CENTRAL

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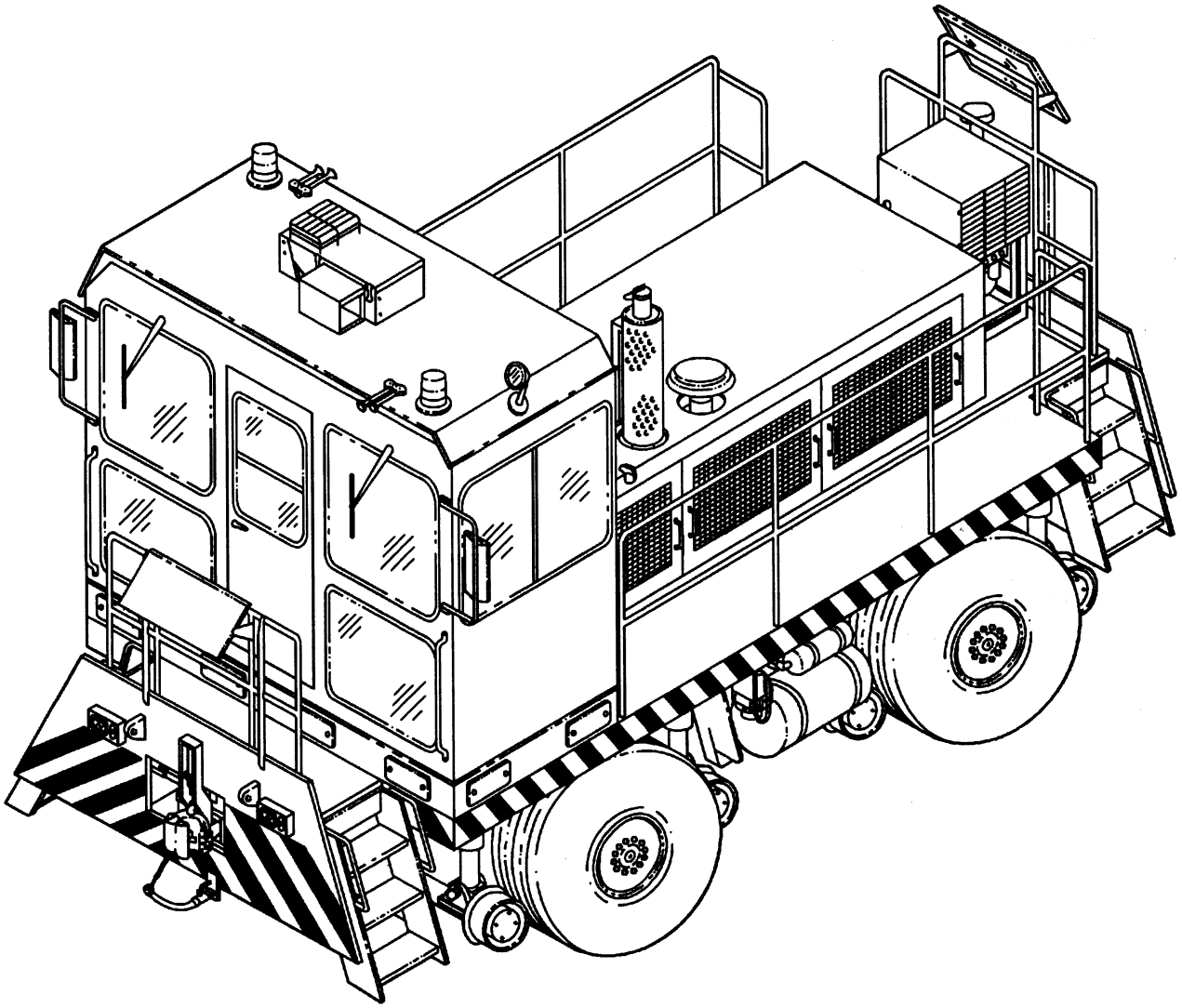
OPERATOR'S HANDBOOK SWX65B

SHUTTLEWAGON®



I. Introduction

Welcome to the Shuttlewagon® Operators Handbook. This handbook contains information, descriptions and illustrations for the various functions and operations of the Shuttlewagon®, and is intended as a handy reference for operating the Shuttlewagon® only. To obtain comprehensive Shuttlewagon® training contact Central Manufacturing's Training and Customer Support service at **(816) 767-0300**.

> NOTE:
> Do not attempt to operate the Shuttle Wagon until you have been properly trained.

The Shuttlewagon® in General

The Shuttlewagon® is designed as a rail car mover to free up locomotives from switching duties. It's unique design helps eliminate rail yard congestion by being able to move both on rail and off rail by means of hydraulically raised and lowered rail wheels.

Under normal conditions the Shuttlewagon® can move freely on asphalt, cement, gravel or dirt roads. Due to the narrow wheel base required for rail operation the Shuttlewagon® should ***never*** be operated on an extreme grade or pitch.

The Shuttlewagon® utilizes a heavy duty power train and rubber tires to achieve tractive effort. The rubber tires achieve a greater rail traction than that of other rail car movers which use steel rail wheels for traction.

Most components of the Shuttlewagon are comprised of brand name parts (i.e. the power train is comprised of a Caterpillar engine, Funk transmission and Deere axles) in a factory built frame. Other systems use similar brand name components with customized layouts.

The Shuttlewagon® off-rail

When the Shuttlewagon® is off-rail, it operates the same as a truck. It has hydrostatic steering, all wheel drive and internal disc brakes. All pedals, switches and controls conform to normal truck operation and application.

The control panels are designed for the operator's convenience. They are easy to read and within easy reach of the driver's seat.

Side view mirrors are located on both sides of the Shuttlewagon® cab for all around views from the driver's seat. The driver's seat is air suspension mounted on a swivel base and is fully adjustable with a lap seat belt.

The Shuttlewagon® on-rail

When the Shuttlewagon® is ready to travel on rail, the rail units are positioned over the rails and lowered, the steering is in the float position and the rubber tires are used to provide traction for moving the Shuttlewagon® and attached rail cars.

> Note:
> The rail wheels do not provide any tractive effort.
> They are simply engaged to guide the Shuttlewagon along the track.

The vehicle and rail unit suspensions are independent allowing for a smoother ride and increased stability for adverse track conditions. When ice and snow are present on the track, sanders located on both sides of each tire can be used to sand the track during forward or reverse operation.

Large mirrors at the front and back of the unit help align the Shuttlewagon® to the track and align its coupler with rail car couplers. Hydraulic cylinders align the coupler and an air cylinder operates the coupler unlatching mechanism.

The Shuttlewagon® is equipped with a train brake valve used to activate the air brake mechanisms of the rail cars to provide braking action for the rail cars and the Shuttlewagon® when actively moving rail cars.

Note:

Do not attempt to stop the Shuttlewagon and rail car caravan with the Shuttlewagon 's foot brake. Use the train brake valve or emergency button to brake both the caravan and Shuttlewagon .

The Shuttlewagon®'s foot brake is for use only in stopping the Shuttlewagon® by itself, and may be used for that purpose either on or off rail.

II. Safety

The operator of the Shuttlewagon® is entirely responsible for the safe handling of the machine and must take every precaution to assure that the unit is maintained properly and that all systems are in good working order prior to start-up. Like any piece of heavy equipment if poorly maintained or carelessly and improperly operated, the Shuttlewagon® could cause serious injury or death to the user and/or others in the vicinity.

Because the Shuttlewagon® is a complex vehicle utilizing air and hydraulic systems for operation, a cracked hose or improperly tightened fitting can cause a loss of air or hydraulic pressure potentially resulting in loss of braking power, derailment or other related mechanical failure.

It is imperative that checks of the mechanical systems, exterior features and interior functions be performed daily in order to avoid mechanical failure.

Under no circumstances should you, the operator, attempt to use or move the Shuttlewagon® until ***you*** are satisfied that everything is in working order and safe to operate.

Mechanical safety

As mentioned, the Shuttlewagon® uses air and hydraulic systems for operation. The hydraulic system operates the rail gear, the steering system,the hydraulic brakes for the Shuttlewagon® and the coupler positioner cylinders. If hydraulic pressure does not build up, the rail wheels cannot be lowered and used to guide the Shuttlewagon® along the rail. A sudden loss in hydraulic pressure can allow the rail wheels to raise, loosing contact with the rail and resulting in derailment.

The air system operates the rail car brakes, the suspension seat, sanders, air horn and the coupler air latching mechanism. Inadequate air pressure will not allow these items or the rail car brakes to function properly.

It is important that air and hydraulic pressures have built up to the correct pressure before moving the Shuttlewagon®. Under no circumstances should the Shuttlewagon® be moved if pressures do not build to the correct setting.

In addition to the air and hydraulic systems, items, such as tires, windshield wipers, lights, oil, coolant, etc., need to be checked on a regular basis to ensure proper working condition.

