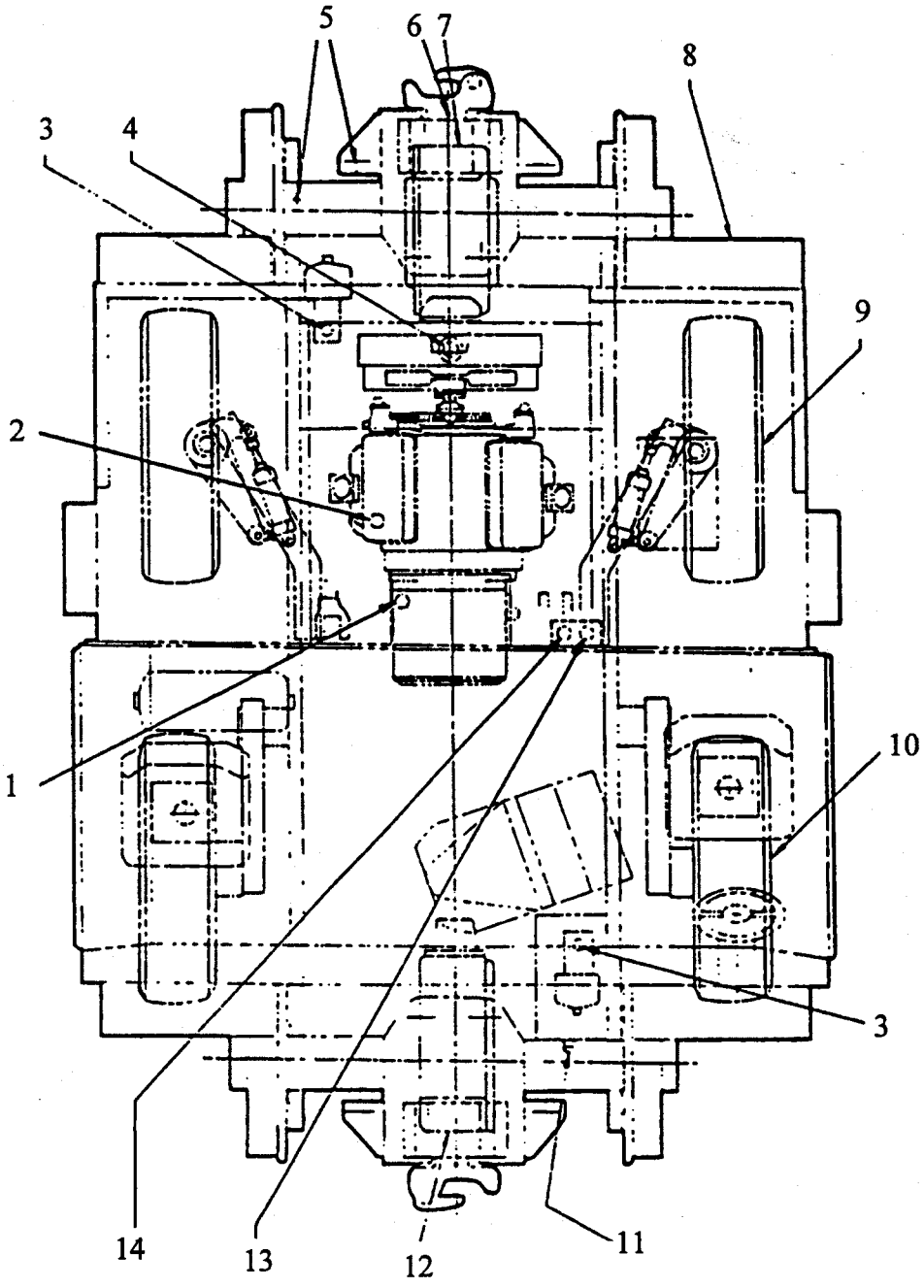
Customer _____
Serial # _____
Date _____

SCHEDULE OF COMPONENTS/AREAS TO BE CHECKED EVERY 250 HOURS

INITIAL AND DATE EACH APPROPRIATE ENTRY TO VERIFY OPERATION WAS PERFORMED AND FORWARD COPY OF THIS TO TRACKMOBILE AFTER EACH 500 HOURS.

