HR2000 SERIES A

UNIVERSAL HY-RAIL®
GUIDE WHEEL EQUIPMENT
HYDRAULICALLY OPERATED

OPERATOR'S SERVICE AND PARTS MANUAL

ISSUED 8 - 2000

BULLETIN 1183B

■ **THIS MANUAL CONTAINS VITAL INFORMATION FOR THE SAFE USE AND EFFICIENT OPERATION OF THE VEHICLE EQUIPPED WITH HY-RAIL® GUIDE WHEEL EQUIPMENT. CAREFULLY READ THIS OPERATOR'S MANUAL BEFORE USING THE VEHICLE. FAILURE TO ADHERE TO THE INSTRUCTIONS COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.**

When this manual is received, record the rail pilot unit serial numbers in the spaces provided in the General Information and Parts Sections for future reference, in case the serial number tags ever become unreadable. A Manual must remain with the vehicle. Additional or replacement manuals may be obtained by calling or writing Harsco Track Technologies, Harsco Corporation.

All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. Harsco Track Technologies, Harsco Corporation reserves the right to make changes at any time without notice.

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SECTION 1 - GENERAL INFORMATION
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Safety Information

THIS SYMBOL MEANS: ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED.

SAFETY IS A CRITICAL FACTOR IN THE DESIGN OF HARSCO TRACK TECHNOLOGIES EQUIPMENT. THE BEST SAFETY PROGRAM STARTS WITH A SAFETY CONSCIOUS OPERATOR. THE SAFETY INFORMATION HIGHLIGHTED IN THIS BULLETIN DESCRIBES SAFE OPERATING PRACTICES FOR THE BENEFIT OF THE WORKERS WHO WILL USE OUR EQUIPMENT IN THEIR DAILY JOBS.

HAZARD SERIOUSNESS

Signal Words: **DANGER**, **WARNING** and **CAUTION** are used to identify levels of hazard seriousness.

DANGER - Immediate hazards which WILL result in sever bodily injury or death.

WARNING - Hazards or unsafe practices which COULD result in severe bodily injury or death.

CAUTION - Hazards or unsafe practices which COULD result in minor bodily injury and / or product or property damage.

Safety Information

- **APPLY THE VEHICLE PARKING BRAKE AND STOP THE ENGINE WHEN PERFORMING MAINTENANCE, MAKING ADJUSTMENTS, WORKING UNDER VEHICLE OR GUIDE WHEEL EQUIPMENT OR WHENEVER UNINTENDED MOVEMENT OF THE VEHICLE COULD OCCUR, UNLESS OTHERWISE INSTRUCTED IN THIS MANUAL.**

- **MAKE SURE ALL PERSONS ARE CLEAR OF VEHICLE BEFORE PERFORMING ANY OPERATING FUNCTIONS.**

- **KEEP ALL PARTS OF THE BODY AND LOOSE CLOTHING CLEAR OF ALL MOVING PARTS OF THE VEHICLE OR GUIDE WHEEL EQUIPMENT.**

- **UNDERSTAND EQUIPMENT OPERATION AND BE AWARE OF ALL PINCH POINTS BEFORE OPERATING OR MAKING ADJUSTMENTS TO GUIDE WHEEL EQUIPMENT.**

- **IF A DERAILMENT SHOULD OCCUR WHILE VEHICLE IS OPERATING IN ELECTRIFIED 3RD-RAIL TERRITORY, VEHICLE OR GUIDE WHEEL EQUIPMENT MIGHT BE IN ELECTRICAL CONTACT WITH ELECTRIFIED RAIL. DO NOT ATTEMPT TO EXIT FROM VEHICLE UNTIL ELECTRICAL POWER TO 3RD-RAIL HAS BEEN TURNED OFF.**

- **DO NOT EXCEED 35 MPH (56 km/h) WHEN OPERATING VEHICLE ON TRACK. RAILROAD RULES GOVERNING SPEEDS SHOULD BE OBSERVED AT ALL TIMES. REDUCE SPEED WHEN PROPELLING VEHICLE THROUGH SWITCHES, CROSSINGS, BRANCH LINES AND ANY SPECIAL TRACK WORKS. OPERATING VEHICLE AT UNSAFE SPEEDS COULD RESULT IN DERAILMENT OF VEHICLE.**

- **CHECK AND CORRECT GUIDE WHEEL EQUIPMENT ALIGNMENT PROMPTLY IF MISALIGNMENT IS INDICATED.**

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Safety Information

- **AT MAXIMUM LOADED GROSS VEHICLE WEIGHT ON TRACK (including driver, passengers, equipment, tools, payload, etc.) DO NOT EXCEED ANY OF THE FOLLOWING:**
  - **VEHICLE'S G.V.W.R. (Gross Vehicle Weight Rating).**
  - **VEHICLE'S FRONT G.A.W.R. (Gross Axle Weight Rating) OR THE FRONT RAIL PILOT UNIT RATED LOAD CAPACITY, WHICHEVER IS LOWER.**
  - **VEHICLE'S REAR G.A.W.R. (Gross Axle Weight Rating) OR THE SUM OF REAR RAIL PILOT UNIT GUIDE WHEEL RATED LOAD CAPACITY PLUS (+) VEHICLE'S REAR TIRE/WHEEL RATED LOAD CAPACITY, WHICHEVER IS LOWER.**
  - **COMPONENTS RATED LOAD CAPACITY:**
    - **A. TIRE MANUFACTURER'S RATED LOAD CAPACITY**
    - **B. VEHICLE'S WHEEL RATED LOAD CAPACITY**
    - **C. FRONT GUIDE WHEEL UNIT RATED LOAD CAPACITY:**
      5,500 lbs (2495 kg)
      2,750 lbs (1248 kg) maximum per guide wheel
    - **D. REAR GUIDE WHEEL UNIT RATED LOAD CAPACITY:**
      5,000 lbs (2268 kg)
      2,500 lbs (1134 kg) maximum per guide wheel

FAILURE TO HEED THESE WARNINGS COULD RESULT IN SEVERE BODILY INJURY.

- **OBSERVE AND FOLLOW ALL RAILROAD SAFETY RULES AND REGULATIONS.**

- **KNOW THE POSITIONS AND FUNCTIONS OF ALL CONTROLS BEFORE ATTEMPTING TO OPERATE VEHICLE.**

- **THIS GUIDE WHEEL EQUIPMENT IS DESIGNED WITH YOUR SAFETY IN MIND. NEVER DISCONNECT AND/OR ATTEMPT TO OVERRIDE SAFETY FEATURES.**

FAILURE TO HEED THESE PRECAUTIONS COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.

Note: To help ensure safe operation of this equipment, keep all safety decals clean and legible. Replace safety decals when necessary with new decals, listed in the Parts Section of this manual.

Identification View

FIGURE 1-1
HR2000 SERIES A HY-RAIL®
GUIDE WHEEL EQUIPMENT

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Description

The FAIRMONT™ HR2000 Series A HY-RAIL® guide wheel equipment can be applied to various standard utility vehicles, cab chassis and pickup trucks. The vehicles G.V.W.R. (gross vehicle weight rating) and/or G.A.W.R. (gross axle weight rating) must comply with the specified limits listed in the Harsco Track Technologies HY-RAIL® Vehicle Specifications Manual. For information regarding special applications not listed in the Harsco Track Technologies HY-RAIL® Vehicle Specifications Manual, contact Harsco Track Technologies, Harsco Corporation, Fairmont, Minnesota.

The rail pilot units are raised and lowered hydraulically. Hydraulic power may be supplied from the vehicle system or from an optional power pack. The rail pilot units are mounted onto the vehicle frame. When the rail pilot units are in the "highway" position, the weight of the pilot units is carried on the vehicle frame. When the vehicle is placed in the "rail" position, load bearing guide wheel assemblies guide the vehicle on the track. Axle hooks hold the vehicle's front tires above the rail surface to ensure that the tires do not come into contact with the rails while the vehicle is propelling through crossings, switches, etc. A steering lock assembly is manually actuated, during on track operation. The steering lock holds the vehicle's steering wheel in place to to ensure alignment of the vehicle's front wheels with the rail.

The vehicle's rear wheels provide propulsion for on track operation. On track braking is provided by the vehicle's rear brakes. To provide additional braking force, the front and rear rail pilot units may be equipped with optional internal shoe type guide wheel brakes or air actuated tread-type composition brake shoes.

Vehicle Orientation

Front - rear and left - right are determined from the vehicle operator's seat.

Serial Numbers

When this bulletin is received, complete the following record from the serial number tags on the rail pilot units. Always provide these factory serial numbers when calling or writing about the units. The serial number tags is located on the frame assembly of the units.

FIGURE 1-2
FRONT RAIL PILOT UNIT SERIAL NUMBER TAG

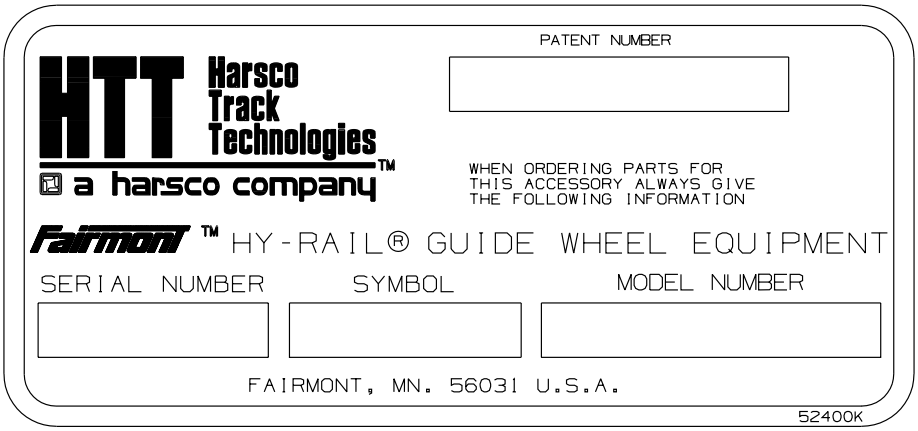
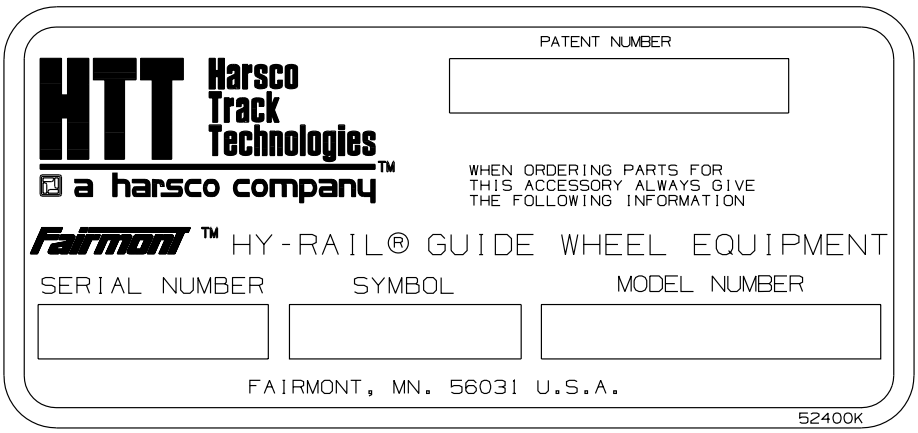


FIGURE 1-3
REAR RAIL PILOT UNIT SERIAL NUMBER TAG



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Specifications

VEHICLE

See the Harsco Track Technologies HY-RAIL® Vehicle Specifications Manual for vehicle specifications. For information regarding special applications not listed in the Harsco Track Technologies Vehicle Specifications Manual, contact Harsco Track Technologies, Harsco Corporation, Fairmont, Minnesota.

RAIL PILOT UNITS

HR2000A1 Front Rail Pilot Unit - Insulated 153738
HR2000A2 / A3 Front Rail Pilot Unit - Insulated 166463
HR2000A2 / A3 Front Rail Pilot Unit - Non-Insulated 168458

HR2000A1 Rear Rail Pilot Unit - Insulated 153737
(raise / lower hydraulic cylinder mounted horizontal)
HR2000A2 Rear Rail Pilot Unit - Insulated 166464
(raise / lower hydraulic cylinder mounted vertical)
HR2000A2 Rear Rail Pilot Unit - Non-Insulated 168457
(raise / lower hydraulic cylinder mounted vertical)
HR2000A3 Rear Rail Pilot Unit - Insulated 169314
(raise / lower hydraulic cylinder mounted horizontal)
HR2000A3 Rear Rail Pilot Unit - Non-Insulated 169318
(raise / lower hydraulic cylinder mounted horizontal)

Track Gauge	56-1/2 in	(1.435 m)
Guide Wheels - Flange Diameter	13-1/4 in	(337 mm)
- Tread Diameter	11 in	(280 mm)
Weight - Front Unit	560 lbs	(254 kg)
- Rear Unit	550 lbs	(249 kg)
Maximum Load Capacity - Front Unit *	5,500 lbs	(2495 kg)
Maximum Load Per Guide Wheel (with vehicle at curb weight)	2,750 lbs	(1248 kg)
Maximum Load Capacity - Rear Unit **	5,000 lbs	(2268 kg)
Maximum Load Per Guide Wheel (with vehicle at curb weight)	2,750 lbs	(1134 kg)

*Note: * Do not exceed the front GAWR of the vehicle.*

*Note: ** The vehicle's rear inner dual wheels carry the remaining load capacity. Do not exceed the tire manufacturer's and / or the wheel manufacturer's load rating capacity for the rear inner dual wheels when on track.*

SECTION 2 - OPERATION
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Highway Operation

Towing

Speedometer

■ **WHEN WHEEL/TIRE MODIFICATIONS ARE APPLIED, CHECK AND CHANGE SPEEDOMETER DRIVE RATIO IF NECESSARY. THE SPEEDOMETER DRIVE RATIO WILL INFLUENCE THE OPERATION OF THE VEHICLE'S ANTI-LOCK BRAKE SYSTEMS, ELECTRONICALLY CONTROLLED TRANSMISSION SHIFT TIMING AND SPEEDOMETER DISPLAY OF THE TRUE VEHICLE SPEED. FAILURE TO MAINTAIN CORRECT SPEEDOMETER DRIVE RATIO COULD RESULT IN SEVERE BODILY INJURY.**

Some vehicles require special larger diameter wheels and/or wheel spacers to properly space the vehicle tires for on track operation. Use of these wheel modifications may effect the speedometer drive ratio calibration. The speedometer drive ratio will influence the operation of the vehicle's anti-lock brake systems, electronically controlled transmission shift timing and speedometer display of the true vehicle speed. The vehicle speedometer must be re-calibrated when wheel modifications are applied to the vehicle. See the vehicle manufacturer or dealer for speedometer calibration information.

Preparing for Operation

VEHICLE

Be sure the vehicle is in operating condition by checking the following:

a. Engine oil level.
b. Radiator fluid level.
c. Fuel tank level.
d. Hydraulic reservoir oil level.
e. Brakes work properly.
f. Parking brake works properly.
g. Head, brake and signal lights work properly.
h. Tires properly inflated to the manufacturer's recommended maximum pressure printed on the sidewall of the tires, or the wheel manufacturer's recommended maximum pressure stamped on the wheel, whichever is lower.
i. Vehicle wheels: Lug nuts / bolts tightened to the proper torque, inspect vehicle wheels, lug bolts and lug nuts for wear or damage. For vehicle wheel, lug bolt and lug nut inspection information refer to the USER'S GUIDE TO WHEELS AND RIMS produced by THE MAINTENANCE COUNCIL. To obtain this guide, contact:

THE MAINTENANCE COUNCIL
AMERICAN TRUCKING ASSOCIATION
2200 MILL ROAD
ALEXANDRIA, VA. 22314
Phone: (703) 838-1763

j. Any other normal maintenance requirements.

Preparing for Operation

GUIDE WHEEL EQUIPMENT

Be sure the guide wheel equipment is in operating condition by checking the following:

a. Air and hydraulic hoses and fittings for damage, wear or leaks.
b. Overall for damaged or worn parts.
c. Properly lubricated at the recommended operating mileage intervals.
d. Brakes work properly.
e. Hydraulic pressure properly adjusted.

Misalignment Indicators

■ **BEFORE OPERATING A VEHICLE WITH NEWLY INSTALLED GUIDE WHEEL EQUIPMENT ON TRACK, VERIFY THAT THE GUIDE WHEEL EQUIPMENT ALIGNMENT PROCEDURE HAS BEEN COMPLETED. CHECK AND CORRECT ALIGNMENT PROMPTLY IF MISALIGNMENT IS INDICATED. MISALIGNMENT OF GUIDE WHEEL EQUIPMENT COULD RESULT IN DERAILMENT OF VEHICLE AND SEVERE BODILY INJURY.**

The following conditions may indicate that minor adjustments to the guide wheel equipment alignment are necessary. If any of these conditions occur during operation, perform the Track Test, see Adjustment Section - Vehicle Track Test and/or complete the Alignment Procedure, see Adjustment Section - Guide Wheel Equipment Alignment Procedure.

1. Excessive flange or tread wear on any of the rail guide wheels.

2. Vehicle pulls noticeably to the left or the right during on track operation.

3. Vibration felt throughout the vehicle at various speeds during on track operation.

Placing Vehicle On Track

- **PLACE VEHICLE AUTOMATIC TRANSMISSION IN "PARK" OR MANUAL TRANSMISSION IN "NEUTRAL". APPLY THE PARKING BRAKE.**

- **UNDERSTAND EQUIPMENT OPERATION AND BE AWARE OF ALL PINCH POINTS BEFORE OPERATING OR MAKING ADJUSTMENTS TO GUIDE WHEEL EQUIPMENT.**

- **BEFORE PROPELLING VEHICLE ON THE TRACK, MAKE SURE:**
  - **FRONT AND REAR GUIDE WHEELS ARE LOWERED AND LOCKED IN RAIL POSITION, AND SECURED WITH LOCK PIN.**
  - **ALL RAIL GUIDE WHEEL FLANGES ARE ENGAGED ON THE INSIDE OF THE RAIL.**
  - **AXLE LOCKS ARE ENGAGED, HOLDING THE VEHICLE FRONT TIRES A MINIMUM OF 1-1/2" (38 mm) ABOVE THE RAIL.**
  - **STEERING WHEEL LOCK IS ENGAGED.**
  - **OPTIONAL BRAKES: BRAKE CONTROL VALVE IS IN THE "ON" POSITION AND GUIDE WHEEL BRAKE EQUIPMENT IS FUNCTIONAL.**

FAILURE TO HEED THESE WARNINGS COULD RESULT IN DERAILMENT OF VEHICLE AND SEVERE BODILY INJURY.

- **WHEN USING VEHICLE MECHANICAL PTO HYDRAULIC PUMP TO LOWER GUIDE WHEEL EQUIPMENT, DO NOT EXCEED HYDRAULIC SYSTEM FLOW OF 8 GPM. EXCESSIVE FLOW COULD DAMAGE HYDRAULIC SYSTEM COMPONENTS.**

- **OBSERVE AND FOLLOW ALL RAILROAD SAFETY RULES AND REGULATIONS.**

- **IF THE VEHICLE IS EQUIPPED WITH A STROBE LIGHT (BEACON) AND RAILROAD RULES AND REGULATIONS REQUIRE ITS USE, THE STROBE LIGHT (BEACON) MUST BE ILLUMINATED WHEN PLACING THE VEHICLE ON TRACK AND WHEN OPERATING THE VEHICLE ON TRACK.**

FAILURE TO HEED THESE PRECAUTIONS COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.

Placing Vehicle On Track

1. Ensure that highway vehicles are not approaching the grade crossing while placing the vehicle on track. To ensure safety, flag the crossing per railroad rules and regulations.

2. At a road crossing, drive the vehicle about 25 feet (7.6 m) past the track. Back the vehicle onto the rails so that the rear vehicle wheels are centered on the rails. On vehicles with dual rear wheels, the inner dual wheels must be centered on the rails. It may be necessary to move the vehicle back and forth several times to get the wheels centered on the rail properly.

3. Place the vehicle automatic transmission in "PARK" or manual transmission in "NEUTRAL". Apply the parking brake.

4. Start the auxiliary hydraulic power source or engage the mechanical PTO hydraulic pump. If the vehicle is equipped with an auxiliary control valve, place the valve in the proper position to direct hydraulic oil flow to the guide wheel equipment.

LOWERING REAR GUIDE WHEELS - See Figure 2-1

1. Lower and lock the rear guide wheels first. The rear guide wheels should be lowered first so the front tires of the vehicle can be maneuvered to align the front guide wheels with the rails.

2. On guide wheel units equipped with rail sweeps, make sure the rail sweeps are raised to the "highway" position before lowering the guide wheels to the rail. This will ensure that the rail sweeps do not become pinched between the guide wheel and the rail.

3. Remove lock pin (1). Button in "T" end of lock pin must be pushed in to remove pin.

4. Push control valve handle (2) in to slightly raise the guide wheels. This will release any pressure on the mechanical lock mechanism.

5. Rotate and hold lock handle (3) clockwise if the control valve and lock handle are located on the left side of the vehicle or counter-clockwise if the control valve and lock handle are located on the right side of the vehicle.

6. While holding lock handle (3) in the released position, pull control valve handle (2) out to lower the guide wheels.

7. When the guide wheels are fully lowered, release the control valve handle. Make sure the flanges on both guide wheels are engaged on the inside of the rails.

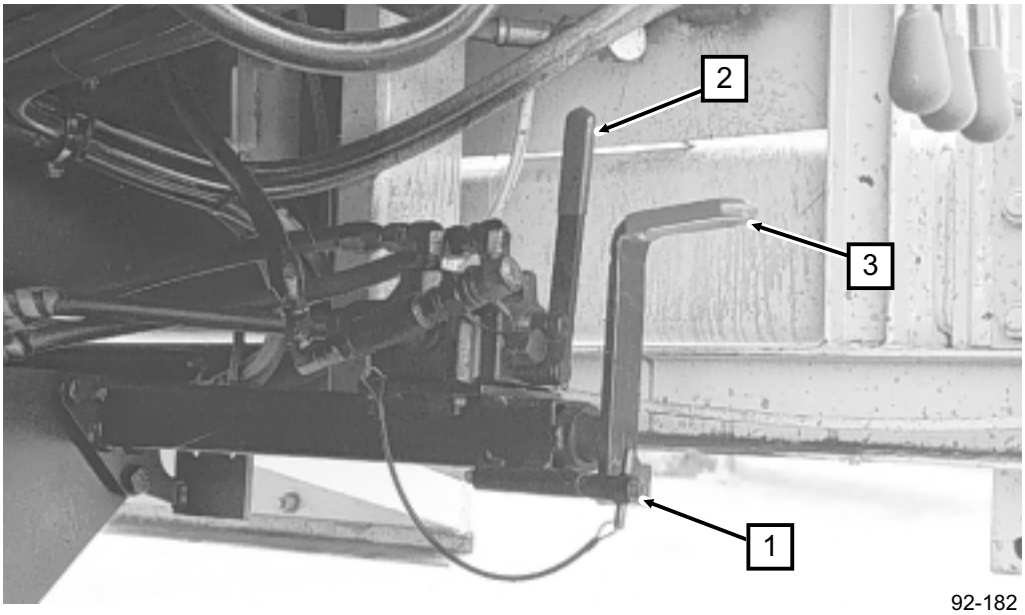
8. Rotate lock handle (3) back to the locked position. Install lock pin (1). Button in "T" end of lock pin must be pushed in to install pin.

9. On guide wheel units equipped with rail sweeps, lower the rail sweeps to the "rail" position.

Placing Vehicle On Track

LOWERING REAR GUIDE WHEELS - Continued

FIGURE 2-1
REAR RAIL PILOT UNIT



Placing Vehicle On Track

LOWERING FRONT GUIDE WHEELS - See Figure 2-2

Note: On some vehicle applications the axle hooks may use a lever and connecting rod system to engage and disengage the axle hooks instead of the push / pull control rod as described and illustrated here. Follow the operating instructions on the rail pilot unit for the correct operating procedures when the unit is equipped with the lever system.

1. To engage the axle hooks under the front axle, pull control rod (1) out and lift up so that the collar on the rod can be moved through the large hole in plate (2). Push control rod (1) towards the vehicle until the axle hooks are engaged under the axle. Ensure that both axle hooks are engaged under the vehicle's axle.

   Note: On some vehicle applications the axle hooks may be reversed and will engage under the axle from the rear instead of from the front. This will cause the axle hook control rod to engage and disengage the axle hooks in the opposite direction.

2. Remove lock pin (3). Push control valve handle (4) in to slightly raise the guide wheels. This will release any pressure on the mechanical lock mechanism.

3. Push and hold lock handle (5) towards the vehicle. While holding lock handle (5) in the released position, pull control valve handle (4) out to lower the guide wheels.

4. When the guide wheels are fully lowered, release the control valve handle. Make sure the flanges on both guide wheels are engaged on the inside of the rails.

5. Pull lock handle (3) forward to the locked position. Install lock pin (3).

6. Stop the auxiliary hydraulic power source or disengage the mechanical PTO hydraulic pump. If the vehicle is equipped with an auxiliary control valve, place the valve in the proper position to shut off hydraulic oil flow to the guide wheel equipment.

7. See Figures 2-3 and 2-4. Set the vehicle front wheels straight ahead and secure the steering wheel in that position by engaging the steering lock on the steering column. Steering locks may vary from vehicle to vehicle but will operate similarly.

   Note: Do not place your hands or any pressure on the steering wheel after the steering lock is engaged.

8. Move the Rail Wheel Brake control valve to the ON position to activate the guide wheel equipment brakes whenever the vehicle is on track. The vehicle brake pedal will actuate the vehicle brakes and the guide wheel equipment brakes simultaneously.

Placing Vehicle On Track

LOWERING FRONT GUIDE WHEELS - Continued

FIGURE 2-2
FRONT RAIL PILOT UNIT

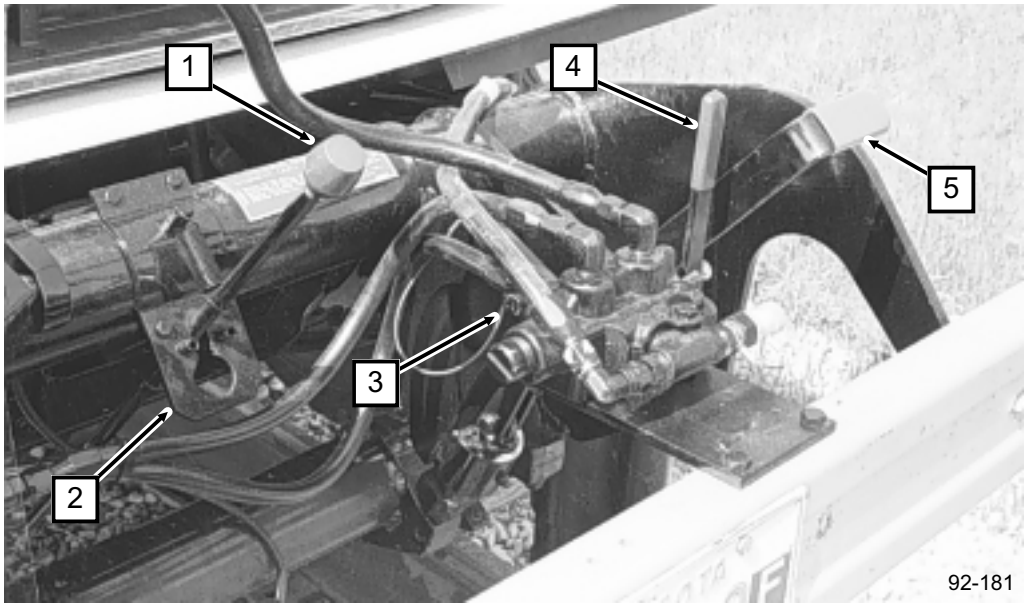


FIGURE 2-3
STEERING LOCK DISENGAGED

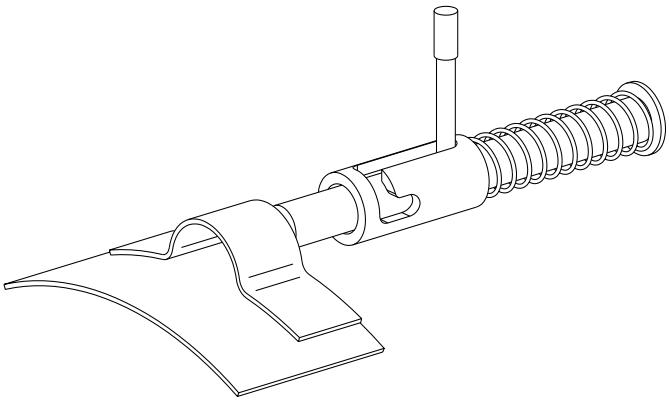
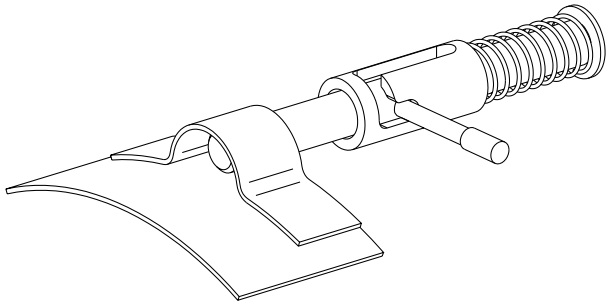


FIGURE 2-4
STEERING LOCK ENGAGED



Guide Wheel Load On Track

- **IMPROPER LOADING OF GUIDE WHEEL EQUIPMENT CAN CAUSE DERAILMENT OF VEHICLE.**

- **ALWAYS CHECK THE GUIDE WHEEL LOAD BEFORE OPERATING THE VEHICLE ON TRACK. NEVER OPERATE THE VEHICLE ON TRACK IF LOAD EXCEEDS THE MAXIMUM RATED LOAD OF THE FRONT AND/OR REAR RAIL PILOT UNITS.**
  - **THE MAXIMUM LOAD ON THE FRONT RAIL PILOT UNIT IS 5,500 LBS (2495 kg) OR 2,750 LBS (1248 kg) MAXIMUM PER GUIDE WHEEL.**
  - **THE MAXIMUM LOAD ON THE REAR RAIL PILOT UNIT IS 5,000 LBS (2268 kg) OR 2,500 LBS (1134 kg) MAXIMUM PER GUIDE WHEEL.**

- **NEVER OPERATE THE VEHICLE ON TRACK IF CLEARANCE BETWEEN VEHICLE FRONT TIRES AND RAIL IS LESS THAN 1-1/2" (38 mm).**

- **REAR RAIL PILOT UNIT MUST BE ADJUSTED TO CARRY APPROXIMATELY 50% OF VEHICLE REAR AXLE CURB WEIGHT OR A MINIMUM OF 2500 LBS (1134 kg).**

- **APPLY PARKING BRAKE AND STOP VEHICLE ENGINE BEFORE CHECKING GUIDE WHEEL LOAD AND VEHICLE FRONT TIRE TO RAIL CLEARANCE.**

FAILURE TO HEED THESE WARNINGS COULD RESULT IN DERAILMENT OF VEHICLE AND/OR SEVERE BODILY INJURY.

Whenever the vehicle is loaded or additional load is added to the existing vehicle load on track, check the load on both the front and rear rail pilot units.

CHECKING FRONT GUIDE WHEEL LOAD - See Chart 2-5 and Figure 2-6

1. Apply the parking brake. Stop the vehicle's engine.

2. The protrusion of rod (1) on the spring cell is used to determine the load on the front guide wheels. Measure dimension (L) on both spring cells. See Chart 2-5 to convert dimension (L) to the load on the guide wheel.

3. The maximum rated load on the front rail pilot unit is 5,500 lbs (2495 kg) or 2,750 lbs (1248 kg) maximum per guide wheel. The front rail pilot unit spring cells are non-adjustable. If the load exceeds the maximum rated load capacity of the front rail pilot unit or the maximum rated load capacity of either guide wheel, the load must be redistributed or some of the load removed. Never operate the vehicle on track if the load on the front rail pilot unit exceeds the maximum rated load capacity.

Guide Wheel Load On Track

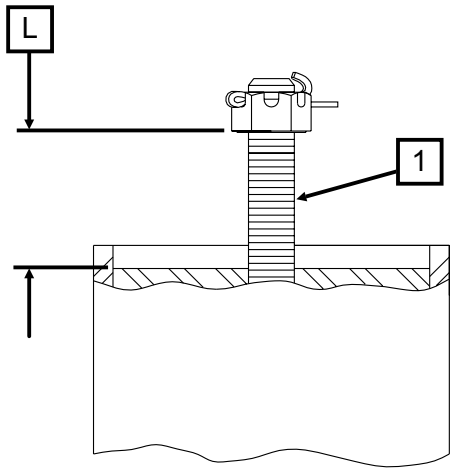
CHECKING FRONT GUIDE WHEEL LOAD - Continued

CHART 2-5
FRONT GUIDE WHEEL LOAD

	DIMENSION (L)		APPROXIMATE LOAD PER SIDE	
	1/4"	(6.4 mm)	525 lbs	(238 kg)
	1/2"	(12.7 mm)	900 lbs	(408 kg)
	3/4"	(19.0 mm)	1275 lbs	(578 kg)
	1"	(25.4 mm)	1650 lbs	(748 kg)
	1-1/4"	(31.8 mm)	2025 lbs	(919 kg)
	1-1/2"	(38.1 mm)	2400 lbs	(1089 kg)
*	**1-3/4"**	**(44.5 mm) . . . . . .**	**2775 lbs**	**(1259 kg)**

*** FRONT GUIDE WHEEL IS OVERLOADED. REDISTRIBUTE OR REMOVE SOME OF THE LOAD. MAXIMUM LOAD ON FRONT RAIL PILOT UNIT MUST NOT EXCEED 5,500 LBS (2495 kg) OR 2,750 LBS (1248 kg) MAXIMUM PER GUIDE WHEEL.**

FIGURE 2-6
FRONT SPRING CELL



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Guide Wheel Load On Track

CHECKING REAR GUIDE WHEEL LOAD - See Chart 2-7 and Figure 2-8

1. Apply the parking brake. Stop the vehicle's engine.

2

2. The protrusion of rod (1) on the spring cell is used to determine the load on the rear guide wheels. Measure dimension (L) on both spring cells. See Chart 2-7 to convert dimension (L) to the load on the guide wheel.

3. The maximum rated load on the rear rail pilot unit is 5,000 lbs (2268 kg) or 2,500 lbs (1134 kg) maximum per guide wheel. The rear rail pilot unit spring cells are adjustable. See the Adjustment Section - Guide Wheel Load for the adjustment procedure. If the load exceeds the maximum rated load capacity of the rear rail pilot unit or the maximum rated load capacity of either guide wheel, the load must be redistributed or some of the load removed. Never operate the vehicle on track if the load on the rear rail pilot unit exceeds the maximum rated load capacity.

CHART 2-7
REAR GUIDE WHEEL LOAD

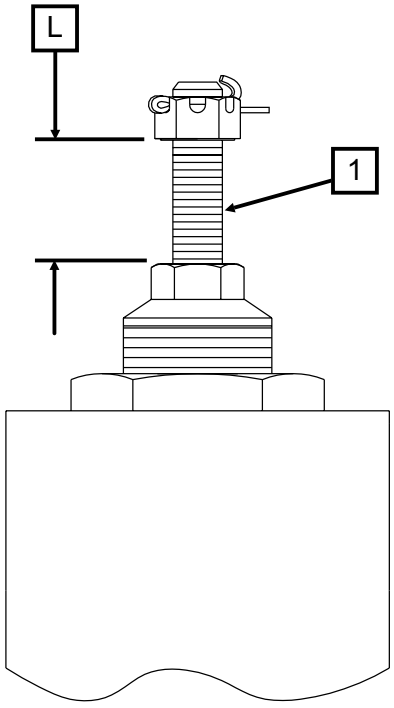
	DIMENSION (L)		APPROXIMATE LOAD PER SIDE	
	1/4"	(6.4 mm)	275 lbs	(125 kg)
	1/2"	(12.7 mm)	400 lbs	(181 kg)
	3/4"	(19.0 mm)	525 lbs	(238 kg)
	1"	(25.4 mm)	650 lbs	(295 kg)
	1-1/4"	(31.8 mm)	775 lbs	(352 kg)
	1-1/2"	(38.1 mm)	945 lbs	(429 kg)
	1-3/4"	(44.5 mm)	1155 lbs	(524 kg)
	2"	(50.8 mm)	1370 lbs	(621 kg)
	2-1/4"	(57.2 mm)	1581 lbs	(717 kg)
	2-1/2"	(63.5 mm)	1795 lbs	(814 kg)
	2-3/4"	(69.9 mm)	2005 lbs	(909 kg)
	3"	(76.2 mm)	2220 lbs	(1007 kg)
	3-1/4"	(82.6 mm)	2430 lbs	(1102 kg)
*	**3-1/2"**	**(88.9 mm)**	**2,645 lbs**	**(1,200 kg)**

* **REAR GUIDE WHEEL IS OVERLOADED. REDISTRIBUTE OR REMOVE SOME OF THE LOAD. MAXIMUM LOAD ON REAR RAIL PILOT UNIT MUST NOT EXCEED 5,000 LBS (2268 kg) OR 2,500 LBS (1134 kg) MAXIMUM PER GUIDE WHEEL.**

Guide Wheel Load On Track

CHECKING REAR GUIDE WHEEL LOAD - Continued

FIGURE 2-8
REAR SPRING CELL



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CHECK VEHICLE FRONT TIRE CLEARANCE ABOVE RAIL

If the vehicle's front tire clearance above the rail is less than 1-1/2" (38 mm) see Adjustment Section - Vehicle Front Wheel Clearance. Never operate the vehicle on track when the front tire clearance above the rail is less than 1-1/2" (38 mm)

Propelling On Track

- **IMPROPER LOADING OF HY-RAIL® EQUIPPED VEHICLE CAN CAUSE DERAILMENT OF VEHICLE.**

- **ALWAYS CHECK GUIDE WHEEL LOAD BEFORE OPERATING THE VEHICLE ON TRACK.**

- **NEVER OPERATE VEHICLE ON TRACK IF LOAD EXCEEDS MAXIMUM RATED LOAD OF FRONT AND/OR REAR RAIL PILOT UNITS.**

- **NEVER OPERATE VEHICLE ON TRACK IF CLEARANCE BETWEEN VEHICLE FRONT TIRE AND RAIL IS LESS THAN 1-1/2" (38 mm).**

FAILURE TO HEED THESE WARNINGS COULD RESULT IN DERAILMENT OF VEHICLE AND/OR SEVERE BODILY INJURY.

- **BEFORE OR WHEN PROPELLING ON TRACK:**
  - **OBSERVE AND FOLLOW ALL RAILROAD SAFETY RULES AND REGULATIONS.**
  - **OPERATOR MUST LOOK IN ALL DIRECTIONS FOR PERSONS OR OBJECTS ON OR ADJACENT TO THE TRACK.**
  - **DO NOT ACCELERATE SUDDENLY. TRACTION IS REDUCED ON TRACK. SPINNING VEHICLE TIRES COULD DAMAGE THEM.**
  - **DO NOT EXCEED 35 MPH (56 km/h) WHEN OPERATING VEHICLE ON TRACK. RAILROAD RULES GOVERNING SPEEDS SHOULD BE OBSERVED AT ALL TIMES. REDUCE SPEED WHEN PROPELLING VEHICLE THROUGH SWITCHES, ROAD CROSSINGS, BRANCH LINES AND ANY SPECIAL TRACK WORKS. OPERATING VEHICLE AT UNSAFE SPEEDS COULD RESULT IN DERAILMENT OF THE VEHICLE.**
  - **STEERING LOCK MUST BE ENGAGED AT ALL TIMES WHEN OPERATING VEHICLE ON TRACK.**
  - **IF THE VEHICLE IS EQUIPPED WITH A STROBE LIGHT (BEACON) AND RAILROAD RULES AND REGULATIONS REQUIRE ITS USE, THE STROBE LIGHT (BEACON) MUST BE ILLUMINATED WHEN OPERATING THE VEHICLE ON TRACK.**

FAILURE TO HEED THESE PRECAUTIONS COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.

Vehicles equipped with the HR2000 Series A HY-RAIL® Guide Wheel Equipment use the vehicle propulsion system to propel on track. Do not accelerate suddenly. Traction is reduced on rail. Spinning the vehicle tires could damage them.

Braking On Track

- **PERSONS WHO OPERATE THE VEHICLE MUST BE FAMILIAR WITH TRACK AND WEATHER CONDITIONS THAT MAY AFFECT STOPPING DISTANCE. BE ALERT TO THESE CONDITIONS AND ALLOW ADEQUATE STOPPING DISTANCE.**

- **BE PREPARED TO BRAKE AT ALL HIGHWAY CROSSINGS. THIS VEHICLE MAY NOT OPERATE TRACK SIGNAL CIRCUITS, AND ONCOMING VEHICLES OR PEDESTRIANS MAY NOT YIELD THE RIGHT OF WAY.**

- **RAIL WHEEL BRAKE CONTROL VALVE MUST BE IN THE "ON" POSITION WHENEVER VEHICLE IS ON TRACK.**

FAILURE TO HEED THESE PRECAUTIONS COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.

The HR2000 Series A HY-RAIL® Guide Wheel Equipment may be equipped with brakes. If the rail pilot units are equipped with brakes, the vehicle uses a combination of the front and/or rear rail pilot unit brakes and the vehicle's rear axle brake system for braking on track. The front and/or rear rail pilot unit brakes will apply simultaneously when the vehicle brakes are applied. Stopping distance is greater on track than on typical road surfaces. Apply the brakes gradually to avoid sliding the vehicle tires and rail guide wheels.

Vehicles Equipped With Crane Or Aerial Lift Device

- **WHEN OPERATING CRANE, AERIAL LIFT DEVICE, ETC., WHILE THE VEHICLE'S GUIDE WHEELS ARE ON THE RAILS, DO NOT OVERLOAD THE GUIDE WHEEL EQUIPMENT OR EXCEED THE CAPACITY OF ANY OF THE EQUIPMENT BEING USED.**

- **THE UNIT SHOULD BE EQUIPPED WITH OUTRIGGERS TO HELP PREVENT ACCIDENTS AND THE POSSIBILITY OF DAMAGE TO THE GUIDE WHEEL EQUIPMENT. WHEN USING THE EQUIPMENT TO TRANSFER ANY LOAD, SET THE OUTRIGGERS ON A STABLE BASE TO PREVENT SETTLING OF THE OUTRIGGERS AND SHIFTING OF THE VEHICLE.**

- **IF OPERATING CONDITIONS REQUIRE LIFTING A LOAD WITH THE CRANE WHILE ON RAIL, BUT WITHOUT THE OUTRIGGERS BEING USED, THE LOAD APPLIED BY LIFTING WITH THE CRANE MUST NOT OVERLOAD ANY COMPONENT OF THE GUIDE WHEEL EQUIPMENT.**

- **CAREFULLY READ THE CRANE OR AERIAL LIFT DEVICE OPERATOR'S MANUAL FOR THE SAFE USE AND EFFICIENT OPERATION OF THE EQUIPMENT.**

FAILURE TO HEED THESE WARNINGS COULD CAUSE DERAILMENT OF THE VEHICLE RESULTING IN SEVERE BODILY INJURY AND/OR DEATH.

Removing Vehicle From Track

- **PLACE VEHICLE AUTOMATIC TRANSMISSION IN "PARK" OR MANUAL TRANSMISSION IN "NEUTRAL". APPLY THE PARKING BRAKE.**

- **UNDERSTAND EQUIPMENT OPERATION AND BE AWARE OF ALL PINCH POINTS BEFORE OPERATING OR MAKING ADJUSTMENTS TO GUIDE WHEEL EQUIPMENT.**

- **BEFORE PROPELLING VEHICLE OFF TRACK, MAKE SURE:**
  - **FRONT AND REAR GUIDE WHEELS ARE RAISED, LOCKED IN THE HIGHWAY POSITION AND SECURED WITH THE LOCK PINS.**
  - **STEERING WHEEL LOCK IS DISENGAGED.**

FAILURE TO HEED THESE WARNINGS COULD RESULT IN SEVERE BODILY INJURY.

- **WHEN USING VEHICLE MECHANICAL PTO HYDRAULIC PUMP TO RAISE GUIDE WHEEL EQUIPMENT, DO NOT EXCEED HYDRAULIC SYSTEM FLOW OF 8 GPM. EXCESSIVE FLOW COULD DAMAGE HYDRAULIC SYSTEM COMPONENTS.**

- **OBSERVE AND FOLLOW ALL RAILROAD SAFETY RULES AND REGULATIONS.**

- **IF THE VEHICLE IS EQUIPPED WITH A STROBE LIGHT (BEACON) AND RAILROAD RULES AND REGULATIONS REQUIRE ITS USE, THE STROBE LIGHT (BEACON) MUST BE ILLUMINATED WHEN OPERATING AND REMOVING THE VEHICLE FROM TRACK.**

FAILURE TO HEED THESE PRECAUTIONS COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.