The following is a list of recommended daily mechanical checks:

- No hoses cut, worn, frayed or leaking
- All fittings are secure and tightened at the proper torque
- The hydraulic tank is clean and not leaking fluid
- The air tanks are not damaged, losing air and are free of moisture
- All valves are secure and working properly
- All caps are present and in place
- All drain cocks are in place and secure
- Windshield wipers are working
- All fluids are at their proper level and containers free of leaks
- Headlights and signals work properly
- Tires are properly inflated and show no cuts, bulges, burnt beads, irregularities or abnormal wear
- Warning devices operate correctly

If your daily inspection uncovers anything needing replacement, repair or adjustment, have the problem corrected before you begin operation.

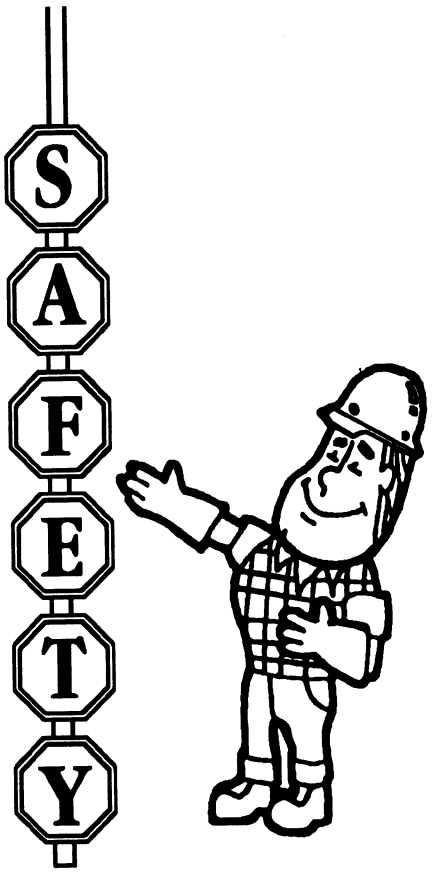
General operating safety

The following is a list of equally important, but commonly overlooked, safety items:

- Make sure all windows, mirrors and outside lights are clean
- Clean the cab steps, grab rails, floor and seat of mud, oil, water and ice.
- Keep the floor free of debris
- Keep the steering wheel, foot pedals, hand levers and knobs clean of oil and grease
- Remove unauthorized tools, supplies and other materials from the cab
- Make sure all necessary items are not loose or obstructing the operation of the Shuttlewagon®
- Relieve all pressure before checking radiator cooling, hydraulic and air pressure systems
- Extinguish all smoking materials before adding fuel or when working on the Shuttlewagon®
- Do not start in an enclosed area or building without adequate ventilation

Remember: as the Shuttlewagon® operator, you are responsible not only for your own safety but those around you. Nothing moves until you are certain that it is safe.

Remember Safety is up to You!



III. Controls and Indicators

This section references each control and indicator found in the cab and on the Shuttle Wagon®. In order to facilitate a working knowledge of them, each control or indicator is listed by number and brief definition of the function which corresponds to its associated illustration.

1. Turn Signal Lever

A three position lever: forward signals right, back signals left and center is off.

2. Emergency Flasher

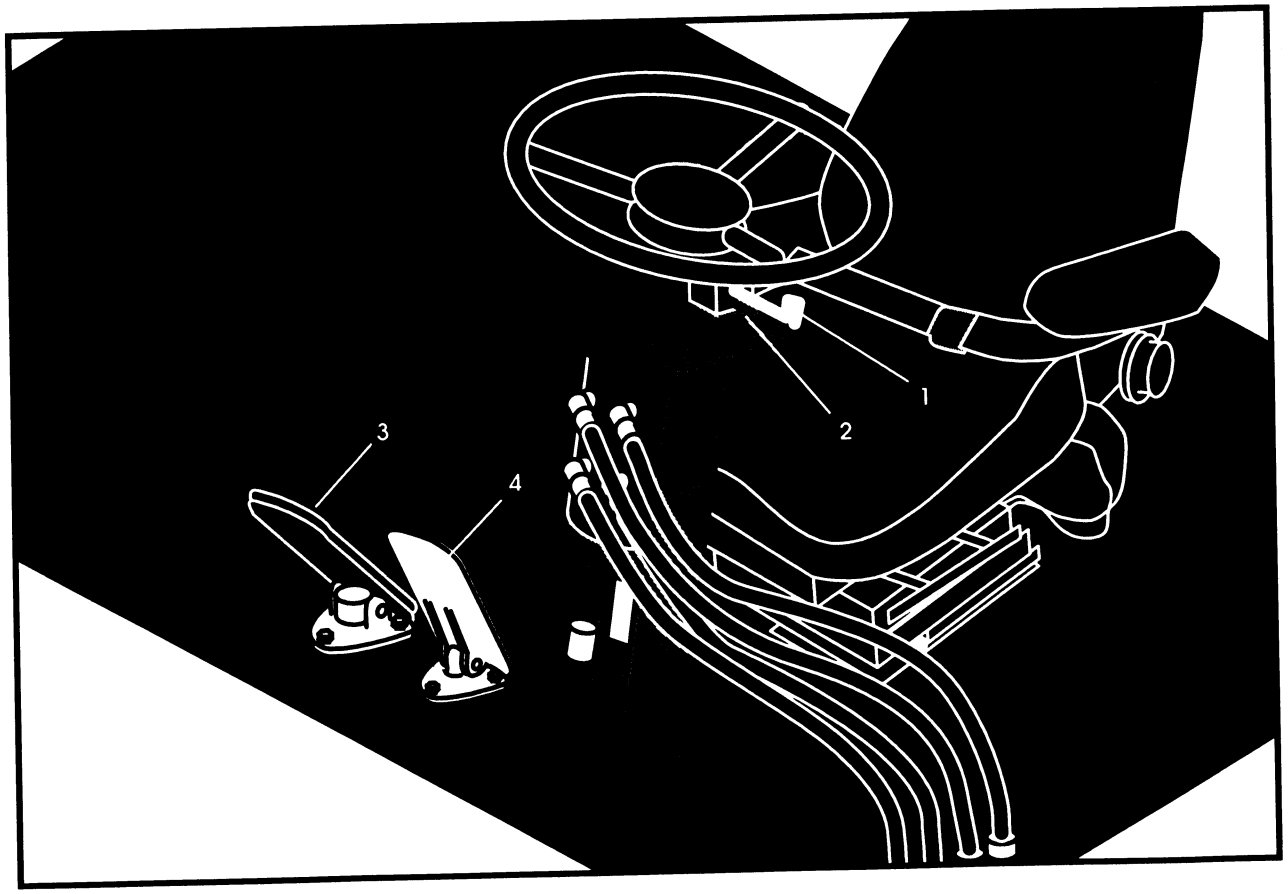
A single position interruptible switch. Pull out to turn on. Move signal lever to turn off.

3. Throttle Pedal

A foot operated pedal. Increasing downward pressure on pedal increases engine RPM, decreasing pressure on the pedal reduces engine RPM.

4. Vehicle Foot Operated Brake Pedal

A foot operated pedal. Increasing downward pressure on pedal increases braking power on the Shuttle Wagon®. For Shuttlewagon® brake application only.



5. Parking Brake Switch

A two position rocker switch. In the on position the parking brakes are applied and red light is illuminated. In the off postion the parking brakes are released.

> Note:
> Parking Brake Switch is for Shuttlewagon use only, not for holding rail cars.

6. Ignition Switch

A four position Key operated switch. Center (vertical) position is off. Turn key counter clockwise for accessory circuit. Turn key clockwise from off position to turn ignition on. Full clockwise turn engages starter.

7. Ether Start (Cold Weather Operation Option)

Instructions imprinted on panel.

8. Headlight Switches (Front and Rear)

Two 3-position rocker switches with blue indicator lamps. Low position is low beam. Center position is off. High position is high beam. The blue indicator lamp is illuminated in the high beam position.