Component/Area	Bolt Size	Torque Ft. Lbs.	Machine Installed 0 Hours	250 HRS. Date Intials	500 HRS. Date Intials	750 HRS. Date Intials	1000 HRS. Date Intials	1250 HRS. Date Intials	1500 HRS. Date Intials	1750 HRS. Date Intials	2000 HRS Date Intials
Hyd. Hoses and Fittings. Check for Leaks, Condition, & Routing.											
Radiator Hoses & Heater Hoses											
Fuel Lines & Fuel Filters											
General Unit Inspection											
Brake Lines and Connection for Leaks											
Front Coupler Operation Condition											
Rear Coupler Operation Condition											
Copy sent to TRACKMOBILE Att: Service Department			Date Intials	X	Date Intials	X	Date Intials	X	Date Initials	X	Date Intials

LUBE GROUP



4500TM TRACKMOBILE
LUBRICATION

1. HYDRAULIC TANK: Fill to level on dipstick. See Reference “AA”.

2. ENGINE FILL: Detroit diesel - See Reference “B”; Cummins Diesel - See Reference “H”.

3. POWER BRAKE MASTER CYLINDER: See Reference “E”. Two(2) Places.

4. RADIATOR: Factory filled with Compleat EG Coolant with DC4A inhibitor package.
   Top off or refill with Compleat EG Coolant only. See Reference “G”

5. GREASE FITTINGS ON ROLLER BEAM COUPLER: See Reference “D”
   (Fifty two (52) pounds)

6. OIL CUP: Small quantity of light weight oil. See Reference “B”.

7. RAIL AXLE GEAR CASE: See Reference “C”.

8. SAND BOX FILL CAP: Four places, 20 mesh dry sand or Trackite. See Reference “F”.

9. ROADWHEEL WHEEL BEARINGS.: See Reference “D”.

10. ROADWHEEL PLANETARY HUB: See Reference “C”.

11. FUEL FILL: Use clean fuel only.

12. RAIL AXLE: See Reference “C”.

13. TRANSMISSION CHECK: Check level with engine/transmission at operating temperature and at idle.

14. TRANSMISSION FILL: See Reference “A”. For drain and fill location, see Transmission Manual.

LUBRICANT REFERENCE:

A. Oil Type SAE 10W API CLASS CE/CD for transmission.
AA. Oil Type Rando HD-32 for hydraulic system.

B. Motor oil or lube oil per spec. SAE 40W API CD/SF for Detroit Diesel engines.

C. Gear lube SAE EP 80-90W API service GL-5 classification for roadwheel planetary hub and rail axle gearcases.

D. Lithium grease for extended lubrication intervals, for all grease fittings and wheel bearings.

E. Fill brake master cylinder with Super Heavy duty brake fluid, SAE 11703 or DOT 3.

F. Traction Compound - “Trackite”

G. Compleat EG Coolant with DC4A Inhibitor package.

H. Cummins Brand Premium Blue 15W-40 for Cummins engine.

Fuel and Lubricant Specifications and Capacities

ENGINE

Detroit Diesel

ELECTRICAL

130 Alternator
Two 12volt, 500 CCA Batteries

ENGINE CRANKCASE

Detroit Diesel - 18 quart (17.0 liters) w/filter
Cummins Diesel - 15 quarts (14.2 liters) w/filter

ENGINE/TRANSMISSION COOLING SYSTEM
40 quarts (37.8 liters)

RAIL AXLE GEARCASE
26 quarts (24.6 liters) per axle
Each Axle EP 80-90W API Spec GL5

HYDRAULIC SYSTEM (Main)
Amount required for change of reservoir, filter, cylinders, and lines:
22 gallons (83.3 liters) capacity. Type HD-32

Fuel and Lubricant Specifications and Capacities

POWER STEERING

None required - same sypply as main hydraulic system.

FUEL

40 gallons (151.4 liters) capacity.

Diesel Engine - ASTMD975 (#1 Diesel for winter & #2 Diesel for summer operation)

NOTE: As the result of the Environmental Protection Agency's Clean Air Act, diesel fuel is required to be produced with low sulphur content. This fuel does not provide adequate fuel system lubrication. Please check with your fuel supplier to insure that sufficient lubrication is present to prevent service problems to injector pumps and nozzles.

It is recommended to add NAPA 9600 diesel fuel anti-gel conditioner, ProChem Fuel Plus DFS 1000, Lubrizol additive or an equivalent fuel additive to improve lubricating properties of low sulfur diesel fuel.

Service failures of diesel fuel injection components that can be attributed to low sulfur/ lubricity fuels <u>will not</u> be covered under our warranty policy.

TRANSMISSION & CONVERTER

7.5 gallons (28.4 liters) initially, type C-3ATF220

5.75 gallons (21.6 liters) when filling.