1. Ensure that highway vehicles are not approaching the grade crossing while placing the vehicle on track. To ensure safety, flag the crossing per railroad rules and regulations.

2. Approach the crossing and stop with the vehicle front wheels on the crossing.

3. Place the vehicle automatic transmission in "PARK" or manual transmission in "NEUTRAL". Apply the parking brake.

4. Move the Rail Wheel Brake control valve to the OFF position, whenever the vehicle is removed from the track for highway use.

5. Start the auxiliary hydraulic power source or engage the mechanical PTO hydraulic pump. If the vehicle is equipped with an auxiliary control valve, place the valve in the proper position to direct hydraulic oil flow to the guide wheel equipment.

Removing Vehicle From Track

RAISING FRONT GUIDE WHEELS - See Figure 2-2

1. Remove lock pin (3). Push control valve handle (4) in to slightly raise the guide wheels. This will release any pressure on the mechanical lock mechanism.

2. Push and hold lock handle (5) towards the vehicle. While holding lock handle (5) in the released position, push control valve handle (4) in to raise the guide wheels.

3. When the guide wheels are fully raised, release the control valve handle.

4. Pull lock handle (3) forward to the locked position. Install lock pin (3).

5. To disengage the axle hooks from under the front axle, lift control rod (1) up so that the collar on the rod can be moved through the large hole in plate (2). Pull control rod (1) away from the vehicle until the axle hooks are disengaged from under the axle. Lower control rod (1) and push the rod in towards the vehicle, making sure that the collar on the control rod is located under the roll pins on plate (2). Ensure that both axle hooks are disengaged from under the vehicle's axle.

   Note: On some vehicle applications the axle hooks may be reversed and will engage under the axle from the rear instead of from the front. This will cause the axle hook control rod to engage and disengage the axle hooks in the opposite direction.

Removing Vehicle From Track

RAISING REAR GUIDE WHEELS - See Figure 2-1

1. Remove lock pin (1). Button in "T" end of lock pin must be pushed in to remove pin.

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2. Push control valve handle (2) in to slightly raise the guide wheels. This will release any pressure on the mechanical lock mechanism.

3. Rotate and hold lock handle (3) clockwise if the control valve and lock handle are located on the left side of the vehicle or counter-clockwise if the control valve and lock handle are located on the right side of the vehicle.

4. While holding lock handle (3) in the released position, push control valve handle (2) in to raise the guide wheels.

5. When the guide wheels are fully raised, release the control valve handle.

6. Rotate lock handle (3) back to the locked position. Install lock pin (1). Button in "T" end of lock pin must be pushed in to install pin.

7. Stop the auxiliary hydraulic power source or disengage the mechanical PTO hydraulic pump. If the vehicle is equipped with an auxiliary control valve, place the valve in the proper position to shut off hydraulic oil flow to the guide wheel equipment.

8. See Figures 2-3 and 2-4. Disengage the vehicle steering lock located on the steering column. Steering locks may vary from vehicle to vehicle but will operate similarly.

Highway Operation

■ **THIS MULTIPURPOSE VEHICLE HAS SPECIAL DESIGN AND EQUIPMENT FEATURES FOR OFF-ROAD USE. IT HANDLES DIFFERENTLY FROM AN ORDINARY PASSENGER CAR IN DRIVING CONDITIONS WHICH MAY OCCUR ON STREETS, HIGHWAYS AND OFF-ROAD. WEIGHT AND LOCATION OF AVAILABLE PAYLOAD MAY ALSO AFFECT THE HANDLING OF THIS VEHICLE. DRIVE WITH CARE AND WEAR SAFETY BELTS AT ALL TIMES. READ VEHICLE OWNER'S MANUAL FOR ADDITIONAL PRECAUTIONS.**

Towing Trailer / Equipment With Vehicle On Track

- **VEHICLE USED FOR TOWING MUST BE RATED BY VEHICLE MANUFACTURER FOR WEIGHT OF TRAILER / EQUIPMENT TO BE TOWED. DO NOT EXCEED VEHICLE MANUFACTURER'S MAXIMUM RATED TOWING CAPACITY.**

- **TOWING VEHICLE MUST WEIGH AS MUCH OR MORE THAN TRAILER / EQUIPMENT BEING TOWED.**

- **VEHICLE USED FOR TOWING MUST HAVE AN ADEQUATE BRAKE SYSTEM TO SAFELY DECELERATE AND STOP TOWING VEHICLE AND TRAILER / EQUIPMENT BEING TOWED.**

- **TOWING TRAILER / EQUIPMENT LENGTHENS STOPPING DISTANCES. ALLOW ADEQUATE DISTANCE FOR STOPPING. ANTICIPATE STOPS SO YOU CAN BRAKE GRADUALLY.**

- **STOPPING DISTANCE IS GREATER ON TRACK THAN ON TYPICAL ROAD SURFACES. APPLY BRAKES GRADUALLY TO AVOID SLIDING VEHICLE TIRES AND RAIL GUIDE WHEELS.**

- **TOW TRAILER / EQUIPMENT AT A REASONABLE SPEED (20 MPH MAXIMUM) TAKING INTO ACCOUNT TRACK CONDITIONS, TRACK GRADE, WEATHER, VISIBILITY AND STOPPING DISTANCE TO ASSURE SAFE OPERATION. RAILROAD RULES GOVERNING SPEEDS AND RIGHT OF WAY SHOULD BE OBSERVED AT ALL TIMES.**

- **TRAILER / EQUIPMENT BEING TOWED MUST BE IN A SAFE, USABLE CONDITION TO BE TOWED.**

- **MAKE SURE THAT VEHICLE'S:**
  - **FRONT AND REAR GUIDE WHEELS ARE LOWERED AND LOCKED IN RAIL POSITION.**
  - **ALL RAIL GUIDE WHEEL FLANGES ARE ENGAGED ON INSIDE OF RAILS.**
  - **FRONT RAIL PILOT UNIT AXLE LOCKS MUST ENGAGED, HOLDING VEHICLE FRONT TIRES A MINIMUM OF 1-1/2" (38 mm) ABOVE RAIL.**
  - **VEHICLE STEERING WHEEL LOCK ENGAGED WITH FRONT WHEELS STRAIGHT AHEAD.**

  FAILURE TO HEED THESE WARNINGS COULD RESULT IN SEVERE BODILY INJURY.

Towing Trailer / Equipment With Vehicle On Track

- **CAREFULLY AND THOROUGHLY PREPARE VEHICLE FOR TOWING, MAKING SURE TO USE THE RIGHT TOWING EQUIPMENT AND TO ATTACH IT PROPERLY.**

- **TOWING EQUIPMENT (HITCHES, TOW BARS, ETC.) MUST BE ATTACHED TO VEHICLE FRAME. DO NOT MOUNT OR ATTACH TOWING EQUIPMENT TO VEHICLE'S GUIDE WHEEL EQUIPMENT.**

- **TOWING EQUIPMENT (HITCHES, TOW BARS, ETC.) MUST HAVE A RATED TOWING CAPACITY EQUAL TO OR GREATER THAN WEIGHT OF TRAILER / EQUIPMENT BEING TOWED.**

- **USE A RIGID TYPE TOW BAR WITH SAFETY LOCKING COUPLERS. DO NOT USE CHAIN, WIRE ROPE ETC.**

- **OBSERVE AND FOLLOW ALL RAILROAD SAFETY RULES AND REGULATIONS.**

- **DO NOT ACCELERATE SUDDENLY. TRACTION IS REDUCED ON RAIL, SPINNING VEHICLE TIRES COULD DAMAGE THEM.**

- **ALWAYS CHOCK TRAILER WHEELS BEFORE UNHOOKING TRAILER FROM TOWING VEHICLE.**

FAILURE TO HEED THESE PRECAUTIONS COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.

Towing Trailer / Equipment With Vehicle On Track

1. See your vehicle's operators manual for towing information.

2. Use the vehicle manufacturer's recommendations to determine the maximum weight the towing vehicle can tow. Do not exceed vehicle manufacturer's maximum rated towing capacity.

3. The towing vehicle must have an adequate brake system to safely decelerate and stop the towing vehicle and the trailer / equipment being towed. The towing vehicle must weigh as much or more than the trailer / equipment being towed.

4. Make sure that the vehicle's:
   a. Front and rear guide wheel units are lowered and locked in the rail position.
   b. All front and rear guide wheel flanges are engaged on the inside of the rails.
   c. Front guide wheel unit axle locks must be engaged, holding the vehicle front tires a minimum of 1-1/2" (38 mm) above the rail.
   d. Vehicle front wheels are set straight ahead and the steering wheel lock is engaged on the steering column.

5. Make sure the towing vehicle and the trailer / equipment are in good working condition (tires, brakes, lights, etc.) and that current maintenance has been performed on the vehicle and trailer / equipment.

6. The towing equipment (hitches, tow bars, etc.) on the towing vehicle must have a rating equal to or greater than the weight of the trailer / equipment being towed.

7. The towing equipment (hitches, tow bars, etc.) must be attached to the towing vehicle frame. Do not mount or attach the towing equipment to the vehicle's guide wheel equipment.

8. Observe and follow all railroad safety rules and regulations.

9. Do not accelerate suddenly. Traction is reduced on rail. Spinning the vehicle tires could damage them.

10. Stopping distance is greater on rail than on typical road surfaces. Apply the vehicle brakes gradually to avoid sliding the vehicle tires and the guide wheel unit rail wheels. Towing trailer / equipment lengthens stopping distances. Allow adequate distance for stopping. Anticipate stops so that you can brake gradually.

11. Tow the trailer / equipment on the track at a reasonable speed (20 MPH maximum) taking into account track conditions, track grade, weather, visibility and stopping distance to assure safe operation. Railroad rules and regulations governing speed limits and right of way should be observed at all times.

12. Always chock the trailer wheels before unhooking the trailer from the towing vehicle.

Towing Trailer / Equipment With Vehicle On Road

- **VEHICLE USED FOR TOWING MUST BE RATED BY VEHICLE MANUFACTURER FOR WEIGHT OF TRAILER / EQUIPMENT TO BE TOWED. DO NOT EXCEED VEHICLE MANUFACTURER'S MAXIMUM RATED TOWING CAPACITY.**

- **VEHICLE USED FOR TOWING MUST HAVE AN ADEQUATE BRAKE SYSTEM TO SAFELY DECELERATE AND STOP TOWING VEHICLE AND TRAILER / EQUIPMENT BEING TOWED.**

- **TOWING TRAILER / EQUIPMENT LENGTHENS STOPPING DISTANCES. ALLOW ADEQUATE DISTANCE FOR STOPPING. ANTICIPATE STOPS SO YOU CAN BRAKE GRADUALLY.**

- **TOW TRAILER / EQUIPMENT AT A REASONABLE SPEED TAKING INTO ACCOUNT ROAD CONDITIONS, ROAD GRADE, WEATHER, VISIBILITY AND STOPPING DISTANCE TO ASSURE SAFE OPERATION. POSTED SPEED LIMITS SHOULD BE OBSERVED AT ALL TIMES.**

- **TRAILER / EQUIPMENT BEING TOWED MUST BE IN A SAFE, USABLE CONDITION TO BE TOWED.**

- **MAKE SURE THAT VEHICLE'S:**
  - **FRONT AND REAR GUIDE WHEELS ARE RAISED AND LOCKED IN HIGHWAY POSITION.**
  - **FRONT RAIL PILOT UNIT AXLE LOCKS MUST BE DISENGAGED FROM THE FRONT AXLE.**
  - **VEHICLE STEERING WHEEL LOCK DISENGAGED.**

FAILURE TO HEED THESE WARNINGS COULD RESULT IN SEVERE BODILY INJURY.

Towing Trailer / Equipment With Vehicle On Road

- **THIS MULTIPURPOSE VEHICLE HAS SPECIAL DESIGN AND EQUIPMENT FEATURES FOR OFF-ROAD USE. IT HANDLES DIFFERENTLY FROM AN ORDINARY PASSENGER CAR IN DRIVING CONDITIONS WHICH MAY OCCUR ON STREETS, HIGHWAYS AND OFF-ROAD. WEIGHT AND LOCATION OF AVAILABLE PAYLOAD MAY ALSO AFFECT THE HANDLING OF THIS VEHICLE. DRIVE WITH CARE AND WEAR SAFETY BELTS AT ALL TIMES. READ VEHICLE OWNER'S MANUAL FOR ADDITIONAL PRECAUTIONS.**

- **OBSERVE AND FOLLOW ALL FEDERAL, STATE AND LOCAL DRIVING RULES AND REGULATIONS.**

- **STATE LAWS MAY REQUIRE TOWING VEHICLE AND TRAILER / EQUIPMENT BEING TOWED TO BE EQUIPPED WITH SPECIAL SAFETY EQUIPMENT (MIRRORS ON BOTH SIDES OF TOWING VEHICLE, TRAILER BRAKES, TRAILER LIGHTS, ETC.).**

- **CAREFULLY AND THOROUGHLY PREPARE YOUR VEHICLE FOR TOWING, MAKING SURE TO USE THE RIGHT TOWING EQUIPMENT AND TO ATTACH IT PROPERLY.**

- **TOWING EQUIPMENT (HITCHES, TOW BARS, ETC.) MUST BE ATTACHED TO VEHICLE FRAME. DO NOT MOUNT OR ATTACH TOWING EQUIPMENT TO VEHICLE'S GUIDE WHEEL EQUIPMENT.**

- **TOWING EQUIPMENT (HITCH, TOW BAR, ETC.) MUST HAVE A RATED TOWING CAPACITY EQUAL TO OR GREATER THAN WEIGHT OF TRAILER / EQUIPMENT BEING TOWED.**

- **ALWAYS CHOCK TRAILER WHEELS BEFORE UNHOOKING TRAILER FROM TOWING VEHICLE.**

FAILURE TO HEED THESE PRECAUTIONS COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.

Towing Trailer / Equipment With Vehicle On Road

1. See your vehicle's operators manual for towing information.

2. Use the vehicle manufacturer's recommendations to determine the maximum weight the towing vehicle can tow. Do not exceed vehicle manufacturer's maximum rated towing capacity.

3. The towing vehicle must have an adequate brake system to safely decelerate and stop the towing vehicle and the trailer / equipment being towed. Towing trailer / equipment lengthens stopping distances. Allow adequate distance for stopping. Anticipate stops so that you can brake gradually.

4. Make sure that the vehicle's:
   a. Front and rear guide wheels are raised and locked in the highway position.
   b. Front rail pilot unit axle locks must be disengaged from vehicle front axle.
   c. Vehicle steering wheel lock is disengaged on the steering column.

5. Make sure the towing vehicle and the trailer / equipment are in good working condition (tires, brakes, lights, etc.) and that current maintenance has been performed on the vehicle and trailer / equipment.

6. The towing equipment (hitches, tow bars, etc.) on the towing vehicle must have a rating equal to or greater than the weight of the trailer / equipment being towed.

7. The towing equipment (hitches, tow bars, etc.) must be attached to the towing vehicle frame. Do not mount or attach the towing equipment to the vehicle's guide wheel equipment.

8. Observe and follow all federal, state and local driving rules, regulations and laws.

9. State laws may require the towing vehicle and/or the trailer / equipment being towed to be equipped with special safety equipment (mirrors on both sides of the towing vehicle, trailer brakes, trailer lights, etc.).

10. Tow the trailer / equipment on the road at a reasonable speed taking into account road conditions, road grade, weather, visibility and stopping distance to assure safe operation. Always observe posted speed limits.

11. Always chock the trailer wheels before unhooking the trailer from the towing vehicle.

Towing Disabled Vehicle On Track

- **TOWING VEHICLE / MACHINE MUST WEIGH AS MUCH OR MORE THAN DISABLED VEHICLE BEING TOWED.**

- **VEHICLE / MACHINE USED FOR TOWING MUST HAVE AN ADEQUATE BRAKE SYSTEM TO SAFELY DECELERATE AND STOP TOWING VEHICLE / MACHINE AND DISABLED VEHICLE BEING TOWED.**

- **TOWING DISABLED VEHICLE LENGTHENS STOPPING DISTANCES. ALLOW ADEQUATE DISTANCE FOR STOPPING. ANTICIPATE STOPS SO YOU CAN BRAKE GRADUALLY.**

- **TOW DISABLED VEHICLE AT A REASONABLE SPEED (10 MPH MAXIMUM) TAKING INTO ACCOUNT TRACK CONDITIONS, TRACK GRADE, WEATHER, VISIBILITY AND STOPPING DISTANCE TO ASSURE SAFE OPERATION. RAILROAD RULES GOVERNING SPEED LIMITS AND RIGHT OF WAY SHOULD BE OBSERVED AT ALL TIMES.**

- **STOPPING DISTANCE IS GREATER ON TRACK THAN ON TYPICAL ROAD SURFACES. APPLY BRAKES GRADUALLY TO AVOID SLIDING TOWING VEHICLE / MACHINE WHEELS.**

- **MAKE SURE THAT DISABLED VEHICLE'S:**
  - **FRONT AND REAR GUIDE WHEELS ARE LOWERED AND LOCKED IN RAIL POSITION.**
  - **ALL RAIL GUIDE WHEEL FLANGES ARE ENGAGED ON INSIDE OF RAILS.**
  - **FRONT RAIL PILOT UNIT AXLE LOCKS MUST BE ENGAGED, HOLDING VEHICLE FRONT TIRES A MINIMUM OF 1-1/2" (38 mm) ABOVE RAIL.**
  - **VEHICLE STEERING WHEEL LOCK ENGAGED WITH FRONT WHEELS STRAIGHT AHEAD.**

  FAILURE TO HEED THESE WARNINGS COULD RESULT IN SEVERE BODILY INJURY.

Towing Disabled Vehicle On Track

- **TOW BAR MUST BE ATTACHED TO DISABLED VEHICLE'S FRAME. DO NOT MOUNT OR ATTACH TOW BAR TO DISABLED VEHICLE'S GUIDE WHEEL EQUIPMENT.**
- **TOW BAR MUST HAVE A RATED TOWING CAPACITY EQUAL TO OR GREATER THAN WEIGHT OF DISABLED VEHICLE BEING TOWED.**
- **USE A RIGID TYPE TOW BAR WITH SAFETY LOCKING COUPLERS. DO NOT USE CHAIN, WIRE ROPE ETC.**
- **OBSERVE AND FOLLOW ALL RAILROAD SAFETY RULES AND REGULATIONS.**
- **DO NOT ACCELERATE SUDDENLY. TRACTION IS REDUCED ON RAIL, SPINNING TOWING VEHICLE / MACHINE WHEELS COULD DAMAGE THEM.**
- **TOW DISABLED VEHICLE TO NEAREST ROAD CROSSING AND REMOVE FROM TRACK.**

FAILURE TO HEED THESE PRECAUTIONS COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.

Towing Disabled Vehicle On Track

1. See your vehicle's operators manual for towing information.

2. The towing vehicle / machine must have an adequate brake system to safely decelerate and stop the towing vehicle / machine and the disabled vehicle being towed. The towing vehicle / machine must weigh as much or more than the disabled vehicle towed.

3. Make sure that the disabled vehicle's:
   a. Front and rear guide wheels are lowered and locked in the rail position.
   b. All rail guide wheel flanges are engaged on the inside of the rails.
   c. Front rail pilot unit axle locks must be engaged, holding the vehicle front tires a minimum of 1-1/2" (38 mm) above the rail.
   d. Vehicle front wheels are set straight ahead and the steering wheel lock is engaged on the steering column.

4. Make sure the towing vehicle / machine is in good working condition (tires, brakes, lights, etc.) and that current maintenance has been performed on the vehicle / machine.

5. The towing equipment (hitches, tow bars, etc.) on the towing vehicle / machine must have a rating equal to or greater than the weight of the disabled vehicle being towed.

6. The tow bar must be mounted or attached to the disabled vehicle's frame. Do not mount or attach the tow bar to the disabled vehicle's guide wheel equipment. Use a rigid type tow bar with safety locking couplers.

7. Observe and follow all railroad safety rules and regulations.

8. Do not accelerate suddenly. Traction is reduced on rail. Spinning the towing vehicle tires / machine wheels could damage them.

9. Stopping distance is greater on rail than on typical road surfaces. Apply the towing vehicle / machine brakes gradually to avoid sliding the vehicle tires / machine wheels. Towing disabled vehicle lengthens stopping distances. Allow adequate distance for stopping. Anticipate stops so that you can brake gradually.

10. Tow the disabled vehicle on the track at a reasonable speed (10 MPH maximum) taking into account track conditions, track grade, weather, visibility and stopping distance to assure safe operation. Railroad rules and regulations governing speed limits and right of way should be observed at all times.

11. Tow the disabled vehicle to the nearest road crossing and remove the vehicle from the track.

Towing Disabled Vehicle On Road

- **TOW DISABLED VEHICLE PER VEHICLE MANUFACTURER'S TOWING SPECIFICATIONS LISTED IN YOUR VEHICLE'S OPERATORS MANUAL.**

- **VEHICLE USED FOR TOWING MUST HAVE AN ADEQUATE BRAKE SYSTEM TO SAFELY DECELERATE AND STOP TOWING VEHICLE AND DISABLED VEHICLE BEING TOWED.**

- **TOW DISABLED VEHICLE AT A REASONABLE SPEED TAKING INTO ACCOUNT ROAD CONDITIONS, ROAD GRADE, WEATHER, VISIBILITY AND STOPPING DISTANCE TO ASSURE SAFE OPERATION. POSTED SPEED LIMITS SHOULD BE OBSERVED AT ALL TIMES.**

- **MAKE SURE DISABLED VEHICLE'S:**
  - **FRONT AND REAR GUIDE WHEELS ARE RAISED AND LOCKED IN HIGHWAY POSITION.**
  - **FRONT RAIL PILOT UNIT AXLE LOCKS MUST BE DISENGAGED FROM VEHICLE FRONT AXLE.**
  - **VEHICLE STEERING WHEEL LOCK DISENGAGED.**

FAILURE TO HEED THESE WARNINGS COULD RESULT IN SEVERE BODILY INJURY.

- **TOWING EQUIPMENT (TOW TRUCK, TOW BARS, ETC.) MUST BE ATTACHED TO DISABLED VEHICLE'S FRAME. DO NOT MOUNT OR ATTACH TOWING EQUIPMENT TO DISABLED VEHICLE'S GUIDE WHEEL EQUIPMENT.**

- **TOWING EQUIPMENT (TOW TRUCK, TOW BARS, ETC.) MUST HAVE A RATED TOWING CAPACITY EQUAL TO OR GREATER THAN WEIGHT OF DISABLED VEHICLE BEING TOWED.**

- **OBSERVE AND FOLLOW ALL FEDERAL, STATE AND LOCAL DRIVING RULES AND REGULATIONS.**

- **STATE LAWS MAY REQUIRE TOWING VEHICLE AND DISABLED VEHICLE TO BE EQUIPPED WITH SPECIAL SAFETY EQUIPMENT (LIGHTS, ETC.).**

FAILURE TO HEED THESE PRECAUTIONS COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.

Towing Disabled Vehicle On Road

1. See your vehicle's operators manual for towing information.

2. The towing vehicle must have an adequate brake system to safely decelerate and stop the towing vehicle and the disabled vehicle being towed.

3. Make sure that the disabled vehicle's:
   a. Front and rear guide wheels are raised and locked in the highway position.
   b. Front rail pilot unit axle locks must be disengaged from the vehicle front axle.
   c. Vehicle steering wheel lock is disengaged on the steering column.

4. Make sure the towing vehicle is in good working condition (tires, brakes, lights, etc.) and that current maintenance has been performed on the vehicle.

5. The towing equipment (tow truck, tow bars, etc.) on the towing vehicle must have a rating equal to or greater than the weight of the disabled vehicle being towed.

6. The towing equipment (tow truck, tow bars, etc.) must be mounted or attached to the disabled vehicle's frame. Do not mount or attach the towing equipment to the disabled vehicle's guide wheel equipment.

7. Observe and follow all federal, state and local driving rules, regulations and laws.

8. State laws may require the towing vehicle and disabled vehicle being towed to be equipped with special safety equipment (lights, etc.).

9. Tow the disabled vehicle on the road at a reasonable speed taking into account road conditions, road grade, weather, visibility and stopping distance to assure safe operation. Always observe posted speed limits.

SECTION 3 - ADJUSTMENTS
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Guide Wheel Equipment Alignment Procedure

Adjustments

Guide Wheel Equipment Alignment Procedure

- **ENGINE MUST BE RUNNING TO OPERATE MECHANICAL PTO HYDRAULIC PUMP TO RAISE / LOWER GUIDE WHEELS. BEFORE PERFORMING ANY ADJUSTMENTS TO GUIDE WHEEL EQUIPMENT OR VEHICLE, ALWAYS PLACE AUTOMATIC TRANSMISSION IN "PARK" OR MANUAL TRANSMISSION IN "NEUTRAL". APPLY THE PARKING BRAKE.**

- **UNDERSTAND EQUIPMENT OPERATION AND BE AWARE OF ALL PINCH POINTS BEFORE OPERATING OR MAKING ADJUSTMENTS TO THE GUIDE WHEEL EQUIPMENT.**

  FAILURE TO COMPLY COULD RESULT IN SEVERE BODILY INJURY.

The Guide Wheel Alignment Procedure must be completed when the guide wheel equipment is applied to the vehicle, or when any of the misalignment indicators occur. See Operation Section -Misalignment Indicators.

VEHICLE CHECK

1. The vehicle must be at curb weight with permanent attachments: spare tire, tool box less tools, utility box, crane, aerial lift boom, etc. and without: passengers, baggage, load, etc.

2. Weigh the entire vehicle and record this weight. Weigh both the front and rear axles of the vehicle separately and record these weights. Weights will be used when calculating the guide wheel load.

3. Permanent attachments to the vehicle such as a tool box, utility box, crane, aerial lift boom, etc. which could cause uneven loading on the guide wheels should be compensated for, by adjusting the vehicle suspension by adding leaf springs, coil springs, torsion bars, etc.

4. Tires must be inflated to the tire manufacturer's recommended maximum pressure printed on the sidewalls of the tires or wheel manufacturer's recommended maximum pressure, stamped on the wheel, whichever is lower.

5. Visually inspect the entire vehicle, especially the guide wheel equipment, for loose or missing bolts, and bent or damaged components. Tighten, repair, or replace as necessary.

6. Verify that the vehicle the guide wheel equipment is being mounted on is equipped correctly (springs, tires, wheels, etc.). See the Harsco Track Technologies HY-RAIL® Vehicle Specifications Manual.

Guide Wheel Equipment Alignment Procedure

VEHICLE CHECK

7. Check the following measurements on the vehicle that the guide wheel equipment is to be mounted on before applying the guide wheel equipment to the vehicle.

   a. Frame must be square. Diagonal measurements of the frame should be equal within 1/8 inch (3.2 mm).

   b. Wheelbase (as measured on each side) must be equal within 1/16 inch (1.8 mm).

   c. Vehicle axles must be square with the frame within 1/64 inch per foot (.4 mm per 304 mm). Harsco Track Technologies, Harsco Corporation recommends that this be checked by a reputable alignment shop.

8. Follow the mounting instructions on the application drawings which are supplied with each Guide Wheel Equipment Group.

9. After mounting the guide wheel equipment to the vehicle, have the front wheels of the vehicle checked for caster, camber, and toe-in as recommended by the vehicle manufacturer.

PLACING VEHICLE ON TRACK

10. Place the vehicle on straight, level, tangent track or an alignment rack constructed for guide wheel equipment alignment. Place the vehicle automatic transmission in "Park" or manual transmission in "Neutral". Apply the parking brake.

    If track or an alignment rack is not available, use 4 x 4 inch lumber on a level floor to simulate track. Space the lumber so it measures 56-1/2 inches (1435 mm) between the inside edges.

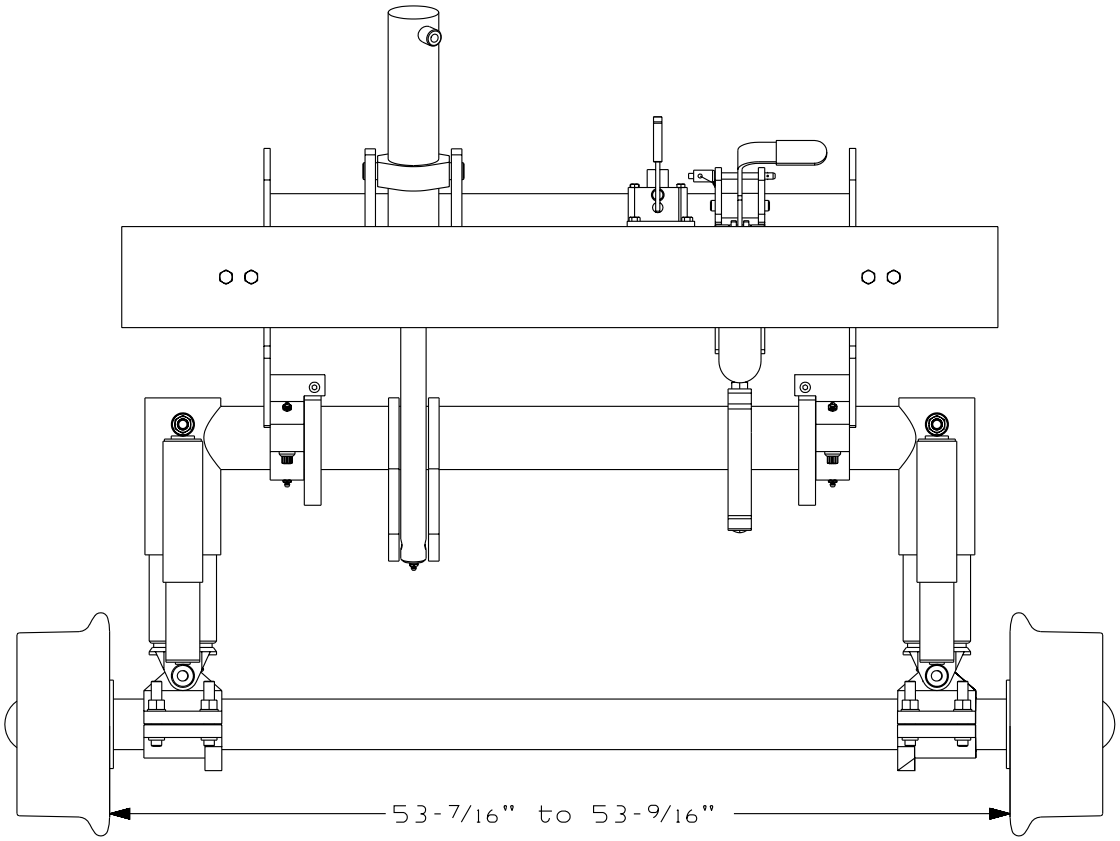
11. Lower and lock the guide wheels in the "rail" position. See Operation Section - Placing Vehicle On Track. Set the vehicle wheels straight ahead. Secure the vehicle steering wheel using the steering lock.

Guide Wheel Equipment Alignment Procedure

GUIDE WHEEL TRACK GAUGE - See Figure 3-1

12. Measure the track gauge of the front and rear rail pilot units. Measure from the back of the left wheel flange, directly below the center line of the wheel spindle, to the same point on the right wheel flange. This dimension must be 53-7/16 to 53-9/16 inches (1357 mm to 1360 mm). The front and rear rail pilot units track gauge is preset at the factory and is non-adjustable.

FIGURE 3-1
GUIDE WHEEL TRACK GAUGE
FRONT RAIL PILOT UNIT SHOWN



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Guide Wheel Equipment Alignment Procedure

GUIDE WHEEL LOAD

Front Guide Wheel Load On Track - See Chart 3-2 and Figure 3-3

13. The front rail pilot unit is equipped with two non-adjustable spring cells. Whenever the vehicle is loaded or additional load is added to the existing vehicle load on track, check the load on the front rail pilot unit guide wheels. The maximum load on the front rail pilot unit is 5,500 lbs (2495 kg) or 2,750 LBS (1248 kg) maximum per guide wheel.

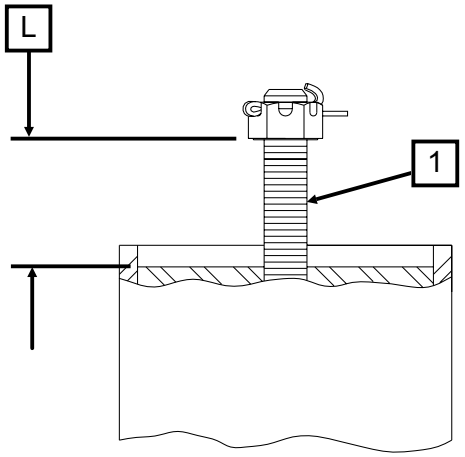
14. The protrusion of rod (1) on the spring cell is used to determine the load on the front guide wheels. Measure dimension (L) on both spring cells. See Chart 3-2 to convert dimension (L) to the load on the guide wheel.

CHART 3-2
FRONT GUIDE WHEEL LOAD

	DIMENSION (L)		APPROXIMATE LOAD PER SIDE	
	1/4"	(6.4 mm)	525 lbs	(238 kg)
	1/2"	(12.7 mm)	900 lbs	(408 kg)
	3/4"	(19.0 mm)	1275 lbs	(578 kg)
	1"	(25.4 mm)	1650 lbs	(748 kg)
	1-1/4"	(31.8 mm)	2025 lbs	(919 kg)
	1-1/2"	(38.1 mm)	2400 lbs	(1089 kg)
*	**1-3/4"**	**(44.5 mm)**	**2775 lbs**	**(1259 kg)**

*** FRONT GUIDE WHEEL IS OVERLOADED. REDISTRIBUTE OR REMOVE SOME OF THE LOAD. MAXIMUM LOAD ON FRONT RAIL PILOT UNIT MUST NOT EXCEED 5,500 LBS (2495 kg) OR 2,750 LBS (1248 kg) MAXIMUM PER GUIDE WHEEL.**

FIGURE 3-3
FRONT SPRING CELL



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Guide Wheel Equipment Alignment Procedure

GUIDE WHEEL LOAD

Rear Guide Wheel Load On Track - See Figure 3-4 and Chart 3-5

15. The rear rail pilot unit is equipped with two adjustable spring cells. The rear rail pilot unit is initially adjusted to carry approximately 1/2 of the vehicle's rear axle curb weight or a minimum of 1550 lbs (703 kg). The remainder of the weight is carried by the inner dual wheels when the vehicle is on "rail". Whenever the vehicle is loaded or additional load is added to the existing vehicle load on track, check the load on the rear rail pilot unit guide wheels. The maximum rated load on the rear rail pilot unit is 5,000 lbs (2268 kg) or 2,500 lbs (1134 kg) maximum per guide wheel.

16. See Figure 3-4. The protrusion of rod (1) on the spring cell is used to determine the load on the rear guide wheels. Measure dimension (L) on both spring cells. See Chart 3-5 to convert dimension (L) to the load on the guide wheel.

FIGURE 3-4
REAR SPRING CELL

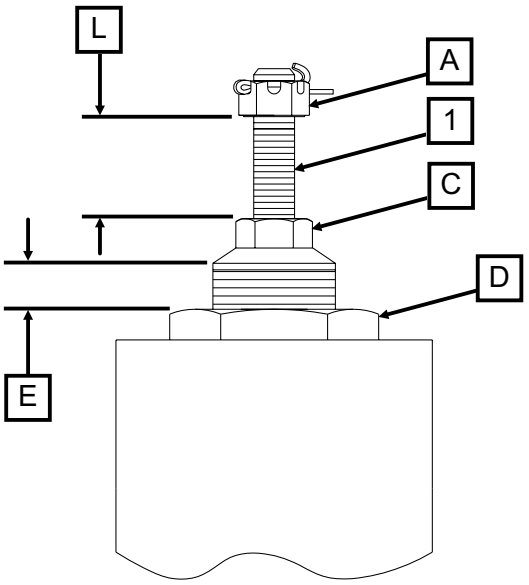

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CHART 3-5
REAR GUIDE WHEEL LOAD

DIMENSION (L)		APPROXIMATE LOAD PER SIDE	
1/4"	(6.4 mm)	275 lbs	(125 kg)
1/2"	(12.7 mm)	400 lbs	(181 kg)
3/4"	(19.0 mm)	525 lbs	(238 kg)
1"	(25.4 mm)	650 lbs	(295 kg)
1-1/4"	(31.8 mm)	775 lbs	(352 kg)
1-1/2"	(38.1 mm)	945 lbs	(429 kg)
1-3/4"	(44.5 mm)	1155 lbs	(524 kg)
2"	(50.8 mm)	1370 lbs	(621 kg)
2-1/4"	(57.2 mm)	1581 lbs	(717 kg)
2-1/2"	(63.5 mm)	1795 lbs	(814 kg)
2-3/4"	(69.9 mm)	2005 lbs	(909 kg)
3"	(76.2 mm)	2220 lbs	(1007 kg)
3-1/4"	(82.6 mm)	2430 lbs	(1102 kg)
*** 3-1/2"**	**(88.9 mm)**	**2645 lbs**	**(1200 kg)**

*** REAR GUIDE WHEEL IS OVERLOADED. REDISTRIBUTE OR REMOVE SOME OF THE LOAD. MAXIMUM LOAD ON REAR RAIL PILOT UNIT MUST NOT EXCEED 5,000 LBS (2268 kg) OR 2,500 LBS (1134 kg) MAXIMUM PER GUIDE WHEEL.**

Note: Permanent attachments to the vehicle such as a tool box, utility box, crane, aerial lift boom, etc. which could cause uneven loading on the rear guide wheels should be compensated for by modifying the vehicle suspension by adding leaf springs, coil springs, torsion bars, etc. Do not adjust the rear rail pilot unit spring cells to compensate for permanent attachments.

Guide Wheel Equipment Alignment Procedure

GUIDE WHEEL LOAD

Adjusting Rear Guide Wheel Load - See Figure 3-4 and Chart 3-5

a. The recommended rear rail pilot unit load setting is approximately 1/2 of the vehicle rear axle weight or 1550 lbs (703 kg) minimum.

b. To calculate the load setting for each rear spring cell, use the following formula:

   Vehicle Rear Axle Weight x 25 % (0.25) = Spring Cell Load

c. Convert the calculated spring cell load into dimension (L). See Rear Guide Wheel Load Chart 3-5. If the calculated spring cell load (dimension L) is less than 1 inch (25.4 mm), the spring cell (dimension L) must be set to a minimum of 1 inch (25.4 mm).

d. Unlock and raise the rear guide wheels. Let the guide wheels rest on the rails.

e. Dimension (E), the length of the large threaded stud extending from the top of lock nut (D) to the bottom of adjusting nut (C), is preset at the factory to 3/4 inch (19 mm). This allows approximately equal adjustment up or down, if necessary. If dimension (E) is not initially set to 3/4 inch (19 mm) on both spring cells, loosen lock nut (D). Turn adjusting nut (C) until dimension (E) is set to 3/4 inch (19 mm) on both spring cells. Re-tighten lock nut (D).

f. Lower and lock the rear guide wheels in the "rail" position.

g. Measure dimension (L), the distance from the top of adjusting nut (C) to the bottom of castle nut (A). See Rear Guide Wheel Load Chart 3-5 to convert dimension (L) to the load. The spring cell must be set to the calculated load dimension (L) or minimum load dimension (L), see Step c.

h. To adjust the spring cell load, unlock and raise the rear guide wheels. Let the guide wheels rest on the rails. Loosen lock nut (D). Turn adjusting nut (C) clockwise to increase the load on the guide wheel or counter-clockwise to decrease the load on the guide wheel.

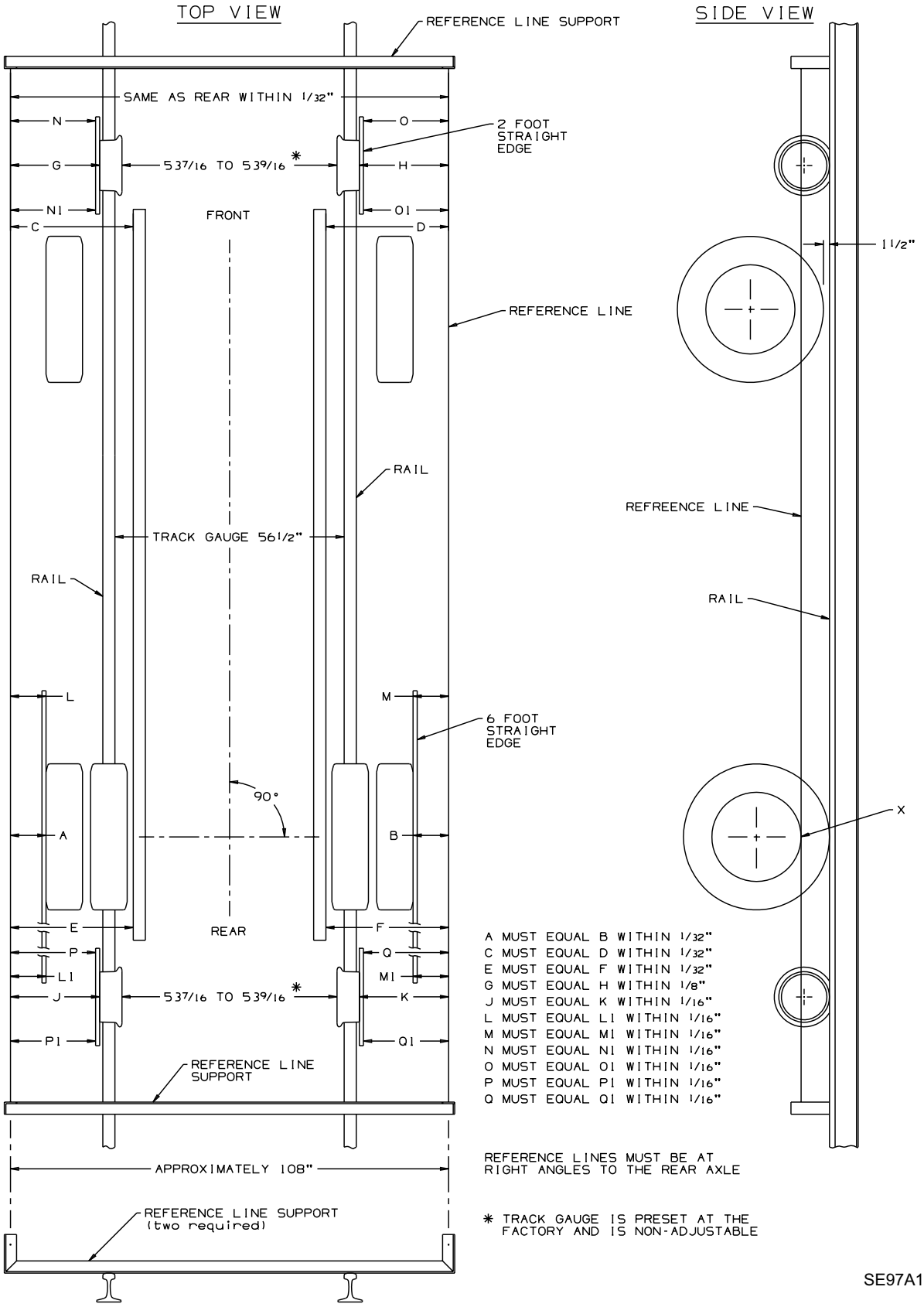
i. Lower and lock the rear guide wheels in the "rail" position. Re-measure dimension (L). See Rear Guide Wheel Load Chart 3-5 to convert dimension (L) to the load on the guide wheel.

j. Repeat Steps h and i until dimension (L) corresponds to the calculated load or minimum load on the spring cell, see Step c. Tighten lock nut (D). Both spring cells must be set to the same dimension (E) within 1/8 inch (3.2 mm).

k. If the spring cell cannot be adjusted to the calculated load or the minimum load, the rear rail pilot unit must be repositioned in a different set of mounting holes.

Guide Wheel Equipment Alignment Procedure

FIGURE 3-6
GUIDE WHEEL EQUIPMENT ALIGNMENT



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Guide Wheel Equipment Alignment Procedure

STRING LINING SET-UP - See Figure 3-6

The string lining procedure is only a guide to check and make alignment adjustments to the guide wheel equipment. String lining the vehicle and guide wheel equipment will not guarantee that the guide wheel equipped vehicle will track properly. Harsco Track Technologies recommends that all HY-RAIL® equipped vehicles be track tested. The vehicle should be at its normal operating load for track testing. The vehicle should be track tested when:

a. The guide wheel equipment is installed on the vehicle.
b. Any adjustments are made to the guide wheel equipment.
c. The load on the vehicle is changed.
d. Periodically to ensure that the vehicle is tracking properly.

17. Lower and lock the guide wheels in the "rail" position. See Operation Section - Placing Vehicle On Track. Set the vehicle wheels straight ahead. Secure the vehicle steering wheel using the steering lock.