9. Strobe Light Switch

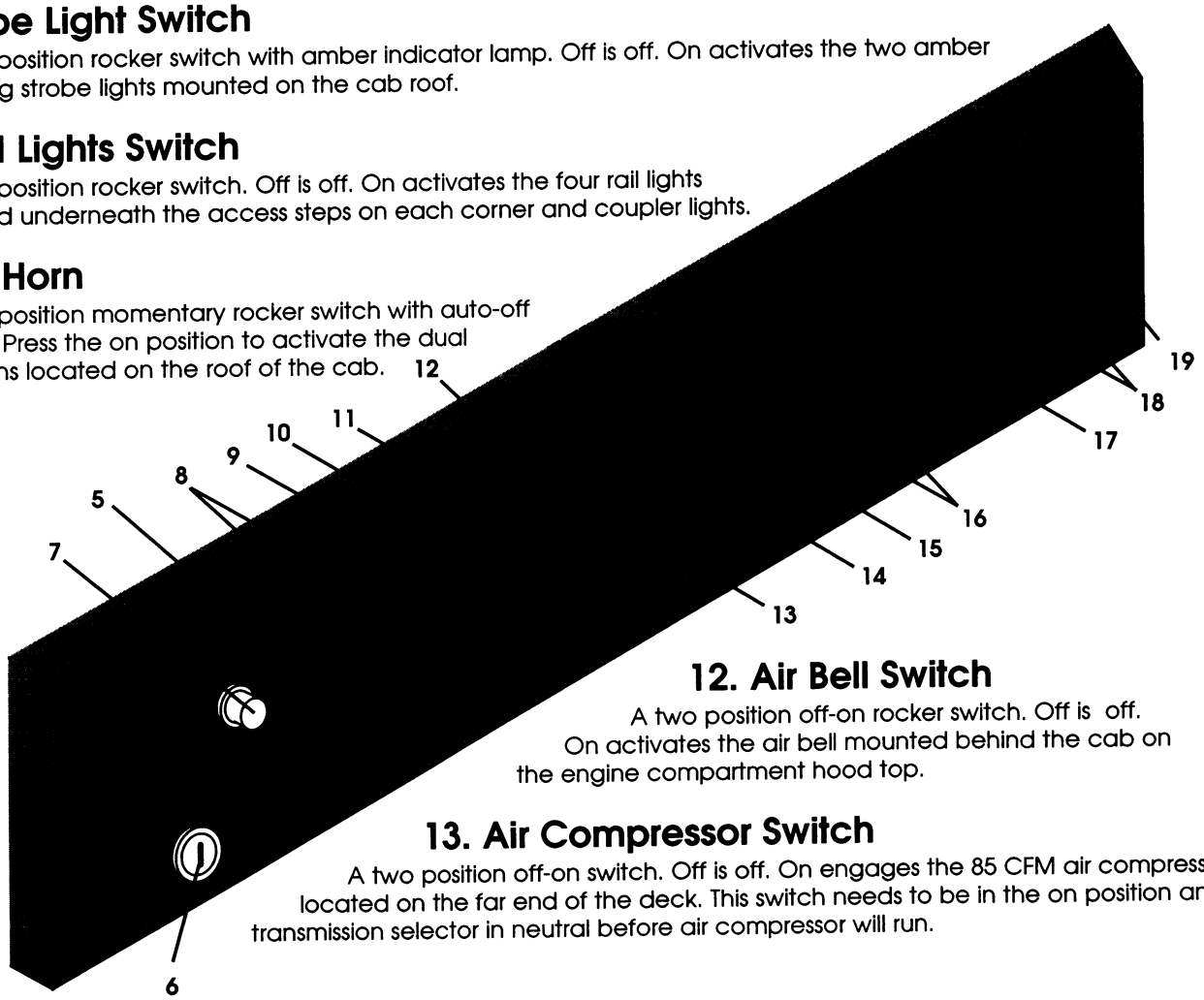
A two position rocker switch with amber indicator lamp. Off is off. On activates the two amber warning strobe lights mounted on the cab roof.

10. Rail Lights Switch

A two position rocker switch. Off is off. On activates the four rail lights located underneath the access steps on each corner and coupler lights.

11. Air Horn

A two position momentary rocker switch with auto-off return. Press the on position to activate the dual air horns located on the roof of the cab.



12. Air Bell Switch

A two position off-on rocker switch. Off is off. On activates the air bell mounted behind the cab on the engine compartment hood top.

13. Air Compressor Switch

A two position off-on switch. Off is off. On engages the 85 CFM air compressor located on the far end of the deck. This switch needs to be in the on position and transmission selector in neutral before air compressor will run.

14. Steering Mode Selector Switch

A two position rocker switch with lock. To operate, push the locking switch on the main switch face down to release the switch to allow movement of the switch. The rail position for rail movement floats the front and rear trucks. The steer position allows movement of the trucks via the steering wheel.

15. Rear Axle Condition Switch

A two position rocker switch. The float position engages the float mode, allowing free movement of the rear truck. This allows the rear tires and rail gear to follow the track , avoiding accidental derailment. The Road Mode position engages the rear steering, controlled via the steering wheel.

Note!

Whenever the unit is in Road Mode and steerable via the steering wheel the Rear Axle Condition Switch must be in the (Steer) mode. Failure to do this will allow the rear wheels to move independently from the front wheels potentially resulting in a complete loss of steering control.

16. Rail Gear Switches (Front and Rear)

Two, three position on-off-momentary rocker switches. The down position allows the rail gear to lower. The up position applies hydraulic fluid to the rail gear cylinders to raise the rail gear. Releasing pressure on the switch in the up position automatically stops fluid flow, stopping rail gear movement.

17. Sanders Switch

A two position momentary rocker switch with auto-off. Press the switch on to activate rail sanders. Sand will be dispensed from the sander units until pressure on the switch is released or sand supply is depleted.

18. Coupler Positioner Switches (Front and Rear)

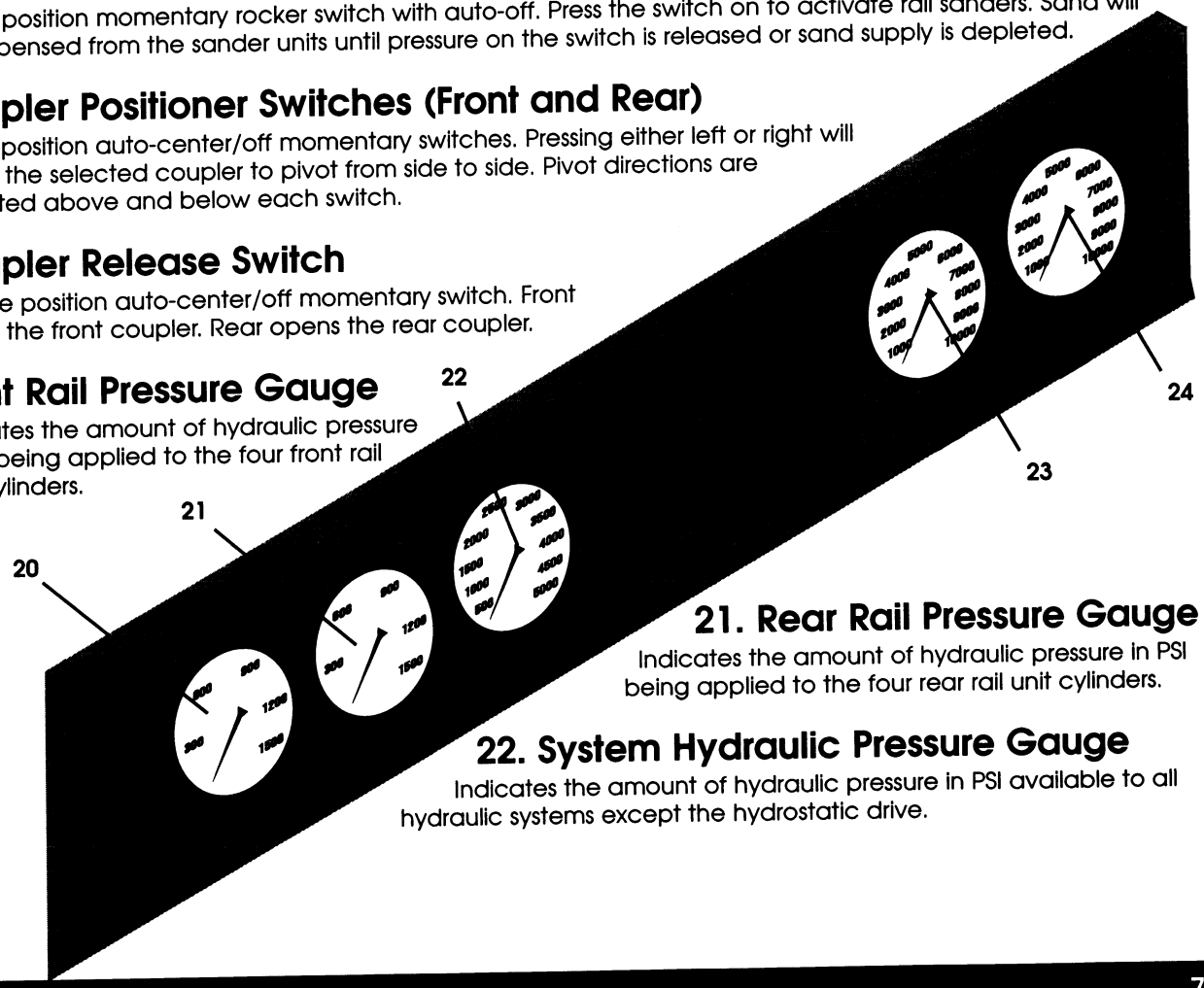
Two 3-position auto-center/off momentary switches. Pressing either left or right will cause the selected coupler to pivot from side to side. Pivot directions are imprinted above and below each switch.

19. Coupler Release Switch

A three position auto-center/off momentary switch. Front opens the front coupler. Rear opens the rear coupler.

20. Front Rail Pressure Gauge

Indicates the amount of hydraulic pressure in PSI being applied to the four front rail unit cylinders.



21. Rear Rail Pressure Gauge

Indicates the amount of hydraulic pressure in PSI being applied to the four rear rail unit cylinders.

22. System Hydraulic Pressure Gauge

Indicates the amount of hydraulic pressure in PSI available to all hydraulic systems except the hydrostatic drive.

23. Front Motor Return Side Gauge

Measures hydraulic pressure in PSI during deceleration or braking.

24. Rear Motor Return Side Gauge

Measures hydraulic pressure in PSI during deceleration or braking.