ROADWHEEL PLANETARY TORQUE HUB

50 fl. oz. (1.5 liters) gear lube SAE EP 80-W-90 API Service

GL=5 classification each hub. Four (4) total.

AIR OVER HYDRAULIC BRAKE MASTER CYLINDER

Approximately 2 quarts (1.9 liters) capacity Heavy Duty Brake Fluid.

ROADWHEEL BEARINGS & ALL GREASE FITTINGS

Lithium grease for high temperatures.

COUPLER PLUNGER

Few drops of light engine oil.

GENERAL OILING

Occasional few drops of light engine oil on all other moving parts will keep the action free and smooth.

SAND BOXES

50 lbs. (22.7 kg) Each (2) Front Boxes.

100 lbs. (45kg) Each (2) Rear Boxes.

20 Mesh Dry "TRACKITE".

TIRE PRESSURE

105 PSI (7.2 bar) front and rear.

AIR PRESSURE

45 gallons (1770 liters).

NORMAL OPERATING PRESSURES AND TEMPERATURES

SANDERS
40 PSI (276 kPa)

TRAIN LINE AIR BRAKES
F90 PSI (621 kPa)

COMPRESSORS
125 PSI (862 kPa)

AIR SYSTEM RELIEF
150 PSI (1034 kPa)

TRANSMISSION PRESSURE
240 to 280 PSI (1655 to 1931 kPa) @ 2000 RPM

ENGINE OIL PRESSURE
Detroit Diesel
Minimum 5 PSI (34.5 kPa) @ Idle, 40-60 PSI (276-414 kPa) @ High Idle

CONVERTE TEMPERATURE
180-200°F (82.2-93.3° C), Max 250° F (121° C)

ENGINE WATER TEMPERATURE
Detroit Diesel: 160-185° F (71.1-85° C), Max 195° F(9035 C)

HYDRAULIC PUMP PRESSURE
2300PSI F(15.858 kPa)

HYDRAULIC RELIEF
2700 PSI (18.616 kPa)

TIRE PRESSURE
105 PSI (732Bars) “Front and Rear)

AIR OVER HYDRAULIC BRAKE SYSTEM
85 PSI (586kPa) at reservoirs primary and secondary air line pressure regulators

AIR THROTTLE SYSTEM
85 PSI (586 kPa) at reservoirs primary tank air line pressure regulator.

Points To Check When 4500tm Trackmobile Is In For Preventive Maintenance

RAIL AXLE GEARCASE: Check for leaks and tightness of bolts.
Check fluid level.
*Bolt size = 5/8”-11

DRIVESHAFTS: Check and torque driveshaft bolts
*Bolt size - 1/2”-20

RAIL WHEELS: Check to tightness of rail wheel retaining bolt Check flange wear.
*Bolt size = 1”-12.

ROADWHEELS Check lug nuts.
Nut size = 3/4”-16
Hydrostatic Roadwheel Attaching Bolts.
*Bolt size = 5/8”-18

TRANSMISSION: Check (4) holding transmission bracket and (4) bolts holding bracket to block. Check for leaks and tightness of bolts.
Check Fluid Level.
*Bolt size = 3/4”-10

COUPLER ROLLERS: Check for smooth operation.

COUPLER KNUCKLE: Check for any cracks or stretch areas around the hole for pin.

ENGINE: Refer to engine manual for adjustments, etc. Check bolts holding engine mounts to frame and engine supports.

BRAKES: Check roadwheel brake shoe lining and brake wheel cylinders. Replace if worn excessively or leaking.
Check rail disc brakes for sufficient brake pad thickness and caliper housing for leaks around pistons. Replace or repair as necessary.
Check air over hydraulic brake line pressure at two pressure regulator valves.
-85psi.
Check torque on bolts.

*Bolt sizes:

Caliper Mounting	5/8”-18
Parking Brake Mounting	1/2”-13

Points To Check When 4500tm Trackmobile Is In For Preventive Maintenance

RADIATOR:	Clean and flush - use compressed air to blow out debris. Check and adjust antifreeze solution to anticipated ambient temperature. Check radiator hoses and heater hoses.
FUEL:	Check fuel lines and fuel filter.
SANDERS:	Check sand flow. Dismantle. Clean and reassemble if necessary. Check sand caps for airtight fit. Replace gaskets if broken or not sealing.
HYDROSTATIC COOLER:	Clean externally with compressed air.
HYDRAULICS, HDROSTATIC & POWER STEERING	Check for external leaks. Repack cylinders if necessary. Change Oil. Change oil filters. No filter on power steering. Check system pressures. See 1000 hour maintenance for pressure setting.Replace hoses that are worn or frayed.
CAB & BODY:	Reweld any breaks in cab, body frame or hand railing. Check all mounting bolts and inspect ladder.
BRAKE MASTER CYLINDER:	Check both cylinder reservoirs and add brake fluid if necessary. Replace seals and cups if necessary.
AIR COMPRESSOR:	Check for proper pressure setting, relief valve setting. etc. Tank relief, 150 psi. (1034 kPa); Compressor - 125 psi (86.2kPa). Clean or replace air filter element. Check for excessive oil passage past rings - rebuild if necessary.
GENERAL:	Do general hardware check-over. Check all hoses.