18. Establish parallel reference lines on each side of the vehicle as shown in Figure 3-6. Parallel reference lines can be established by building two supports or brackets. These can be built out of scrap angle iron or other material. The supports must be high enough so the reference lines are in line with the bottom edge of the vehicle's rear rims (point X) and a few inches longer than the width of the vehicle. Wires or cords stretched between the front and rear supports will be the reference lines. The wires or cords should be spaced approximately 108 inches (2743 mm) apart. The distance between the wires or cords must be equal or within 1/32 inch (.8 mm) at each support.

19. Clamp the supports to the rail in front of and behind the vehicle. The supports should be at right angles to the rail. Stretch the wires or cords between the supports, so the reference line is level with the bottom edge of the rear vehicle wheel rim(s) (point X). The reference lines must be level.

20. Shift the supports on the rail until dimension A equals (=) B and dimension C equals (=) D or within 1/32 inch (.8 mm). Measurements A and B should be taken from the edge of the rear vehicle rim(s) directly below the axle (point X) to the reference lines. Measurements C and D are taken from the front of the vehicle frame. When shifting the supports, keep them at right angles to the rail so the reference lines stay level and parallel to each other.

21. Hold a six (6) foot straight edge against the outer edge of the rear, outside tires with the straight edge centered on the tires. Record dimensions L, L1, M and M1 to the reference line. Rotate the rear tires 180 degrees and record a second set of dimensions at L, L1, M and M1. Average the two dimensions taken at L, L1, M and M1.

    Example: [L (first dimension) + L (second dimension)] ÷ 2 = L (average dimension)

Guide Wheel Equipment Alignment Procedure

GUIDE WHEEL ALIGNMENT - See Figures 3-6 and 3-7

22. Shift the supports on the rail until dimension L (average) equals (=) M (average) and dimension L1 (average) equals (=) M1 (average) or within 1/16 inch (1.6 mm). When shifting the supports, keep them at right angles to the rail so the reference lines stay level and parallel to each other. The reference lines will be parallel only when the rear axle is straight.

23. After the reference lines have been established, measurements can be taken from these lines to the guide wheels to help ensure correct alignment.

24. Take measurements G and H on the front rail pilot unit, J and K on the rear rail pilot unit. Measure from the outer edge of the guide wheels, directly below the center line of the wheel spindle, to the reference lines. Measurements G, H, J, & K must all be equal or within 1/16 inch (1.6 mm). If not, see Adjustment.

Adjustment - See Figures 3-6 and 3-7

a. Unlock the front and / or rear guide wheels from the "rail" position. Let the guide wheels rest on the rails.

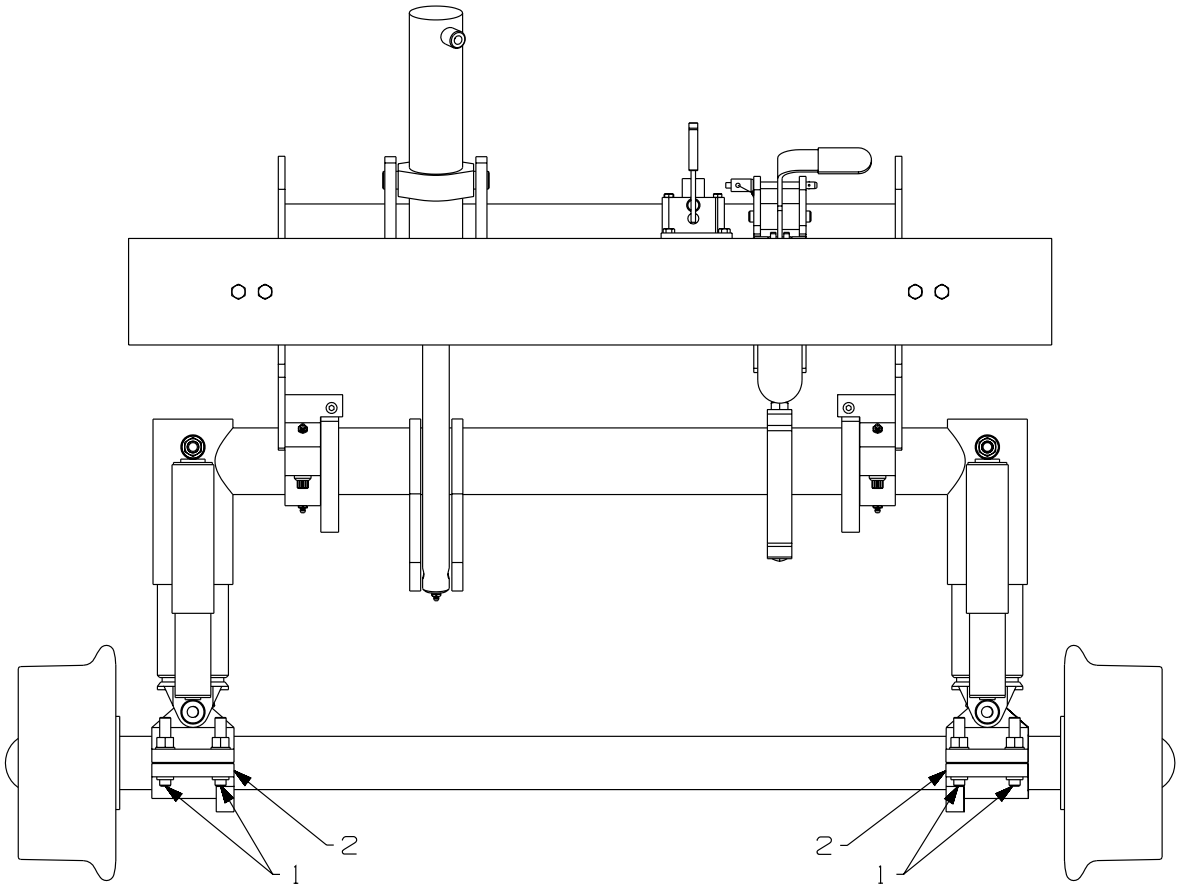
b. Loosen the eight 5/8 inch socket head cap screws (1) that secure the axle in the axle clamps (2). Shift the axle and guide wheels until measurements G, H, J and K are equal. Re-tighten and torque the eight cap screws (1) to 213 ft. Lbs (284 N - m).

c. Lower and lock the guide wheels in the "rail" position. Recheck measurements G, H, J and K. Repeat the adjustment procedure until measurements G, H, J, & K are equal or within 1/16 inch (1.6 mm).

Guide Wheel Equipment Alignment Procedure

GUIDE WHEEL ALIGNMENT - Continued

FIGURE 3-7
RAIL PILOT UNIT ALIGNMENT
FRONT RAIL PILOT UNIT SHOWN



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Guide Wheel Equipment Alignment Procedure

GUIDE WHEEL ALIGNMENT - See Figures 3-6 and 3-8

25. Hold a two foot long straight edge against the outer edge of the guide wheel. Check the dimensions N and N1, O and O1, P and P1, and Q and Q1 as shown in Figure 3-6. These dimensions must be equal or within 1/16 inch (1.6 mm). If not, see Adjustment.

Adjustment - See Figures 3-6 and 3-8

a. Unlock the front and / or rear guide wheels from the "rail" position. Let the guide wheels rest on the rails.

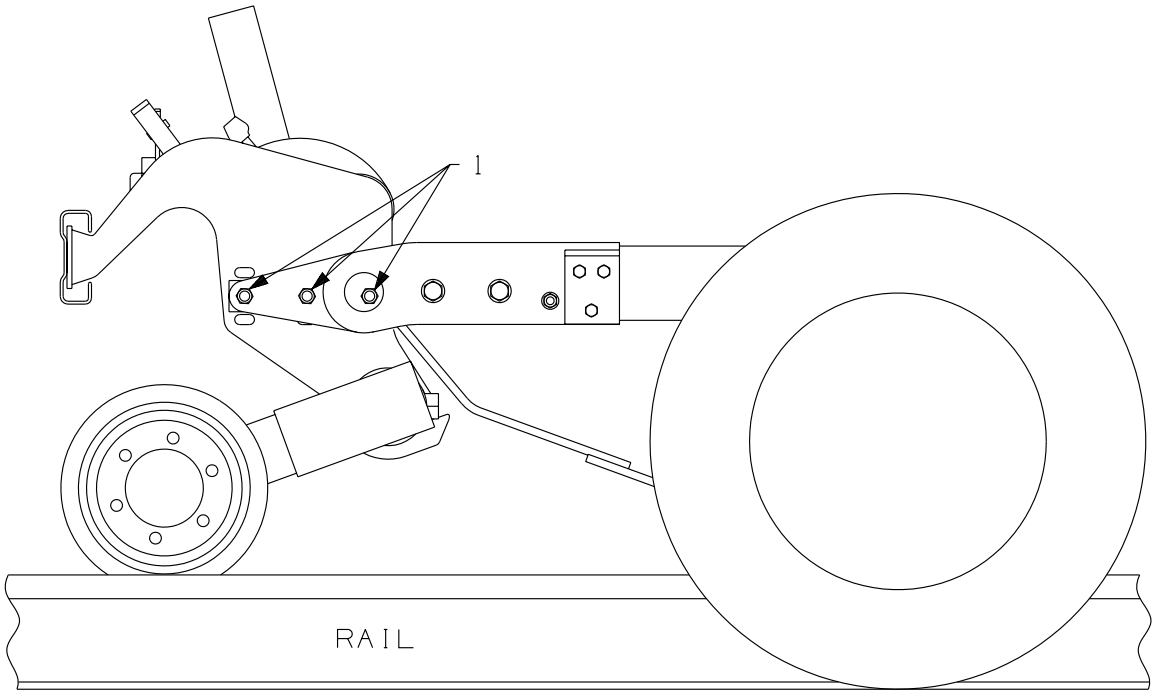
b. Loosen the six cap screws and nuts (1). Shift the rail pilot unit until the dimensions are equal or within 1/16 inch (1.6 mm). Re-tighten and torque the six cap screws and nuts (1) to the torque specifications shown in the Appendices Section of this manual.

c. Lower and lock the guide wheels in the "rail" position. Recheck measurements N and N1, O and O1, P and P1, and Q and Q1. Repeat the adjustment procedure until the measurements are equal or within 1/16 inch (1.6 mm).

Guide Wheel Equipment Alignment Procedure

GUIDE WHEEL ALIGNMENT - Continued

FIGURE 3-8
RAIL PILOT UNIT ALIGNMENT
FRONT RAIL PILOT UNIT SHOWN



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Guide Wheel Equipment Alignment Procedure

VEHICLE TRACK TEST

■ **CHECK AND CORRECT ALIGNMENT PROMPTLY IF MISALIGNMENT IS INDICATED. MISALIGNMENT OF GUIDE WHEEL EQUIPMENT COULD RESULT IN DERAILMENT OF THE VEHICLE AND SEVERE BODILY INJURY.**

26. Harsco Track Technologies recommends that all HY-RAIL® equipped vehicles be track tested. The vehicle should be at its normal operating load for track testing. The vehicle should be track tested when:
    a. The guide wheel equipment is installed on the vehicle.
    b. Any adjustments are made to the guide wheel equipment.
    c. The load on the vehicle is changed.
    d. Periodically to ensure that the vehicle is tracking properly.

27. The vehicle must be placed on straight, level, tangent track. See Operation Section - Placing Vehicle On Track.

28. Apply spray paint to the flanges and treads of all guide wheels.

29. Lower and lock the guide wheels in the "rail" position.

30. Operate the vehicle for a short distance at a normal operating speed.

31. The paint should wear evenly around the flanges and treads of all guide wheels. If the paint is worn evenly on all guide wheels, the vehicle and guide wheel equipment is properly aligned.

32. If the paint wore off the right front guide wheel flange and not off the left front guide wheel flange, the guide wheel unit is "flanging right".

    a. Unlock and lower the front of the vehicle from the "rail" position. Let the guide wheels rest on the rail. Support the guide wheel unit. Loosen the mounting bolts and slightly move the right side of the guide wheel unit forward or the left side of the guide wheel unit slightly rearward. Torque the mounting bolts to the torque specifications shown in the Appendices Section of this manual.

    b. Repaint the flanges and treads on all guide wheels. Lower and lock the guide wheel unit in the "rail" Position. Operate the vehicle for a short distance at a normal operating speed. If the paint is worn evenly on all guide wheels, the vehicle and guide wheel equipment is properly aligned.

    c. If the paint continues to wear off the right front guide wheel flange and not off the left front guide wheel flange, repeat Steps a. & b. If the guide wheel unit is adjusted to the limit of the mounting hole slots, go to Step 34.

Guide Wheel Equipment Alignment Procedure

VEHICLE TRACK TEST - Continued

33. If the paint wore off the left front guide wheel flange and not off the right front guide wheel flange, the guide wheel unit is "flanging left".

    a. Unlock and lower the front of the vehicle from the "rail" position. Let the guide wheels rest on the rail. Support the guide wheel unit. Loosen the mounting bolts and slightly move the left side of the guide wheel unit forward or the right side of the guide wheel unit slightly rearward. Torque the mounting bolts to the torque specifications shown in the Appendices Section of this manual.

    b. Repaint the flanges and treads on all guide wheels. Lower and lock the guide wheel unit in the "rail" Position. Operate the vehicle for a short distance at a normal operating speed. If the paint is worn evenly on all guide wheels, the vehicle and guide wheel equipment is properly aligned.

    c. If the paint continues to wear off the left front guide wheel flange and not off the right front guide wheel flange, repeat Steps a. & b. If the guide wheel unit is adjusted to the limit of the mounting hole slots, go to Step 34.

34. Note which guide wheels, flange and/or tread the paint is worn on.

    a. Repaint the flanges and treads on all guide wheels.

    b. Operate the vehicle in reverse for a short distance at a normal operating speed.

    c. Note which guide wheels, flange and/or tread the paint is worn on.

       If the paint wore off the right front flange when traveling forward and then off the left rear flange when traveling in reverse or off the left front flange when traveling forward and then off the right rear flange when traveling in reverse, the vehicle is probably not aligned properly. Have the frame checked for proper alignment. See Vehicle Check.

35. If the vehicle continues to track improperly, repeat the String Lining and Guide Wheel Alignment Procedure.

Adjustments

VEHICLE FRONT TIRE CLEARANCE - RAIL POSITION - See Figure 3-9

The vehicle's front tire clearance should be checked whenever the vehicle is placed on rail or whenever the load on the vehicle is changed significantly.

1. Place the vehicle on straight, level, tangent track. Place the vehicle automatic transmission in "Park" or manual transmission in "Neutral". Apply the parking brake. Lower and lock the guide wheels in the "rail" position. See Operation Section - Placing Vehicle On Track.

2. When the front guide wheels are lowered and locked in the "rail" position, the axle hooks will raise the vehicle's front tires above the rails. This is necessary to ensure clearance when the vehicle passes through switches, turnouts, crossings, frogs, etc. As the vehicle is loaded, the front tire clearance will decrease. The front tires must always clear the top of the rails by a minimum of 1-1/2 inches (38 mm) whenever the vehicle is on track. If not see Adjustment.

Adjustment - See Figure 3-9

3. Unlock and raise the front guide wheels to lower the front of the vehicle to the ground. Loosen and remove the two nuts and cap screws (1). Reposition the lower part (2) of the two piece axle hook to a different pair of holes in the upper part (3) of the hook assembly. Reinstall and tighten the two nuts and cap screws (1). Repeat this procedure to adjust the other axle hook. Both axle hooks must be adjusted to maintain the minimum vehicle front tire to rail clearance for both front tires.

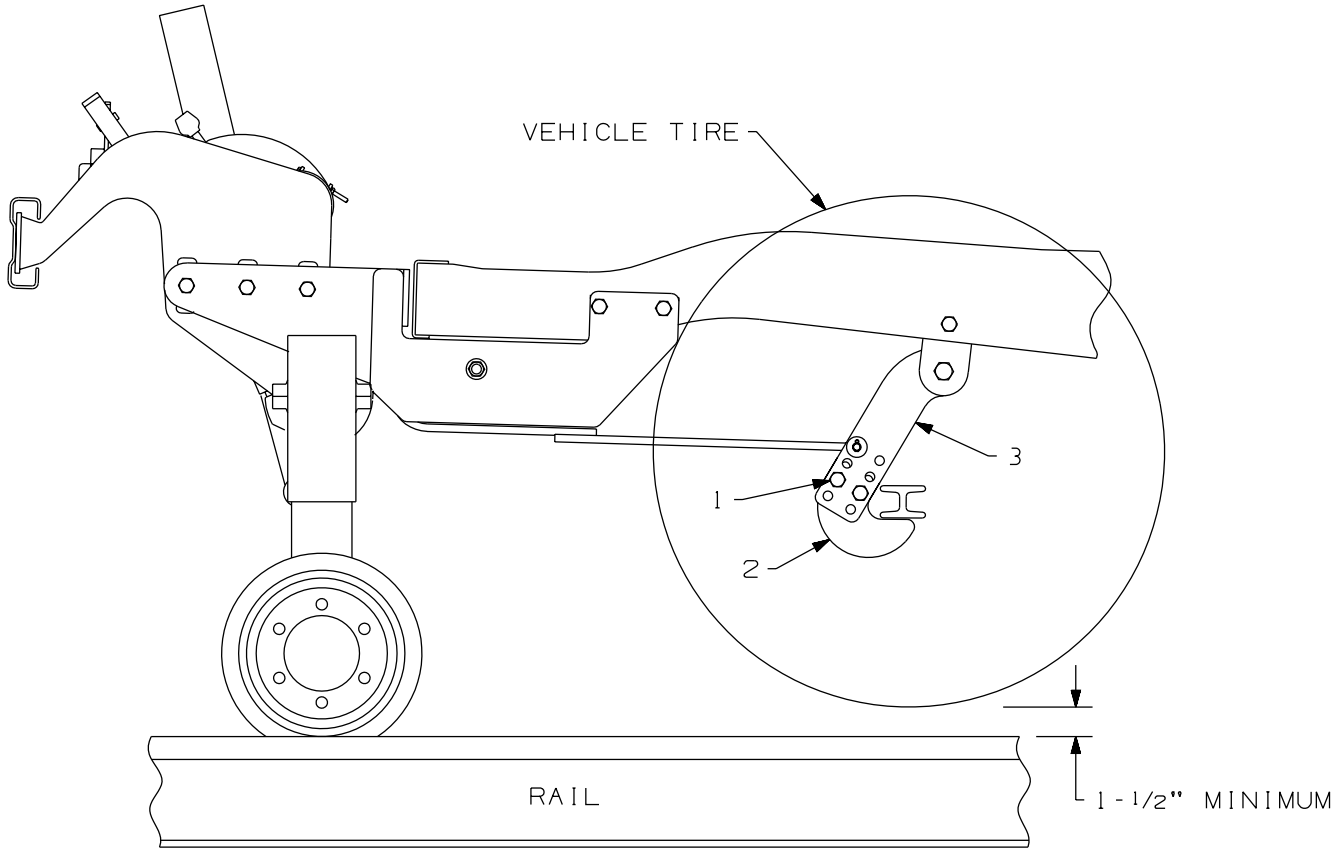
4. Lower and lock the front guide wheels in the "rail" position. Recheck the vehicle front tire clearance. If necessary, repeat the adjustment procedure until the minimum of 1-1/2 inches (38 mm) of clearance is obtained.

5. If the front axle hooks cannot be adjusted to obtain the 1-1/2 inch (38 mm) minimum clearance, the rail pilot unit must be repositioned in a different set of mounting holes or different axle hooks must be applied to the vehicle. For axle hook replacement, contact Harsco Track Technologies, Harsco Corporation, Fairmont, Minnesota.

Adjustments

VEHICLE FRONT TIRE CLEARANCE - RAIL POSITION - Continued

FIGURE 3-9
VEHICLE FRONT TIRE CLEARANCE



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Adjustments

AXLE HOOK CLEARANCE - HIGHWAY POSITION

RAIL PILOT UNITS WITH PUSH / PULL CONTROL ROD ACTUATED AXLE HOOKS

1. Park the vehicle on solid level ground. The vehicle must be loaded with its normal operating load. Place the vehicle automatic transmission in "Park" or manual transmission in "Neutral". Apply the parking brake. Stop the engine.

Note: On some vehicle applications the axle hooks may be reversed and will engage under the axle from the rear instead of from the front as illustrated. This will cause the axle hook control rod to engage and disengage the axle hooks in the opposite direction.

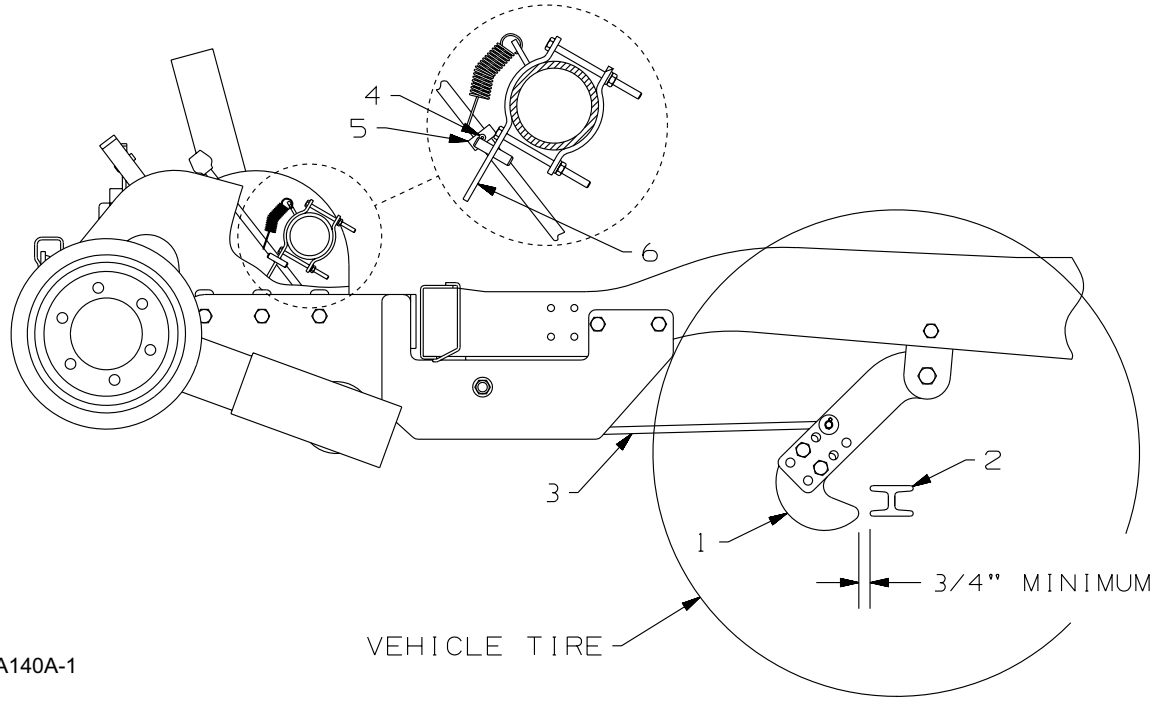
Checking Axle Hook Clearance - Disengaged - See Figure 3-10

2. Measure the distance from the "toe" of both axle hooks (1) to the axle (2). The minimum clearance between the axle hook "toe" and the axle is 3/4 inch (19 mm). If the axle hook clearance is incorrect, see Adjustment.

Adjustment - See Figure 3-10

3. To adjust the axle hooks, position the axle hook control rod (3) so the axle hook is at least 3/4 inch (19 mm) away from the axle. Loosen set screw (4) on collar (5). Slide collar (5) tight against plate (6). Tighten set screw (4). Repeat this procedure to adjust the axle hook clearance for the other axle hook.

FIGURE 3-10
AXLE HOOK CLEARANCE



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Adjustments

AXLE HOOK CLEARANCE - HIGHWAY POSITION

RAIL PILOT UNITS WITH LEVER ACTUATED AXLE HOOKS

1. Park the vehicle on solid level ground. The vehicle must be loaded with its normal operating load. Place the vehicle automatic transmission in "Park" or manual transmission in "Neutral". Apply the parking brake. Stop the engine.

   Note: On some vehicle applications the axle hooks may be reversed and will engage under the axle from the front instead of from the rear as illustrated. This will cause the axle hook lock lever to engage and disengage the axle hooks in the opposite direction.

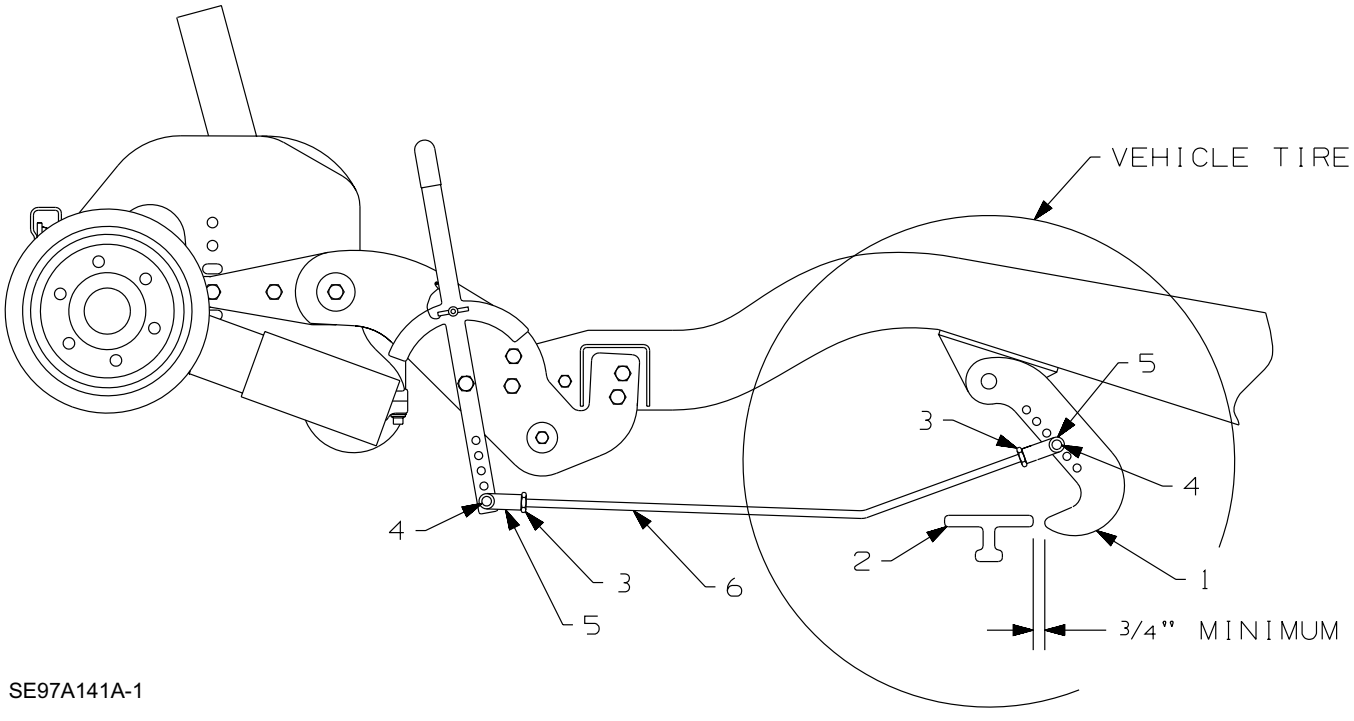
Checking Axle Hook Clearance - Disengaged - See Figure 3-11

2. Measure the distance from the "toe" of both axle hooks (1) to the axle (2). The minimum clearance between the axle hook "toe" and the axle is 3/4 inch (19 mm). If the axle hook clearance is incorrect, see Adjustment.

Adjustment - See Figure 3-11

3. Both axle hooks must be adjusted to obtain equal clearance from the axle. The axle hooks may be adjusted by loosening jam nut (3). Removing cotter pins and pins (4) and adjusting yokes (5) on rod (6) to obtain the minimum clearance of 3/4 inch (19 mm). Reinstall pins and cotter pins (4). Tighten Jam nut (3).

FIGURE 3-11
AXLE HOOK CLEARANCE



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Adjustments

GUIDE WHEEL UNIT STOP ADJUSTMENT - RAIL POSITION

1. The vehicle must be on level track. Place the vehicle automatic transmission in "Park" or manual transmission in "Neutral". Apply the parking brake. Lower and lock the guide wheels in the "rail" position. See Operation Section - Placing Vehicle On Track.

2. Both the front and rear rail pilot unit spring cell suspension tubes must be perpendicular (90 degrees or as close as possible to 90 degrees) to the rail when the vehicle is in the "rail" position. Proper adjustment of the spring cell tubes will allow the spring cell suspension to operate correctly. A bubble level placed against the front or rear of the spring cell suspension tube can be used to check this. If the spring cell suspension tubes are not perpendicular (90 degrees) to the rail, see Adjustment.

Adjustment - See Figure 3-12

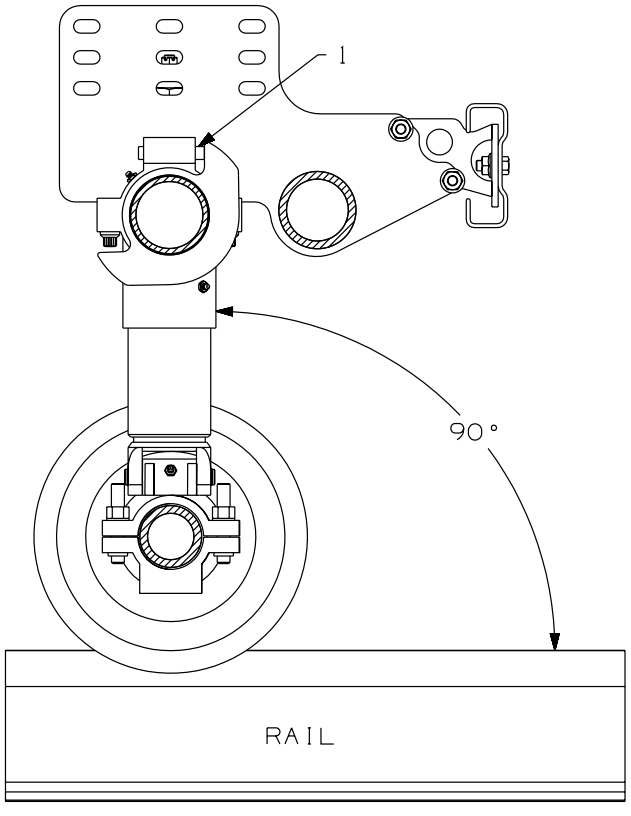
3. A rear rail pilot unit is shown. Location of the adjusting screws and adjustment procedure will be similar for the front rail pilot unit. *Note: The stop adjustment may affect the lock adjustment. See Lock Adjustment - Rail Position.*

4. Determine the approximate amount of adjustment required. Unlock and raise the guide wheels from the "rail" position. Let the guide wheels rest on the rails.

5. Turn adjusting screw (1) clockwise or counter-clockwise as needed. Lower and lock the guide wheels in the "rail" position.

6. Using the bubble level, re-check the spring cell suspension tube to rail position (90 degrees). If necessary, repeat Steps 4 and 5 until the rail pilot unit spring cell suspension tubes are perpendicular (90 degrees or as close as possible to 90 degrees) to the rail.

FIGURE 3-12
STOP ADJUSTMENT - RAIL POSITION



SE97A143A-1

Adjustments

GUIDE WHEEL UNIT STOP ADJUSTMENT - HIGHWAY POSITION

1. Place the vehicle automatic transmission in "Park" or manual transmission in "Neutral". Apply the parking brake.

2. To allow for ground clearance, the front rail pilot units spring cell suspension tubes should be adjusted to angle approximately 15 to 20 degrees above parallel to the ground surface. The rear rail pilot unit's spring cell suspension tubes should be adjusted to approximately parallel to the ground surface. If adjustment to the position of the rail pilot unit(s) when in the "highway" position is desired, see Adjustment.

Adjustment - See Figure 3-13

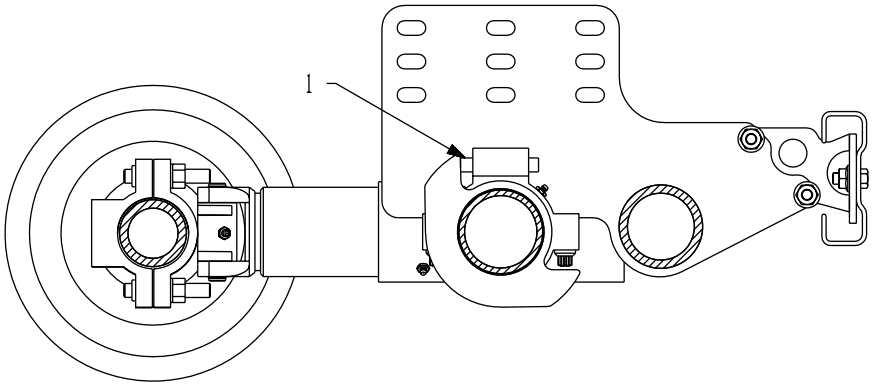
3. A rear rail pilot unit is shown. Location of the adjusting screws and adjustment procedure will be similar for the front rail pilot unit. *Note: The stop adjustment may affect the lock adjustment. See Lock Adjustment - Highway Position.*

4. Determine the approximate amount of adjustment required. Unlock and lower the guide wheels from the "highway" position. Let the guide wheels rest on the ground.

5. Turn adjusting screw (1) clockwise or counter-clockwise as needed. Raise and lock the guide wheels in the "highway" position.

6. Re-check the guide wheel to ground surface clearance. Repeat Steps 3 and 4 until the desired guide wheel to ground surface clearance is achieved.

FIGURE 3-13
STOP ADJUSTMENT - HIGHWAY POSITION



SE97A145A-1

Adjustments

LOCK ADJUSTMENT - RAIL POSITION, HR2000A1

1. The vehicle must be on level track. Place the vehicle automatic transmission in "Park" or manual transmission in "Neutral". Apply the parking brake. Lower and lock the guide wheels in the "rail" position. See Operation Section - Placing Vehicle On Track.

2. Before adjusting the locking mechanism, make sure the spring cell suspension tubes are perpendicular (90 degrees or as close as possible to 90 degrees) to the rail.

3. The locking mechanism must be fully engaged so the "T" lock pin can be inserted to secure the lock lever in the "locked" position. Also, with the lock lever fully engaged, lock bar (1) must be tight against the head of stop bolt (2). If not, see Adjustment.

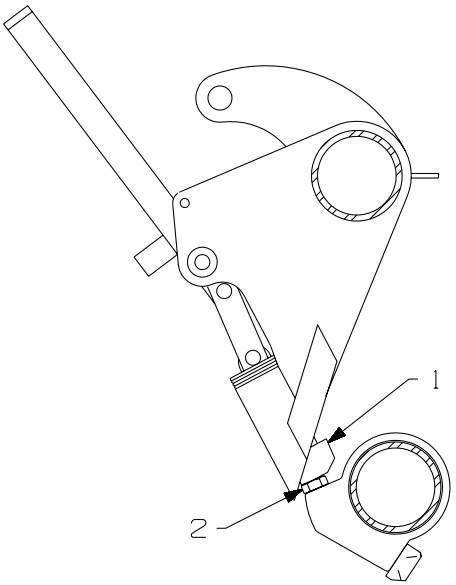
Adjustment - See Figures 3-14 and 3-15

4. Determine the approximate amount of adjustment required. Unlock and raise the guide wheels from the "rail" position. Let the guide wheels rest on the rails.

5. Adjust stop bolt (2) so it will be tight against lock bar (1) and the "T" lock pin can also be inserted to secure the lock lever in the "locked" position. Lower and lock the guide wheels in the "rail" position.

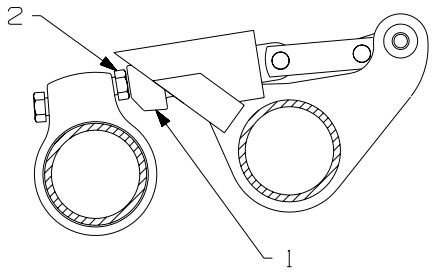
6. Re-check the lock engagement. If necessary, repeat Steps 4 and 5 until the lock mechanism is adjusted correctly.

FIGURE 3-14
LOCK ADJUSTMENT
RAIL POSITION, FRONT



SE97A142A-1

FIGURE 3-15
LOCK ADJUSTMENT
RAIL POSITION, REAR



SE97A144A-1

Adjustments

LOCK ADJUSTMENT - HIGHWAY POSITION, HR2000A1

1. Place the vehicle automatic transmission in "Park" or manual transmission in "Neutral". Apply the parking brake.

2. Before adjusting the locking mechanism, make sure the guide wheel unit is fully raised to the desired position. See Guide Wheel Unit Stop Adjustment - Highway Position.

3. The locking mechanism must be fully engaged so the "T" lock pin can be inserted to secure the lock lever in the "locked" position. Also, with the lock lever fully engaged, lock bar (1) must be tight against lock stop plate (3), front rail pilot unit or the head of stop bolt (2), rear rail pilot unit. If not, see Adjustment.

Adjustment - See Figures 3-16 and 3-17

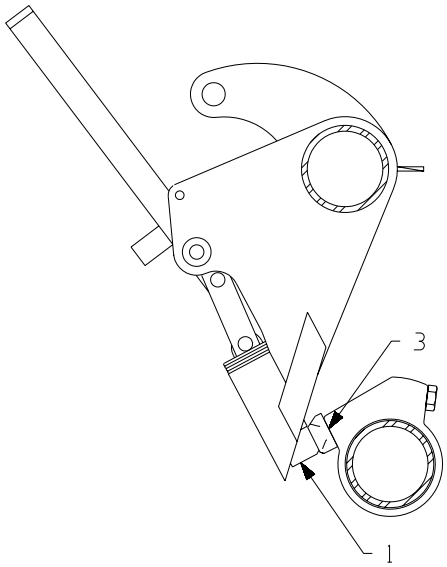
4. Determine the approximate amount of adjustment required. Unlock and lower the guide wheels from the "highway" position. Let the guide wheels rest on the rails.

5. FRONT RAIL PILOT UNITS: Adjustment is made by adding or removing shims under the lock stop plate (3). Add or remove shims from under lock stop plate so it will be tight against lock bar (1) and the "T" lock pin can also be inserted to secure the lock lever in the "locked" position. Raise and lock the guide wheels in the "highway" position.

   REAR RAIL PILOT UNITS: Adjust stop bolt (2) so it will be tight against lock bar (1) and the "T" lock pin can also be inserted to secure the lock lever in the "locked" position. Raise and lock the guide wheels in the "highway" position.

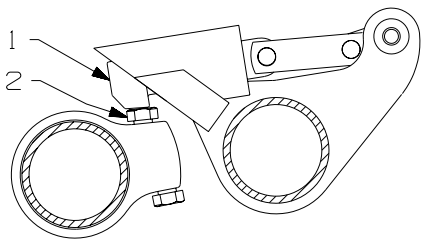
6. Re-check the lock engagement. If necessary, repeat Steps 4 and 5 until the lock mechanism is adjusted correctly.

FIGURE 3-16
LOCK ADJUSTMENT
HIGHWAY POSITION, FRONT



SE97A146A-1

FIGURE 3-17
LOCK ADJUSTMENT
HIGHWAY POSITION, REAR



SE97A147A-1

Adjustments

LOCK ADJUSTMENT - RAIL POSITION, HR2000A2 AND HR2000A3

1. The vehicle must be on level track. Place the vehicle automatic transmission in "Park" or manual transmission in "Neutral". Apply the parking brake. Lower and lock the guide wheels in the "rail" position. See Operation Section - Placing Vehicle On Track.

2. Before adjusting the locking mechanism, make sure the spring cell suspension tubes are perpendicular (90 degrees or as close as possible to 90 degrees) to the rail.

3. The locking mechanism must be fully engaged so the "T" lock pin can be inserted to secure the lock lever in the "locked" position. Also, with the lock lever fully engaged, lock bar (1) must be tight against the head of stop bolt (2). If not, see Adjustment.

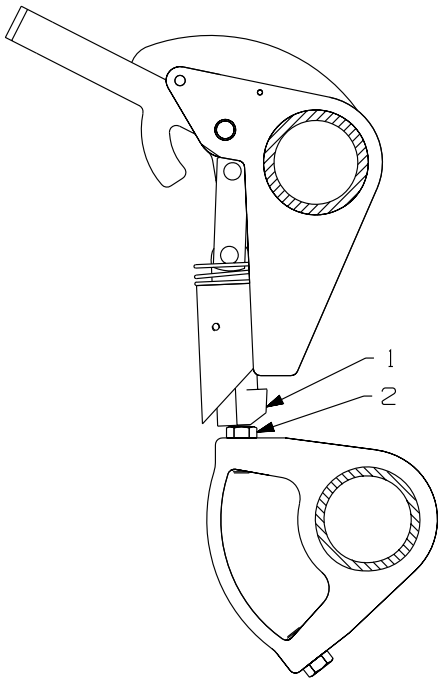
Adjustment - See Figures 3-18 and 3-19

4. Determine the approximate amount of adjustment required. Unlock and raise the guide wheels from the "rail" position. Let the guide wheels rest on the rails.

5. Adjust stop bolt (2) so it will be tight against lock bar (1) and the "T" lock pin can also be inserted to secure the lock lever in the "locked" position. Lower and lock the guide wheels in the "rail" position.

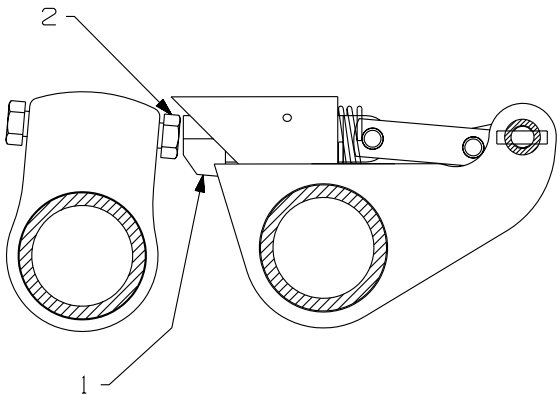
6. Re-check the lock engagement. If necessary, repeat Steps 4 and 5 until the lock mechanism is adjusted correctly.

FIGURE 3-18
LOCK ADJUSTMENT
RAIL POSITION, FRONT



SE97A148A-1

FIGURE 3-19
LOCK ADJUSTMENT
RAIL POSITION, REAR



SE97A150A-1

Adjustments

LOCK ADJUSTMENT - HIGHWAY POSITION, HR2000A2 AND HR2000A3

1. Place the vehicle automatic transmission in "Park" or manual transmission in "Neutral". Apply the parking brake.

2. Before adjusting the locking mechanism, make sure the guide wheel unit is fully raised to the desired position. See Guide Wheel Unit Stop Adjustment - Highway Position.

3. The locking mechanism must be fully engaged so the "T" lock pin can be inserted to secure the lock lever in the "locked" position. Also, with the lock lever fully engaged, lock bar (1) must be tight against the head of stop bolt (2). If not, see Adjustment.

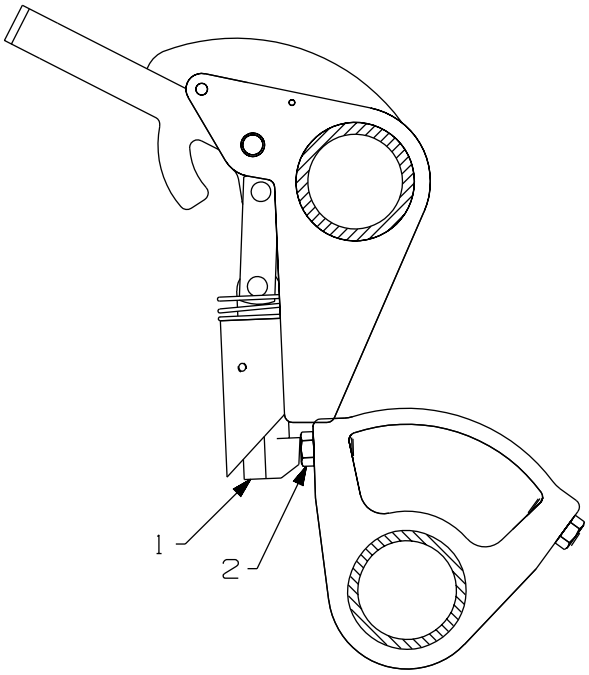
Adjustment - See Figures 3-20 and 3-21

4. Determine the approximate amount of adjustment required. Unlock and lower the guide wheels from the "highway" position. Let the guide wheels rest on the rails.

5. Adjust stop bolt (2) so it will be tight against lock bar (1) and the "T" lock pin can also be inserted to secure the lock lever in the "locked" position. Raise and lock the guide wheels in the "highway" position.