25. Engine Oil Pressure Gauge

Measures pressure in the engine lubricating system in PSI. (Refer to engine handbook for specific oil pressure)

26. Engine Water Temperature Gauge

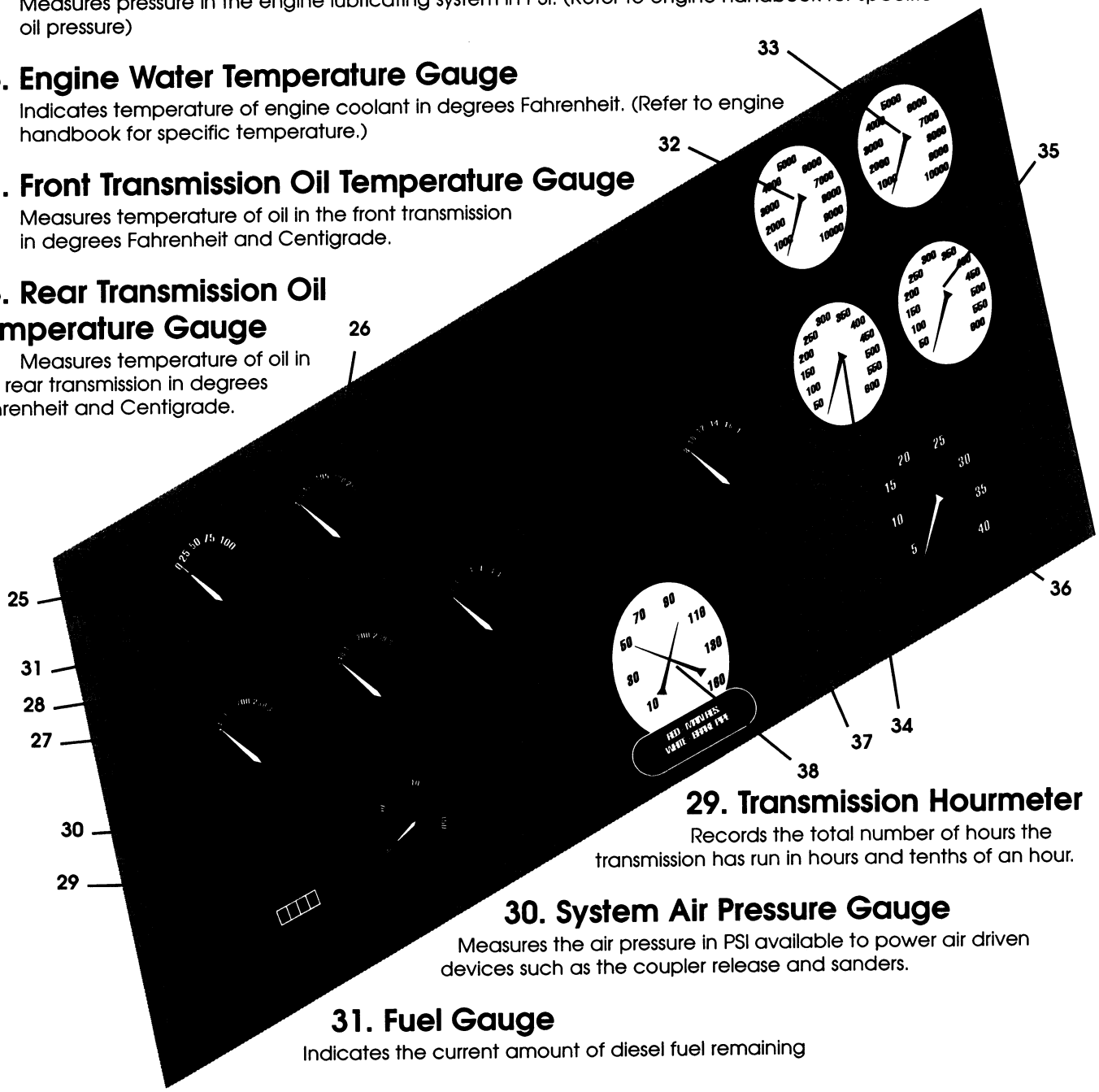
Indicates temperature of engine coolant in degrees Fahrenheit. (Refer to engine handbook for specific temperature.)

27. Front Transmission Oil Temperature Gauge

Measures temperature of oil in the front transmission in degrees Fahrenheit and Centigrade.

28. Rear Transmission Oil Temperature Gauge

Measures temperature of oil in the rear transmission in degrees Fahrenheit and Centigrade.



29. Transmission Hourmeter

Records the total number of hours the transmission has run in hours and tenths of an hour.

30. System Air Pressure Gauge

Measures the air pressure in PSI available to power air driven devices such as the coupler release and sanders.

31. Fuel Gauge

Indicates the current amount of diesel fuel remaining

32. Front Motor Drive Pressure Gauge

Indicates the amount of hydraulic pressure in PSI available to power the front drive motor.

33. Rear Motor Drive Pressure Gauge

Indicates the amount of hydraulic pressure in PSI available to power the rear drive motor.

34. Front Charge Pump Pressure Gauge

Indicates the amount of positive charge pressure in PSI in the front hydrostatic closed loop system. Normal operating range is 230-280 PSI. Below 150 PSI an alarm will sound.

35. Rear Charge Pump Pressure Gauge

Indicates the amount of positive charge pressure in PSI in the rear hydrostatic closed loop system. Normal operating range is 230-280 PSI. Below 150 PSI an alarm will sound.

36. Tachometer/Hourmeter Gauge

Indicates engine rpm. x 100. The numeric counter at the bottom of the gauge records the number of hours the engine has run in hours and tenths of an hour.

37. Voltmeter

Indicates the voltage in the electrical system. Normal reading is between 13.5 and 14 volts.

38. Rail Air Reservoir/Rail Air Brake Gauge

Red hand indicates pressure in PSI available in the rail air brake system reservoir.
The white hand indicates the air pressure supplied through the brake hoses to release the rail car brakes.

39. High Engine Water Temp. Warning Light

A red lamp that will illuminate if the engine water temperature exceeds 220 °F.

40. Low Engine Oil Pressure Warning Light

A red lamp that will illuminate if the engine oil pressure drops below 15 PSI.

41. High Front Transmission Oil Temperature Warning Light

A red lamp that will illuminate if the front transmission oil temperature exceeds 295°F.

42. High Rear Transmission Oil Temperature Warning Light

A red lamp that will illuminate if the rear transmission oil temperature exceeds 295°F.

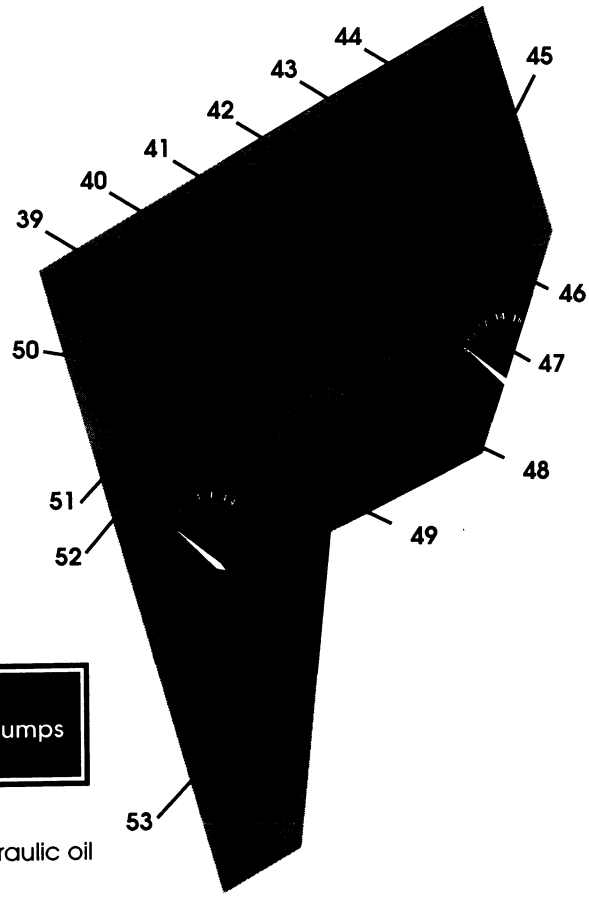
43. Low Hydraulic Oil Level Warning Light

A red lamp that will illuminate if the oil level in the hydraulic oil reservoir tank drops below a prescribed minimum.

> **NOTE:**
> If oil level drops to an amount critical to pump condition, pumps will be disabled and an audible buzzer will sound.

44. High Hydraulic Oil Temp Warning Light

A red lamp that will illuminate if the oil temperature in the hydraulic oil reservoir tank exceeds a prescribed maximum.



45. Low Vehicle Brake Pressure Warning Light

A red lamp that will illuminate if the hydraulic pressure in the vehicle brake system drops below 1000 PSI.

46. Low Rear Rail Pressure Warning Light

A red lamp that will illuminate if the hydraulic pressure to the rear rail units drops below 400 PSI.

47. Low Front Rail Pressure Warning Light

A red lamp that will illuminate if the hydraulic pressure to the front rail units drops below 400 PSI.

48. Rear Drive Wheels Straight Ahead Indicator Light

A Green lamp that will illuminate when the rear drive wheels are aligned parallel with the vehicle center line.