*Refer to bolt torque cart for proper torque per bolt size.

Refer to Section 13, Page #2 for additional checks and lubrication recommendations.

GRADE 8 LUBRICATED
BOLT TORQUE CHART

SIZE	TORQUE VALUE
1/4 - 20	9 FT LBS [12 Nm]
1/4 - 28	10 FT LBS [14 Nm]
5/16 - 18	18 FT LBS [24 Nm]
5/16 - 24	20 FT LBS [27 Nm]
3/8 - 16	35 FT LBS [45 Nm]
3/8 - 24	35 FT LBS [45 Nm]
7/16 - 14	55 FT LBS [75 Nm]
7/16 - 20	60 FT LBS [81 Nm]
1/2 - 13	80 FT LBS [108 Nm]
1/2 - 20	90 FT LBS [122 Nm]
9/16 - 12	110 FT LBS [149 Nm]
9/16 - 18	130 FT LBS [176 Nm]
5/8 - 11	170 FT LBS [230 Nm]
5/8 - 18	180 FT LBS [244 Nm]

SIZE	TORQUE VALUE
3/4 - 10	280 FT LBS [380 Nm]
3/4 - 16	320 FT LBS [434 Nm]
7/8 - 9	460 FT LBS [624Nm]
7/8 - 14	500 FT LBS [678 Nm]
1 - 8	680 FT LBS [922 Nm]
1 - 12	740 FT LBS [1003 Nm]
1 1/8 - 7	960 FT LBS [1302 Nm]
1 1/8 - 12	1080 FT LBS [1463 Nm]
1 1/4 - 7	1360 FT LBS [1843 Nm]
1 1/4 - 12	1500 FT LBS [2033 Nm]
1 3/8 - 6	1780 FT LBS [2413 Nm]
1 3/8 - 12	2040 FT LBS [2764 Nm]
1 1/2 - 6	2360 FT LBS [3098 Nm]
1 1/2 - 12	2660 FT LBS [3605 Nm]

GRADE 8 IDENTIFICATION, 6 RADIAL DASHES 60° APART ON HEAD OF BOLT

Grade 8

NOTE: RATED TORQUE VALUES ARE + or - 5%

USE ONLY GRADE 8 HARDWARE FOR REPLACEMENT

4500TM TRACKMOBILE

Suggested 150 Hour Preventive Maintenance Schedule (sample copy)

Refer to Preventive Manual for complete 50,100, 150, 250, 300, 500, 1000 hour service.

Serial No. _____ Date _____

Department _____ Hour Meter Reading _____

Mechanic _____

Item		Condition	Remarks
1.	Change engine oil (change filter cartridge)		
2.	Check radiator coolant level		
3.	Clean crankcase breather cap		
4.	Clean engine air cleaner		
5.	Check fan and alternator belts		
6.	Check battery water level		
7.	Check hydraulic tank oil level		
8.	Clean hydraulic breather cap		
9.	Clean rail axle gearcase breather		
10.	Check operation of hydraulic system		
11.	Check operation of hydrostatic system		
12.	Check for oil leaks		
13.	Clean transmission breather		
14.	Check tire pressure (F & R 105 psi)		
15.	Grease unit completely		
16.	Adjust brakes		
17.	Check rail axle gearcase oil level		
18.	Check torque converter oil level		
19.	Check operation gauges on instrument panel		
20.	Check lights and horn		
21.	Check sanders		
22.	Check tightness-engine bolts to frame		
23.	Check tightness-cab bolts to frame		
24.	Check operation of couplers		
25.	Check engine performance		
26.	Check electrical system (loose connections)		
27.	Drain water from air reservoir		
28.	Check hydrostatic cooling system		
29.	Check brake master cylinder		
30.	Clean air compressor filter		

NOTE: Refer to Maintenance Manual for procedure and adjustments. ALWAYS BLOCK TRACKMOBILE in RAISED POSITION before making repairs.

Miscellaneous: _____