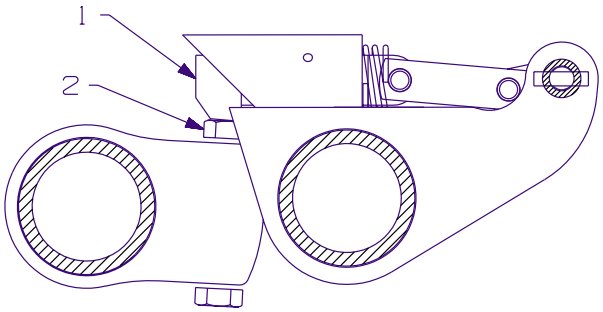
6. Re-check the lock engagement. If necessary, repeat Steps 4 and 5 until the lock mechanism is adjusted correctly.

FIGURE 3-20
LOCK ADJUSTMENT
HIGHWAY POSITION, FRONT



SE97A149A-1

FIGURE 3-21
LOCK ADJUSTMENT
HIGHWAY POSITION, REAR



SE97A151A-1

Adjustments

BRAKE SHOE CLEARANCE

1. Place the vehicle automatic transmission in "Park" or manual transmission in "Neutral". Apply the vehicle parking brake. Be sure the vehicle air brake system or the optional Electrical / Air Brake Group is at operating pressure to fully release the guide wheel brakes. Move the rail wheel brake control valve to the On position.

2. Measure the clearance between the brake shoe and the guide wheel tread. The clearance must not exceed 1/8 inch (3.2 mm), or adjustment is required. See Adjustment.

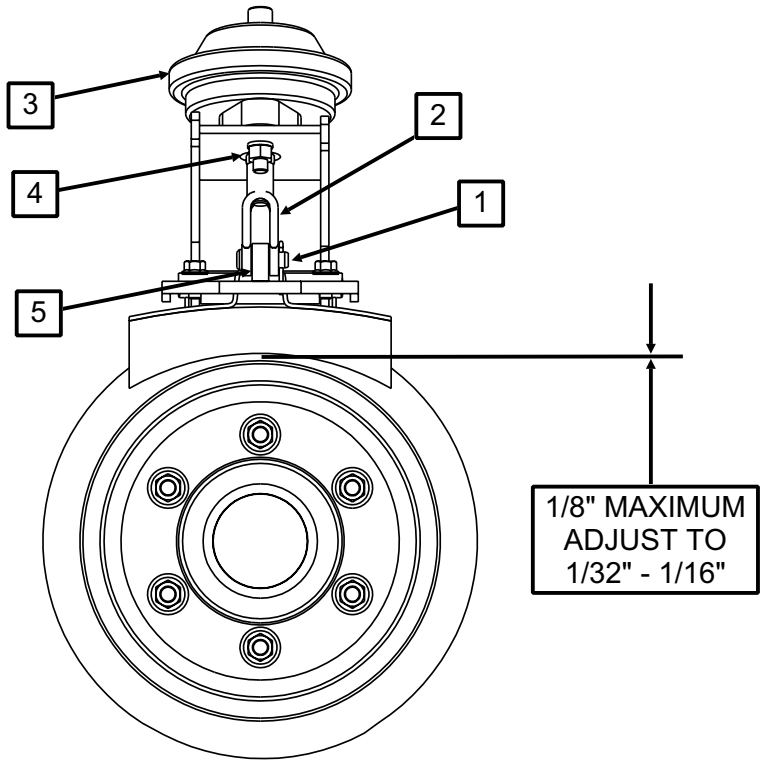
3. Repeat Step 2 to check the brake shoe clearance on the other guide wheel brake.

Adjustment - See Figure 3-22

4. Remove the cotter pin from the pin (1). Remove the pin (1) from the yoke (2) on the brake actuator (3). Loosen jam nut (4) and turn yoke (2) counter-clockwise to adjust the brake shoe closer to the guide wheel tread or clockwise to adjust the brake shoe away from the guide wheel tread. Adjust so the brake shoe is 1/32 - 1/16 inch (.8 - 1.6 mm) away from the guide wheel tread. Install the pin (1) through the yoke (2) and brake arm (5) and secure using the cotter pin. Tighten jam nut (4) securely. Recheck the brake shoe clearance.

5. Repeat Step 4 to adjust the brake shoe clearance on the other guide wheel brake.

FIGURE 3-22
BRAKE SHOE CLEARANCE



Adjustments

BRAKE AIR PRESSURE REGULATOR VALVE - See Figure 3-23

Vehicles that are not equipped with an air brake system from the vehicle manufacturer must be equipped with an auxiliary air system such as Harsco Track Technologies 163987 or 163988 Electric Air Brake System. Any air supply system that is used must have an air regulator valve installed in the air system to regulate the air pressure to the rail guide wheel brakes.

1. Place the vehicle on track. Apply the vehicle's parking brake. Place the vehicle's automatic transmission in "Park" or manual transmission in "Neutral". Leave the vehicle's engine operating. Activate the rail guide wheel air brake system by moving the toggle switch to the ON position. Be sure the air brake system is at operating pressure.

2. Initially adjust the air regulator valve (1) until 25 PSI (172 kPa) is indicated on the air pressure gauge (2). To adjust the regulator valve, loosen jam nut (3). Turn the adjusting handle (4) clockwise to increase pressure or counter-clockwise to decrease pressure. After this initial adjustment, tighten the jam nut securely.

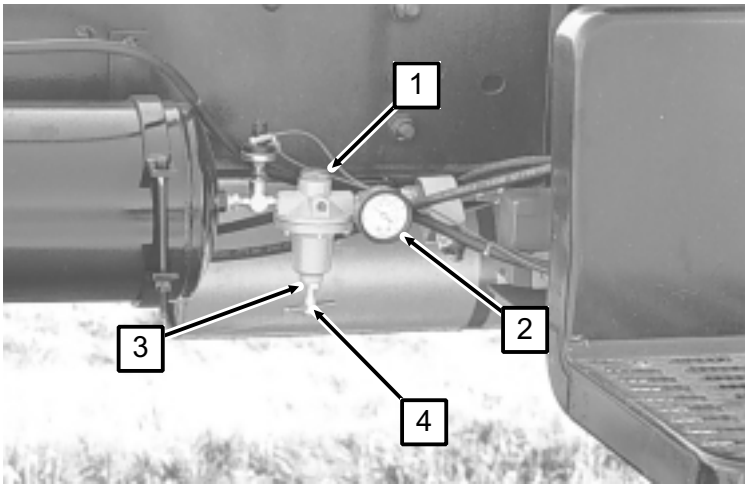
3. Be sure the test track is clear of all rail traffic before testing the brakes. Follow all railroad rules and regulations. Release the vehicle's parking brakes. Propel the vehicle forward and then apply the vehicle's brakes. The vehicle must stop in the shortest possible stopping distance without the rail guide wheels locking up and sliding on the rail.

   a. If the rail guide wheels lock up and slide on the rail when the vehicle's brakes are applied, adjust the regulator valve to a lower air pressure setting. Repeat Step 3.

   b. If the rail guide wheels do not stop the vehicle in the shortest possible stopping distance, adjust the regulator valve to a higher air pressure setting. Repeat Step 3.

Note: Many factors will determine the shortest possible stopping distance for a vehicle on track; such as vehicle weight, rear tire tread wear, vehicle speed, single or tandem rear axles, whether the front and/or rear rail pilot units are equipped with guide wheel brakes, rail conditions, etc.

FIGURE 3-23
BRAKE SYSTEM AIR PRESSURE REGULATOR AND GAUGE



94-143

Adjustments

RAIL SWEEP CLEARANCE - 154522 AND 168480 RAIL SWEEP GROUPS

The front and / or rear rail pilot units may be equipped with the 154522 or 168480 Rail Sweep Groups.

1. Place the vehicle on straight, level track. Place the vehicle automatic transmission in "Park" or manual transmission in "Neutral". Apply the vehicle parking brake. Lower and lock the front and rear guide wheels in the "rail" position.

2. Lower the rail sweeps to the rail by rotating them down. The rubber rail sweeps should clear the top of the rail by 1/8 inch (3.2 mm). If not, see Adjustment.

Adjustment - See Figure 3-24

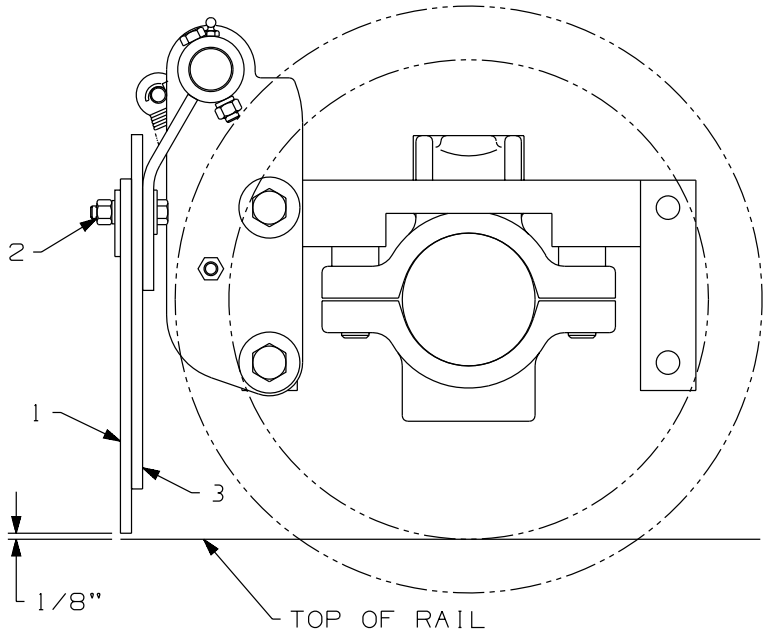
3. Loosen the two cap screws (2). Slide the rubber sweep (1) down until it clears the top of the rail by 1/8 inch (3.2 mm). Re-tighten the two cap screws.

4. If the rubber sweep cannot be lowered because the cap screws are in the bottom of the slots in the mounting plate, remove the two cap screws. Relocate the cap screws in the next upper set of holes in the rubber sweep. Adjust the sweep.

5. If the rubber sweep (1) is in the last, upper set of holes, move the second sweep (3) to the front and sweep (1) to the rear as a stiffener. Adjust the sweep.

6. When both sweeps are worn so neither can be adjusted, replace both sweeps.

FIGURE 3-24
RAIL SWEEP CLEARANCE



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Adjustments

HYDRAULIC PRESSURE ADJUSTMENTS

Checking Guide Wheel Unit Control Valve Relief Pressure - See Figures 3-25 and 3-26

Note: Hydraulic pressure settings are preset at the factory and should not be changed unless an operation malfunction indicates an incorrect pressure setting. It is very important that any pressure gauge being used is accurate and sized properly. Hydraulic pressure checks and adjustments must be with the pump at no flow. An incorrectly adjusted pressure setting could cause system damage.

1. Place the vehicle automatic transmission in "Park" or manual transmission in "Neutral". Apply the vehicle parking brake.

2. The relief pressure at both the front and rear rail pilot unit control valves must be set at 2000 PSI ± 50 PSI (137.9 bar ± 3.45 bar) . The relief pressure is checked at the test port connected to the "IN" port of the control valve.

3. Remove the dust cap from the test port. Attach a pressure gauge to test port (1) on the control valve.

4. Start the auxiliary hydraulic power source or engage the mechanical PTO hydraulic pump. If the vehicle is equipped with an auxiliary control valve, place the valve in the proper position to direct hydraulic oil flow to the guide wheel equipment.

5. Do not release the locking mechanism. Shift the control valve to "bottom" the hydraulic cylinder out against the locking mechanism. Hold the control valve handle in this position to obtain a pressure reading on the pressure gauge.

   a. If the pressure indicated on the pressure gauge is 2000 PSI ± 50 PSI (137.9 bar ± 3.45 bar), the relief pressure is set correctly. Stop the auxiliary hydraulic power source or disengage the mechanical PTO hydraulic pump. If the vehicle is equipped with an auxiliary control valve, place the valve in the proper position to shut off hydraulic oil flow to the guide wheel equipment.

   b. If the pressure indicated on the pressure gauge is not 2000 PSI ± 50 PSI (137.9 bar ± 3.45 bar), see Adjustment.

Adjustments

HYDRAULIC PRESSURE ADJUSTMENTS

Adjustment - See Figures 3-25 and 3-26

6. Remove cap (2) from the control valve, exposing the adjusting screw.

7. Do not release the locking mechanism. Shift the control valve to "bottom" the hydraulic cylinder out against the locking mechanism. Hold the control valve handle in this position while adjusting the pressure.

8. Turn the adjusting screw clockwise to increase the pressure setting or counter-clockwise to decrease the pressure setting. Stop when the pressure gauge remains steady at 2000 PSI ± 50 PSI (137.9 bar ± 3.45 bar).

9. Stop the auxiliary hydraulic power source or disengage the mechanical PTO hydraulic pump. If the vehicle is equipped with an auxiliary control valve, place the valve in the proper position to shut off hydraulic oil flow to the guide wheel equipment.

10. Install cap (2) on the control valve. Remove the pressure gauge from the test port. Install the dust cap on the test port.

Adjustments

HYDRAULIC PRESSURE ADJUSTMENTS

FIGURE 3-25
FRONT RAIL PILOT UNIT CONTROL VALVE

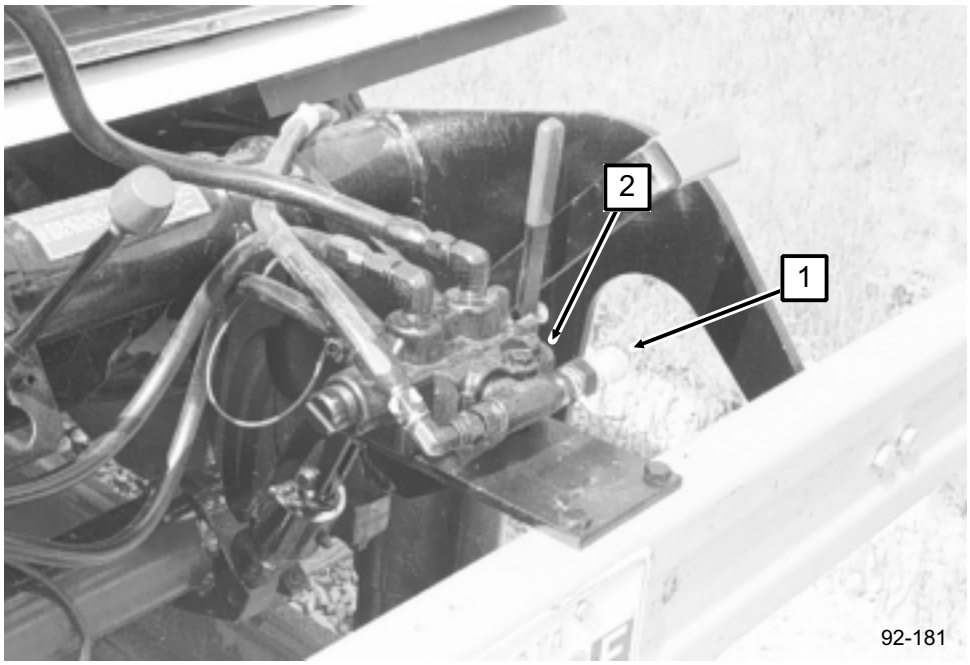
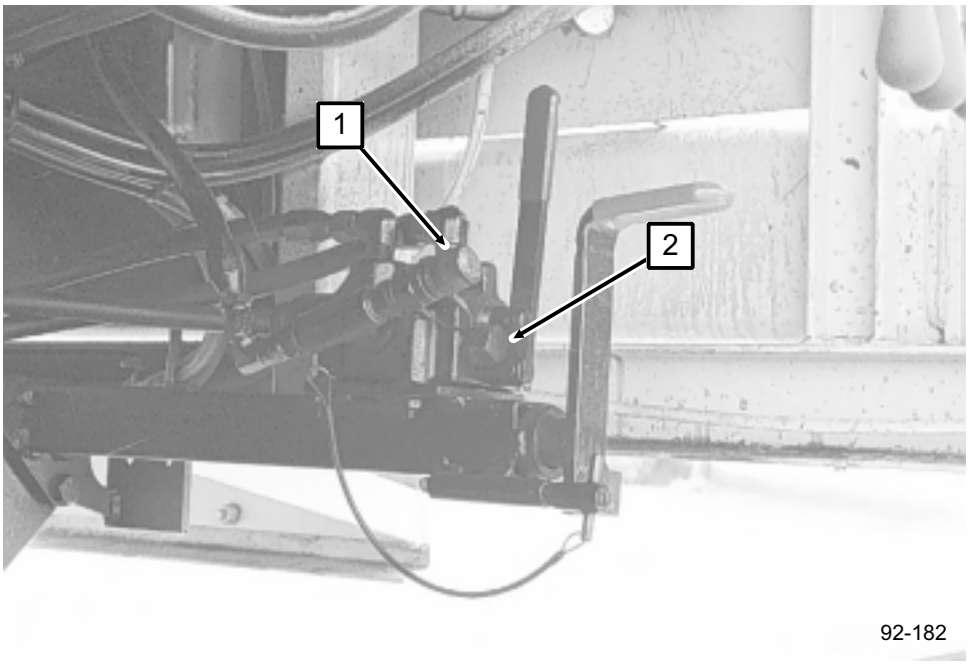


FIGURE 3-26
REAR RAIL PILOT UNIT CONTROL VALVE



SECTION 4 - MAINTENANCE
TABLE OF CONTENTS

Maintenance Schedule

■ **RE-TORQUE VEHICLE WHEEL LUG NUTS AND GUIDE WHEEL LUG NUTS AFTER THE FIRST 50 MILES OF OPERATION. THEREAFTER TORQUE WHEEL LUG NUTS ACCORDING TO VEHICLE MANUFACTURER'S WHEEL TORQUE SPECIFICATIONS. FAILURE TO COMPLY COULD RESULT IN SEVERE BODILY INJURY.**

DAILY:

1. Inspect the front and rear rail pilot units for damaged, worn or missing parts.

2. Check the mechanical locks and lock pins for ease of operation.

3. The lock pins should never be able to be pulled out unless the button on the "T" end of the pin is pushed in. The button in the lock pin must push in easily and also pop out when released. The locking balls in the end of the pin must work freely so the pin cannot be removed until the button in the lock pin is depressed. If the lock pin does not operate properly, replace the lock pin.

4. Check the hydraulic reservoir to ensure that the oil level is full. If low, fill to the proper level with the correct fluid.

5. When the vehicle is operated on the track, listen for unusual noises. Unusual noises may indicate incorrectly lowered guide wheels, damaged or missing parts, or insufficient lubrication. Pay attention to the quality of the ride. Check the guide wheel equipment alignment if the vehicle crowds one side of the track instead of floating from side to side. See Adjustments - Guide Wheel Equipment Alignment Procedure.

WEEKLY:

1. Check the guide wheel equipment alignment. See Adjustment Section, Guide Wheel Equipment Alignment Procedure - Vehicle Track Test.

2. Inspect the guide wheel tread and flanges for wear or damage. See Maintenance - Guide Wheel Allowable Wear.

3. Spin each guide wheel by hand, checking for ease of rotation. If the guide wheel does not rotate easily, the guide wheel bearings may be lacking lubrication or may be damaged. Inspect, re-pack or replace the bearings if necessary.

4. Inspect the vehicle wheels, studs, lug nuts and tires for wear, damage, cuts etc.

5. Check the vehicle tires for correct inflation pressure. Operate at the tire manufacturer's recommended maximum pressure printed on the sidewalls of the tires, or the wheel manufacturer's recommended maximum pressure stamped on the wheel, whichever is lower.

6. Check all bolts for tightness. See Appendices - Appendix A, Bolt Torque Requirement Chart.

Maintenance Schedule

At 50 Vehicle Miles (80 Vehicle km):

Torque the vehicle wheel lug nuts and guide wheel lug nuts to the recommended specifications. Thereafter refer to the vehicle manufacturer's wheel torque specifications.

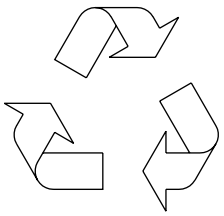
Every 2,000 Track Miles (3200 km):

Lubricate the rail pilot units locations provided with grease fittings. See Guide Wheel Equipment Lubrication.

At 10,000 Track Miles (16000 km):

Re-pack and adjust the guide wheel bearings. See Re-packing Guide Wheel Bearings.

Waste Disposal



Dispose of waste properly. Improper disposal of waste can threaten the environment. The operation and maintenance of Harsco Track Technologies equipment may involve the use of such items as hydraulic oil, engine oil, fuel, coolant, brake fluid, filters, batteries, etc.

Use leak proof containers when draining fluids. Do not pour waste onto the ground, down a drain, or into any water source. Inquire on the proper way to recycle or dispose of waste according to applicable Federal, State and/or local regulations.

Guide Wheel Equipment Lubrication

Lubricate the guide wheel equipment every 2000 track miles (maximum) or each time the vehicle is serviced.

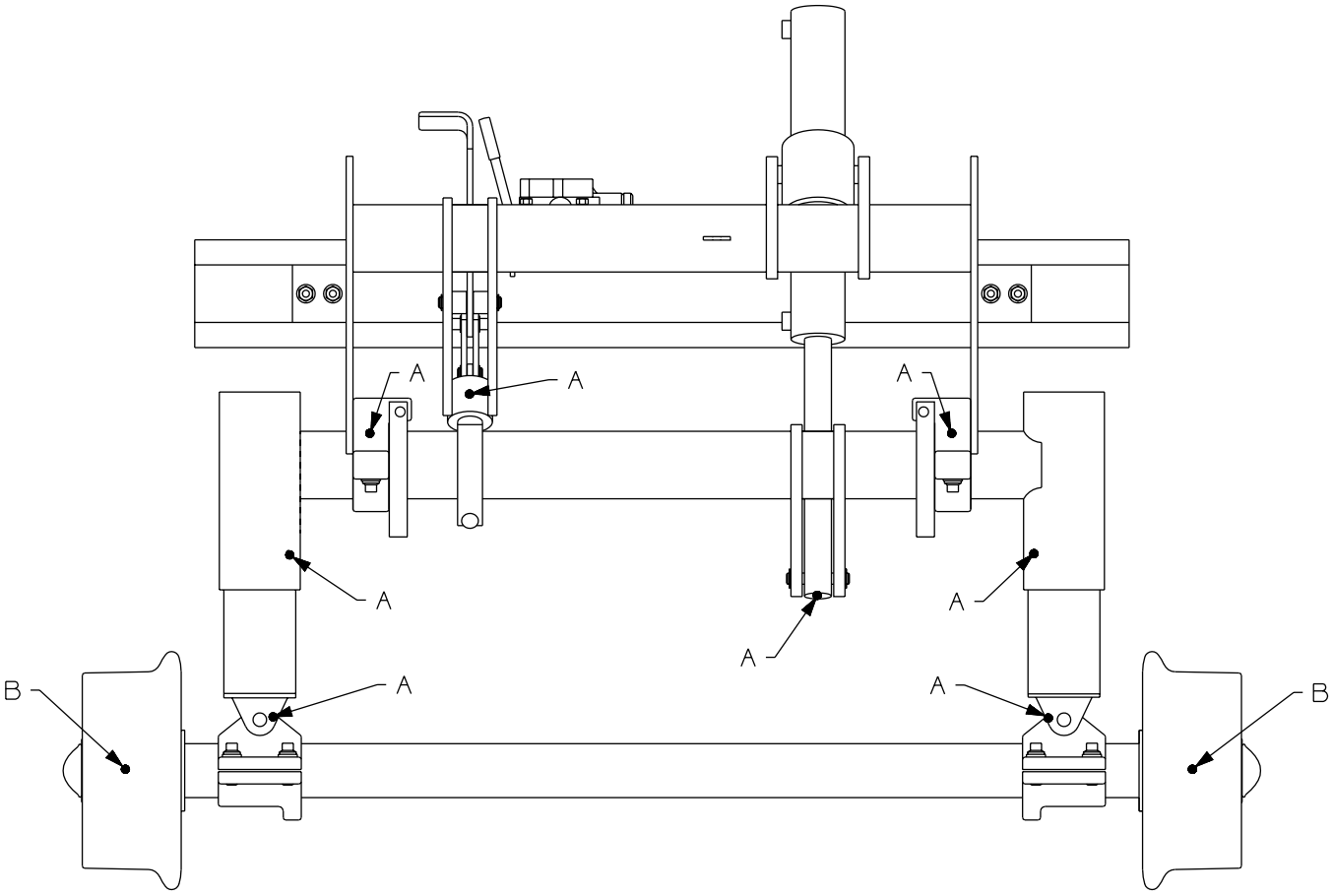
FRONT RAIL PILOT UNIT LUBRICATION - See Figure 4-1

1. Apply the vehicle parking brake. Stop the vehicle engine. Turn the vehicle's ignition switch off.

2. Lubricate grease fittings (A) using Mobil Special Moly, or equivalent.

3. Re-pack the guide wheel bearings (B) every 10,000 track miles (maximum) or at least once every two years (minimum), whichever occurs first. See Re-packing Guide Wheel Bearings.

FIGURE 4-1
FRONT RAIL PILOT UNIT LUBRICATION



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Guide Wheel Equipment Lubrication

Lubricate the guide wheel equipment every 2000 track miles (maximum) or each time the vehicle is serviced.

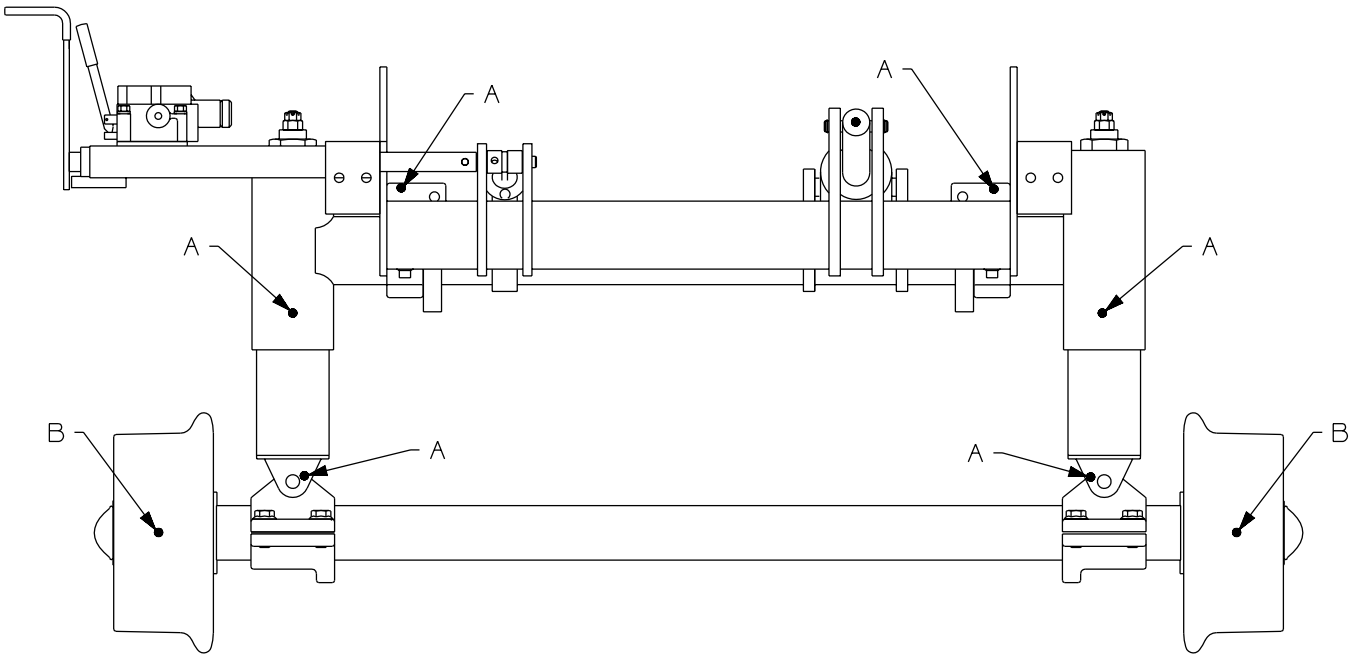
REAR RAIL PILOT UNIT LUBRICATION - See Figure 4-2

1. Apply the vehicle parking brake. Stop the vehicle engine. Turn the vehicle's ignition switch off.

2. Lubricate grease fittings (A) using Mobil Special Moly, or equivalent.

3. Re-pack the guide wheel bearings (B) every 10,000 track miles (maximum) or at least once every two years (minimum), whichever occurs first. See Re-packing Guide Wheel Bearings.

FIGURE 4-2
REAR RAIL PILOT UNIT LUBRICATION



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Guide Wheel Equipment Lubrication

RE-PACKING GUIDE WHEEL BEARINGS - See Figure 4-3

Re-pack the guide wheel bearings every 10,000 track miles (maximum) or at least once every two years (minimum), whichever occurs first.

1. Apply the vehicle parking brake. Raise and lock the front and rear rail pilot units in the "highway" position. Stop the vehicle engine. Turn the vehicle ignition switch off.

2. Remove the hub cap (1). Remove the 1/8 x 1-1/4 inch cotter pin (2), 1 inch castle nut (3) and spindle washer (4).

3. Pull the guide wheel (5) from the spindle (6). Remove the outer bearing cone (7) from the guide wheel (5). Remove the grease seal (11) and inner bearing cone (9) from the guide wheel (5).

4. Clean all components of old grease and dirt.

5. Inspect the spindle, bearing cones and cups (7 & 8, 9 & 10) for nicks, gouges and wear. If any of these are evident, replace the component.

6. Measure the guide wheel wear. See Maintenance - Guide Wheels, Allowable Wear.

7. Coat the spindle surface, grease seal surface, both bearing cup surfaces, pack both bearing cones and fill the guide wheel cavity 1/2 full (50 %) using Mobil HP grease, or equivalent.

8. Install the inner bearing cone (9) into the guide wheel (5). Install a new grease seal (11) into the wheel.

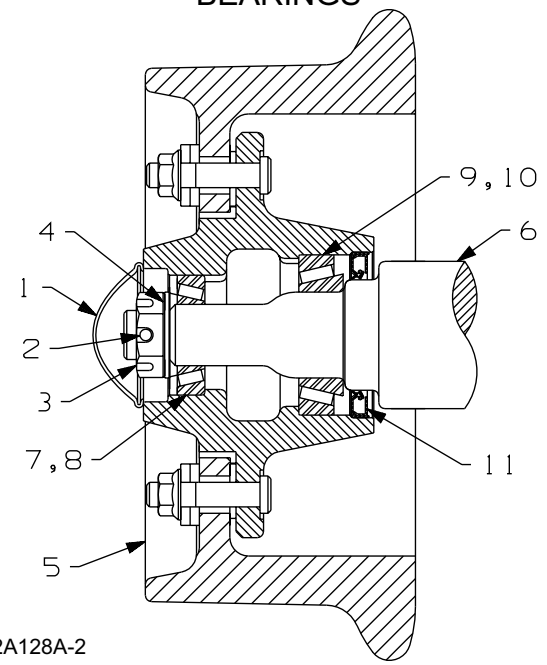
9. Slide the guide wheel (5) with the inner bearing (9) and grease seal (11) onto the spindle (6). Install the outer bearing cone (7), spindle washer (4) and 1 inch castle nut (3) onto the spindle (6).

10. Torque the castle nut (3) to approximately 20 ft lbs. Then loosen the castle nut. This is especially important if new bearing cups have been installed.

11. Torque the castle nut (3) to 7 ft lbs (zero clearance). Then back the castle nut off 1/2 to 1 flat of the nut (0.001 - 0.010 inch clearance). Secure the castle nut using a new cotter pin (2).

12. Install the hub cap (1) onto the guide wheel.

FIGURE 4-3
RE-PACKING GUIDE WHEEL BEARINGS



SE92A128A-2

Guide Wheels Revised 10-2007

ALLOWABLE WEAR - See Figure 4-4

WARNING

■ **REPLACE ANY GUIDE WHEEL IMMEDIATELY WHICH SHOWS DAMAGE AND/OR HAS WORN MORE THAN THE ALLOWABLE LIMITS. FAILURE TO COMPLY COULD RESULT IN DERAILMENT OF THE VEHICLE, AND SEVERE BODILY INJURY.**

1. Tools needed: Harsco Track Technologies wheel caliper (M019889), or equivalent.

2. Measure the guide wheel flange at Position "A" with the wheel caliper. The minimum allowable flange dimension at Position "A" is 1/2 inch (12.7 mm).

   If the guide wheel flange dimension is less than the allowable limit, replace the guide wheel immediately.

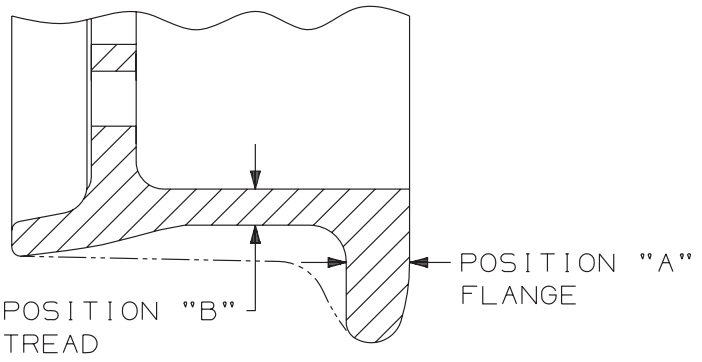
3. Measure the guide wheel tread at Position "B" with the wheel caliper. The minimum allowable tread dimension at Position "B" is 5/16 inch (8 mm).

   If the guide wheel tread dimension is less than the allowable limit, replace the guide wheel immediately.

4. The entire guide wheel must not have any gouges or cracks. If any of these are evident, replace the guide wheel immediately.

4

FIGURE 4-4
ALLOWABLE GUIDE WHEEL WEAR



SE92A128A-3

Hoses and Fittings

WARNING

■ **ALL HOSES AND FITTINGS ON THIS EQUIPMENT MUST COMPLY WITH SAE STANDARD J1273 RECOMMENDED PRACTICE FOR SELECTION, INSTALLATION AND MAINTENANCE OF HOSE AND HOSE ASSEMBLIES. FAILURE TO COMPLY TO THIS STANDARD COULD RESULT IN SEVERE BODILY INJURY.**

INSPECTION, MAINTENANCE, REPLACEMENT AND INSTALLATION

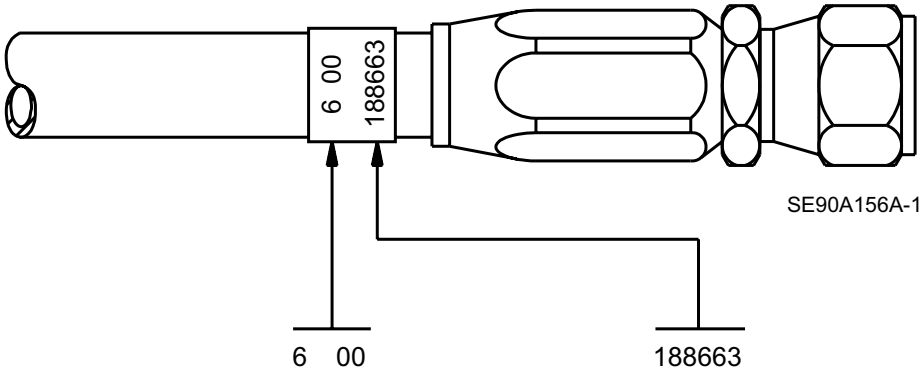
The inspection, maintenance, replacement and installation of hydraulic hose assemblies and fittings on this equipment must conform with SAE Standard J1273. See Appendices Section - Appendix B.

HOSE BAND - See Figure 4-5

4

All Harsco Track Technologies original and replacement hose assemblies manufactured for this equipment at the Harsco Track Technologies, Harsco Corporation Fairmont, Minnesota plant facility are supplied with a hose band displaying the date of manufacture and the Harsco Track Technologies part number. See Figure 4-5 for explanation of the hose band. The hose assembly illustrated in the example was manufactured in June 2000 and is Harsco Track Technologies part number 188663.

FIGURE 4-5
HOSE BAND



MONTH		YEAR	HARSCO TRACK
JANUARY	= 1	LAST TWO	TECHNOLOGIES
FEBRUARY	= 2	DIGITS OF	PART NUMBER
MARCH	= 3	THE YEAR OF	
APRIL	= 4	MANUFACTURE	
MAY	= 5		
JUNE	= 6		
JULY	= 7		
AUGUST	= 8		
SEPTEMBER	= 9		
OCTOBER	= O		
NOVEMBER	= N		
DECEMBER	= D		

Vehicle Wheels

WHEEL REPLACEMENT

■ **USE REPLACEMENT WHEELS AS RECOMMENDED IN THE HARSCO TRACK TECHNOLOGIES HY-RAIL® VEHICLE SPECIFICATIONS MANUAL. FAILURE TO COMPLY COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.**

Use replacement wheel rim(s) as recommended in the Harsco Track Technologies HY-RAIL® Vehicle Specifications Manual to ensure correct vehicle wheel spacing and accurate guide wheel load. The wheels and tires should be static balanced or balanced after installation on the vehicle for best results. Torque vehicle wheel lug nuts to recommended specifications.

TIRE REPLACEMENT

■ **USE REPLACEMENT TIRES WITH THE SAME ROLLING RADIUS, TREAD WIDTH, PLY RATING, AND LOAD RATING AS RECOMMENDED IN THE HARSCO TRACK TECHNOLOGIES HY-RAIL® VEHICLE SPECIFICATIONS MANUAL. FAILURE TO COMPLY COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.**

Bias ply tires are the recommended tire for use on vehicles equipped with guide wheel equipment. Radial tires may influence vehicle tracking. Performance of vehicles equipped with radial tires is the responsibility of the end user.

Replacement tires must have the same rolling radius, tread width, ply rating, and load rating as recommended in the Harsco Track Technologies HY-RAIL® Vehicle Specifications Manual. Using tires of equal diameter will help keep the speedometer reading and the guide wheel load accurate. Tires must have a minimum 6-1/2 inches of tread width.

Inflate tires to the tire manufacturer's recommended maximum pressure printed on the sidewall of the tire or to the wheel manufacturer's recommended maximum pressure stamped on the wheel, whichever is lower. The wheels and tires should be static balanced or balanced after installation on the vehicle for best results. Torque vehicle wheel lug nuts to recommended specifications.

Bolt Torque Requirements

■ **CHECK ALL BOLTS AND NUTS PERIODICALLY. KEEP BOLTS AND NUTS TIGHTENED TO THE TORQUE SPECIFIED IN APPENDICES SECTION - APPENDIX A. IF BOLT REPLACEMENT BECOMES NECESSARY, REPLACE WORN BOLT WITH EQUAL S.A.E. GRADE NUMBER BOLT. FAILURE TO COMPLY COULD RESULT IN BODILY INJURY, AND/OR PROPERTY DAMAGE.**

See Appendices Section - Appendix A, for bolt torque requirements table and grade identification markings used by manufacturers.

SECTION 5 - TROUBLESHOOTING
TABLE OF CONTENTS

Troubleshooting Guide Wheel Equipment

Troubleshooting Guide Wheel Equipment

PROBLEM	PROBABLE CAUSE	POSSIBLE REMEDY
Hydraulic pump not delivering oil.	Mechanical PTO not engaged or control valve not shifted to direct oil flow to guide wheel equipment.	Engage mechanical PTO. Shift control valve to direct oil flow to guide wheel equipment.
	Switch for auxiliary electric powered hydraulic pump in OFF position.	Move switch to ON position.
	Hydraulic reservoir oil level low.	Fill reservoir to full level with recommended hydraulic oil.
	Oil restricted to pump intake.	Check all strainers and filters for dirt and sludge. Clean and replace if necessary.
	Components bent, broken, worn, etc.	Replace components.
Rail pilot unit does not lower or raise.	Mechanical lock engaged.	Disengage mechanical lock. See Operation Section - Placing Vehicle On Track or Removing Vehicle From Track.
	Hydraulic pump not operating.	Start hydraulic pump.
	Hydraulic reservoir oil level low.	Fill reservoir to full level with recommended hydraulic oil.
	Components bent, broken, worn, etc.	Replace components.
	Lack of lubrication.	Lubricate front and rear rail pilot units. See Maintenance Section - Lubrication.

Troubleshooting Guide Wheel Equipment

PROBLEM	PROBABLE CAUSE	POSSIBLE REMEDY
Rail pilot unit is difficult to lower or raise.	Vehicle over-loaded.	Remove excess load from vehicle.
	Guide wheel load adjusted incorrectly.	Re-adjust. See Adjustment Section - Guide Wheel Equipment Alignment Procedure.
	Components bent, broken, worn, etc.	Replace components.
	Lack of lubrication.	Lubricate front and rear rail pilot units. See Maintenance Section - Lubrication.
	Control Valve hydraulic relief pressure set incorrectly.	Check and adjust if necessary. See Adjustments Section - Hydraulic Pressure Adjustments.
Lock pins cannot be inserted when rail pilot unit is in "rail" or "highway" position.	Mud, slush, dirt, etc. in locking mechanism.	Clean foreign material from locking mechanism.
	Locking mechanism adjusted incorrectly.	Adjust locking mechanism. See Adjustments- Locking Mechanism.
	Lack of lubrication.	Lubricate front and rear rail pilot units. See Maintenance Section - Lubrication.
	Components bent, broken, worn, etc.	Replace components.
Vehicle derails.	Rail pilot units, vehicle rear axle, etc. not aligned with vehicle frame.	Check alignment. See Adjustment Section - Guide Wheel Equipment Alignment Procedure.

Troubleshooting Guide Wheel Equipment

PROBLEM	PROBABLE CAUSE	POSSIBLE REMEDY
Vehicle front tires clear rail less than 1-1/2" (38 mm) when vehicle is on track and loaded.	Axle hook arms not engaged under front axle.	Engage axle hook arms.
	Vehicle overloaded.	Redistribute or remove some of the load.
	Axle Hooks not lifting front axle high enough.	See Adjustment Section - Vehicle Front Tire Clearance - Rail Position.
	Front rail pilot unit not positioned in proper holes of mounting brackets.	Mount front rail pilot unit in correct mounting holes. See application drawings supplied with guide wheel equipment group.
Vehicle pulls noticeably to the left or right when on track.	Vehicle loaded heavy on one side.	Move load to center of vehicle.
	Rail pilot units, vehicle rear axle, etc. not aligned with vehicle frame.	Check alignment. See Adjustment Section - Guide Wheel Equipment Alignment Procedure.
	Incorrect or worn vehicle rear tire.	Check for correct rear tire. Replace if necessary. Replace worn rear tire.
	Vehicle rear tires under inflated.	Check pressure. Inflate if low. Do not exceed tire manufacturer's recommended maximum pressure printed on the sidewalls, or wheel manufacturer's recommended maximum pressure stamped on the wheel, whichever is lower.
	Guide wheel brake shoes dragging.	Re-adjust brake shoes. See Adjustment Section - Brake Shoe Clearance.

Troubleshooting Guide Wheel Equipment

PROBLEM	PROBABLE CAUSE	POSSIBLE REMEDY
Vehicle load on front spring cells exceeds front rail pilot unit maximum rated load.	Vehicle overloaded.	Redistribute or remove some of the load.
Vehicle load on rear spring cells exceeds rear rail pilot unit maximum rated load capacity.	Vehicle overloaded.	Redistribute or remove some of the load.
	Rear guide wheel unit not initially set to carry approximately 1/2 of vehicle rear axle curb weight.	Re-adjust. See Guide Wheel Equipment Alignment Procedure.
	Vehicle rear tires under inflated.	Check pressure. Inflate if low. Do not exceed tire manufacturer's recommended maximum pressure printed on the sidewalls, or wheel manufacturer's recommended maximum pressure stamped on the wheel, whichever is lower.
Vibration felt in the vehicle when traveling on track.	Rail pilot units mounting fasteners loose.	Tighten all bolts to recommended torque.
	Guide wheel bearings worn.	Replace bearings, wheel or axle.
	Guide wheels worn.	Check guide wheel wear. See Maintenance Section - Guide Wheels, Allowable Wear.
	Vehicle rear rim bent.	Replace. See Parts Section - Vehicle Applications.
	Vehicle rear tires out of balance.	Balance tires.

Troubleshooting Guide Wheel Equipment

PROBLEM	PROBABLE CAUSE	POSSIBLE REMEDY
Vibration felt in the vehicle when traveling on highway.	Rail pilot units mounting fasteners loose.	Tighten all bolts to recommended torque.
	Rail pilot units not locked in "highway" position.	STOP IMMEDIATELY. Make sure both rail pilot units are locked in "highway" position.
	Vehicle rim bent.	Replace. See Parts Section - Vehicle Applications.
	Vehicle tires out of balance.	Balance tires.