49. Front Drive Wheels Straight Ahead Indicator Light

A Green lamp that will illuminate when the front drive wheels are aligned parallel with the vehicle center line.

50. Low System Hydraulic Pressure/Accumulator Warning Light

A Red lamp that will illuminate if the hydraulic pressure available to the system is insufficient.

51. Low Front Charge Pressure Warning Light

A red lamp that will illuminate if the charge pressure to the front hydraulic pump drops below 150 PSI.

52. Low Rear Charge Pressure Warning Light

A red lamp that will illuminate if the charge pressure to the rear hydraulic pump drops below 150 PSI.

53. Low System Air Pressure Warning Light

A red lamp that will illuminate if the remaining air pressure in the main air reservoir drops below 60 PSI.

54. Transmission Shifter Range Switch

A two position toggle switch. Positioned to "LOW" engages the 1st, 2nd and 3rd gear range. Positioned to "HIGH"engages the 4th, 5th and 6th gear range.

55. Transmission Selector Lever

A seven detent selector lever. The middle detent is neutral. The upper three detents working in conjunction with the Transmission Shifter Range Switch provide six forward speeds. The three lower detents with the Transmission Shifter Range Switch provide six reverse speeds.

56. Train Brake Emergency Valve

A red "Push/Pull" knob. Pull the knob out to charge or open compressed air flow to the Train Rail Car Brakes. Push the knob in to release air pressure in the Train Rail Car Brake system.

57. Train Air Brake Valve

A variable air pressure valve. The 'RELEASE" position opens compressed air flow to release the Train Rail Car Brakes. The "APPLY" position releases air pressure from the Train Rail Car Brakes causing the brakes to engage. This valve may be positioned anywhere between full release to full applied to provide braking power for the rail car caravan when operating on a grade. The amount of braking action provided by the Train Air Brake Valve may be monitored by the white hand on the Rail Air Reservoir/Rail Air Brake Gauge (item 38).

NOTE:
If handle is positioned in the full applied position, the brakes on the rail cars will be completely applied.

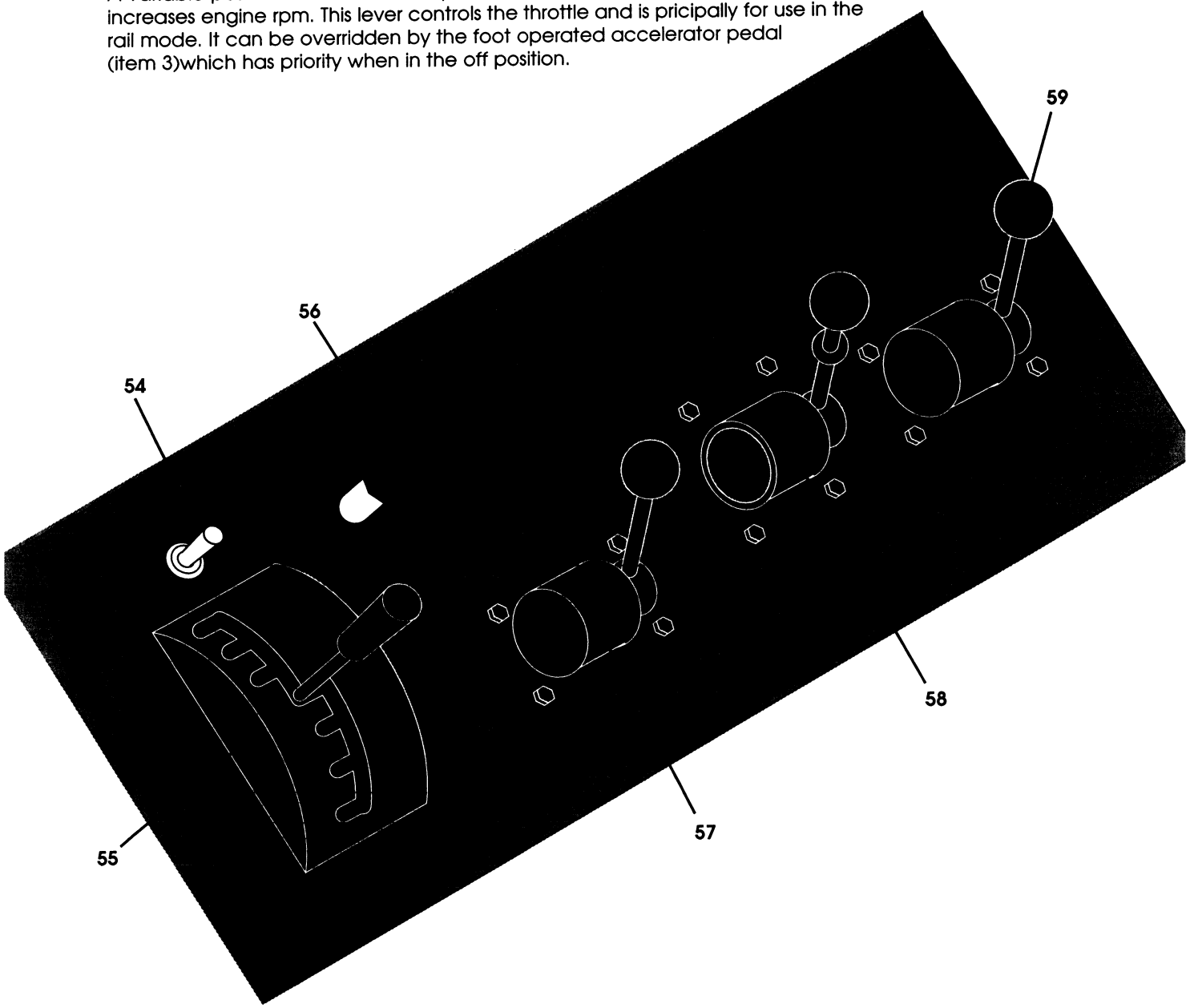
58. Vehicle Brake Lever

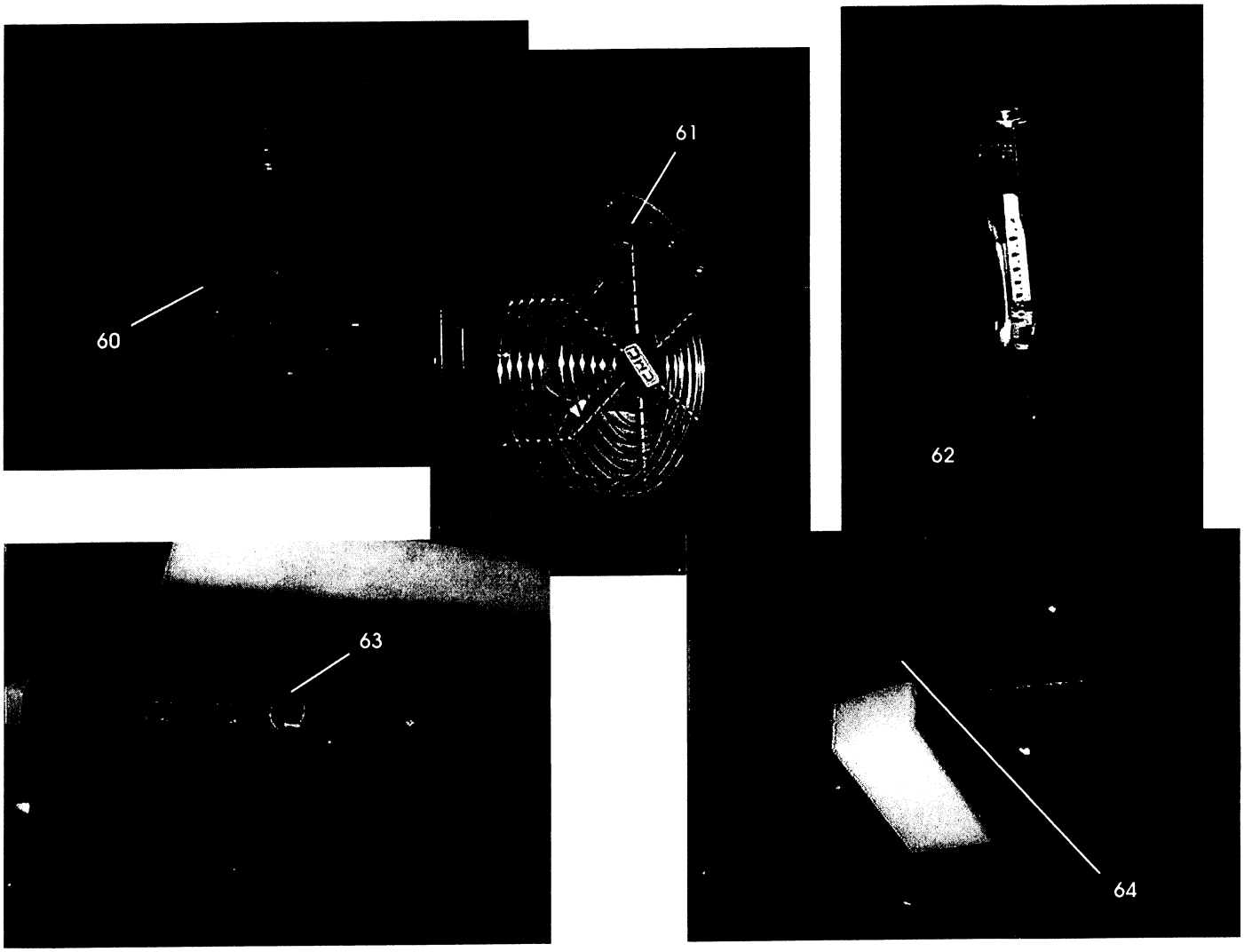
A variable position brake lever with lock for the fully applied position.

> NOTE:
> Not for parking

59. Rail Throttle Lever

A variable position lever. The "OFF" position is off. Pushing the lever toward the dash increases engine rpm. This lever controls the throttle and is pricipally for use in the rail mode. It can be overridden by the foot operated accelerator pedal (item 3)which has priority when in the off position.





60. Windshield Wiper Switch

A three position rotary switch "OFF-LOW-HIGH". The four wiper switches are located just above the windshield in the corners of the cab and on the deck access doors just below the window.

61. Defroster/Defogger Fan

These four swivel fans are located in the upper four corners of the cab. "OFF-ON" switches are located on the mounting plate.

62. Hydraulic Sight Level Gauge

This sight level gauge for checking the hydraulic oil level in the reservoir tank is located on the hydraulic reservoir tank, and may be viewed by raising the first engine access panel located directly behind the driver's seat.

63. Air Conditioner Controls

These are located in the middle of the cab ceiling. Operating instructions are printed next to each control.

64. Cab and Swivel Map Spotlights

Two Cab and Swivel Map Spotlights are located on the ceiling above either seat.

IV. Pre-Start

Pre-start inspection offers you, the operator, a chance to visually check your machine for mechanical hazards in much the same manner that a pilot pre-flight inspects his aircraft. Discovering that you have insufficient hydraulic pressure on a down grade while pulling a caravan of rail cars can be as unpleasant as loosing part of a wing at 12,000 feet in the air.

The time to correct mechanical problems is before they happen, and knowing what to look for is an important part of successfully discovering and correcting potential problems.

Pre-Start Walk Around

Checking for broken/defective parts as part of a visual inspection varies widely and is different for every operating condition. The only way to learn which parts are most likely to break or wear out is to check the unit daily. As you become more familiar with your Shuttle Wagon®, you will soon know what to look for beyond the basics.

To begin, you should check all fluid levels daily. A sudden fluctuation in level can alert you to an otherwise hidden leakage that could damage your vehicle and endanger you.

When checking the Shuttlewagon®'s coolant level, check the coolant level in the radiator itself. The recommended level for the coolant is full to the bottom of the fill neck.

To check the hydraulic fluid, place the rail units in the full up position and turn the engine off. The hydraulic indicator gauge and thermometer (located on the side of the hydraulic reservoir tank) should show fluid at the black line. If it is necessary to add hydraulic fluid, the more care taken - the better in keeping dust, dirt and/or other contaminants out of the fluid. Wipe away any dirt from around the neck of the tank and cap and carefully fill to the needed level with fluid from a clean, previously unopened container. Hydraulic fluid contaminated with dirt is very abrasive and will severely shorten the life of the hydraulic system.

Check both transmissions with engine running at idle, the parking brake set and the transmission in neutral. Fluid level should be at the "FULL" mark when warm.

If fluid levels are normal, inspect for wear or damage around the rail air brake line and rubber insert in the glad hand. The insert should be clean, in one piece and in good condition. Check the air pressure shut off valves on the front and rear of the Shuttle Wagon®; open and close the valves to ensure the handles move properly.

Make sure the air cleaner is clear and free of debris. Is the air filter restriction indicator green? If the indicator is red, replace the filter and reset the indicator. Are all tires properly inflated to the correct pressure?

If conditions warrant, check the sanders. Moisture can cause sand to clump, restricting flow.

Daily Checklist

Engine Compartment (Engine Off)

- ◆ Engine oil level
- ◆ Radiator coolant level
- ◆ Front and rear transmission's oil level; level at full mark when warm
- ◆ Funk pump drive
- ◆ Hydraulic reservoir tank level
- ◆ All drive belts*
- ◆ Cables and linkages*
- ◆ Oil leaks
- ◆ Condition of radiator hoses*

* Visual Inspection

Exterior of Vehicle (Engine Off)

- ◆ Hydraulic oil level
- ◆ Condition of batteries and cables*
- ◆ Coolant level
- ◆ Sanders
- ◆ Mirrors clean and adjusted
- ◆ Windows clean
- ◆ Oil leaks
- ◆ All lights clean and intact
- ◆ Train brake lines and gasket seals intact
- ◆ All fittings and lines*
- ◆ Couplers in good condition, not loose or sagging*
- ◆ Coupler knuckle in good condition*
- ◆ Train brake line ball valves closed

Interior Cab (Engine On)

- ◆ Seat adjusted properly
- ◆ Mirrors adjusted
- ◆ Engine Oil Pressure
- ◆ Coolant temperature
- ◆ Transmission temperatures
- ◆ Charging system
- ◆ Fuel level
- ◆ Vehicle brakes
- ◆ Engine idle and high RPM
- ◆ Steering functions
- ◆ Air horns
- ◆ Windshield wipers
- ◆ Turn signals, stop lights and parking lights
- ◆ Parking brake
- ◆ Headlights
- ◆ Strobe lights
- ◆ Hydraulic system and pressure
- ◆ Low rail pressure alarms
- ◆ Steering straight ahead lights
- ◆ Rail air reservoir air pressure
- ◆ Train brake line air pressure
- ◆ Vehicle brakes
- ◆ Back-up alarm
- ◆ High beam/low beam indicator lights
- ◆ Instrument lights
- ◆ Interior dome lights
- ◆ Cab clean (no loose foreign objects that can shift during movement)

Monthly Inspections

The following is a list of manufacturer's recommended monthly checks. Completing checks on these items on a monthly basis will help prevent mechanical problems not easily detected on a daily inspection.

Engine Compartment

- ◆ Belt tension - tight, not slipping
- ◆ Cables and linkages - tight and operational
- ◆ Radiator hoses - soft and clamps tight
- ◆ Cleanliness - overall engine and transmission condition compared to prior month's inspection

* Visual Inspection

Vehicle Exterior

- ◆ Batteries clean and cables tight
- ◆ Check of all fittings and lines for leaks
- ◆ Couplers in good condition - operate freely, not sagging
- ◆ Rail wheels spin freely - not loose or grabbing
- ◆ Check torque on wheel lug nuts - 350 ft/lbs.
- ◆ Brake fluid level
- ◆ Tire pressure

Cab Interior

- ◆ Seat operational with no broken parts
- ◆ Seat belts operational
- ◆ Brake and accelerator functions
- ◆ Emergency brake lever adjusted properly
- ◆ Hydraulic gauges operational
- ◆ Door operation condition

Semiannual Inspection

The following is a list of manufacturer's semi annual or thousand operating hours inspections, whichever occurs first, and need to be conducted by a qualified mechanic.

- ◆ Completely clean unit inside and out including engine compartment, radiator and transmission cooler.
- ◆ Inspect hydraulic hose conditions, no leaks or cracks
- ◆ Belt condition - change belts annually
- ◆ Inspect engine and transmission mounts for cracks and bolt tightness.
- ◆ Inspect entire unit for fluid or air leaks.
- ◆ Inspect drive lines for bends or loose/missing bolts.
- ◆ Inspect axle mount brackets for cracks and bolts for wear.
- ◆ Inspect all cylinders for bent housings, bent rods or scoring.
- ◆ Inspect all cylinder rod pins for wear.
- ◆ Check hydraulic tank for holes or seam leaks.
- ◆ Check sander boxes for hardened sand.
- ◆ Inspect exposed wiring insulation.
- ◆ Check all operation systems including hydraulic, air, brake, etc.
- ◆ Inspect ladders and railing.
- ◆ Inspect engine air inlet and exhaust for leaks.
- ◆ Check rail gear hydraulic gauges for accuracy.
- ◆ Inspect train brake system for leaks or dirt in lines.
- ◆ Remove rail gear hub caps and inspect bearing lock and nut tightness.
- ◆ Check condition of brake master cylinder and brake lines.
- ◆ Ensure rail gear has no play and moves freely.
- ◆ Inspect steering axle for broken parts, worn pins, steering cylinder tightness and tie rod end condition.
- ◆ Remove and inspect couplers.

* Visual Inspection

V. Start-Up

Do not start-up until you are satisfied with your inspection and the condition of the Shuttlewagon® and that you have taken all the proper precautions necessary for operating heavy equipment and the Shuttle Wagon® in particular.

Before beginning operations, familiarize yourself with your work area. Check track conditions and grades involved. A caravan of rail cars can stop or push the Shuttle Wagon® based on the grade of the track. This can be further aggravated by wet or icy track conditions.

Double check your vehicle's present movement mode (ie., if in road mode are the rail units up and locked), is the steering properly engaged for your current movement mode (ie., wheels straight ahead in road movement mode) and the seat swivel securely locked?