SECTION 6 - APPENDICES
TABLE OF CONTENTS

Appendix A - Conversion Tables

Appendix B - SAE J1273

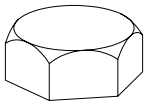
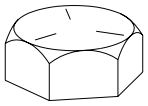
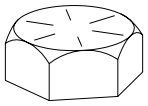
Appendix C - Service Data Sheets

Appendix A

FIGURE 6-1
STANDARD BOLT TORQUE REQUIREMENTS TABLE
STANDARD TYPE FASTENERS

The torque values listed below are for standard-type fasteners only. The torque values listed are based on wet (lubricated) and dry conditions. The torque values for 1/4 and 5/16 inch size fasteners are listed in in-lbs torque only. The torque values for all other size fasteners are listed in ft-lbs torque with metric equivalents in parentheses. Use lower grade torque values if bolt and nut have different SAE grades. Manufacturer's SAE grade markings may vary.

STANDARD MARKINGS AND TORQUE SPECIFICATIONS

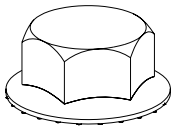
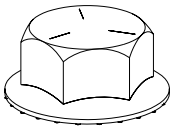
SAE Grade	**1 or 2**				**5**				**8**			
Fastener Standard SAE Grade Markings												
Fastener Body Size	**Torque Wet**		**Dry**		**Torque Wet**		**Dry**		**Torque Wet**		**Dry**	
Inch Thrd	in-lb		in-lb		in-lb		in-lb		in-lb		in-lb	
1/4 - 20	49		65		75		100		107		142	
1/4 - 28	56		74		86		114		122		162	
5/16 - 18	103		137		157		208		220		293	
5/16 - 24	113		150		173		230		244		325	
Fastener Body Size	**Torque Wet**		**Dry**		**Torque Wet**		**Dry**		**Torque Wet**		**Dry**	
Inch Thrd	ft-lb	(kg-m)	ft-lb	(kg-m)	ft-lb	(kg-m)	ft-lb	(kg-m)	ft-lb	(kg-m)	ft-lb	(kg-m)
3/8 - 16	15	(2.1)	20	(2.8)	23	(3.2)	31	(4.2)	32	(4.4)	43	(5.9)
3/8 - 24	17	(2.4)	23	(3.1)	26	(3.6)	35	(4.8)	37	(5.1)	49	(6.8)
7/16 - 14	24	(3.3)	32	(4.4)	37	(5.1)	49	(6.8)	52	(7.2)	69	(9.6)
7/16 - 20	27	(3.7)	36	(5.0)	42	(5.8)	56	(7.7)	58	(8.0)	77	(10.7)
1/2 - 13	39	(5.4)	52	(7.2)	57	(7.9)	76	(10.5)	80	(11.0)	106	(14.7)
1/2 - 20	41	(5.7)	55	(7.5)	64	(8.9)	85	(11.8)	90	(12.4)	120	(16.5)
9/16 - 12	53	(7.3)	71	(9.7)	82	(11.3)	109	(15.1)	115	(15.9)	153	(21.1)
9/16 - 18	59	(8.2)	78	(10.8)	91	(12.6)	121	(16.7)	129	(17.8)	172	(23.7)
5/8 - 11	73	(10.0)	97	(13.4)	113	(15.6)	150	(20.8)	160	(22.1)	213	(29.4)
5/8 - 18	83	(11.5)	110	(15.2)	128	(17.7)	170	(23.5)	180	(24.9)	239	(33.1)
3/4 - 10	129	(17.8)	172	(23.7)	200	(27.7)	266	(36.8)	282	(39.0)	375	(51.8)
3/4 - 16	144	(19.9)	192	(26.5)	223	(30.8)	297	(41.0)	315	(43.6)	419	(57.9)
7/8 - 9	124	(17.1)	165	(22.8)	323	(44.7)	430	(59.4)	454	(62.8)	604	(83.5)
7/8 - 14	138	(19.1)	184	(25.4)	355	(49.1)	472	(65.3)	501	(69.3)	666	(92.1)
1 - 8	188	(26.0)	250	(34.6)	483	(66.8)	642	(88.9)	681	(94.2)	906	(125.2)
1 - 14	210	(29.0)	279	(38.6)	541	(74.8)	720	(99.5)	764	(106.0)	1,016	(140.5)
1-1/8 - 7	266	(36.8)	354	(48.9)	596	(82.4)	793	(109.6)	966	(134.0)	1,285	(177.6)
1-1/8 - 12	297	(41.1)	395	(54.6)	668	(92.4)	888	(122.8)	1,083	(150.0)	1,440	(199.1)
1-1/4 - 7	375	(51.9)	499	(69.0)	841	(116.0)	1,119	(154.6)	1,363	(189.0)	1,813	(250.6)
1-1/4 - 12	415	(57.4)	552	(76.3)	930	(129.0)	1,237	(171.0)	1,509	(209.0)	2,007	(277.5)
1-3/8 - 6	492	(68.0)	654	(90.5)	1,102	(152.0)	1,466	(202.6)	1,787	(247.0)	2,377	(328.6)
1-3/8 - 12	560	(77.4)	745	(103.0)	1,255	(174.0)	1,670	(230.8)	2,034	(281.0)	2,705	(374.0)
1-1/2 - 6	653	(90.3)	868	(120.1)	1,463	(202.0)	1,946	(269.0)	2,371	(328.0)	3,153	(436.0)
1-1/2 - 12	734	(102.0)	976	(135.0)	1,645	(228.0)	2,188	(302.5)	2,668	(369.0)	3,548	(490.6)

Appendix A

FIGURE 6-2
STANDARD BOLT TORQUE REQUIREMENTS TABLE
SERRATED TYPE FLANGE FASTENERS

The torque values listed below are for serrated-type flange fasteners only. The torque values listed are based on wet (lubricated) and dry conditions. The torque values for all size fasteners are listed in ft-lbs torque with metric equivalents in parentheses. Use lower grade torque values if bolt and nut have different SAE grades. Manufacturer's SAE grade markings may vary.

STANDARD MARKINGS AND TORQUE SPECIFICATIONS

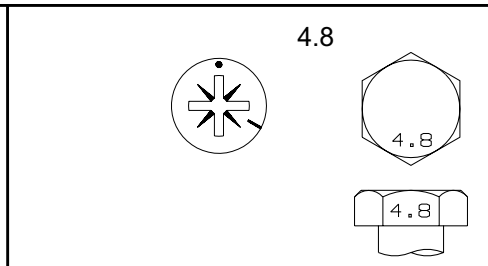
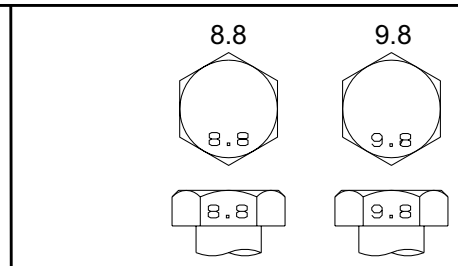
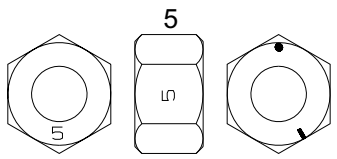
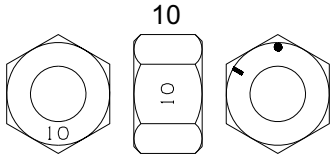
SAE Grade	**1 or 2**				**5**			
Fastener Standard SAE Grade Markings								
Fastener Body Size	**Torque Wet**		**Dry**		**Torque Wet**		**Dry**	
Inch Thrd	ft-lb	(kg-m)	ft-lb	(kg-m)	ft-lb	(kg-m)	ft-lb	(kg-m)
1/4 - 20	8	(1.1)	11	(1.5)	11	(1.5)	15	(2.1)
1/4 - 28	9	(1.2)	12	(1.7)	12	(1.7)	16	(2.2)
5/16 - 18	13	(1.8)	17	(2.4)	20	(2.8)	27	(3.7)
5/16 - 24	13	(1.8)	17	(2.4)	32	(4.4)	43	(5.9)
3/8 - 16	23	(3.2)	31	(4.3)	40	(5.5)	53	(7.3)
3/8 - 24	25	(3.5)	33	(4.6)	43	(5.9)	57	(7.9)
7/16 - 14	38	(5.3)	51	(7.1)	55	(7.6)	73	(10.1)
7/16 - 20	40	(5.5)	53	(7.5)	60	(8.3)	80	(11.1)
1/2 - 13	60	(8.3)	80	(11.1)	95	(13.1)	127	(17.6)
1/2 - 20	65	(9.0)	87	(12.0)	100	(13.8)	133	(18.4)
9/16 - 12	78	(10.8)	104	(14.4)	140	(19.4)	187	(25.9)
9/16 - 18	85	(11.8)	113	(15.6)	150	(20.7)	200	(27.7)
5/8 - 11	125	(17.3)	167	(23.1)	190	(26.3)	253	(35.0)
5/8 - 18	135	(18.7)	180	(24.9)	220	(30.4)	293	(40.5)
3/4 - 10	225	(31.1)	300	(41.2)	350	(48.4)	467	(64.6)
3/4 - 16	250	(34.6)	333	(46.1)	400	(55.3)	533	(73.7)
7/8 - 9	350	(48.4)	467	(64.6)	550	(76.1)	733	(101.4)
7/8 - 14	375	(51.9)	500	(69.2)	600	(83.0)	800	(110.6)
1 - 8	480	(66.4)	640	(88.5)	750	(103.7)	1,000	(138.3)
1 - 14	500	(69.2)	666	(92.1)	800	(110.6)	1,066	(147.4)

Appendix A

FIGURE 6-3
BOLT TORQUE REQUIREMENTS TABLE
METRIC TYPE FASTENERS

Do not use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically. Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to the strength of the original. Make sure fastener's threads are clean and that thread engagement is properly started. This will help prevent them from failing when tightening.

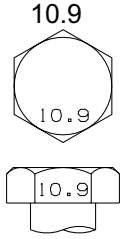
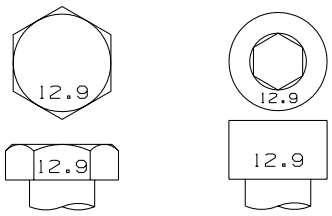
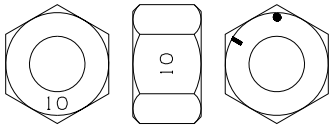
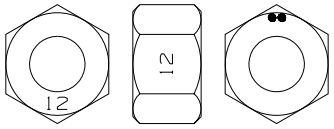
* Lubricated means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. Dry means plain or zinc plated without any lubrication.

Property Class and Head Markings		
Property Class and Head Markings		

Size	Class 4.8				Class 8.8 or 9.8			
	* Lubricated		* Dry		* Lubricated		* Dry	
	N - m	lb - ft	N - m	lb - ft	N - m	lb - ft	N - m	lb - ft
M 6	4.8	3.5	6	4.5	9	6.5	11	8.5
M 8	12	8.5	15	11	22	16	28	20
M10	23	17	29	21	43	32	55	40
M12	40	29	50	37	75	55	95	70
M14	63	47	80	60	120	88	150	110
M16	100	73	125	92	190	140	240	175
M18	135	100	175	125	260	195	330	250
M20	190	140	240	180	375	275	475	350
M22	260	190	330	250	510	375	650	475
M24	330	250	425	310	650	475	825	600
M27	490	360	625	450	950	700	1200	875
M30	675	490	850	625	1300	950	1650	1200
M33	900	675	1150	850	1750	1300	2200	1650
M36	1150	850	1450	1075	2250	1650	2850	2100

Appendix A

FIGURE 6-4
BOLT TORQUE REQUIREMENTS TABLE
METRIC TYPE FASTENERS

Property Class and Head Markings	10.9 	12.9 
Property Class and Head Markings	10 	12 

Size	Class 10.9				Class 12.9			
	* Lubricated		* Dry		* Lubricated		* Dry	
	N - m	lb - ft	N - m	lb - ft	N - m	lb - ft	N - m	lb - ft
M 6	13	9.5	17	12	15	11.5	19	14.5
M 8	32	24	40	30	37	28	47	35
M10	63	47	80	60	75	55	95	70
M12	110	80	140	105	130	95	165	120
M14	175	130	225	165	205	150	260	190
M16	275	200	350	255	320	240	400	300
M18	375	275	475	350	440	325	560	410
M20	530	400	675	500	625	460	800	580
M22	725	540	925	675	850	625	1075	800
M24	925	675	1150	850	1075	800	1350	1000
M27	1350	1000	1700	1250	1600	1150	2000	1500
M30	1850	1350	2300	1700	2150	1600	2700	2000
M33	2500	1850	3150	2350	2900	2150	3700	2750
M36	3200	2350	4050	3000	3750	2750	4750	3500

Appendix A

FIGURE 6-5
INCH TO MILLIMETER CONVERSION TABLE
1 INCH = 25.4 MILLIMETERS

FRACTIONS	DECIMALS	MILLIMETERS	FRACTIONS	DECIMALS	MILLIMETERS
1/64	.016	0.397	33/64	.516	13.097
1/32	.031	0.794	17/32	.531	13.494
3/64	.047	1.191	35/64	.547	13.891
1/16	.063	1.588	9/16	.563	14.288
5/64	.078	1.984	37/64	.578	14.684
3/32	.094	2.381	19/32	.594	15.081
7/64	.109	2.778	39/64	.609	15.478
1/8	.125	3.175	5/8	.625	15.875
9/64	.141	3.572	41/64	.641	16.272
5/32	.156	3.969	21/32	.656	16.669
11/64	.172	4.366	43/64	.672	17.066
3/16	.188	4.763	11/16	.688	17.463
13/64	.203	5.159	45/64	.703	17.859
7/32	.219	5.556	23/32	.719	18.256
15/64	.234	5.953	47/64	.734	18.653
1/4	.250	6.350	3/4	.750	19.050
17/64	.266	6.747	49/64	.766	19.447
9/32	.281	7.144	25/32	.781	19.844
19/64	.297	7.541	51/64	.797	20.241
5/16	.313	7.938	13/16	.813	20.638
21/64	.328	8.334	53/64	.828	21.034
11/32	.344	8.731	27/32	.844	21.431
23/64	.359	9.128	55/64	.859	21.828
3/8	.375	9.525	7/8	.875	22.225
25/64	.391	9.922	57/64	.891	22.622
13/32	.406	10.319	29/32	.906	23.019
27/64	.422	10.716	59/64	.922	23.416
7/16	.438	11.113	15/16	.938	23.813
29/64	.453	11.509	61/64	.953	24.209
15/32	.469	11.906	31/32	.969	24.606
31/64	.484	12.303	63/64	.984	25.003
1/2	.500	12.700	1	1.000	25.400

FIGURE 6-6
FEET TO METERS CONVERSION TABLE
1 FOOT = 0.3048 METER

FEET	METERS	FEET	METERS	FEET	METERS	FEET	METERS	FEET	METERS
100	30.480	10	3.048	1.	0.305	0.1	0.030	0.01	0.003
200	60.960	20	6.096	2.	0.610	0.2	0.061	0.02	0.006
300	91.440	30	9.144	3.	0.914	0.3	0.091	0.03	0.009
400.	121.920	40.	12.192	4.	1.219	0.4	0.122	0.04	0.012
500.	152.400	50.	15.240	5.	1.524	0.5	0.152	0.05	0.015
600.	182.880	60.	18.288	6.	1.829	0.6	0.183	0.06	0.018
700.	213.360	70.	21.336	7.	2.134	0.7	0.213	0.07	0.021
800.	243.840	80.	24.384	8.	2.438	0.8	0.244	0.08	0.024
900.	274.320	90.	27.432	9.	2.743	0.9	0.274	0.09	0.027
1,000.	304.800	100.	30.480	10.	3.048	1.0	0.305	0.10	0.030

Appendix A

FIGURE 6-7
POUNDS TO KILOGRAMS CONVERSION TABLE
1 POUND = 0.4536 KILOGRAM

LB	KG	LB	KG	LB	KG	LB	KG	LB	KG
1,000	453.59	100	45.36	10	4.54	1	0.45	0.1	0.05
2,000	907.18	200	90.72	20	9.07	2	0.91	0.2	0.09
3,000	1,360.78	300	136.08	30	13.61	3	1.36	0.3	0.14
4,000	1,814.37	400	181.44	40	18.14	4	1.81	0.4	0.18
5,000	2,267.96	500	226.80	50	22.68	5	2.27	0.5	0.23
6,000	2,721.55	600	272.16	60	27.22	6	2.72	0.6	0.27
7,000	3,175.15	700	317.51	70	31.75	7	3.18	0.7	0.32
8,000	3,628.74	800	362.87	80	36.29	8	3.63	0.8	0.36
9,000	4,082.33	900	408.23	90	40.82	9	4.08	0.9	0.41
10,000	4,535.92	1,000	453.59	100	45.36	10	4.54	1.0	0.45

FIGURE 6-8
POUNDS PER SQUARE INCH TO BAR CONVERSION TABLE
1 PSI = 0.06895 BAR

PSI	BAR	PSI	BAR	PSI	BAR	PSI	BAR
1,000	68.95	100	6.90	10	0.69	1	0.07
2,000	137.90	200	13.79	20	1.38	2	0.14
3,000	206.84	300	20.68	30	2.07	3	0.21
4,000	275.80	400	27.58	40	2.76	4	0.28
5,000	344.70	500	34.47	50	3.45	5	0.35
6,000	413.64	600	41.36	60	4.14	6	0.41
7,000	482.58	700	48.26	70	4.83	7	0.48
8,000	551.52	800	55.15	80	5.52	8	0.55
9,000	620.46	900	62.05	90	6.21	9	0.62
10,000	689.48	1,000	68.95	100	6.90	10	0.69

FIGURE 6-9
POUNDS PER SQUARE INCH TO
KILOPASCALS CONVERSION TABLE
1 PSI = 6.895 kPa

PSI	kPa	PSI	kPa
10	68.95	1	6.90
20	137.90	2	13.79
30	206.84	3	20.68
40	275.80	4	27.58
50	344.70	5	34.47
60	413.64	6	41.36
70	482.58	7	48.26
80	551.52	8	55.15
90	620.46	9	62.05
100	689.48	10	68.95

Appendix A

FIGURE 6-10
FAHRENHEIT TO CELSIUS (Centigrade) CONVERSION TABLE
(DEGREES F - 32°) ÷ 1.8 = DEGREES C

deg F	deg C	deg F	deg C	deg F	deg C	deg F	deg C
1	-17.2	51	10.6	101	38.3	151	66.1
2	-16.7	52	11.1	102	38.9	152	66.7
3	-16.1	53	11.7	103	39.4	153	67.2
4	-15.6	54	12.2	104	40.0	154	67.8
5	-15.0	55	12.8	105	40.6	155	68.3
6	-14.4	56	13.3	106	41.1	156	68.9
7	-13.9	57	13.9	107	41.7	157	69.4
8	-13.3	58	14.4	108	42.2	158	70.0
9	-12.8	59	15.0	109	42.8	159	70.6
10	-12.2	60	15.6	110	43.3	160	71.1
11	-11.7	61	16.1	111	43.9	161	71.7
12	-11.1	62	16.7	112	44.4	162	72.2
13	-10.6	63	17.2	113	45.0	163	72.8
14	-10.0	64	17.8	114	45.6	164	73.3
15	- 9.4	65	18.3	115	46.1	165	73.9
16	- 8.9	66	18.9	116	46.7	166	74.4
17	- 8.3	67	19.4	117	47.2	167	75.0
18	- 7.8	68	20.0	118	47.8	168	75.6
19	- 7.2	69	20.6	119	48.3	169	76.1
20	- 6.7	70	21.1	120	48.9	170	76.7
21	- 6.1	71	21.7	121	49.4	171	77.2
22	- 5.6	72	22.2	122	50.0	172	77.8
23	- 5.0	73	22.8	123	50.6	173	78.3
24	- 4.4	74	23.3	124	51.1	174	78.9
25	- 3.9	75	23.9	125	51.7	175	79.4
26	- 3.3	76	24.4	126	52.2	176	80.0
27	- 2.8	77	25.0	127	52.8	177	80.6
28	- 2.2	78	25.6	128	53.3	178	81.1
29	- 1.7	79	26.1	129	53.9	179	81.7
30	- 1.1	80	26.7	130	54.4	180	82.2
31	- 0.6	81	27.2	131	55.0	181	82.8
32	0.0	82	27.8	132	55.6	182	83.3
33	0.6	83	28.3	133	56.1	183	83.9
34	1.1	84	28.9	134	56.7	184	84.4
35	1.7	85	29.4	135	57.2	185	85.0
36	2.2	86	30.0	136	57.8	186	85.6
37	2.7	87	30.6	137	58.3	187	86.1
38	3.3	88	31.1	138	58.9	188	86.7
39	3.9	89	31.7	139	59.4	189	87.2
40	4.4	90	32.2	140	60.0	190	87.8
41	5.0	91	32.8	141	60.6	191	88.3
42	5.6	92	33.3	142	61.1	192	88.9
43	6.1	93	33.9	143	61.7	193	89.4
44	6.7	94	34.4	144	62.2	194	90.0
45	7.2	95	35.0	145	62.8	195	90.6
46	7.8	96	35.6	146	63.3	196	91.1
47	8.3	97	36.1	147	63.9	197	91.7
48	8.9	98	36.7	148	64.4	198	92.2
49	9.4	99	37.2	149	65.0	199	92.8
50	10.0	100	37.8	150	65.6	200	93.3

Appendix A

FIGURE 6-11
MILES PER HOUR TO KILOMETERS
PER HOUR CONVERSION TABLE
1 MPH = 1.609 KM/H

MPH	KM/H	MPH	KM/H	MPH	KM/H
10	16.09	1	1.61	0.1	0.16
20	32.19	2	3.22	0.2	0.32
30	48.28	3	4.83	0.3	0.48
40	64.37	4	6.44	0.4	0.64
50	80.47	5	8.05	0.5	0.80
60	96.56	6	9.66	0.6	0.97
70	112.65	7	11.27	0.7	1.13
80	128.75	8	12.87	0.8	1.29
90	144.84	9	14.48	0.9	1.45
100	160.93	10	16.09	1.0	1.61

FIGURE 6-12
U.S. GALLONS TO LITERS CONVERSION TABLE
1 U.S. GALLON = 3.785 LITERS

GAL	LITER	GAL	LITER	GAL	LITER	GAL	LITER
100	378.54	10	37.85	1	3.79	0.1	0.38
200	757.08	20	75.71	2	7.57	0.2	0.76
300	1,135.62	30	113.56	3	11.36	0.3	1.14
400	1,514.16	40	151.42	4	15.14	0.4	1.51
500	1,892.71	50	189.27	5	18.93	0.5	1.89
600	2,271.25	60	227.12	6	22.71	0.6	2.27
700	2,649.79	70	264.98	7	26.50	0.7	2.65
800	3,028.33	80	302.83	8	30.28	0.8	3.03
900	3,406.87	90	340.69	9	34.07	0.9	3.41
1,000	3,785.41	100	378.54	10	37.85	1.0	3.79

Appendix B

DISCLAIMER

HARSCO TRACK TECHNOLOGIES, HARSCO CORPORATION RECOMMENDS THAT ALL HOSE, HOSE ASSEMBLIES AND/OR FITTINGS REPLACED BY THE CUSTOMER SHOULD BE EQUAL TO OR EXCEED THE CURRENT SPECIFICATIONS OF THE ORIGINAL EQUIPMENT SUPPLIED BY HARSCO TRACK TECHNOLOGIES, HARSCO CORPORATION. HARSCO TRACK TECHNOLOGIES, HARSCO CORPORATION WILL NOT BE LIABLE FOR ANY CLAIMS OF PERSONAL INJURY RESULTING FROM THE USE OF HOSE, HOSE ASSEMBLIES AND/OR FITTINGS THAT DO NOT MEET CURRENT ORIGINAL EQUIPMENT SPECIFICATIONS. THE CUSTOMER IS ADVISED TO COMPLY WITH SAE J1273 NOVEMBER 1991, SELECTION, INSTALLATION, AND MAINTENANCE OF HOSE AND HOSE ASSEMBLIES.

SAE J1273 - NOVEMBER 1991*
SELECTION, INSTALLATION AND MAINTENANCE OF HOSE AND HOSE ASSEMBLIES

1. SCOPE - Hose (also includes hose assemblies) has a finite life and there are a number of factors which will reduce its life.

This SAE recommended practice is intended as a guide to assist system designers and/or users in the selection, installation, and maintenance of hose. The designers and users must make a systematic review of each application and then select, install, and maintain the hose to fulfill the requirements of the application. The following are general guidelines and are not necessarily a complete list.

6

- **IMPROPER SELECTION, INSTALLATION, OR MAINTENANCE MAY RESULT IN PREMATURE FAILURES, BODILY INJURY, OR PROPERTY DAMAGE.**

2. REFERENCES

2.1 Applicable Documents - The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1.1 SAE Publications - Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.
J516 - Hydraulic Hose Fittings
J517 - Hydraulic Hose

3. SELECTION - The following is a list of factors which must be considered before final hose selection can be made.

3.1 Pressure - After determining the system pressure, hose selection must be made so that the recommended maximum operating pressure is equal to or greater than the system pressure. Surge pressures higher than the maximum operating pressure will shorten hose life and must be taken into account by the hydraulic designer.

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3.2 Suction - Hoses used for suction applications must be selected to insure the hose will withstand the negative pressure of the system.

3.3 Temperature - Care must be taken to insure that fluid and ambient temperatures, both static and transient, do not exceed the limitations of the hose. Special care must be taken when routing near hot manifolds.

3.4 Fluid Compatibility - Hose selection must assure compatibility of the hose tube, cover, and fittings with the fluid used. Additional caution must be observed in hose selection for gaseous applications.

3.5 Size - Transmission of power by means of pressurized fluid varies with pressure and rate of flow. The size of the components must be adequate to keep pressure losses to a minimum and avoid damage to the hose due to heat generation or excessive turbulence.

3.6 Routing - Attention must be given to optimum routing to minimize inherent problems.

3.7 Environment - Care must be taken to insure that the hose and fittings are either compatible with or protected from the environment to which they are exposed. Environmental conditions such as ultraviolet light, ozone, salt water, chemicals, and air pollutants can cause degradation and premature failure, and, therefore, must be considered.

3.8 Mechanical Loads - External forces can significantly reduce hose life. Mechanical loads which must be considered include excessive flexing, twist, kinking, tensile or side loads, bend radius, and vibration. Use of swivel type fittings or adapters may be required to insure no twist is put into the hose. Unusual applications may require special testing prior to hose selection.

3.9 Abrasion - While a hose is designed with a reasonable level of abrasion resistance, care must be taken to protect the hose from excessive abrasion which can result in erosion, snagging and cutting of the hose cover. Exposure of the reinforcement will significantly accelerate hose failure.

3.10 Proper End Fitting - Care must be taken to insure proper compatibility exists between the hose and coupling selected based on the manufacturer's recommendations substantiated by testing to industry standards such as SAE J517. End fitting components from one manufacturer are usually not compatible with end fitting components supplied by another manufacturer (i.e., using a hose fitting nipple from one manufacturer with a hose socket from another manufacturer). It is the responsibility of the fabricator to consult the manufacturer's written instructions or the manufacturer directly for proper end fitting componentry.

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3.11 Length - When establishing proper hose length, motion absorption, hose length changes due to pressure, as well as hose and machine tolerances must be considered.

3.12 Specifications and Standards - When selecting hose, government, industry, and manufacturer's specifications and recommendations must be reviewed as applicable.

3.13 Hose Cleanliness - Hose components vary in cleanliness levels. Care must be taken to insure that the assemblies selected have an adequate level of cleanliness for the application.

3.14 Electrical Conductivity - Certain applications require that the hose be non-conductive to prevent electrical current flow. Other applications require the hose to be sufficiently conductive to drain off static electricity. Hose and fittings must be chosen with these needs in mind.

4. INSTALLATION - After selection of proper hose, the following factors must be considered by the installer.

4.1 Pre-Installation Inspection - Prior to installation, a careful examination of the hose must be performed. All components must be checked for correct style, size, and length. In addition, the hose must be examined for cleanliness, I.D. obstructions, blisters, loose cover, or any other visible defects.

4.2 Follow Manufacturers' Assembly Instructions - Hose assemblies may be fabricated by the manufacturer, an agent for or customer of the manufacturer, or by the user. Fabrication of permanently attached fittings to hydraulic hose requires specialized assembly equipment. Field-attachable fittings (screw style and segment clamp style) can usually be assembled without specialized equipment although many manufacturers provide equipment to assist in this operation.
SAE J517 hose from one manufacturer is not compatible with SAE J516 fittings supplied by another manufacturer. It is the responsibility of the fabricator to consult the manufacturer's written assembly instructions or the manufacturers directly before intermixing hose and fittings from two manufacturers. Similarly, assembly equipment from one manufacturer is usually not interchangeable with that of another manufacturer. It is the responsibility of the fabricator to consult the manufacturer's written instructions or the manufacturer directly for proper assembly equipment. Always follow the manufacturer's instructions for proper preparation and fabrication of hose assemblies.

4.3 Minimum Bend Radius - Installation at less than minimum bend radius may significantly reduce hose life. Particular attention must be given to preclude sharp bending at the hose / fitting juncture.

4.4 Twist Angle and Orientation - Hose installations must be such that relative motion of machine components produces bending of the hose rather than twisting.

Appendix B

4.5 Securement - In many applications, it may be necessary to restrain, protect, or guide the hose to protect it from damage by unnecessary flexing, pressure surges, and contact with other mechanical components. Care must be taken to insure such restraints do not introduce additional stress or wear points.

4.6 Proper Connection of Ports - Proper physical installation of the hose requires a correctly installed port connection while insuring that no twist or torque is put into the hose.

4.7 Avoid External Damage - Proper installation is not complete without insuring that tensile loads, side loads, kinking, flattening, potential abrasion, thread damage, or damage to sealing surfaces are corrected or eliminated.

4.8 System Check Out - After completing the installation, all air entrapment must be eliminated and the system pressurized to the maximum system pressure and checked for proper function and freedom from leaks.

Note: Avoid potential hazardous areas while testing.

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5. MAINTENANCE - Even with proper selection and installation, hose life may be significantly reduced without a continuing maintenance program. Frequency should be determined by the severity of the application and risk potential. A maintenance program should include the following as a minimum.

5.1 Hose Storage - Hose products in storage can be affected adversely by temperature, humidity, ozone, sunlight, oils, solvents, corrosive liquids and fumes, insects, rodents and radioactive materials. Storage areas should be relatively cool and dark and free of dust, dirt, dampness, and mildew.

5.2 Visual Inspection - Any of the following conditions requires replacement of the hose:

a. Leaks at fitting or in hose (leaking fluid is a fire hazard)
b. Damaged, cut, or abraded cover (any reinforcement exposed)
c. Kinked, crushed, flattened, or twisted hose
d. Hard, stiff, heat cracked, or charred hose
e. Blistered, soft degraded, or loose cover
f. Cracked, damaged, or badly corroded fittings
g. Fitting slippage on hose

5.3 Visual Inspection - The following items must be tightened, repaired, or replaced as required:

a. Leaking port conditions
b. Clamps, guards, shields
c. Remove excessive dirt buildup
d. System fluid level, fluid type, and any air entrapment

5.4 Functional Test - Operate the system at maximum operating pressure and check for possible malfunctions and freedom from leaks.

Note: Avoid potential hazardous areas while testing.

5.5 Replacement Intervals - Specific replacement intervals must be considered based on previous service life, government or industry recommendations, or when failures could result in unacceptable down time, damage, or injury risk.

SECTION 7 - PARTS
TABLE OF CONTENTS

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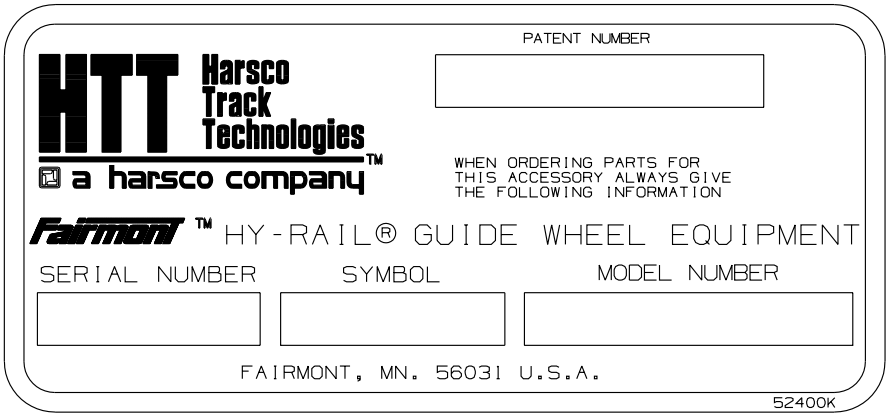
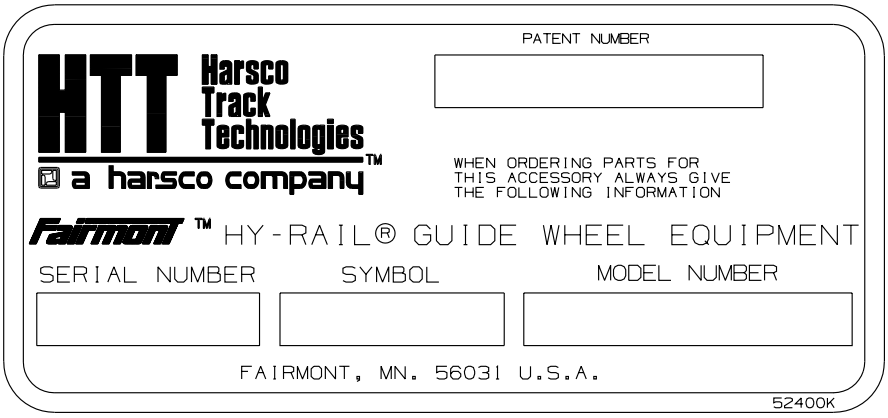
Serial Numbers

When this bulletin is received, fill in the spaces provided below using the information from the serial number tags on both the front and rear rail pilot units. Always provide these factory serial numbers when calling or writing about the units. The serial number tags are located on the mounting frame on both units.

FRONT RAIL PILOT UNIT SERIAL NUMBER



REAR RAIL PILOT UNIT SERIAL NUMBER



Instructions For Ordering Parts

1. See Section 8 for the Vehicle Application charts.

2. Find the chart for the make, model and year of the vehicle that the unit is mounted on.

3. Each application consists of required groups, optional groups required and accessory group options. These are the group numbers that were supplied with, or that were available for the unit.

4. Locate the appropriate group numbers in the Parts Section to find the individual parts required.

5. Front - rear and left - right are determined from the operator's position.

6. Assemblies: Items listed in CAPITALS are assemblies which include all parts listed immediately following and with the part description indented to the right. When assemblies can be used, always order them to save work of fitting separate parts.

7. For convenience in ordering, parts are listed by item number, part number, description, and quantity in each assembly or group. If in doubt as to any part wanted, send full description, sketch, or send the old part with the order.

8. To insure prompt and correct shipment of parts on orders, always give:

    1. Quantity of each part wanted.
    2. Part number of each part as shown in this book. Include any prefix and suffix letters.
    3. Description of each part as shown in this book.
    4. Factory serial numbers from the serial number tag.
    5. Purchase order number (if required).
    6. Preferred method of shipment.

9. All parts are shipped F.O.B. factory, transportation charges to be paid by customer. Terms to be determined by the Credit Department.

Limited Warranty

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Equipment or parts not manufactured by this company, but which are furnished in connection with HARSCO TRACK TECHNOLOGIES™ products, are covered directly by the warranty of the manufacturer supplying them. However, Harsco Track Technologies, Harsco Corporation will assist in obtaining adjustment on such equipment or parts when necessary.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND OF ANY OTHER OBLIGATION OR LIABILITY OF HARSCO TRACK TECHNOLOGIES, HARSCO CORPORATION.

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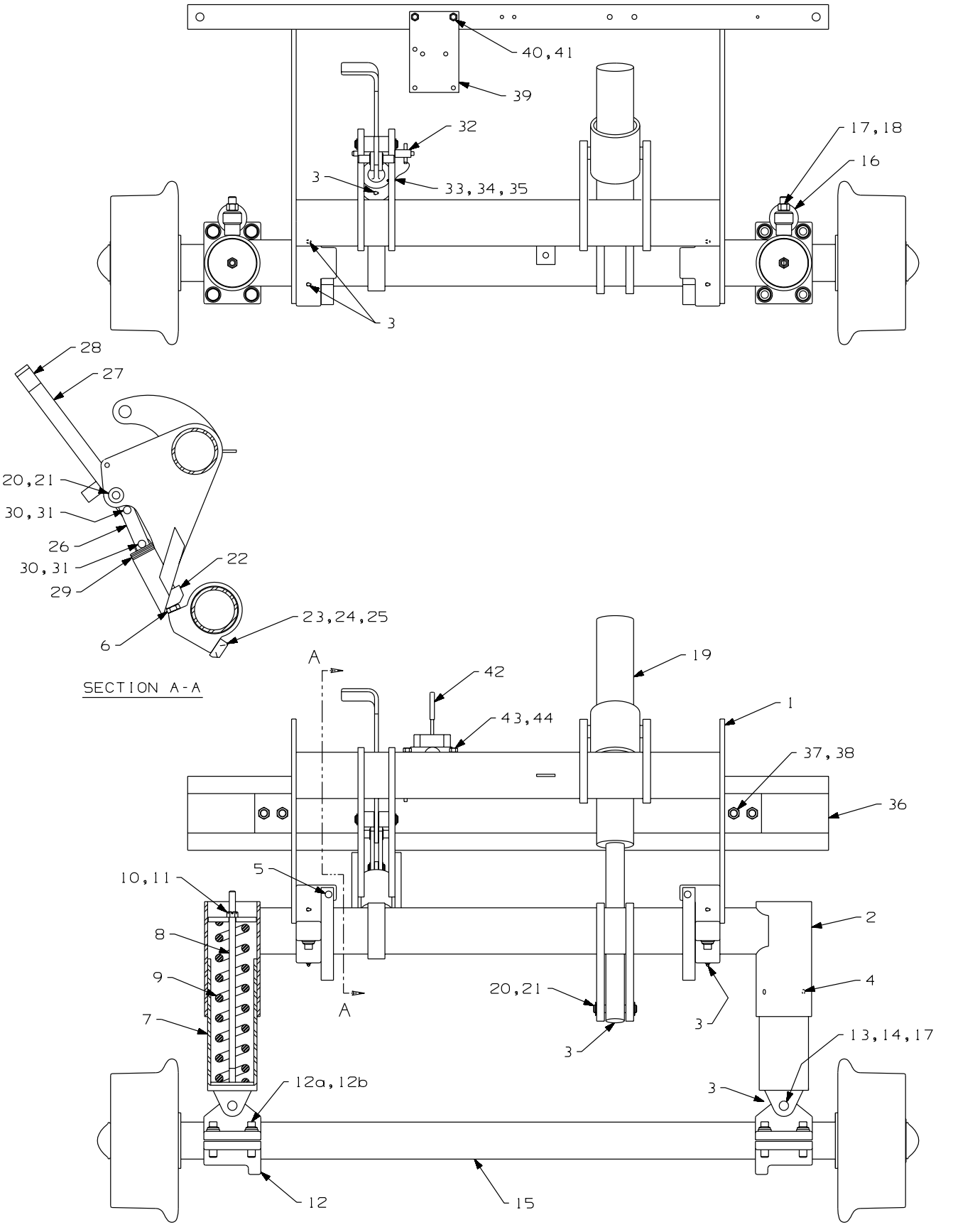
Hazardous Material Disclaimer

THE PARTS/ASSEMBLIES THAT ARE USED IN THIS PRODUCT ARE CLASSIFIED AS "ARTICLES" ACCORDING TO 29 CFR 1910.1200 (C). THEY ARE FORMED TO A SPECIFIC SHAPE OR DESIGN DURING MANUFACTURE, HAVE END USE FUNCTION DEPENDENT UPON THEIR SHAPE OR DESIGN, AND DO NOT RELEASE ANY HAZARDOUS CHEMICAL UNDER NORMAL CONDITIONS OF USE. ACCORDINGLY, WE ARE NOT REQUIRED TO SUPPLY MATERIAL SAFETY DATA SHEETS (MSDS) OR TO LABEL SHIPPING CONTAINERS FOR "ARTICLES". HOWEVER, LUBRICANTS, LIQUIDS, GASEOUS CHEMICALS AND SOLIDS USED IN OPERATION OR MAINTENANCE OF THE PRODUCT MAY REQUIRE THAT USER'S TAKE OCCUPATIONAL PROTECTIVE MEASURES. MSDS SHEETS FOR SUCH MATERIALS WILL BE SUPPLIED TO YOUR PURCHASING MANAGER/SAFETY DIRECTOR TO BE USED IN YOUR EMPLOYEE SAFETY TRAINING EDUCATION AND ENVIRONMENTAL HEALTH TRAINING.