Beginning Operation (road mode)

To start:

- Place transmission in "N" neutral
- Set parking brake
- Ensure rail units are up and locked
- Ensure steering is engaged by positioning the steering mode switch to steer
- Ensure road axle switch is in road mode

To start, engage the starter. The Shuttlewagon®'s ignition system is identical to an automobile's. The diesel engine should start at once. If the engine does not start after 30 seconds, let the starter cool for a couple of minutes and then try again. If the engine does not start after three or four attempts, stop and look for the cause.

Oil Pressure

Once the engine is started the oil pressure should begin to rise. If it does not begin to rise after 15 seconds shut down the engine and inspect. Once the oil pressure starts to build, increase the engine RPM slowly to be sure adequate lubrication is available to the bearings and to allow the oil pressure to stabilize.

NOTE!
Idle the engine three to five minutes at 1000 RPM before operating under load.

NOTE!
If operating in temperatures below +32° F, oil pressure indication will be higher than normal and not cause for alarm.

Air Pressure

Check the air pressure indicator gauges for system air and rail air pressure. Normal air pressure should be 105 PSI to 120 PSI maximum for both.

CAUTION!
If air pressure is below 65 PSI, an audible buzzer will sound.
Do Not attempt to move the Shuttlewagon if this condition persists.

After initial warm-up, operate the engine at 1500 to 1800 RPM until the air pressure indicator gauges show that air pressure has built to operational norms.

If both pressure gauges are below 65 PSI, the lower gauge will increase first until both gauges are equal. Both gauges will then increase together. As air pressure increases beyond 65 PSI, the audible buzzer will shut off.

Once air pressure has built up to 65+ PSI, enough pressure is available to operate the Shuttlewagon®. Air pressure for the rail car brakes will continue to increase. A minimum of 90 PSI in the Rail Reservoir Tank is required to activate the rail car brakes.

Check other gauges; fuel, battery charge, tach, etc. If everything is operating properly it is now safe to move the Shuttlewagon®.

- Be sure front and rear rail units are raised to the full up position for road travel.
- Make a positive check of the steering by turning the wheel hard in both directions. If it does not move or is difficult to move check the the steering mode switch; it should be in the steer mode.
- Check to see no unauthorized passengers are aboard.
- Make final adjustments to your seat and fasten seat belt.
- Apply service brakes.
- Release parking brake.
- Select desired transmission speed range.
- Release service brakes to move the Shuttlewagon®. When wheels are rolling depress service brake pedal to ensure brakes are working properly.

WARNING!

If the service brakes fail to work, apply the emergency (Parking) brake to stop the Shuttlewagon and have the brake system checked for the cause.

If everything is okay, it is safe to continue.

VI. Operating on Rail

Mounting on Rail

Choosing a good place to mount on rail is important. An improved crossing or area fairly level with the track is best. Avoid mounting the Shuttle Wagon® on exposed rail.

To mount on rail, begin by lining up the rear end of the Shuttle Wagon® with the rail. Because the Shuttlewagon® is so large this will require a person outside to help guide the operator.

Once the rear rail wheels are aligned, drop the rear end rail unit by pressing the rear rail wheel control switch to the down position. The outside operator needs to ensure that the rear rail wheels are properly engaged with the track and the cab operator needs to ensure that the low rear rail pressure light is not illuminated.

With the rear rail units properly engaged place the rear axle condition switch to the float position. This allows the rear rail truck to swivel freely guided by the rail. With the steering mode selector switch still in the road mode, slowly move the Shuttlewagon® forward or backward along the track to align the front rail unit with the track, guided by the outside operator.

With the front rail unit in position, lower the rail gear by pressing the front rail gear switch to the down position. At this point the Shuttlewagon® should be mounted on the track with the rail gear engaging the track. The outside operator needs to visually ensure that this is correct. The cab operator will then need to press the steering mode switch to the rail position and be sure that the front and rear rail pressure gauges show adequate pressure (approximately 600 PSI). Both rail pressure gauges should read the same pressures.

The Shuttlewagon® is now mounted on the rail and ready to begin rail operation once the accumulator is fully charged and the indicator lamp (item 50) is no longer illuminated.

Hydraulic Pressure

It is very important to have the proper rail hydraulic pressure for your unit; without proper rail pressure, the possibility of derailing increases. Hydraulic pressure is required for lowering the rail units when the Shuttle Wagon® is in rail mode, for activating the coupler positioners, vehicle brakes and for active steering when the unit is in road mode.

Upon lowering the rail gear the hydraulic system will charge the accumulator with a maximum system pressure (2500PSI) of hydraulic pressure.

The maximum hydraulic pressure available is 2500 PSI. After lowering the rail units the accumulator buzzer should go off within 1 to 2 minutes. If it does not, something is wrong with the hydraulic system.

A warning buzzer will sound if the main hydraulic pressure drops below 250 PSI. If the low hydraulic pressure warning buzzer sounds, stop immediately determine the cause, and get it fixed! Under no circumstances should the Shuttlewagon® be moved on rail or off rail while this condition exists. All hydraulic systems other than the drive system could fail.

Coupling

The next step in moving rail cars is coupling. Move the Shuttle Wagon® to the selected rail car and use the mirror to align the Shuttle Wagon® coupler with the rail car coupler. To adjust the Shuttle Wagon®'s coupler use the appropriate coupler positioning switch (item 18).

Once the couplers are aligned, move the Shuttle Wagon® towards the rail car until the couplers join together and lock automatically. Test the couplers by slowly pulling away from the rail car. If the car moves with the Shuttle Wagon®, the couplers are locked.

Set the transmission to neutral "N", set the parking brake and hook together the rail brake hoses. In a vertical position, mate them together then lower them to lock. The hoses must be in a vertical position in order to mate. Close the rear most air valve of the rear most car in the caravan and open all the other rail car air valves. Open the Shuttle Wagon® air valve.

Pull out the train brake emergency valve (56) and raise the train air brake valve lever (57) to the release position to allow air pressure to build up in the rail cars. A noticeable drop in air pressure will occur then slowly begin to recover as air is applied to the rail car's air brake system.

Operating pressure for the rail air brake system will vary between rail cars, ranging between 60 and 90 PSI. Older rail cars' release systems are typically set at 60 PSI, while newer rail car systems are usually set at 80-90 PSI.

Normally it will take from three to five minutes to build up enough air pressure in the rail car brake system to release the first car's brakes and about one minute per car thereafter. After sufficient air pressure has built up, test the brakes by performing a rail air brake test.

NOTE:
The 85 CFM Air Compressor can only be operated with the Transmission Shift Control in the neutral position

Train Air Brake Valve

The train air brake valve does three things for the Shuttle Wagon®. It increases tire life, increases brake life and stops the Shuttle Wagon® when stopping the rail cars.

The operator will have to use his/her own judgement on the amount of braking power for different situations. Downhill situations will call for more braking power and a slight dragging/braking effect. Using more braking power allows the operator to keep better control of the caravan.

During uphill situations, the operator is not likely to use any braking power and will leave the train air brake valve in the release position. This allows less drag and allows more traction with less effort.

Operating on a level track, the operator may run with partial brake application depending on travel distance. Even the slightest down grade can cause the rail cars to build up a tremendous amount of momentum and get out of control. Always be aware of the stopping distance and grade of the track. You do not want to go past where you want to stop. Leave yourself plenty of room. You always want to keep control of your caravan.

The train air brake valve is a variable position valve that controls the amount of air flow into the train air brake system. In the full release position air is allowed to flow freely from the Shuttlewagon® into the hoses and train brake system, releasing the train brakes. Moving the handle toward the apply position reduces the amount of air flow to the train brakes allowing the brakes to close depending on the amount of air the train air brake valve allows into the train brake system. The full apply position restricts all air flow to deplete air from the train brakes and fully apply the train brakes.

NOTE:
Pushing the train brake emergency valve knob in will dump the air from the train brakes, but will not deplete the air reservoir.

NOTE:
The train brake emergency valve in the down/emergency position will override the train air brake valve and not allow the train brakes to release. This knob must be in the up/release position to allow the train air brake valve to function.

NOTE:
If the train brake emergency valve knob is pressed in to the emergency position while the train air brake lever is in any position other than "EMERGENCY" will drain the air reservoir

VII. Rail Car Movement

Grade in Relation to Travel

CAUTION!
Always be conscious of grade relation to intended travel.

Are you going to move up a grade, down a grade, or level? Don't guess, rail grade is not always visible to the eye. As little as 1/2% grade can affect starting and stopping and cannot be seen by the naked eye. As the Shuttle Wagon® operator, you should know grade and direction.

When starting a load, remember heavy loads may be eased in OPPOSITE DIRECTION of intended pull, to allow slack between the couplers. You can gain as much as 6 to 8 inches of FREE travel for each coupled car. Using this technique, the Shuttle Wagon® starts pulling one car at a time and the momentum of the moving cars helps start the remaining cars. Maintain a steady increase of power so as not to lose the momentum gained.

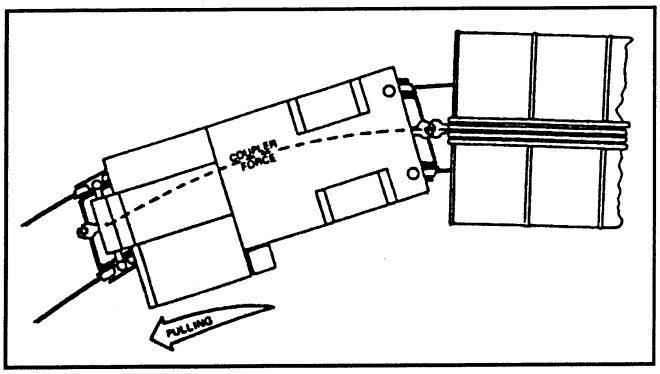
The Shuttle Wagon® power train is geared extremely low through the transmission, differential and planetaries. Thus tremendous torque develops quickly in lower gears. A quickly applied throttle in the low gears could cause spin-out of the tires. Maximum drawbar pull is achieved in 1st gear and should be used when maximum drawbar pull is going to be required to start the load. When starting in 1st or 2nd, apply the throttle steadily and smoothly to maintain maximum traction. The operator should learn to feel the difference between tire "creep" and tire "spin". Maximum traction will be achieved at1400 RPM in 1st gear just prior to tires creeping, and diminishes quickly once tires start spinning. Take full advantage of coupler slack when maximum pulls involve more than one car.

The Shuttle Wagon® is equipped with a full powershift transmission, and the ratio variance between gear settings is substantial. Up or down shifting is not recommended while pulling rail cars. However, should it be necessary to shift on the rail while under way, do so with a RETARDED throttle then press gradually on the throttle after the shift is complete, to maintain desired speed.

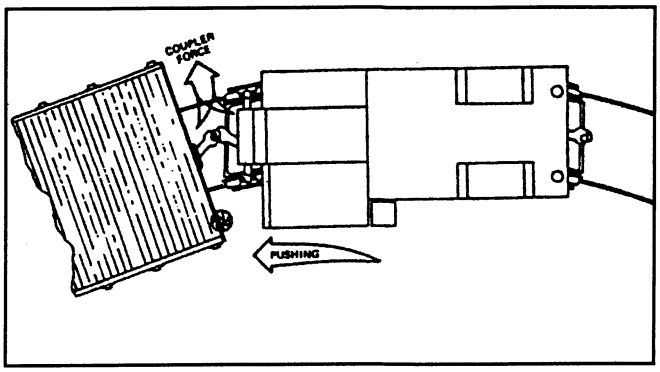
Move the cars at a safe speed, 5-7 mph. Plan stops in advance so the entire operation runs smoothly. Be sure you understand how both the Shuttle Wagon® and rail car air brakes operate. Know in advance what is expected of the Shuttle Wagon®. Know how many cars are to be switched and where they are to be switched. Know if additional cars are to be picked up and switched.

Should a HEAVY (meaning maximum or near maximum load for Shuttle Wagon®) car or train be required to move through a tight curve (caution should start at 22° or more), PULL rather than push the car or train, if possible. When pulling, the couplers continue to follow the center line of pull. When pushing maximum or near maximum loads around tight curves, the coupler in the Shuttle Wagon® and attached car will tend to pivot opposite to the direction of curve until stopped by the coupler housing. At this point, the line of push is not following the center line of the vehicle. The Shuttle Wagon® weighing less than the load, is now pushing the load with couplers angled, and could cause derailment of the Shuttle Wagon®. This situation is more prevalent when a curve and upgrade occur together, rather than on level or downgrade curve where the car momentum might not require the Shuttle Wagon® to apply maximum push. An experienced operator will recognize this situation and be able to apply the right technique.

Before uncoupling the Shuttle Wagon® from the rail cars, be conscious of whether or not the cars are on a grade. If the rail cars are fully "aired" or "charged", bring the cars to a full stop. Apply rail car brake using the train air brake control valve in cab. A chock should be wedged under the rail car wheel. Have an assistant set rail car hand brake by turning the hand brake wheel. Uncouple and pull away from cars.



Coupler reaction when pulling.



Coupler Reaction when pushing heavy loads on tight curves.

CAUTION!

For safety, *ALWAYS* apply rail car hand brake and wedge a chock under the rail car wheel before pulling away from the car or caravan.

Rail Car Brake Systems (Air and Mechanical)

The rail brakes are a very important safety factor in the movement of rail cars. For optimum safety, you should always hook up the air brake system before moving rail cars. This rule applies whether moving loaded or empty cars.

The principle of all rail air brake systems is Air Pressure Reduction through a combination service and emergency valve. When the Shuttle Wagon® is coupled to a rail car and the car brake system is "aired" or "charged", the car brakes are held "released" by air pressure. As long as the required air pressure charges the car system, the car brakes remain released. If a pressure drop occurs in the car brake system (as when the Train Rail Air Brake valve is moved), the car brakes are applied.

The purpose of a Pressure Reduction system is to provide emergency braking to rail cars in the event a car becomes uncoupled or an air line ruptures. Should this occur, the car brakes will be applied automatically from the air reserve tank on each car. This system is of standard design on all AAR cars in the United States, Canada and Mexico. Specially built cars for intra-plant movement may be equipped with this same brake system, a different design brake system, or more commonly, no brakes at all.

NOTE!

Surplus, wrecked or damaged AAR cars, purchased for intra-plant movement, may still have the rail brake hoses and mechanism in place, but caution should be taken to determine whether or not they function properly before depending on them to stop a load.

NOTE!
Be sure the rail car brakes are fully "aired" or "charged" before moving, otherwise the system will not function properly.

Rail cars also have mechanically set hand brakes. The hand brake device is located at one end of the rail car. To apply this brake, turn brake wheel to tighten chain and set the brakes. To release this brake, release ratchet lock on hand brake body or turn the brake wheel to release the brakes. Before moving rail cars, make sure all hand brakes are released. Make sure all safety chocks or other obstructions placed under the wheels, are removed.

Unhooking From Rail Cars

Once the cars are moved into position and are ready to unhook, put the train air brake valve in the emergency position. This will activate the rail car brakes. Use chocks and hand brakes to secure the rail cars. Release the couplers using the coupler release switch. Pull away slowly from the rail cars. As you move away from the rail cars, the glad hand hose connection for the rail car brakes will automatically disconnect.

WARNING!
Never disconnect the glad hand hose connection by hand. Air pressure can remain trapped in the hoses and be quite lethal.

Adverse Weather Conditions

If operations are taking place in the winter and frosted track or ice covered track conditions exist, move the Shuttlewagon® over the entire rail complex to break up frost and ice on rails. Sand rails in those areas that could present problems. Use the same procedure if the rails are snow covered. Common sense should be used in operating in deep snow. As a guide, if the rails can be seen after two passes with the Shuttlewagon®, you can proceed. All locomotive devices will lose traction on wet, frosted, iced or snow covered rail. Percentage-wise, the Shuttlewagon® will lose less traction, due to a better coefficient of friction for rubber to steel, than steel to steel.

Dismounting From Rail

When you wish to move off rail, select an improved crossing area or an area level to the track just like when mounting the rails. Bring the vehicle to a complete stop.

NOTE:
It is necessary to have both front and rear wheels straight ahead indicator lights on before switching from rail to road mode.

Because the steering wheel turns the front and rear trucks together in road mode, if the wheels are not aligned straight ahead when road steering is engaged, the unit may not respond as expected to input from the steering wheel.

Change the steering mode switch from the rail position to the steer position. Move the rear axle condition switch from float to road. This does not mean that the rail units are raised. To raise the rail units, use the rail gear control switches to raise the rail units.

You are now ready to move off the track.

NOTE:
Before shutting down the Shuttlewagon , make sure the Rail Pressure Gauges read 0 PSI and that the Accumulator is fully discharged.

VIII. Specifications and Capacities

		SWX65B
Engine	Model Cylinders Horsepower	3406C Caterpillar 6 Cylinder 500 hp. @ 2100 rpm.
Transmission	Model Speeds Maximum Speed	Funk 2133H00B 3-Speed Forward and Reverse 18 mph. Road / 5-7 mph. Rail
Axle	Manufacturer Type Hub Type Drive Ratio	John Deere No-spin Front and Rear Internal Planetary 20.945:1
Tires/Wheels	Manufacturer Size Load Range Operation PSI Wheel Type	Michelin 14.00R 24XKDA1A Three Star 130 PSI 1024AG Dotson Torque Wheels To 350 ft lbs
Air	Standard	85 CFM
Electrical	Alternator Batteries	105 Amp/24 Volt 12 Volt, 1250 CCA
Hydraulic	Manufacturer Type	John Deere Model 593 Triple Pad Pump Drive
Steering		Hydrostatic Power Assisted Dual Steering
Brake	Service Parking Rail Car	Hydraulic Electrically activated hydraulic AAR connection for rail car brake system with cab mounted air control valve independent of vehicle brakes
Capacities	Transmission Axles Fuel Tank Hydraulic Tank Rail Air Tank Compressor Radiator Coolant Engine Coolant Oil - Caterpillar Pump Drive	5 Gallons (Approximately) 30 Quarts 115 Gallons 30 Gallons 11 Cubic Feet 2.5 Gallons/Dextron #3 30 Quarts 34 Quarts 30 Quarts 6-3/4 Quarts/85W140

IX. Quik Reference