FRONT RAIL PILOT UNIT - 153738 - INSULATED - HR2000A1



SE153738A-1

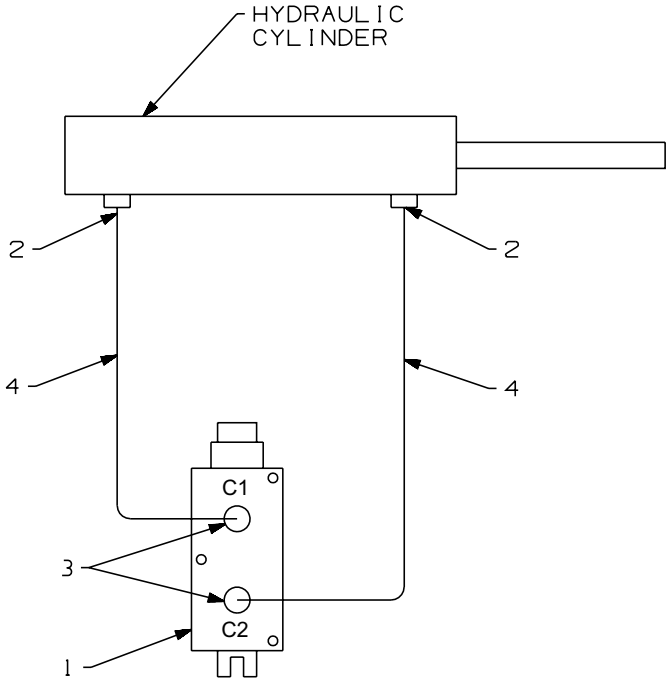
FRONT RAIL PILOT UNIT - 153738 - INSULATED - HR2000A1

ITEM	PART NO	DESCRIPTION	QTY
1	140184	Frame Mounting Unit	1
2	140167	Cross Tube	1
3	F004252	Grease Fitting, 1/8 M NPT Straight	11
4	F009217	Grease Fitting, 1/8 M NPT 90°	4
5	F023879	Set Screw, 5/8-11 x 1-1/2" Oval Point	4
6	F005869	Cap Screw, 5/8-11 x 1-1/4" GR 5 Hex Hd	1
7	153735	Spring Housing	2
8	161624	Adjusting Rod	2
9	137165	Spring, Compression	2
10	F002545	Hex Slotted Nut, 1/2"-13	2
11	F001182	Cotter Pin, 1/8 x 1-1/4"	2
12	140106	AXLE CLAMP ASSEMBLY	2
12a	F001103	SAE Lock Washer, 5/8"	4
12b	F013816	Cap Screw, 5/8-11 x 2-1/4" Counter Bore	4
13	116232	Pin	2
14	F018844	Retaining Ring	4
15	140178	Axle	1
16	105289K	Shock Absorber	2
17	M033847	Washer	6
18	F013239	Hex Lock Nut, 5/8"-18	4
19	162128K	Cylinder	1
20	153705	Pin	2
21	F009288K	Retaining Ring	4
22	140162	Lock Pin	1
23	168112	Lock Stop	1
24	168111	Shim	2
25	F012087	Cap Screw, 5/8-11 x 1-1/2" Flt Soc	1
26	161434	Link	2
27	153702	Lock Handle	1
28	F022846	Handle Grip	1
29	F025043	Compression Spring	1
30	161435	Pin	2
31	F016611	Retaining Ring	4
32	F022104	Lock Pin And Lanyard	1
33	F017061	Machine Screw, #4-40 x 1" Rd Hd	1
34	F022981	Lock Washer, #4	1
35	F010193	Hex Nut, #4-40	1
36	140790	Bumper	1
37	F001539	Cap Screw, 1/2-13 x 1-1/4" Hex Hd	4
38	F022037	Hex Flg Nut, 1/2"-13	4
39	140792	Plate	1
40	F001007	Cap Screw, 3/8-16 x 1" GR 5 Hex Hd	2
41	F023225	Hex Flg Nut, 3/8"-16	2

FRONT RAIL PILOT UNIT - 153738 - INSULATED - HR2000A1

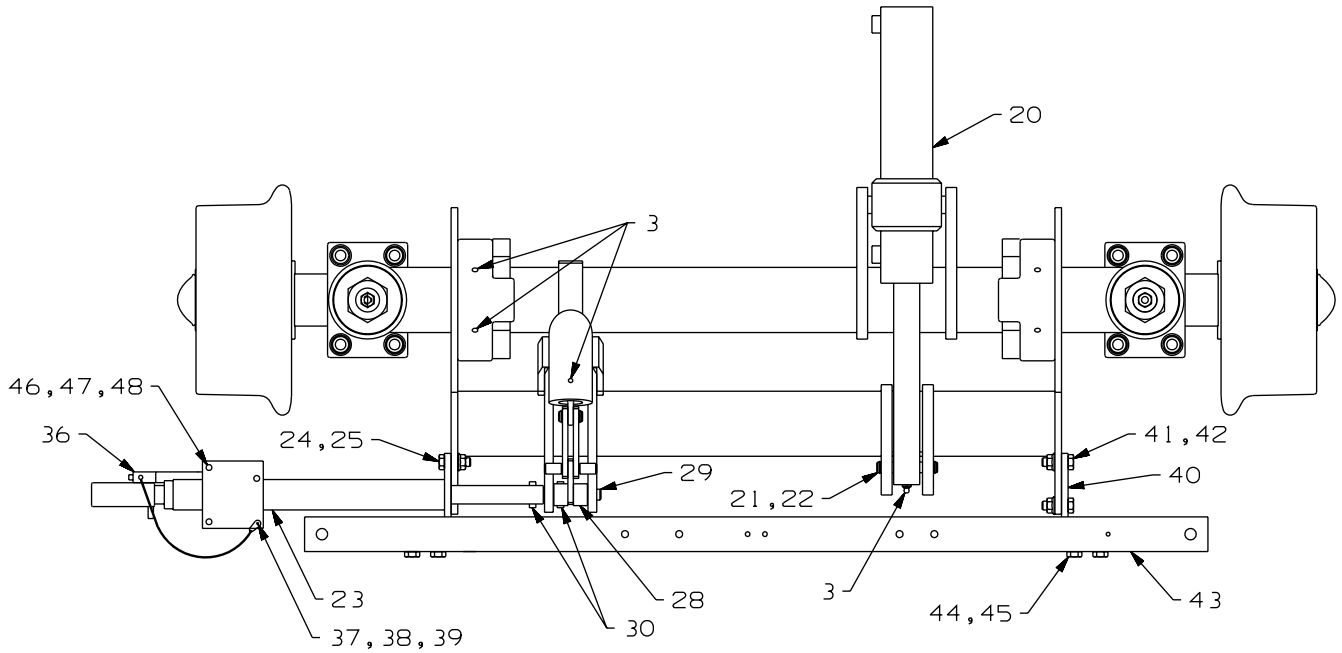
ITEM	PART NO	DESCRIPTION	QTY
42	F018510	Control Valve	1
43	F013428	Cap Screw, 5/16-18 x 2-1/2" GR 5 Hex Hd	3
44	F040088	Hex Flg Nut, 5/16"-18	3

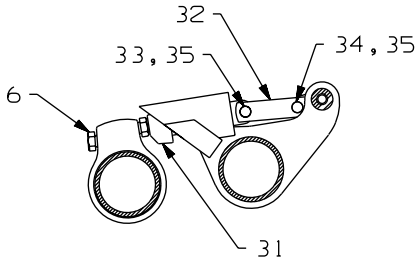
HYDRAULIC PIPING - 153738 FRONT RAIL UNIT



ITEM	PART NO	DESCRIPTION	QTY
1	F018510	Control Valve	1
2	F013326	Adapter, 9/16 M JIC x 9/16 M STR	2
3	F012055	90° Elbow, 9/16 M JIC x 3/8 M NPT	2
4	188666	Hose, 5/16 x 25-1/2" Swivel 9/16 F JIC Both Ends	2

REAR RAIL PILOT UNIT - 153737 - INSULATED - HR2000A1





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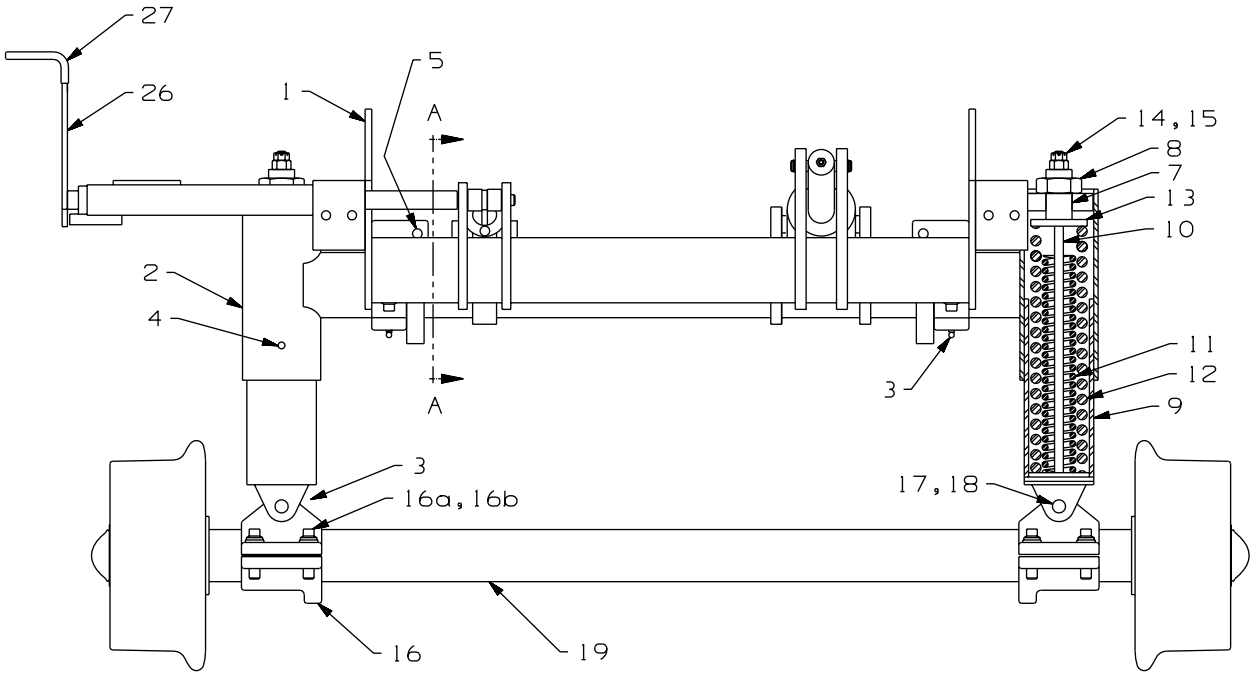

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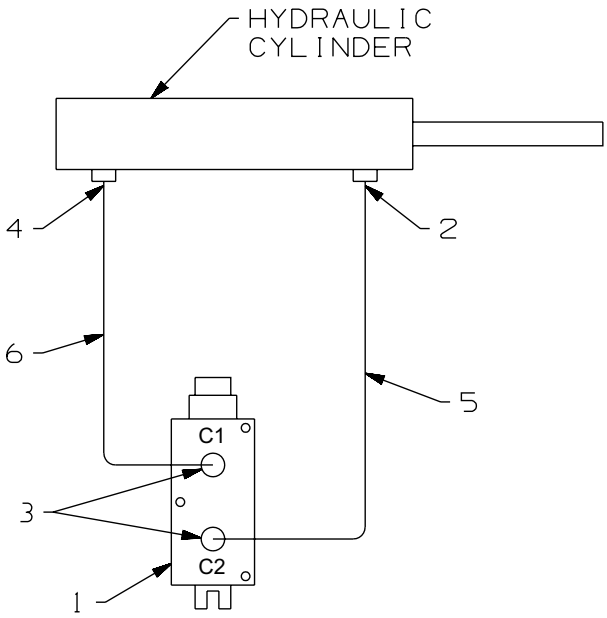
REAR RAIL PILOT UNIT - 153737 - INSULATED - HR2000A1

ITEM	PART NO	DESCRIPTION	QTY
1	140332	Frame Mounting Unit	1
2	140196	Cross Tube	1
3	F004252	Grease Fitting, 1/8 M NPT Straight	11
4	F009217	Grease Fitting, 1/8 M NPT 90°	4
5	F023879	Set Screw, 5/8-11 x 1-1/2" Oval Point	4
6	F001193	Cap Screw, 5/8-11 x 1" GR 5 Hex Hd	2
7	140771	Adjusting Stud	2
8	F024361	Hex Jam Nut, 1-1/2"-12	2
9	153735	Spring Housing	2
10	140191	Adjusting Rod	2
11	140128	Spring	2
12	140129	Spring	2
13	140789	Washer	2
14	F002545	Hex Slotted Nut, 1/2"-13	2
15	F001182	Cotter Pin, 1/8 x 1-1/4"	2
16	140106	AXLE CLAMP ASSEMBLY	2
16a	F001103	SAE Lock Washer, 5/8"	4
16b	F013816	Cap Screw, 5/8-11 x 2-1/4" Counter Bore	4
17	116242	Pin	2
18	F018844	Retaining Ring	4
19	140178	Axle	1
20	153733K	Cylinder	1
21	153705	Pin	1
22	F009288K	Retaining Ring	2
23	153711	Lock Handle Bracket	1
24	F001090	Cap Screw, 1/2-13 x 1-1/2" GR 5 Hex Hd	2
25	F022037	Hex Flg Nut, 1/2"-13	2
26	153698	Lock Handle	1
27	F022846	Handle Grip	1
28	153708K	Toggle Link	1
29	153704	Pin	1
30	F011954	Spring Pin, 3/8 x 1-1/2"	2
31	140162	Lock Pin	1
32	153703	Link	2
33	153707	Pin	1
34	153706	Pin	1
35	F009288K	Retaining Ring	4
36	F022104	Lock Pin And Lanyard	1
37	F017061	Machine Screw, #4-40 x 1" Rd Hd	1
38	F022981	Lock Washer, #4	1
39	F010193	Hex Nut, #4-40	1
40	153712	Bracket	1
41	F001090	Cap Screw, 1/2-13 x 1-1/2" GR 5 Hex Hd	2

REAR RAIL PILOT UNIT - 153737 - INSULATED - HR2000A1

ITEM	PART NO	DESCRIPTION	QTY
42	F022037	Hex Flg Nut, 1/2"-13	2
43	140790	Bumper	1
44	F001539	Cap Screw, 1/2-13 x 1-1/4" GR 5 Hex Hd	4
45	F022037	Hex Flg Nut, 1/2"-13	4
46	F018510	Control Valve	1
47	F013428	Cap Screw, 5/16-18 x 2-1/2" GR 5 Hex Hd	3
48	F040088	Hex Flg Nut, 5/16"-18	3

HYDRAULIC PIPING - 153737 REAR RAIL PILOT UNIT



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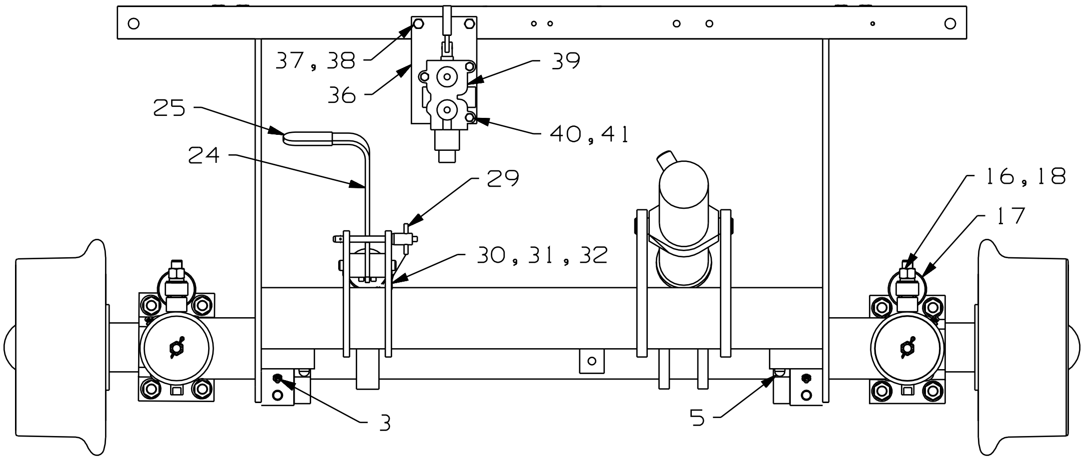
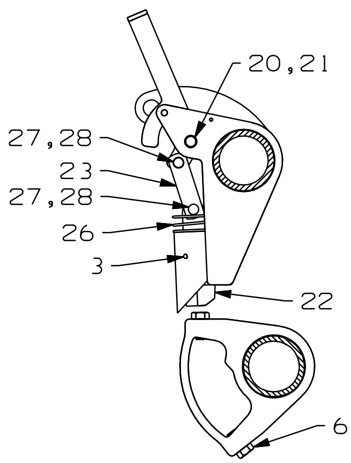
ITEM	PART NO	DESCRIPTION	QTY
1	F018510	Control Valve	1
2	F013326	Adapter, 9/16 M JIC x 9/16 M STR	1
3	F012055	90° Elbow, 9/16 M JIC x 3/8 M NPT	2
4	F013020	45° Elbow, 9/16 M JIC x 9/16 M STR	1
5	061356	Hose, 5/16 x 41" Swivel 9/16 F JIC Both Ends	1
6	079017	Hose, 5/16 x 50" Swivel 9/16 F JIC Both Ends	1

FRONT RAIL PILOT UNIT - 166463 - INSULATED - HR2000A2 / A3
FRONT RAIL PILOT UNIT - 168458 - NON INSULATED - HR2000A2 / A3





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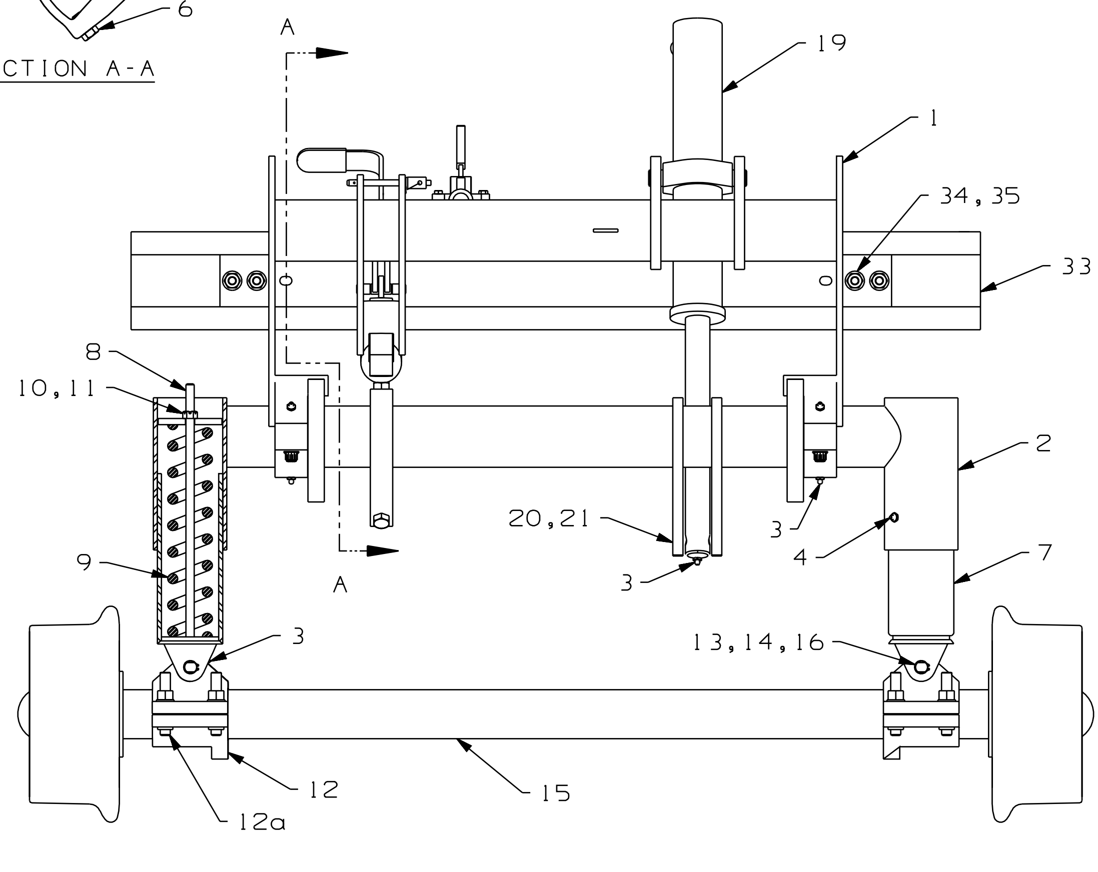

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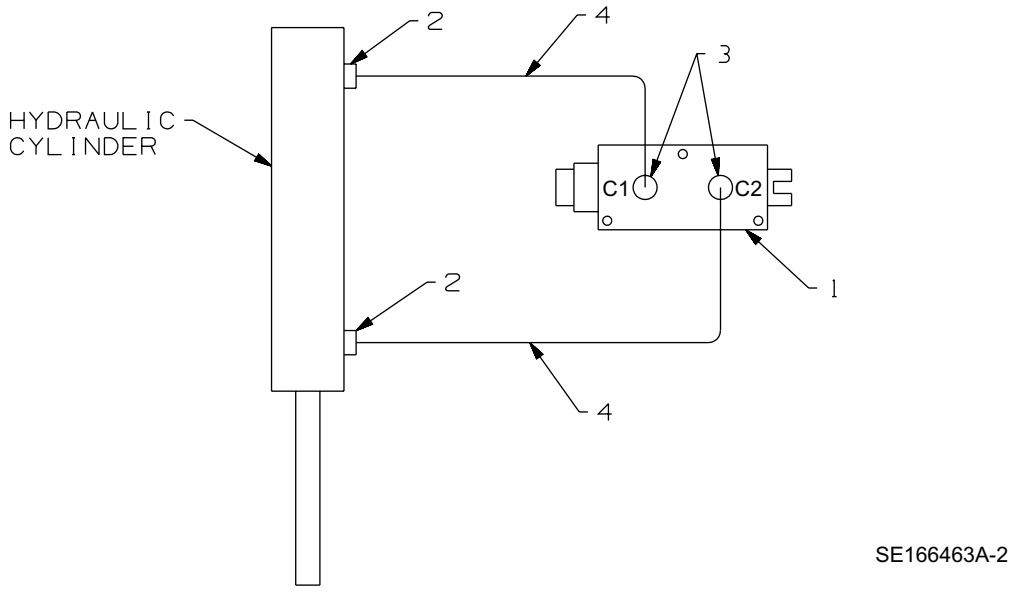
FRONT RAIL PILOT UNIT - 166463 - INSULATED - HR2000A2 / A3
FRONT RAIL PILOT UNIT - 168458 - NON INSULATED - HR2000A2 / A3

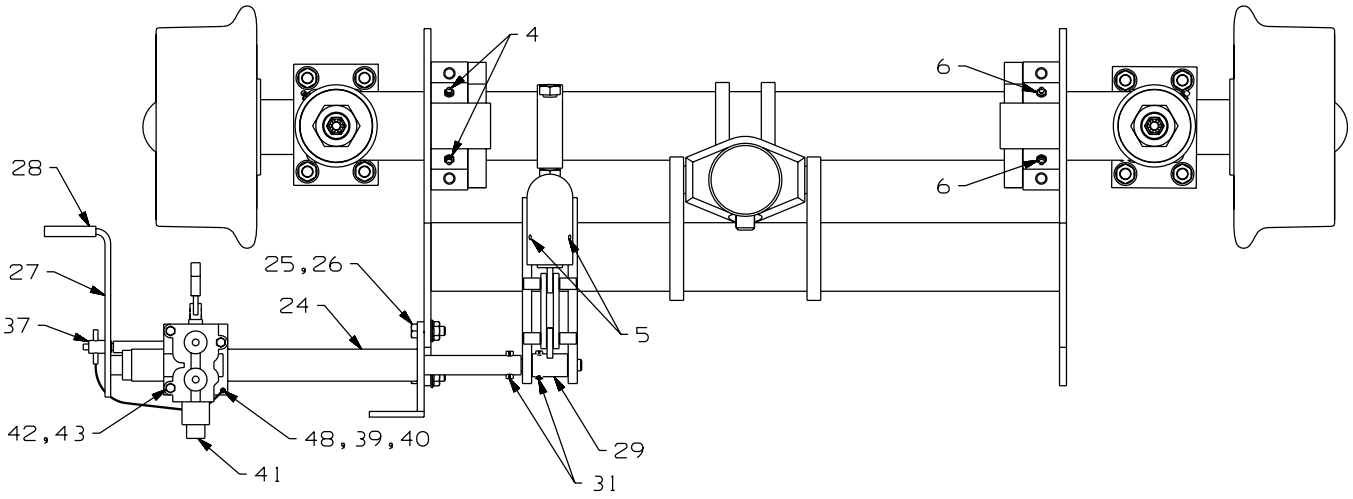
ITEM	PART NO	DESCRIPTION	QTY
1	166462	Mounting Frame	1
2	166461	Cross Tube	1
3	F004252	Grease Fitting, 1/8 M NPT Straight	11
4	F009217	Grease Fitting, 1/8 M NPT 90°	4
5	F023879	Set Screw, 5/8-11 x 1-1/2" Oval Point	4
6	700568125	Cap Screw, 3/4-10 x 1-1/4" GR 8 Hex Hd	2
7	153735	Spring Housing	2
8	161624	Adjusting Rod	2
9	137165	Spring, Compression	2
10	F002545	Hex Slotted Nut, 1/2"-13	2
11	F001182	Cotter Pin, 1/8 x 1-1/4"	2
12	168481	AXLE CLAMP ASSEMBLY	2
12a	171088	Cap Screw, 5/8-11 x 3" Soc Hd	4
13	116232	Pin	2
14	F018844	Retaining Ring	4
15	140178	Axle	1
16	M033847	Washer	6
17	105289K	Shock Absorber	2
18	F013239	Hex Lock Nut, 5/8"-18	4
19	162128K	Hydraulic Cylinder	1
20	153705	Pin	2
21	F009288K	Retaining Ring	4
22	140162	Lock Pin	1
23	161434	Link	2
24	166469	Lock Lever	1
25	F022846	Handle Grip	1
26	F025817	Spring, Compression	1
27	161435	Pin	2
28	F016611	Retaining Ring	4
29	F022104	Lock Pin And Lanyard	1
30	F017061	Machine Screw, #4-40 x 1" Rd Hd	1
31	F022981	Lock Washer, #4	1
32	F010193	Hex Nut, #4-40	1
33	140790	Bumper	1
34	F001539	Cap Screw, 1/2-13 x 1-1/4" GR 5 Hex Hd	4
35	F022037	Hex Flg Nut, 1/2"-13	4
36	140792	Plate	1
37	F001007	Cap Screw, 3/8-16 x 1" GR 5 Hex Hd	2
38	F023225	Hex Flg Nut, 3/8"-16	2
39	F018510	Control Valve	1
40	F013428	Cap Screw, 5/16-18 x 2-1/2" GR 5 Hex Hd	3
41	F040088	Hex Flg Nut, 5/16"-18	3

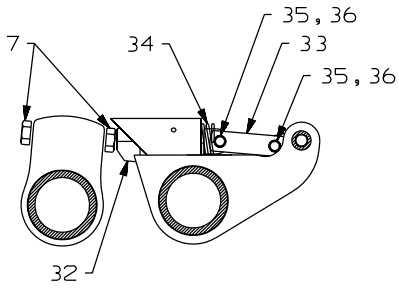
HYDRAULIC PIPING - 166463 FRONT RAIL PILOT UNIT
HYDRAULIC PIPING - 168458 FRONT RAIL PILOT UNIT



ITEM	PART NO	DESCRIPTION	QTY
1	F018510	Control Valve	1
2	F013326	Adapter, 9/16 M JIC x 9/16 M STR	2
3	F012055	90° Elbow, 9/16 M JIC x 3/8 M NPT	2
4	188666	Hose, 5/16 x 25-1/2" Swivel 9/16 F JIC Both Ends	2

REAR RAIL PILOT UNIT - 166464 - INSULATED - HR2000A2
REAR RAIL PILOT UNIT - 168457 - NON INSULATED - HR2000A2





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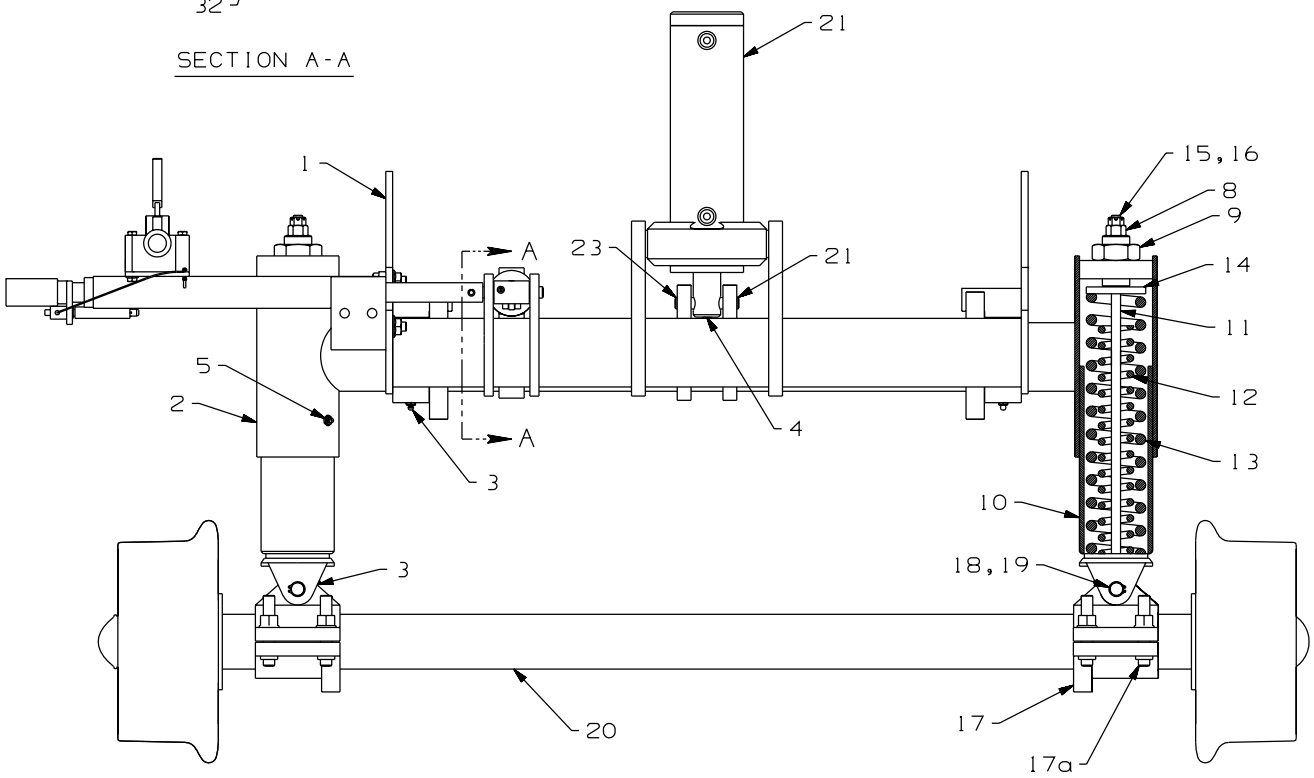

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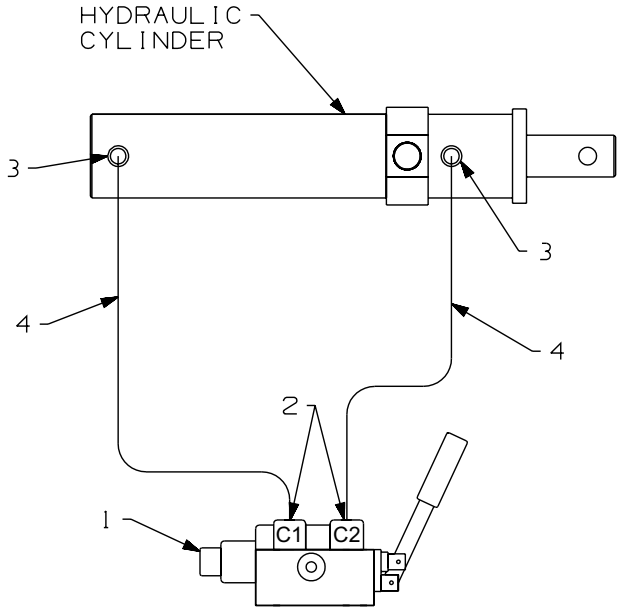
REAR RAIL PILOT UNIT - 166464 - INSULATED - HR2000A2
REAR RAIL PILOT UNIT - 168457 - NON INSULATED - HR2000A2

ITEM	PART NO	DESCRIPTION	QTY
1	166465	Mounting Frame	1
2	166466	Cross Tube	1
3	F004252	Grease Fitting, 1/8 M NPT Straight	4
4	F009420	Grease Fitting, 1/8 M NPT 45°	5
5	F009217	Grease Fitting, 1/8 M NPT 90°	6
6	F023879	Set Screw, 5/8-11 x 1-1/2" Oval Point	4
7	700568125	Cap Screw, 3/4-10 x 1-1/4" GR 8 Hex Hd	2
8	140771	Adjusting Stud	2
9	F024361	Hex Jam Nut, 1-1/2"-12	2
10	153735	Spring Housing	2
11	140191	Rod	2
12	140128	Spring	2
13	140129	Spring	2
14	140789	Washer	2
15	F002545	Hex Slotted Nut, 1/2"-13	2
16	F001182	Cotter Pin, 1/8 x 1-1/4"	2
17	168481	AXLE CLAMP ASSEMBLY	2
17a	171088	Cap Screw, 5/8-11 x 3" Soc Hd	4
18	116242	Pin	2
19	F018844	Retaining Ring	4
20	140178	Axle	1
21K	F025909	Hydraulic Cylinder	1
22	168668	Pin	1
23	F011054	Retaining Ring	2
24	153711	Lock Handle Bracket	1
25	F001090	Cap Screw, 1/2-13 x 1-1/2" GR 5 Hex Hd	2
26	F022037	Hex Flg Nut, 1/2"-13	2
27	168233	Lock Lever	1
28	F022846	Handle Grip	1
29	153708K	Toggle Link	1
30	168236	Pin	1
31	F011954	Spring Pin, 3/8 x 1-1/2"	2
32	140162	Lock Pin	1
33	153703	Link	2
34	F025817	Spring, Compression	1
35	153706	Pin	2
36	F009288K	Retaining Ring	4
37	F022104	Lock Pin And Lanyard	1
38	F017061	Machine Screw, #4-40 x 1" Rd Hd	1
39	F022981	Lock Washer, #4	1
40	F010193	Hex Nut, #4-40	1
41	F018510	Control Valve	1

REAR RAIL PILOT UNIT - 166464 - INSULATED - HR2000A2
REAR RAIL PILOT UNIT - 168457 - NON INSULATED - HR2000A2

ITEM	PART NO	DESCRIPTION	QTY
42	F013428	Cap Screw, 5/16-18 x 2-1/2" GR 5 Hex Hd	3
43	F040088	Hex Flg Nut, 5/16"-18	3

HYDRAULIC PIPING - 166464 REAR RAIL PILOT UNIT
HYDRAULIC PIPING - 168457 REAR RAIL PILOT UNIT



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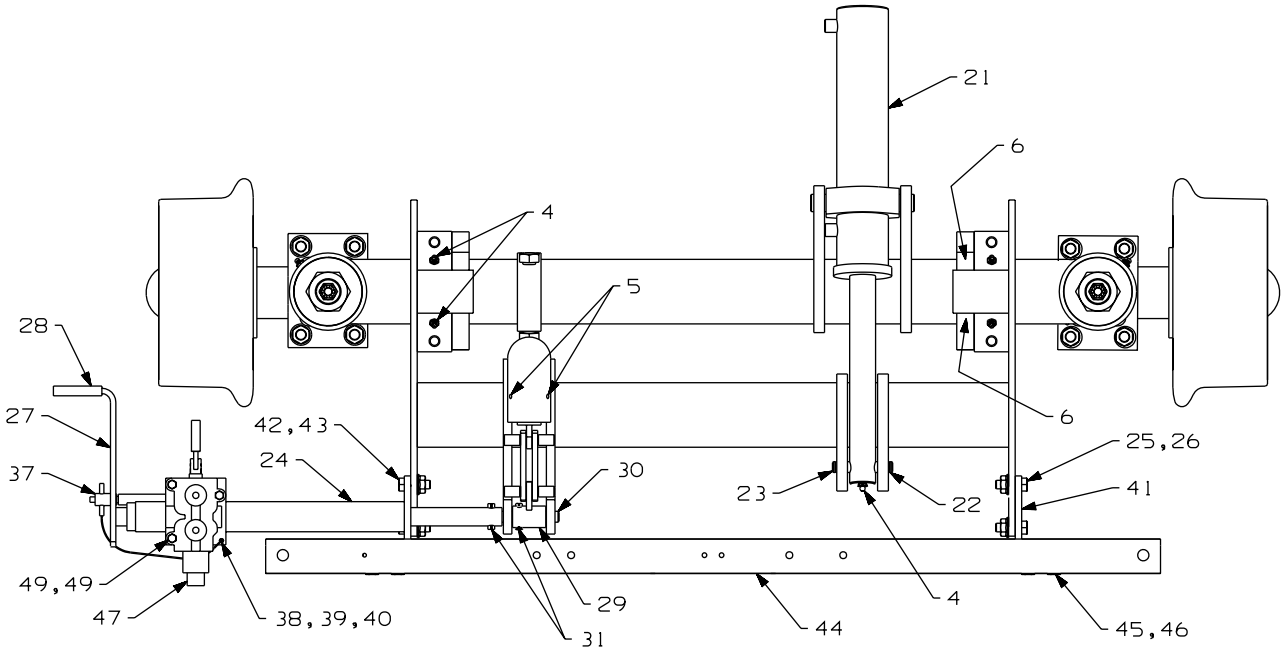
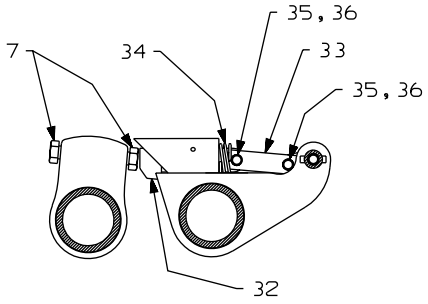
ITEM	PART NO	DESCRIPTION	QTY
1	F018510	Control Valve	1
2	F012055	90° Elbow, 9/16 M JIC x 3/8 M NPT	2
3	F013327	90° Elbow, 9/16 M JIC x 9/16 M STR	2
4	188665	Hose, 5/16 x 40" Swivel 9/16 F JIC Both Ends	2

REAR RAIL PILOT UNIT - 169314 - INSULATED - HR2000A3
REAR RAIL PILOT UNIT - 169318 - NON INSULATED - HR2000A3





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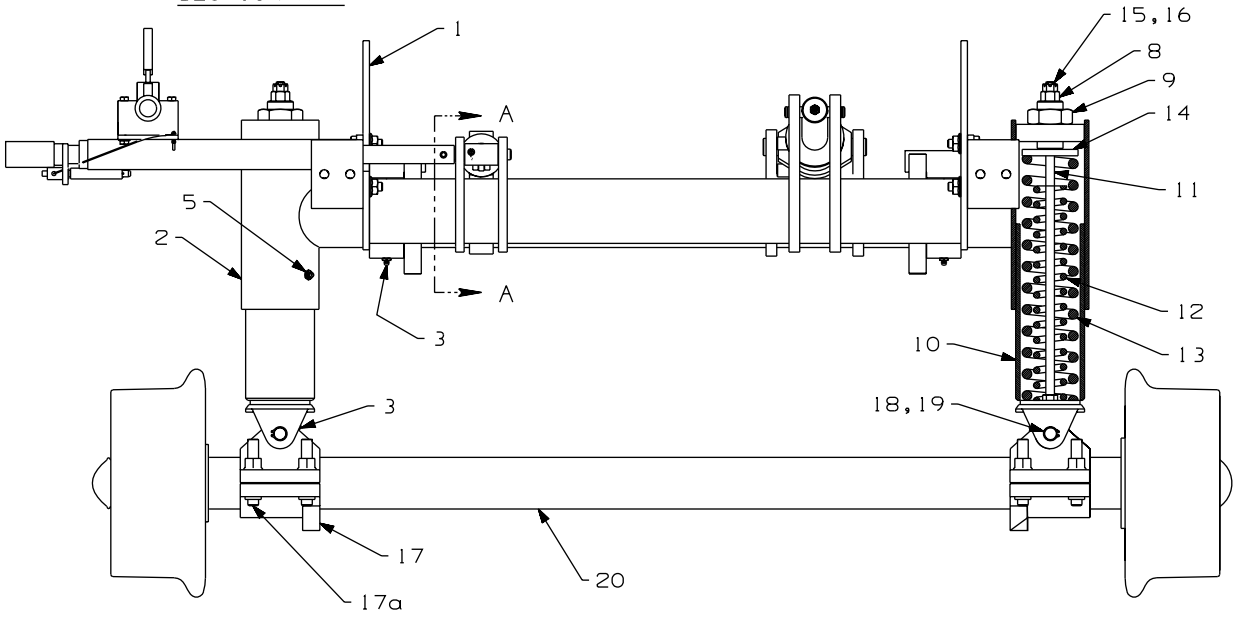

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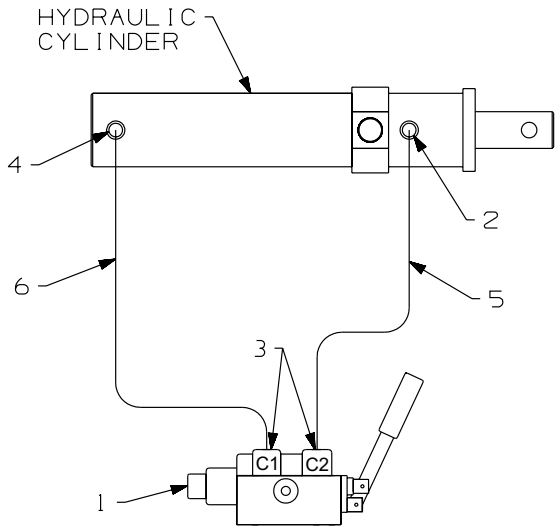
REAR RAIL PILOT UNIT - 169314 - INSULATED - HR2000A3
REAR RAIL PILOT UNIT - 169318 - NON INSULATED - HR2000A3

ITEM	PART NO	DESCRIPTION	QTY
1	169315	Mounting Frame	1
2	169316	Cross Tube	1
3	F004252	Grease Fitting, 1/8 M NPT Straight	4
4	F009420	Grease Fitting, 1/8 M NPT 45°	5
5	F009217	Grease Fitting, 1/8 M NPT 90°	6
6	F023879	Set Screw, 5/8-11 x 1-1/2" Oval Point	4
7	700568125	Cap Screw, 3/4-10 x1-1/4" GR 8 Hex Hd	2
8	140771	Adjusting Stud	2
9	F024361	Hex Jam Nut, 1-1/2"-12	2
10	153735	Spring Housing	2
11	140191	Adjusting Rod	2
12	140128	Spring	2
13	140129	Spring	2
14	140789	Washer	2
15	F002545	Hex Slotted Nut, 1/2"-13	2
16	F001182	Cotter Pin, 1/8 x 1-1/4"	2
17	168481	AXLE CLAMP ASSEMBLY	2
17a	171088	Cap Screw, 5/8-11 x 3" Soc Hd	4
18	116242	Pin	2
19	F018844	Retaining Ring	4
20	140178	Axle	1
21	153733K	Hydraulic Cylinder	1
22	153705	Pin	1
23	F009288K	Retaining Ring	2
24	153711	Lock Handle Bracket	1
25	F001090	Cap Screw, 1/2-13 x 1-1/2" GR 5 Hex Hd	2
26	F022037	Hex Flg Nut, 1/2"-13	2
27	168233	Lock Lever	1
28	F022846	Handle Grip	1
29	153708K	Toggle Link	1
30	168236	Pin	1
31	F011954	Spring Pin, 3/8 x 1-1/2"	2
32	140162	Lock Pin	1
33	153703	Link	2
34	F025817	Spring, Compression	1
35	153706	Pin	2
36	F009288K	Retaining Ring	4
37	F022104	Lock Pin And Lanyard	1
38	F017061	Machine Screw, #4-40 x 1" Rd Hd	1
39	F022981	Lock Washer, #4	1
40	F010193	Hex Nut, #4-40	1
41	153712	Bracket	1

REAR RAIL PILOT UNIT - 169314 - INSULATED - HR2000A3
REAR RAIL PILOT UNIT - 169318 - NON INSULATED - HR2000A3

ITEM	PART NO	DESCRIPTION	QTY
42	F001090	Cap Screw, 1/2-13 x 1-1/2" GR 5 Hex Hd	2
43	F022037	Hex Flg Nut, 1/2"-13	2
44	140790	Bumper	1
45	F001539	Cap Screw, 1/2-13 x 1-1/4" GR 5 Hex Hd	4
46	F022037	Hex Flg Nut, 1/2"-13	4
47	F018510	Control Valve	1
48	F013428	Cap Screw, 5/16-18 x 2-1/2" GR 5 Hex Hd	3
49	F040088	Hex Flg Nut, 5/16"-18	3

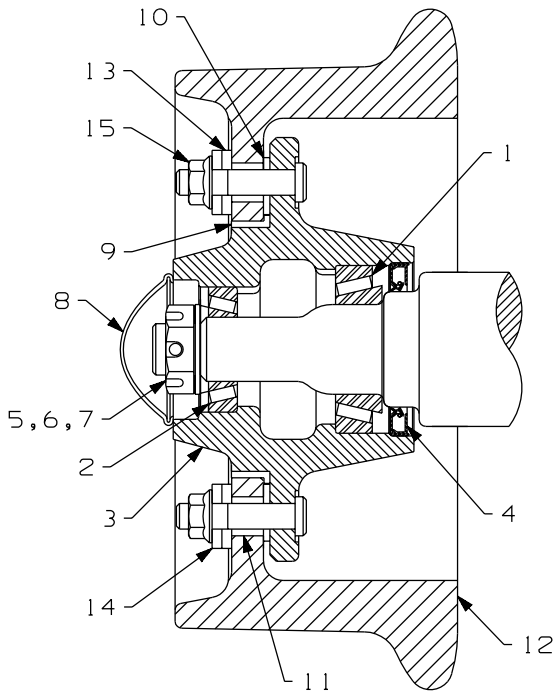
HYDRAULIC PIPING - 169314 REAR RAIL PILOT UNIT
HYDRAULIC PIPING - 169318 REAR RAIL PILOT UNIT



SE169314A-2

ITEM	PART NO	DESCRIPTION	QTY
1	F018510	Control Valve	1
2	F013326	Adapter, 9/16 M JIC x 9/16 M STR	1
3	F012055	90° Elbow, 9/16 M JIC x 3/8 M NPT	2
4	F013020	45° Elbow, 9/16 M JIC x 9/16 M STR	1
5	188668	Hose, 5/16 x 48" Swivel 9/16 F JIC Both Ends	1
6	188662	Hose, 5/16 x 56" Swivel 9/16 F JIC Both Ends	1

INSULATED GUIDE WHEEL - INSULATED UNITS

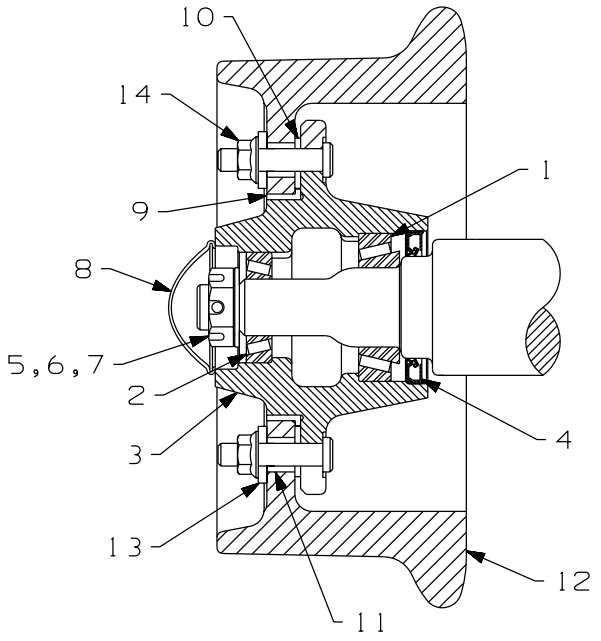


SE92A128A-2

Note: Quantities Listed Are For One Wheel Only.

ITEM	PART NO	DESCRIPTION	QTY
1	154745	Bearing Cup & Cone, Inside	1
2	157622	Bearing Cup & Cone, Outside	1
3	153739	HUB ASSEMBLY	1
3a	120884	Stud Bolt, 1/2-20 x 2-5/16"	6
4	F024339	Grease Seal	1
5	F023271	Axle Washer	1
6	F023270	Hex Slotted Nut, 1"	1
7	F001182	Cotter Pin, 1/8 x 1-1/4"	1
8	F023272	Dust Cap	1
9	108585	Insulating Flange	1
10	108586	Insulating Washer	1
11	100765	Insulating Bushing	6
12	140104	Guide Wheel	1
13	090177	Insulating Washer	6
14	072897	Washer, 33/64"	6
15	F021281	Hex Flg Nut, 1/2"-20	6

NON INSULATED GUIDE WHEEL - NON INSULATED UNITS



SE97A131A-1

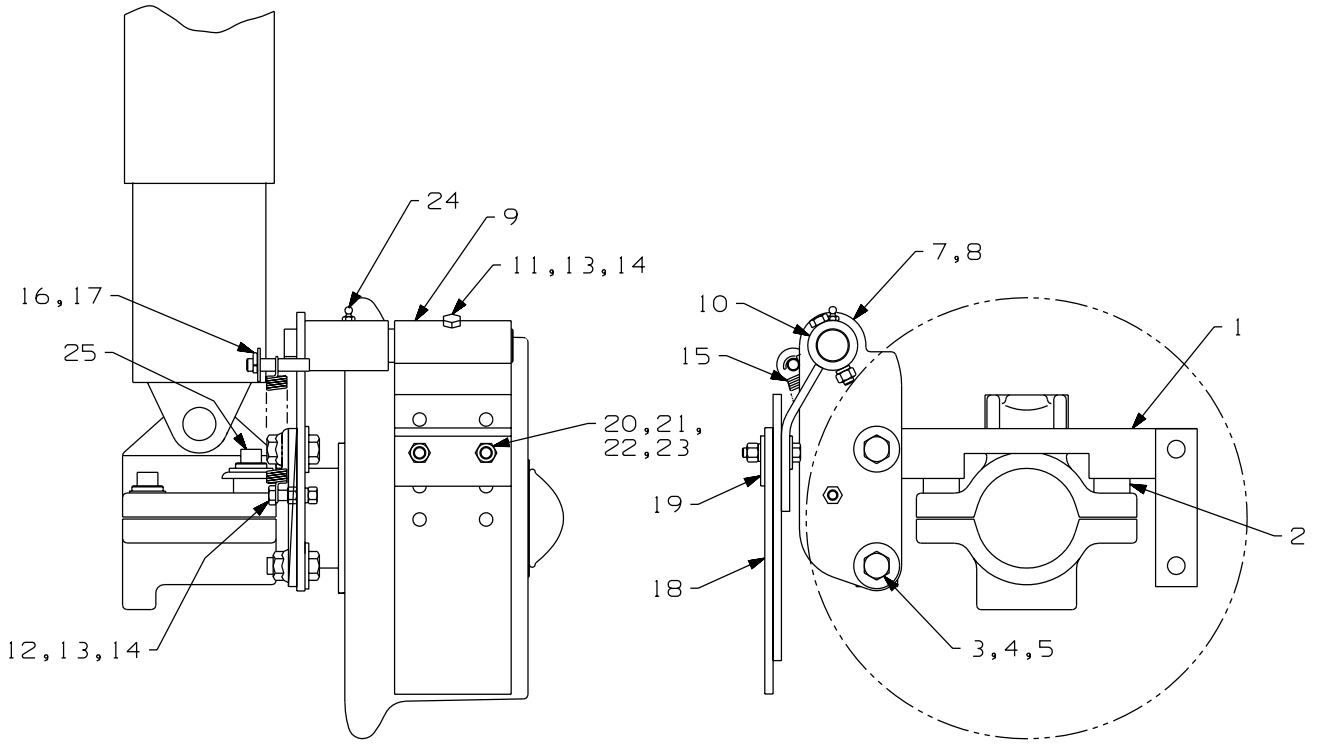
Note: Quantities Listed Are For One Wheel Only.

ITEM	PART NO	DESCRIPTION	QTY
1	154745	Bearing Cup And Cone, Inside	1
2	157622	Bearing Cup And Cone, Outside	1
3	153739	HUB ASSEMBLY	1
3a	120884	Stud Bolt, 1/2-20 x 2-5/16"	6
4	F024339	Grease Seal	1
5	F023271	Axle Washer	1
6	F023270	Hex Slotted Nut, 1"	1
7	F001182	Cotter Pin, 1/8 x 1-1/4"	1
8	F023272	Dust Cap	1
9	108585	Insulating Flange	1
10	108586	Insulating Washer	1
11	100765	Insulating Bushing	6
12	140104	Guide Wheel	1
13	072897	Washer, 33/64"	6
14	F021281	Hex Flg Nut, 1/2"-20	6

STEERING LOCK GROUPS

Individual steering lock components are not available as repair parts. Steering lock groups are sold as complete replacement groups only. See vehicle application charts to find the correct steering lock group applicable to your make, model and year of vehicle.

RAIL SWEEP GROUP - 154522

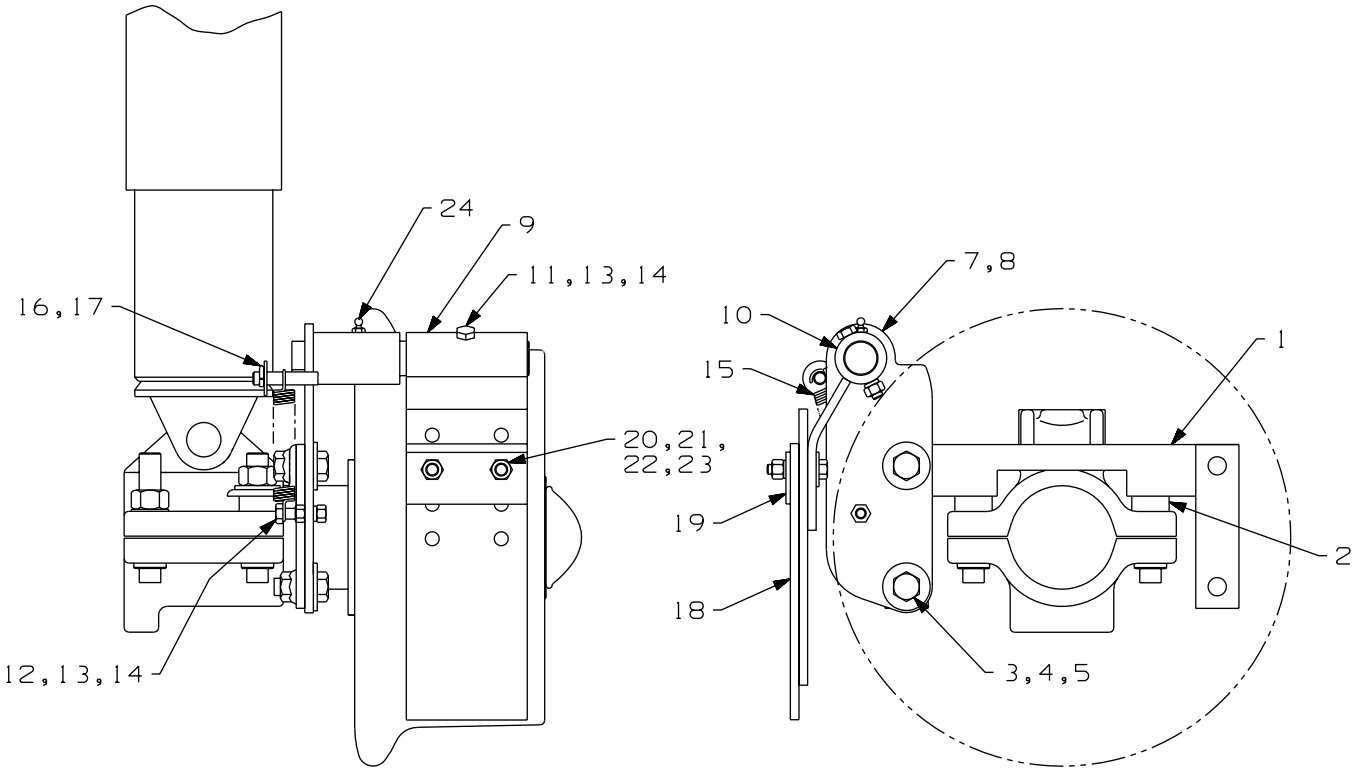


SE020456A-1

RAIL SWEEP GROUP - 154522

ITEM	PART NO	DESCRIPTION	QTY
1	154518	Rail Sweep Bracket	2
2	154521	Spacer	4
3	F001539	Cap Screw, 1/2-13 x 1-1/4" GR 5 Hex Hd	4
4	F001267	Wrought Washer, 1/2"	4
5	F022037	Hex Flg Nut, 1/2"-13	4
6	159099	Decal, Rear Rail Sweeps... (not illustrated)	1
	138421	RAIL SWEEP, LEFT FRONT OR RIGHT REAR	1
	138422	RAIL SWEEP, RIGHT FRONT OR LEFT REAR	1
7	138417	Rail Sweep Bracket, Left Front or Right Rear	1
8	138420	Rail Sweep Bracket, Right Front or Left Rear	1
9	138428	Swivel Bracket	2
10	118573	Shaft	2
11	F009663	Cap Screw, 5/16-18 x 2" GR 5 Hex Hd	2
12	F001113	Cap Screw, 5/16-18 x 1-1/4" GR 5 Hex Hd	2
13	F001100	SAE Lock Washer, 5/16"	4
14	F007021	Hex Nut, 5/16"	6
15	072909	Spring	2
16	F001115	Wrought Washer, 3/8"	2
17	F001030	Cotter Pin, 1/8 x 3/4"	2
18	118580	Rubber Sweep	4
19	118581	Plate	2
20	F001024	Cap Screw, 3/8-16 x 1-1/2" GR 5 Hex Hd	4
21	F007020	Hex Nut, 3/8"-16	4
22	F001115	Wrought Washer, 3/8"	4
23	F001025	SAE Lock Washer, 3/8"	4
24	F008014	Grease Fitting	2
25	F013816	Cap Screw, 5/8-11 x 2-1/4" Counter Bore	4

RAIL SWEEP GROUP - 168480

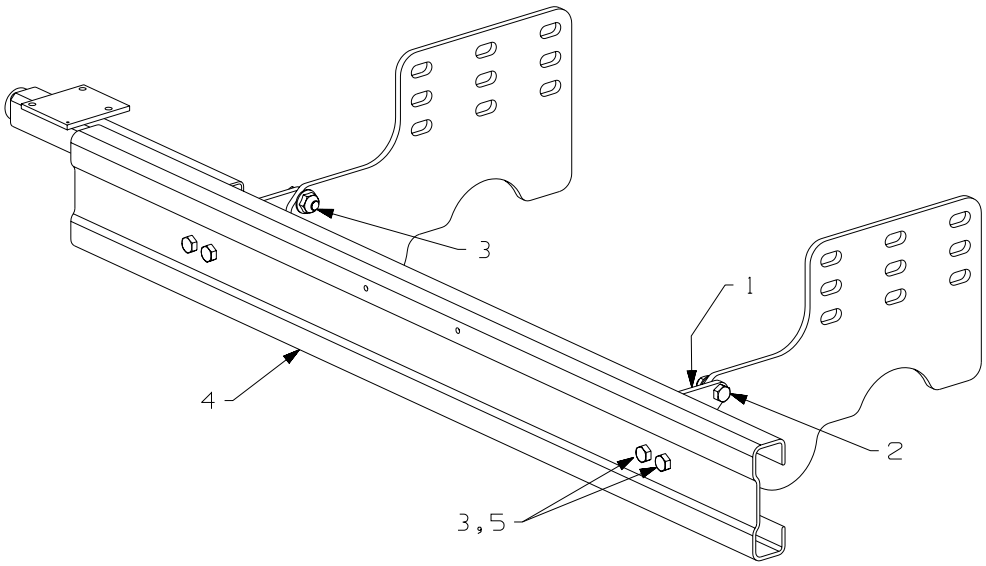


SE021678A-1

RAIL SWEEP GROUP - 168480

ITEM	PART NO	DESCRIPTION	QTY
1	154518	Rail Sweep Bracket	2
2	154521	Spacer	4
3	F001539	Cap Screw, 1/2-13 x 1-1/4" GR 5 Hex Hd	4
4	F001267	Wrought Washer, 1/2"	4
5	F022037	Hex Flg Nut, 1/2"-13	4
6	159099	Decal, Rear Rail Sweeps... (not illustrated)	1
	138421	RAIL SWEEP, LEFT FRONT OR RIGHT REAR	1
	138422	RAIL SWEEP, RIGHT FRONT OR LEFT REAR	1
7	138417	Rail Sweep Bracket, Left Front or Right Rear	1
8	138420	Rail Sweep Bracket, Right Front or Left Rear	1
9	138428	Swivel Bracket	2
10	118573	Shaft	2
11	F009663	Cap Screw, 5/16-18 x 2" GR 5 Hex Hd	2
12	F001113	Cap Screw, 5/16-18 x 1-1/4" GR 5 Hex Hd	2
13	F001100	SAE Lock Washer, 5/16"	4
14	F007021	Hex Nut, 5/16"	6
15	072909	Spring	2
16	F001115	Wrought Washer, 3/8"	2
17	F001030	Cotter Pin, 1/8 x 3/4"	2
18	118580	Rubber Sweep	4
19	118581	Plate	2
20	F001024	Cap Screw, 3/8-16 x 1-1/2" GR 5 Hex Hd	4
21	F007020	Hex Nut, 3/8"-16	4
22	F001115	Wrought Washer, 3/8"	4
23	F001025	SAE Lock Washer, 3/8"	4
24	F008014	Grease Fitting	2

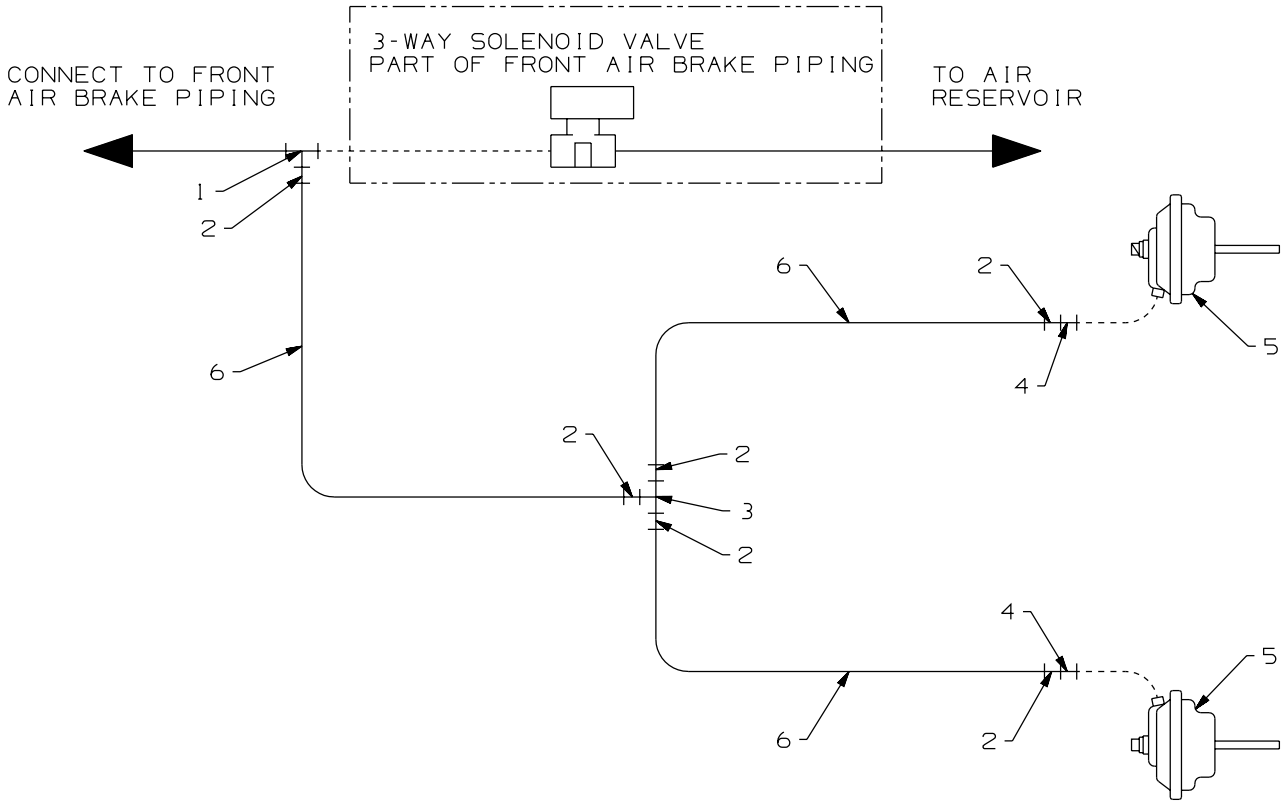
REAR BUMPER GROUP - 168682



SE021721A-1

ITEM	PART NO	DESCRIPTION	QTY
1	153712	Bracket	1
2	F001090	Cap Screw, 1/2-13 x 1-1/2" GR 5 Hex Hd	2
3	F022037	Hex Flg Nut, 1/2"-13	6
4	137172	Bumper	1
5	F001539	Cap Screw, 1/2-13 x 1-1/4" GR 5 Hex Hd	4

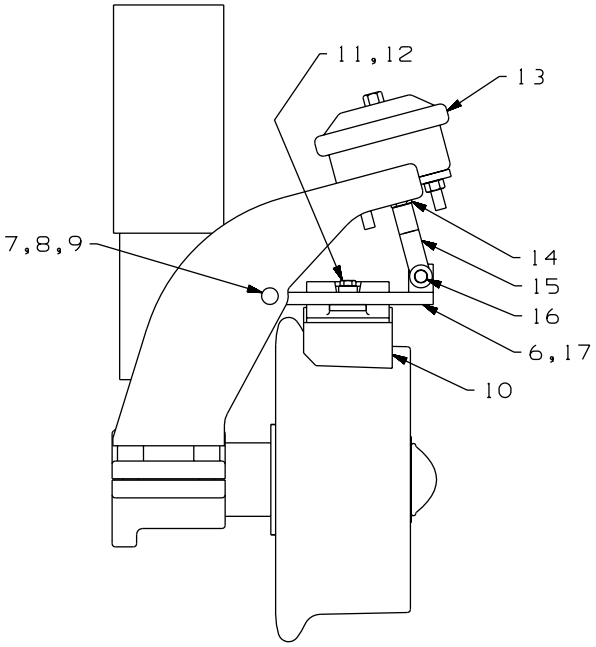
REAR BRAKE CONNECTION GROUP - 163991

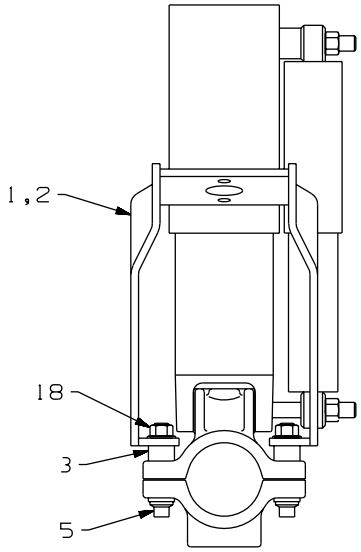


SE021271A-1

ITEM	PART NO	DESCRIPTION	QTY
1	F022304	Tee, 7/16 M JIC x 1/4 M NPT x 7/16 M JIC	1
2	F012507	Swivel Hose Fitting, 7/16 F JIC	6
3	F014241	Tee, 7/16 M JIC x 7/16 M JIC x 7/16 M JIC	1
4	F024046	Adapter, 7/16 M JIC x 3/8 M NPT	2
5	F025058	Actuator (reference)	2
6	F012222	Hose, 1/4" I.D. (use as required)	240"

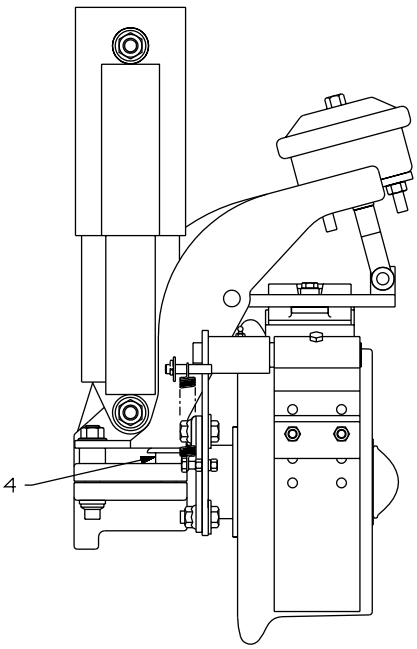
FRONT OR REAR UNIT BRAKE GROUP - 163990

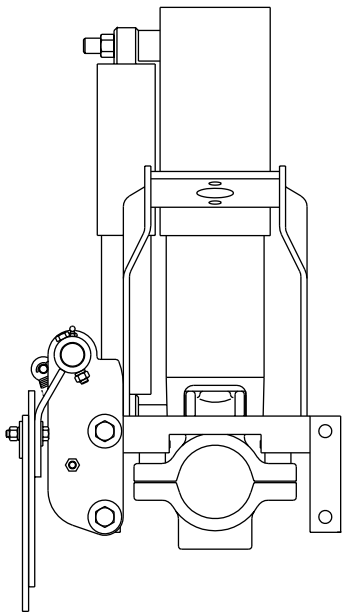




BRAKES AND GUIDE WHEEL NOT SHOWN IN THIS VIEW FOR CLARITY

BRAKE APPLICATION WITHOUT RAIL SWEEPS APPLIED





BRAKES AND GUIDE WHEEL NOT SHOWN IN THIS VIEW FOR CLARITY

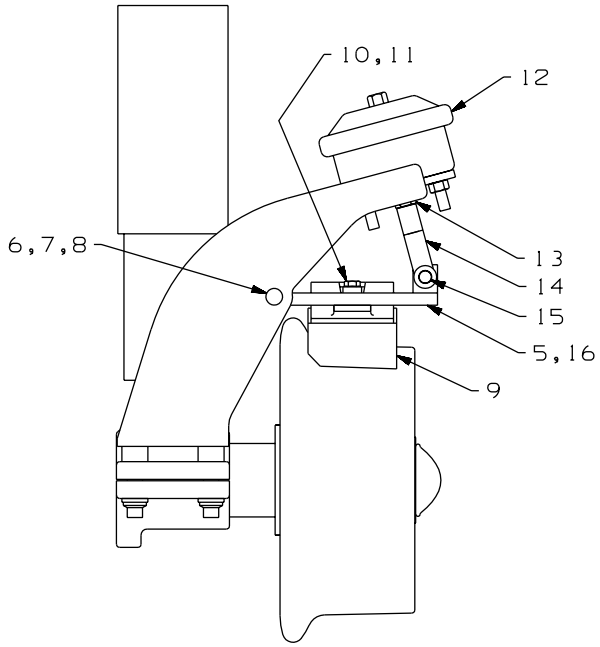
BRAKE APPLICATION WITH RAIL SWEEP APPLIED

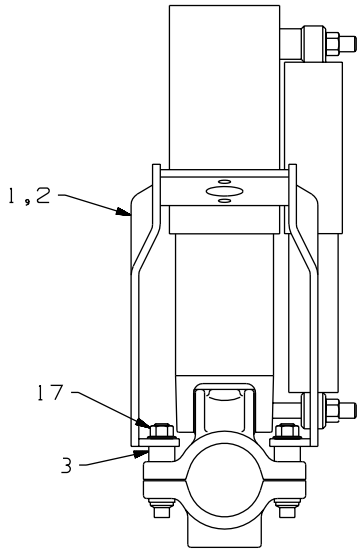
7

FRONT OR REAR UNIT BRAKE GROUP - 163990

ITEM	PART NO	DESCRIPTION	QTY
1	162429	Bracket	1
2	162426	Bracket	1
3	162327	Spacer	8
4	154521	Spacer (part of rail sweep group)	4
5	F025504	Cap Screw, 5/8-11 x 2-3/4" Counter Bore	8
6	162052	Plate	2
7	162050	Pin	2
8	M033847	Washer	4
9	F001182	Cotter Pin, 1/8 x 1-1/4"	4
10	F022274	Brake Shoe	2
11	157694	Link	2
12	F023416	Cap Screw, 3/8-16 x 3/4" GR 5 Hex Flg Hd	4
13	F025058	Actuator	2
14	F011013	Hex Jam Nut, 1/2"-20	2
15	F005459	Yoke End	2
16	F005460	Yoke Pin With Cotter Pins	2
17	F008014	Grease Fitting	4
18	F021924	Hex Flg Nut, 5/8"-11	4

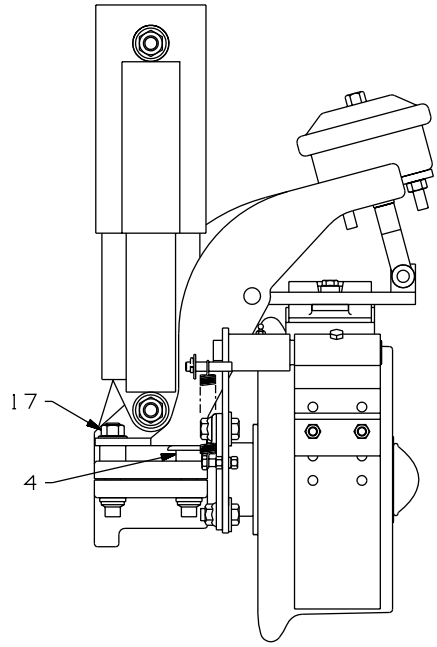
FRONT OR REAR UNIT BRAKE GROUP - 168477

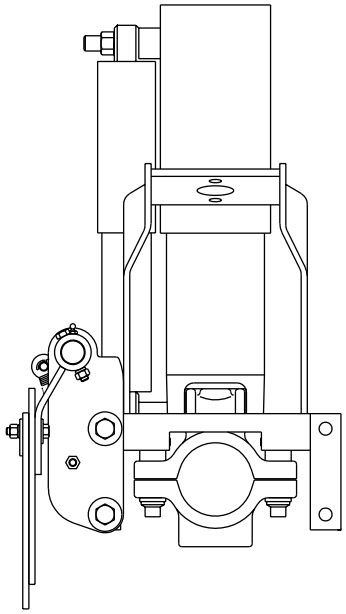




BRAKES AND GUIDE WHEEL NOT SHOWN IN THIS VIEW FOR CLARITY

BRAKE APPLICATION WITHOUT RAIL SWEEPS APPLIED





BRAKES AND GUIDE WHEEL NOT SHOWN IN THIS VIEW FOR CLARITY

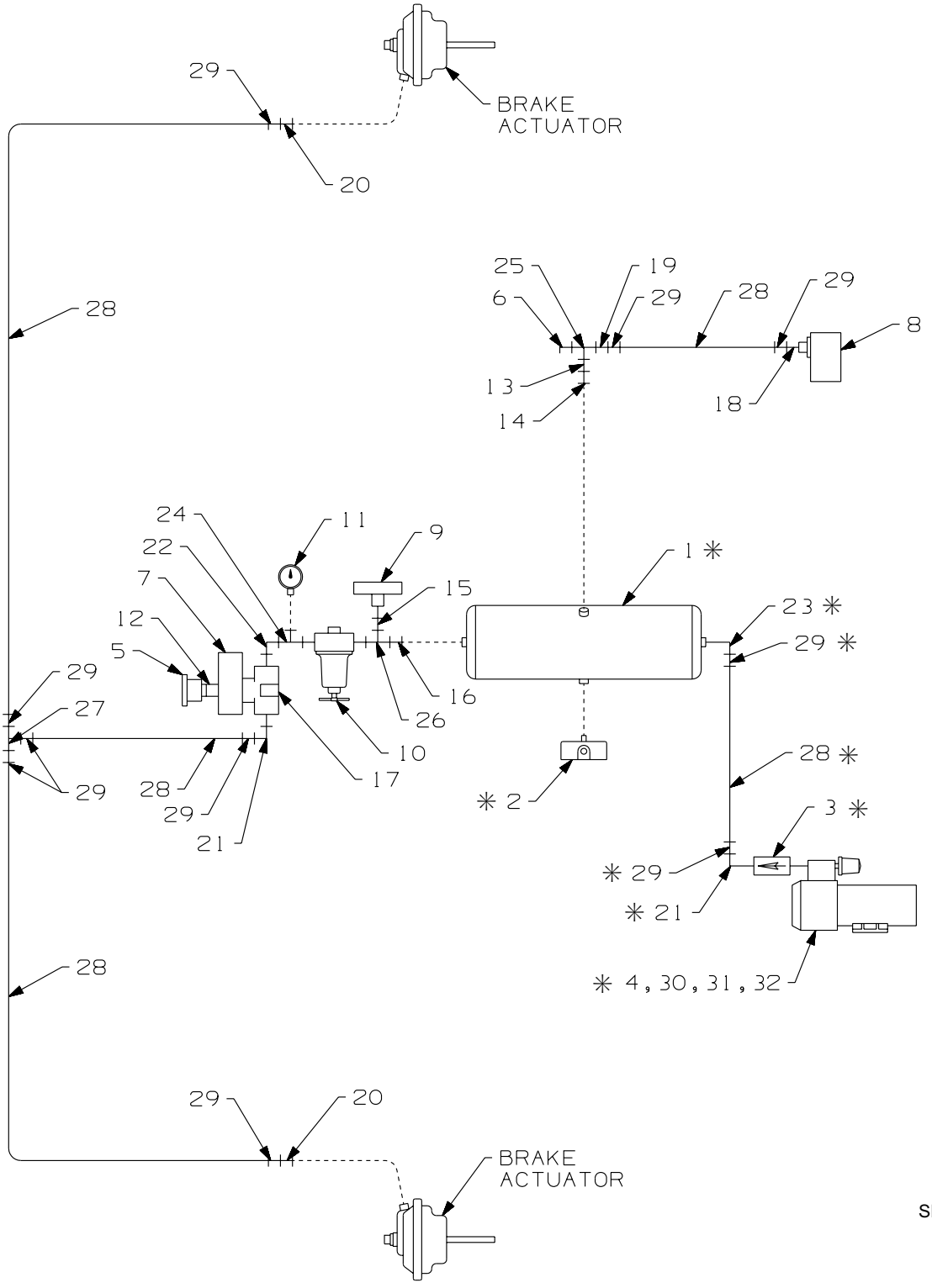
BRAKE APPLICATION WITH RAIL SWEEP APPLIED

7

FRONT OR REAR UNIT BRAKE GROUP - 168477

ITEM	PART NO	DESCRIPTION	QTY
1	162429	Bracket	1
2	162426	Bracket	1
3	162327	Spacer	8
4	154521	Spacer (part of rail sweep group)	4
5	162052	Plate	2
6	162050	Pin	2
7	M033847	Washer	4
8	F001182	Cotter Pin, 1/8 x 1-1/4"	4
9	F022274	Brake Shoe	2
10	157694	Link	2
11	F023416	Cap Screw, 3/8-16 x 3/4" GR 5 Hex Flg Hd	4
12	F025058	Actuator	2
13	F011013	Hex Jam Nut, 1/2"-20	2
14	F005459	Yoke End	2
15	F005460	Yoke Pin With Cotter Pins	2
16	F008014	Grease Fitting	4
17	F021924	Hex Flg Nut, 5/8"-11	4

ELECTRIC/AIR BRAKE SYSTEM GROUP - 163987 - FULL
ELECTRIC/AIR BRAKE SYSTEM GROUP - 163988 - ABBREVIATED
BRAKE SYSTEM AIR PIPING



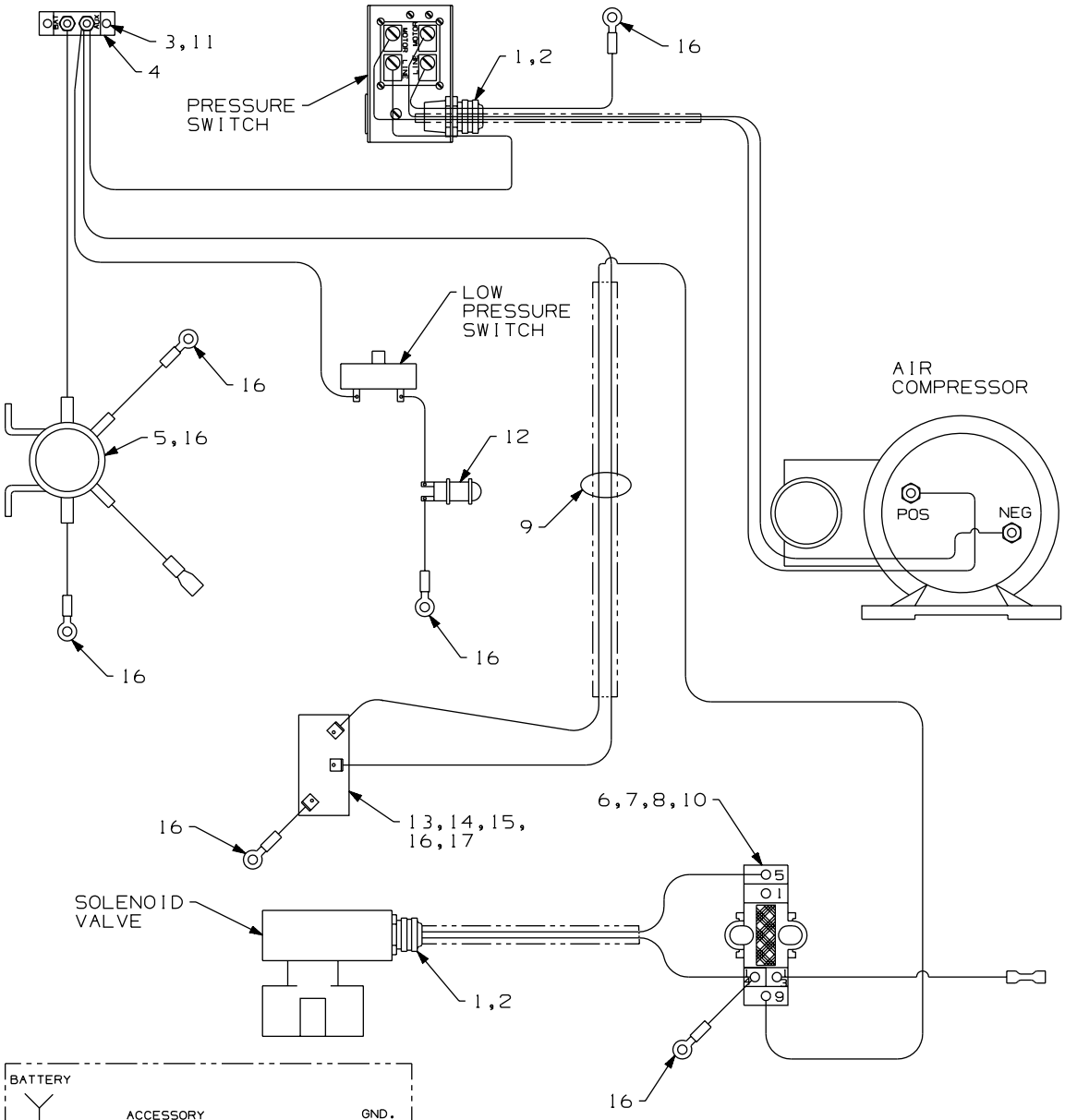
SE021269A-1

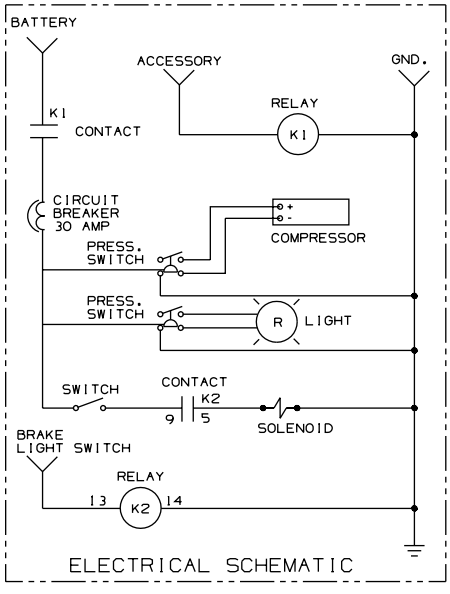
✳ ITEMS NOT INCLUDED IN THE 163988 ELECTRIC/AIR BRAKE SYSTEM GROUP - ABBREVIATED

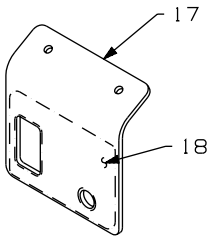
ELECTRIC/AIR BRAKE SYSTEM GROUP - 163987 - FULL
ELECTRIC/AIR BRAKE SYSTEM GROUP - 163988 - ABBREVIATED
BRAKE SYSTEM AIR PIPING

ITEM	PART NO	DESCRIPTION	QTY
1	F009910	Air Reservoir	1
1a	F022776	Reservoir Mounting Bracket	2
1b	F040088	Hex Flg Nut, 5/16"-18	4
1c	F023415	Cap Screw, 5/16-18 x 1-1/2" GR 5 Hex Flg Hd	4
2	F021131	Moisture Ejection Valve	1
3	F015447	Check Valve	1
4	F025423	Air Compressor	1
5	F025816	Vent	1
6	F010144	Safety Valve	1
7	F025025	Solenoid Valve	1
8	F019402	Pressure Switch	1
8a	157631	Pressure Switch Mounting Angle	1
9	F025055	Low Pressure Switch	1
10	F018668	Regulator	1
11	F019924	Pressure Gauge	1
12	F001737	Coupling, 1/8 F NPT x 1/8 F NPT	1
13	F023936	Coupling, 1/4 F NPT x 1/4 F NPT	1
14	F013373	Hex Nipple, 1/4 M NPT x 3/8 M NPT	1
15	F004386	Bushing, 1/4 M NPT x 1/8 F NPT	1
16	F008844	Bushing, 3/8 M NPT x 1/4 F NPT	1
17	F011132	Plug, 1/8 M NPT	1
18	F023041	Adapter, 7/16 M JIC x 1/4 M NPT	1
19	F023087	Adapter, 9/16 F JIC x 7/16 M JIC	1
20	F024046	Adapter, 7/16 M JIC x 3/8 M NPT	2
21	F011937	90° Elbow, 7/16 M JIC x 1/4 M NPT	2
22	F013685	90° Elbow, 1/4 M NPT x 1/4 M NPT	1
23	F015104	90° Elbow, 7/16 M JIC x 3/8 M NPT	1
24	F010680	Tee, 1/4 M NPT x 1/4 F NPT x 1/4 F NPT	1
25	F011241	Tee, 9/16 M JIC x 1/4 F NPT x 1/4 M NPT	1
26	F015809	Tee, 1/4 M NPT x 1/4 M NPT x 1/4 F NPT	1
27	F014241	Tee, 7/16 M JIC x 7/16 M JIC x 7/16 M JIC	1
28	F012222	Hose, 1/4" I.D.	600"
29	F012507	Swivel Hose Fitting, 7/16 F JIC	10
30	161888	Cover, Air Compressor	1
31	F023255	Cap Screw, 3/8-16 x 1" GR 5 Hex Flg Hd	4
32	F023225	Hex Flg Nut, 3/8"-16 GR 5	4

ELECTRIC/AIR BRAKE SYSTEM GROUP - 163987 - FULL
ELECTRIC/AIR BRAKE SYSTEM GROUP - 163988 - ABBREVIATED
BRAKE SYSTEM ELECTRICAL WIRING







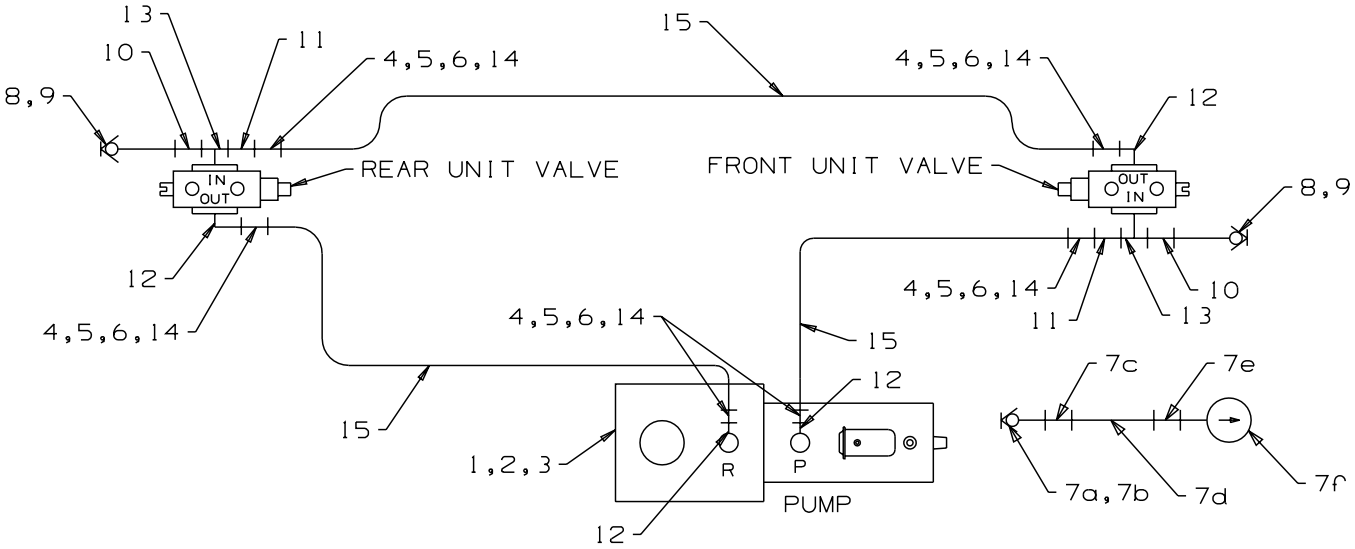
SE020869A-1

7

ELECTRIC/AIR BRAKE SYSTEM GROUP - 163987 - FULL
ELECTRIC/AIR BRAKE SYSTEM GROUP - 163988 - ABBREVIATED
BRAKE SYSTEM ELECTRICAL WIRING

ITEM	PART NO	DESCRIPTION	QTY
1	F014874	Cable Grip	2
2	F013279	Lock Nut	2
3	F009594	Machine Screw, #10-24 x 5/8" Rd Hd	2
4	F014406	Circuit Breaker	1
5	F018569	Solenoid	1
6	F023445	Relay Socket	1
7	F023444	Relay	1
8	F023443	Bail	1
9	F017311	Grommet	1
10	F007801	Screw, #8 x 5/8" Rd Hd Self-Tap	2
11	F022039	Hex Flg Nut, #10-24	2
12	F017159	Indicator Light.	1
13	F023886	Switch	1
14	F009594	Machine Screw, #10-24 x 5/8" Rd Hd	4
15	F022039	Hex Flg Nut, #10-24	4
16	F009265	Screw, #12 x 1/2" Rd Hd Self-Tap	9
17	168107	Switch Mount	1
18	168464	Decal, Panel	1
19	157633	Decal, Do Not Propel...(not Illustrated)	1

HYDRAULIC POWER PACK GROUP - 168104
HYDRAULIC SYSTEM

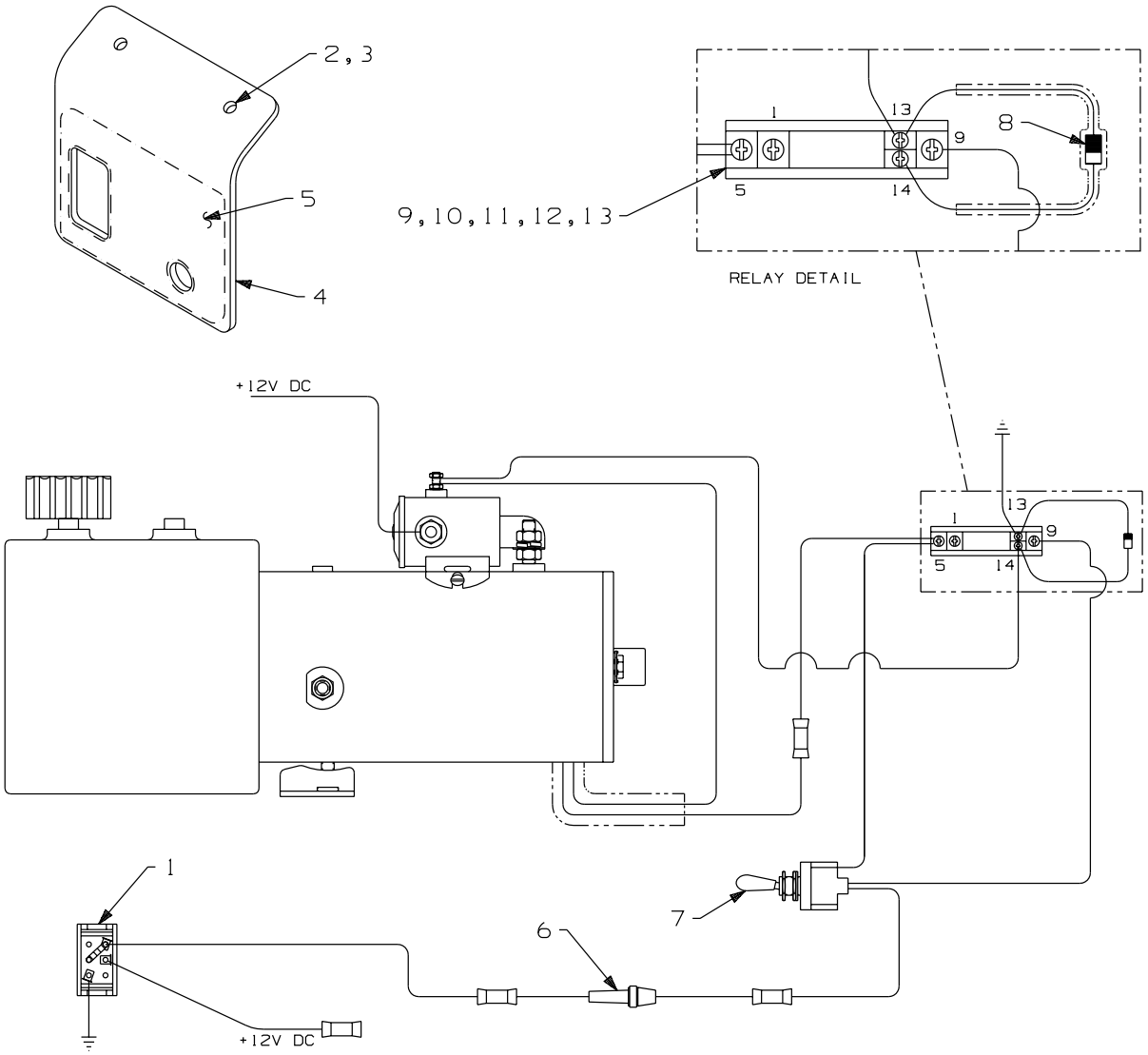


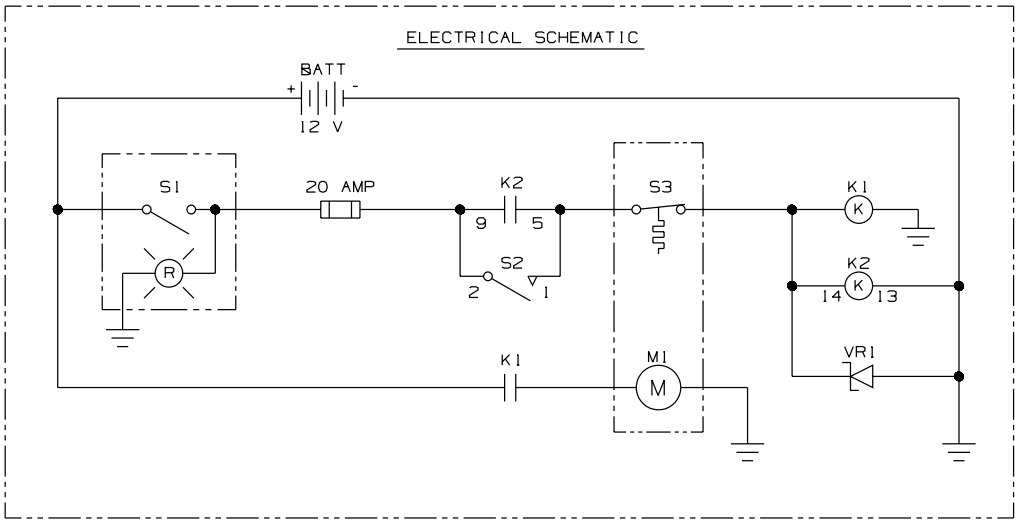
SE021523A-1

HYDRAULIC POWER PACK GROUP - 168104
HYDRAULIC SYSTEM

ITEM	PART NO	DESCRIPTION	QTY
1	F025767	Hydraulic Unit	1
2	F004683	Cap Screw, 3/8-16 x 5/8" GR 5 Hex Hd	2
3	F001025	SAE Lock Washer, 3/8"	2
4	F009825	Cap Screw, 1/4-20 x 1" GR 5 Hex Hd	8
5	F009535	SAE Lock Washer, 1/4"	8
6	F007022	Hex Nut, 1/4"-20	8
7	099137K	PRESSURE GAUGE ASSEMBLY	1
7a	F015110K	Female Coupler	1
7b	F015111	Dust Cap	1
7c	F012056	Adapter, 3/8 M NPT x 9/16 M JIC	1
7d	171878	Hose, 5/16 x 14" Swivel 9/16 F JIC Both Ends	1
7e	F011109	Adapter, 9/16 M JIC x 1/4 F NPT	1
7f	F011432K	Pressure Gauge - 0 to 3000 PSI, 1/4 M NPT	1
8	F015303K	Male Coupler	2
9	F015077	Dust Cap	2
10	F011604	Nipple, 3/8 M NPT x 3/8 M NPT	2
11	F012056	Adapter, 3/8 M NPT x 9/16 M JIC	2
12	F012055	90° Elbow, 3/8 M NPT x 9/16 M JIC	4
13	F011594	Tee, 3/8 F NPT x 3/8 F NPT x 3/8 M NPT	2
14	F019242	Hose Clamp	8
15	140348	HOSE GROUP	1
15a	F010693	Hose, 5/16" I.D.	720"
15b	F011392	Swivel Hose Fitting, 9/16 F JIC	6

HYDRAULIC POWER PACK GROUP - 168104
ELECTRICAL SYSTEM





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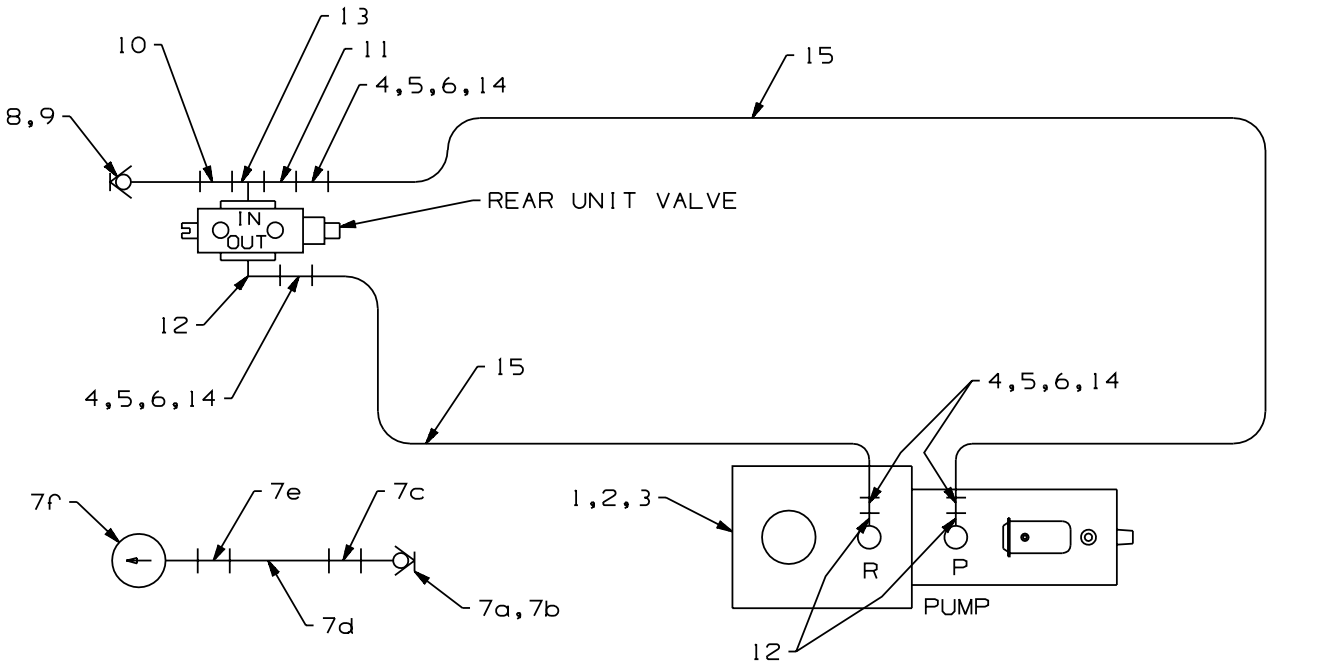
HYDRAULIC POWER PACK GROUP - 168104
ELECTRICAL SYSTEM

ITEM	PART NO	DESCRIPTION	QTY
1	F023886	Switch, ON/OFF	1
2	F009594	Machine Screw, #10-24 x 5/8" Rd Hd	2
3	F022039	Hex Flg Nut, #10-24	2
4	168107	Switch Mount	1
5	168108	Decal, Panel	1
6	F017476	Fuse Holder, With 20 Amp Fuse	1
7	F017149	Switch	1
8	F022246	Noise Suppresser	1
9	F007801	Screw, #8 x 5/8" Rd Hd Self-Tap	2
10	F023563	Connector	2
11	F023443	Bail	1
12	F023444	Relay	1
13	F023445	Relay Socket	1

HYDRAULIC POWER PACK GROUP - 168105, REAR ONLY
HYDRAULIC SYSTEM

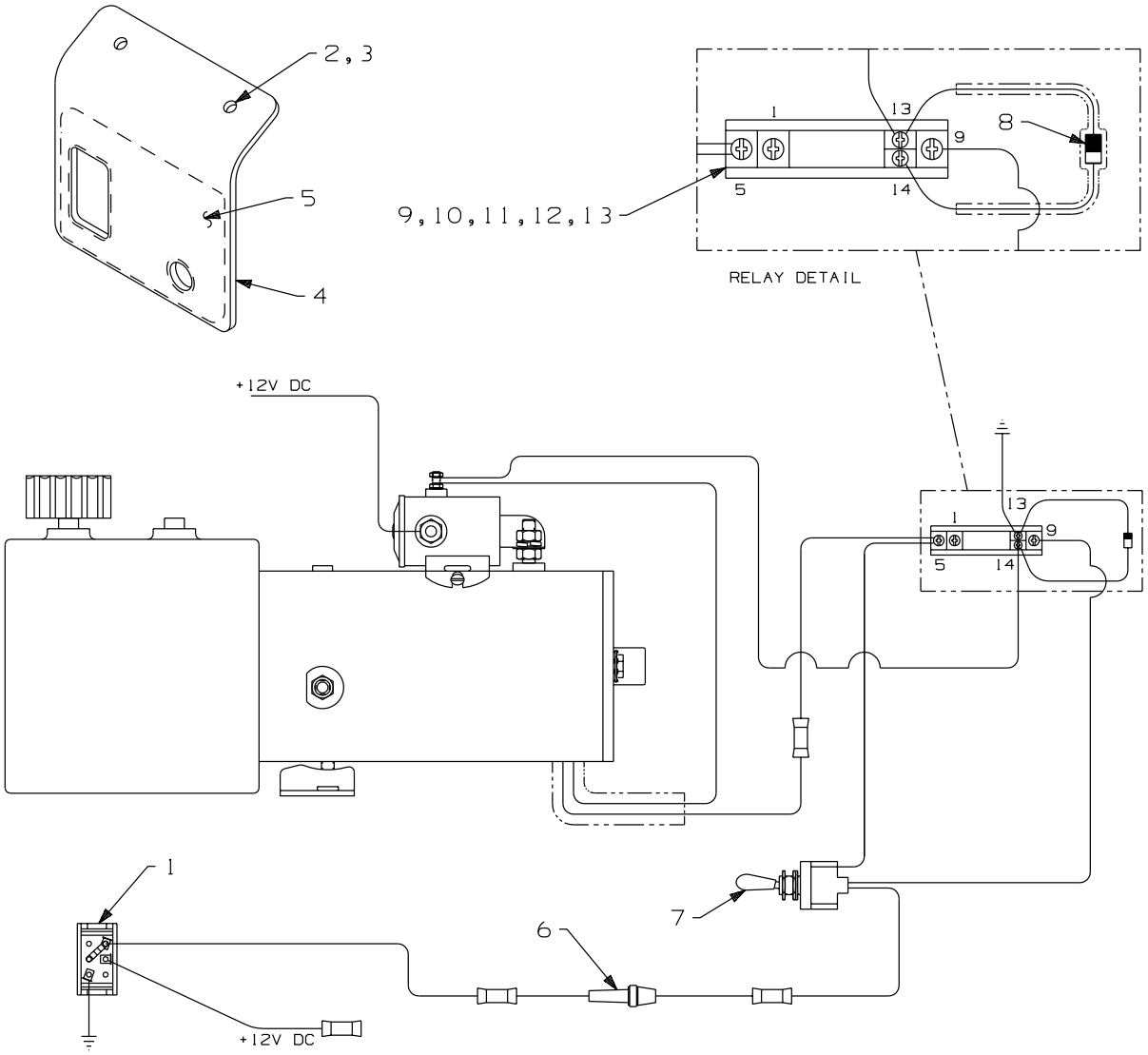


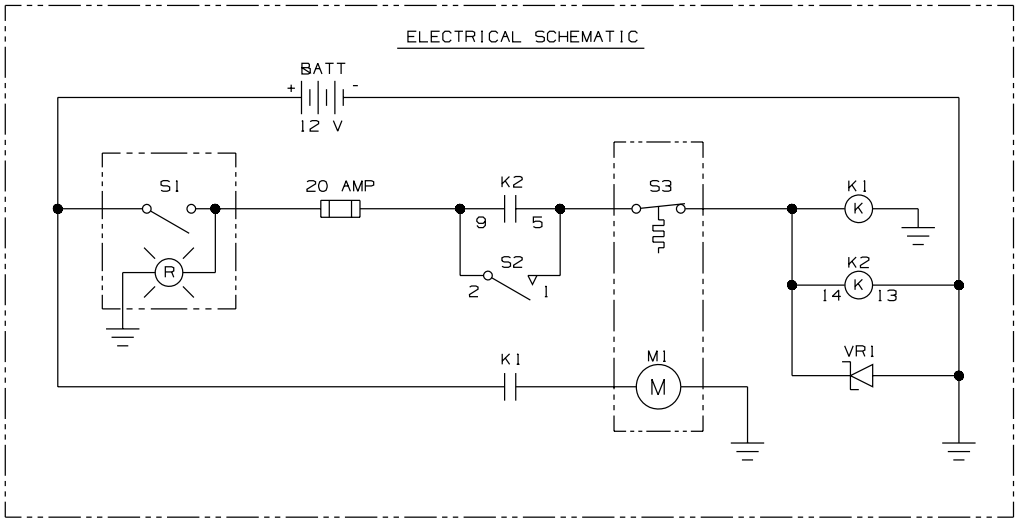
SE021531A-1

HYDRAULIC POWER PACK GROUP - 168105, REAR ONLY
HYDRAULIC SYSTEM

ITEM	PART NO	DESCRIPTION	QTY
1	F025767	Hydraulic Unit	1
2	F004683	Cap Screw, 3/8-16 x 5/8" GR 5 Hex Hd	2
3	F001025	SAE Lock Washer, 3/8"	2
4	F009825	Cap Screw, 1/4-20 x 1" GR 5 Hex Hd	4
5	F009535	SAE Lock Washer, 1/4"	4
6	F007022	Hex Nut, 1/4"-20	4
7	099137K	PRESSURE GAUGE ASSEMBLY	1
7a	F015110K	Female Coupler	1
7b	F015111	Dust Cap	1
7c	F012056	Adapter, 3/8 M NPT x 9/16 M JIC	1
7d	171878	Hose, 5/16 x 14" Swivel 9/16 F JIC Both Ends	1
7e	F011109	Adapter, 9/16 M JIC x 1/4 F NPT	1
7f	F011432K	Pressure Gauge - 0 to 3000 PSI, 1/4 M NPT	1
8	F015303K	Male Coupler	1
9	F015077	Dust Cap	1
10	F011604	Nipple, 3/8 M NPT x 3/8 M NPT	1
11	F012056	Adapter, 3/8 M NPT x 9/16 M JIC	1
12	F012055	90° Elbow, 3/8 M NPT x 9/16 M JIC	3
13	F011594	Tee, 3/8 F NPT x 3/8 F NPT x 3/8 M NPT	1
14	F019242	Hose Clamp	4
15	154047	HOSE GROUP	1
15a	F010693	Hose, 5/16" I.D.	600"
15b	F011392	Swivel Hose Fitting, 9/16 F JIC	4

HYDRAULIC POWER PACK GROUP - 168105, REAR ONLY
ELECTRICAL SYSTEM





SE021523A-2

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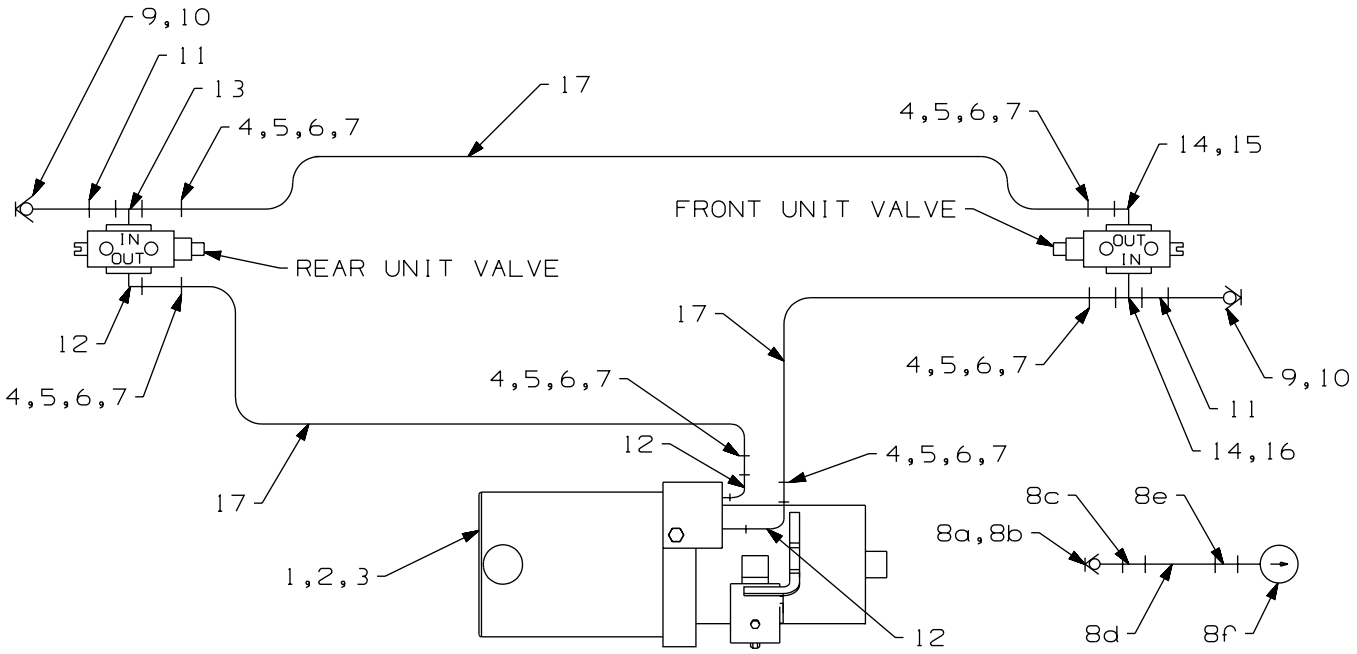
HYDRAULIC POWER PACK GROUP - 168105, REAR ONLY
ELECTRICAL SYSTEM

ITEM	PART NO	DESCRIPTION	QTY
1	F023886	Switch, ON/OFF	1
2	F009594	Machine Screw, #10-24 x 5/8" Rd Hd	2
3	F022039	Hex Flg Nut, #10-24	2
4	168107	Switch Mount	1
5	168108	Decal, Panel	1
6	F017476	Fuse Holder, With 20 Amp Fuse	1
7	F017149	Switch	1
8	F022246	Noise Suppresser	1
9	F007801	Screw, #8 x 5/8" Rd Hd Self-Tap	2
10	F023563	Connector	2
11	F023443	Bail	1
12	F023444	Relay	1
13	F023445	Relay Socket	1

186157 HYDRAULIC POWER PACK GROUP
HYDRAULIC SYSTEM

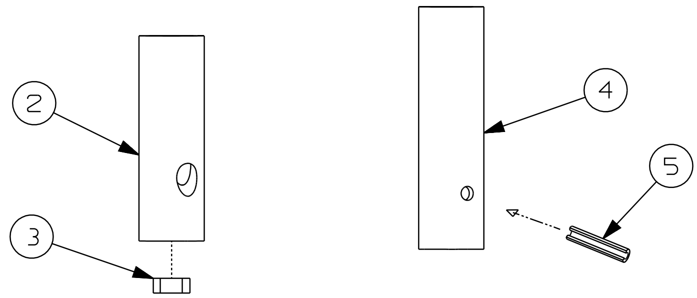


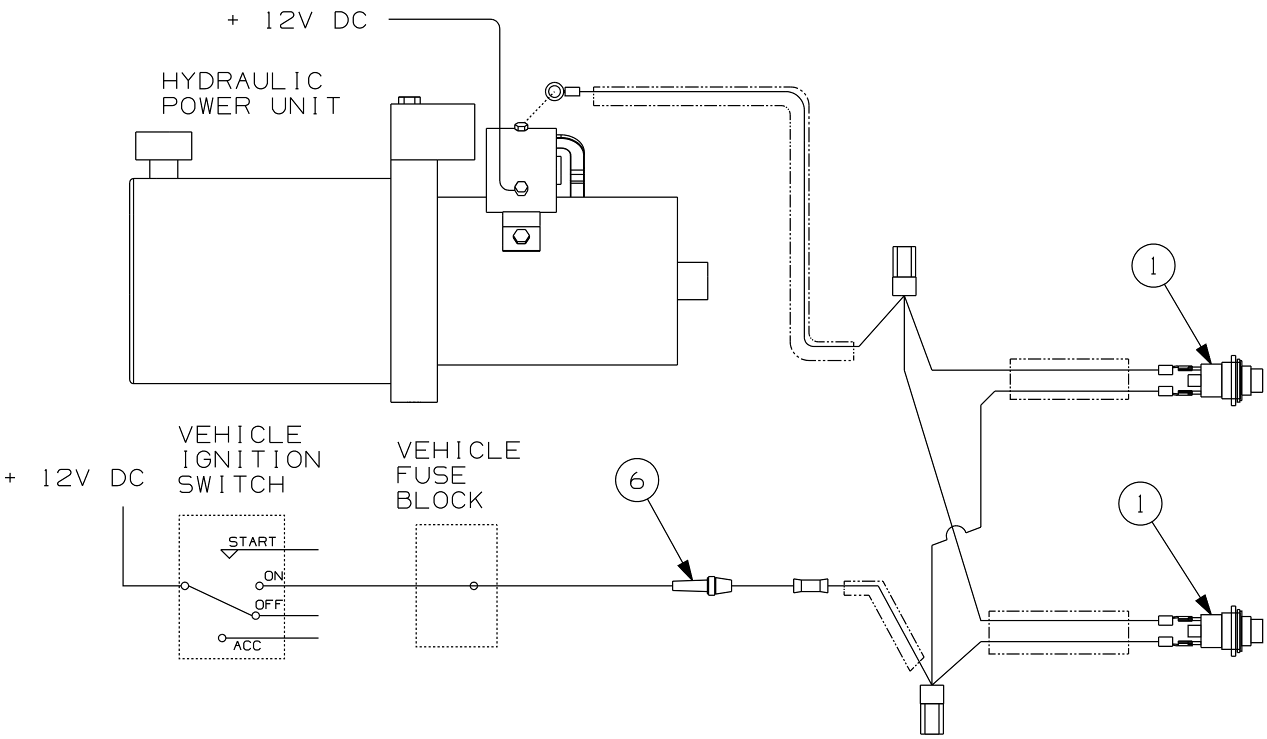
SE023172A-1

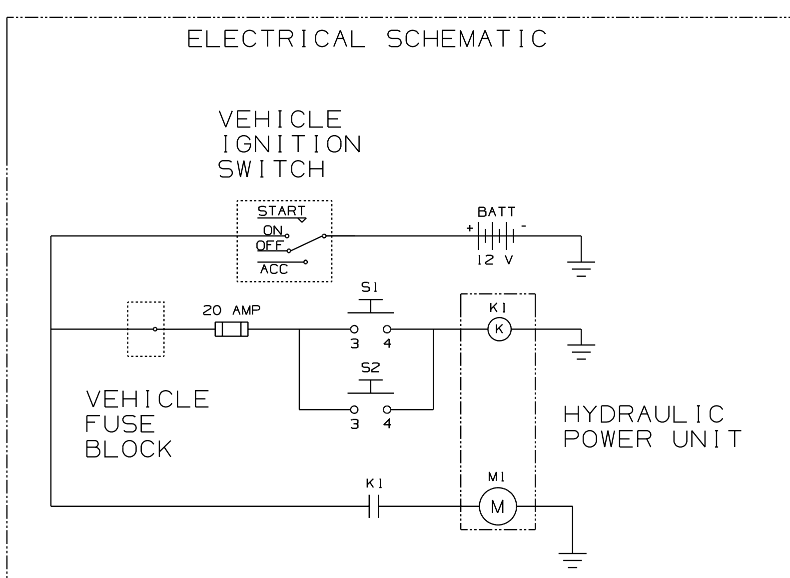
186157 HYDRAULIC POWER PACK GROUP
HYDRAULIC SYSTEM

ITEM	PART NO	DESCRIPTION	QTY
1	186119	Hydraulic Unit	1
2	F004683	Cap Screw, 3/8-16 x 5/8" GR 5 Hex Hd	2
3	F001025	SAE Lock Washer, 3/8"	2
4	F019242	Hose Clamp	8
5	F009825	Cap Screw, 1/4-20 x 1" GR 5 Hex Hd	8
6	F009535	SAE Lock Washer, 1/4"	8
7	F007022	Hex Nut, 1/4"-20	8
8	099137K	PRESSURE GAUGE ASSEMBLY	1
8a	F015110K	Female Coupler	1
8b	F015111	Dust Cap	1
8c	F012056	Adapter, 3/8 M NPT x 9/16 M JIC	1
8d	171878	Hose, 3/8 x 14" Swivel 9/16 F JIC Both Ends	1
8e	F011109	Adapter, 9/16 M JIC x 1/4 F NPT	1
8f	F011432K	Pressure Gauge - 0 to 3000 PSI, 1/4 M NPT	1
9	F015303K	Male Coupler	2
10	F015077	Dust Cap	2
11	F011604	Nipple, 3/8 M NPT x 3/8 M NPT	2
12	F012055	90° Elbow, 3/8 M NPT x 9/16 M JIC	4
13	F011594	Tee, 3/8 F NPT x 3/8 F NPT x 3/8 M NPT	1
14	F013518	Adapter, 9/16 M JIC x 3/4 M STR	2
15	F012808	90° Elbow, 9/16 F STR x 9/16 M JIC	1
16	F015626	Tee, 9/16 M JIC x 9/16 M JIC x 9/16 F STR	1
17	140348	HOSE GROUP	1
17a	F010693	Hose, 5/16" I.D.	720"
17b	F011392	Swivel Hose Fitting, 9/16 F JIC	6

186157 HYDRAULIC POWER PACK GROUP
ELECTRICAL SYSTEM





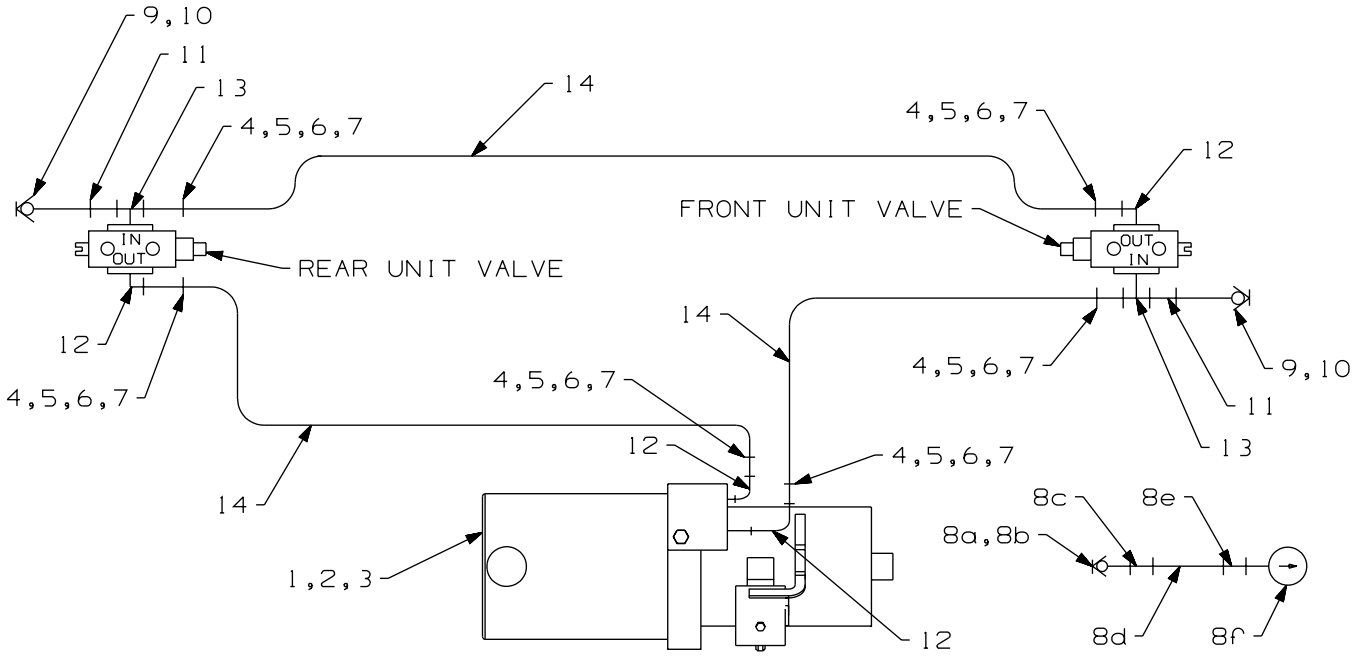


SE023172A-2

186157 HYDRAULIC POWER PACK GROUP
ELECTRICAL SYSTEM

ITEM	PART NO	DESCRIPTION	QTY
1	F025620	Switch	2
2	186118	Handle / Switch Mount Tube, HR18A Rail Pilot Unit	1
3	F025777	Hex Nut, M8 x 1.25	1
4	184549	Handle / Switch Mount Tube, HR2000 Rail Pilot Unit	1
5	700751087	Spring Pin, 3/16 x 7/8"	1
6	F017476	Fused Line Connector With 20 amp Fuse	1

186158 HYDRAULIC POWER PACK GROUP
HYDRAULIC SYSTEM

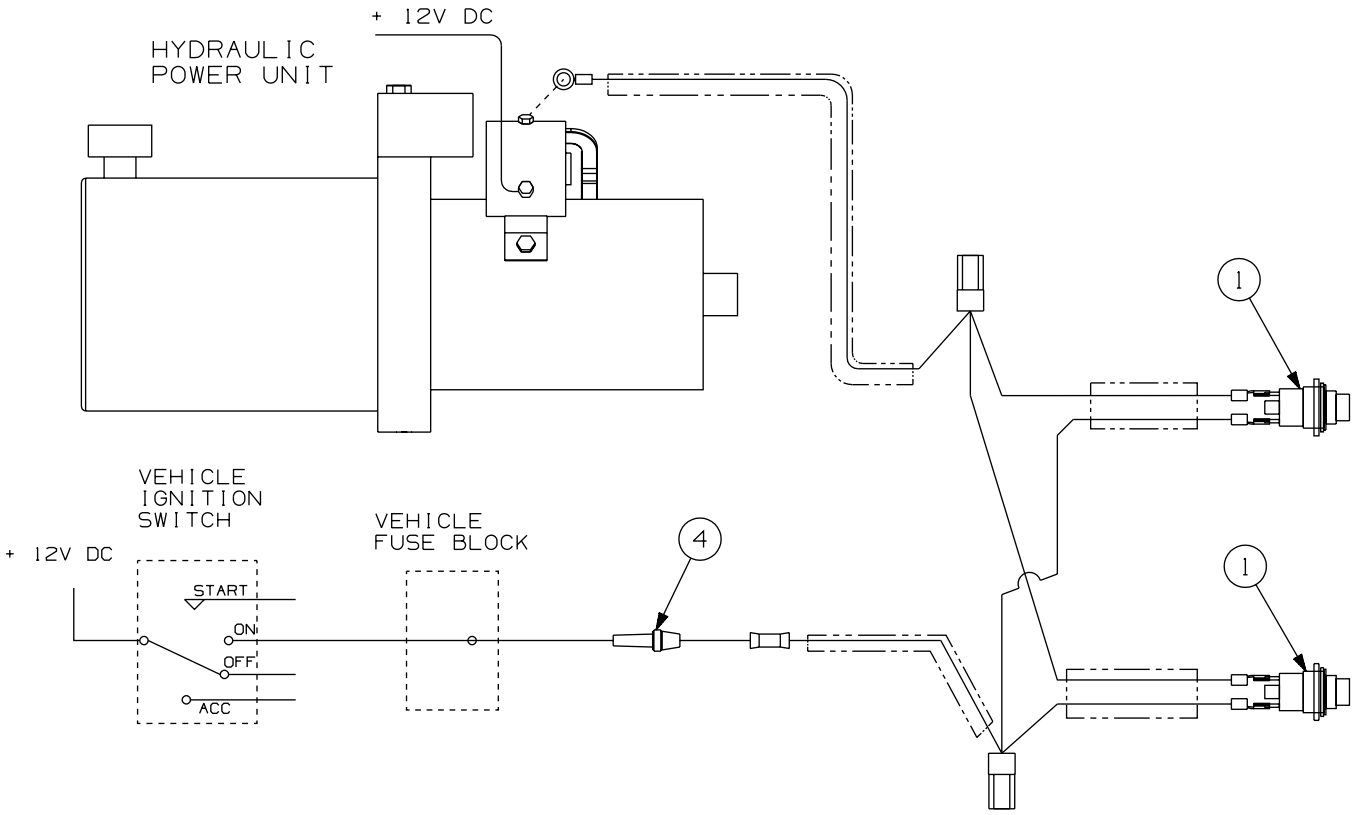


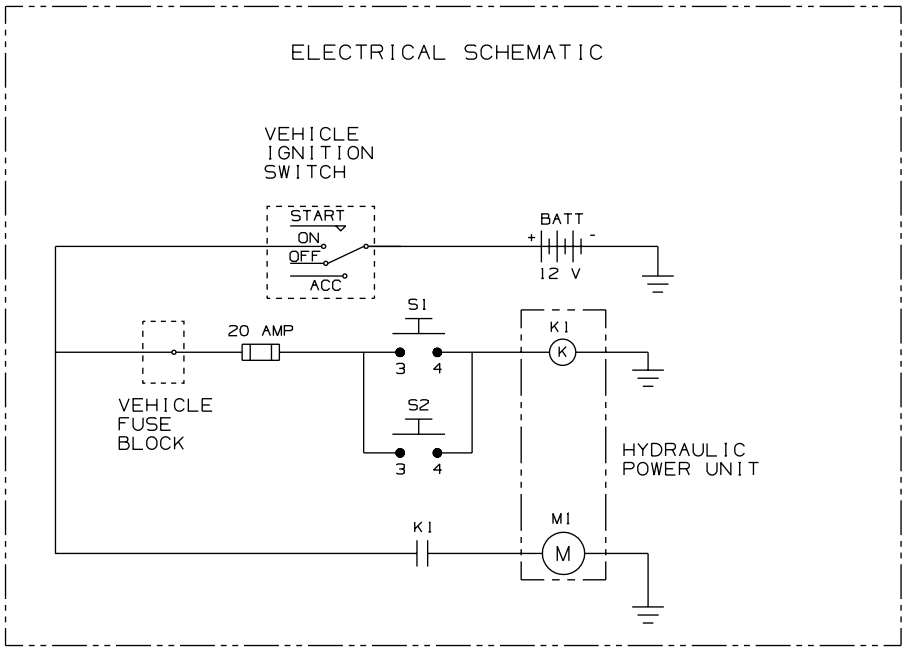
SE023186A-1

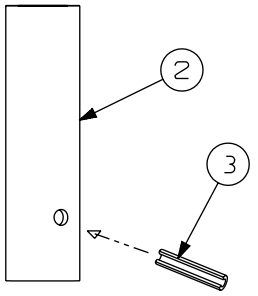
186158 HYDRAULIC POWER PACK GROUP
HYDRAULIC SYSTEM

ITEM	PART NO	DESCRIPTION	QTY
1	186119	Hydraulic Unit	1
2	F004683	Cap Screw, 3/8-16 x 5/8" GR 5 Hex Hd	2
3	F001025	SAE Lock Washer, 3/8"	2
4	F019242	Hose Clamp	8
5	F009825	Cap Screw, 1/4-20 x 1" GR 5 Hex Hd	8
6	F009535	SAE Lock Washer, 1/4"	8
7	F007022	Hex Nut, 1/4"-20	8
8	099137K	PRESSURE GAUGE ASSEMBLY	1
8a	F015110K	Female Coupler	1
8b	F015111	Dust Cap	1
8c	F012056	Adapter, 3/8 M NPT x 9/16 M JIC	1
8d	171878	Hose, 3/8 x 14" Swivel 9/16 F JIC Both Ends	1
8e	F011109	Adapter, 9/16 M JIC x 1/4 F NPT	1
8f	F011432K	Pressure Gauge - 0 to 3000 PSI, 1/4 M NPT	1
9	F015303K	Male Coupler	2
10	F015077	Dust Cap	2
11	F011604	Nipple, 3/8 M NPT x 3/8 M NPT	2
12	F012055	90° Elbow, 3/8 M NPT x 9/16 M JIC	4
13	F011594	Tee, 3/8 F NPT x 3/8 F NPT x 3/8 M NPT	2
14	140348	HOSE GROUP	1
14a	F010693	Hose, 5/16" I.D.	720"
14b	F011392	Swivel Hose Fitting, 9/16 F JIC	6

186158 HYDRAULIC POWER PACK GROUP
ELECTRICAL SYSTEM







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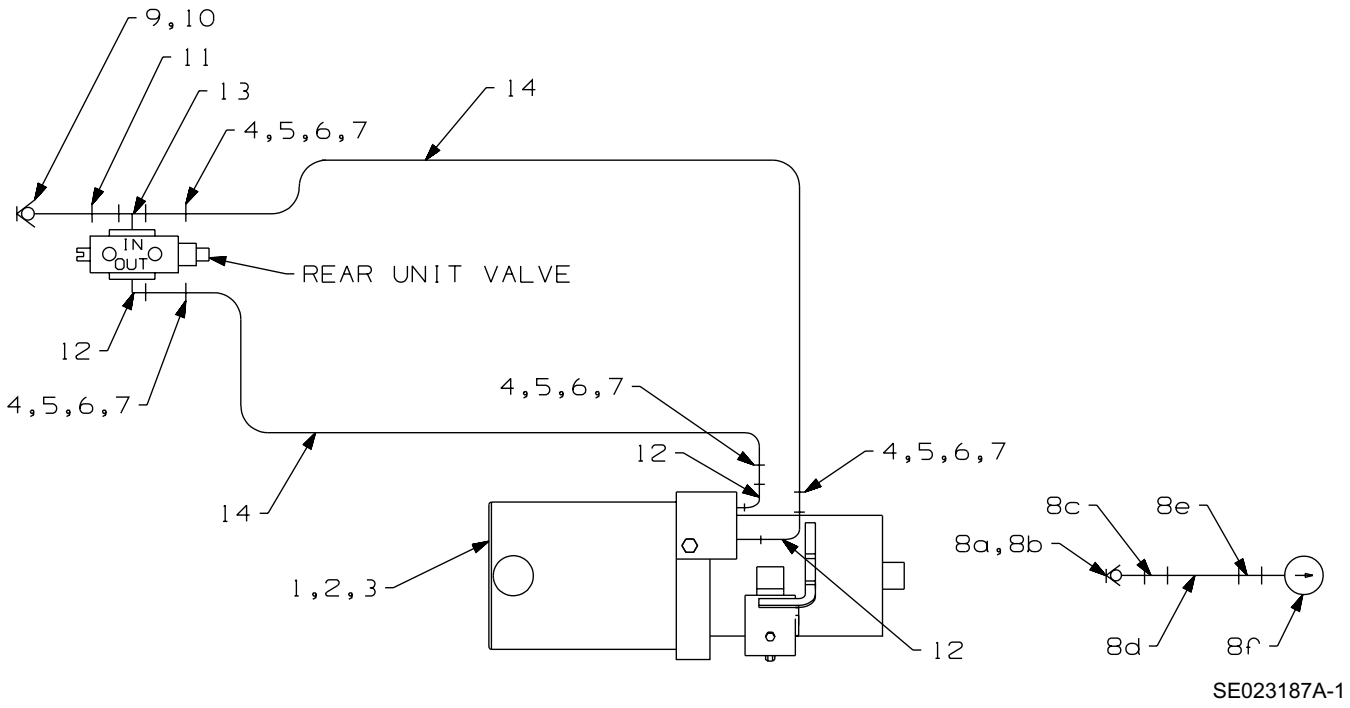
186158 HYDRAULIC POWER PACK GROUP
ELECTRICAL SYSTEM

ITEM	PART NO	DESCRIPTION	QTY
1	F025620	Switch	2
2	184549	Handle / Switch Mount Tube	2
3	700751087	Spring Pin, 3/16 x 7/8"	2
4	F017476	Fused Line Connector With 20 amp Fuse	1

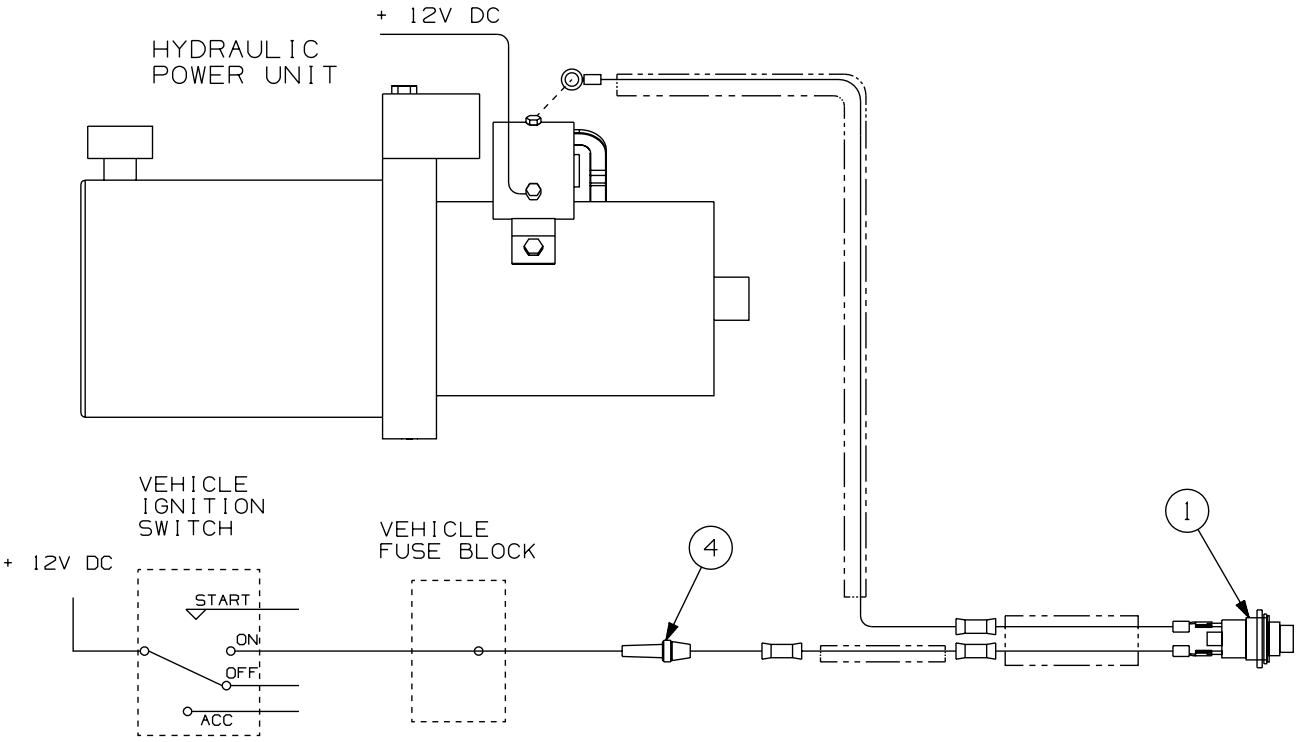
186159 HYDRAULIC POWER PACK GROUP - REAR ONLY
HYDRAULIC SYSTEM

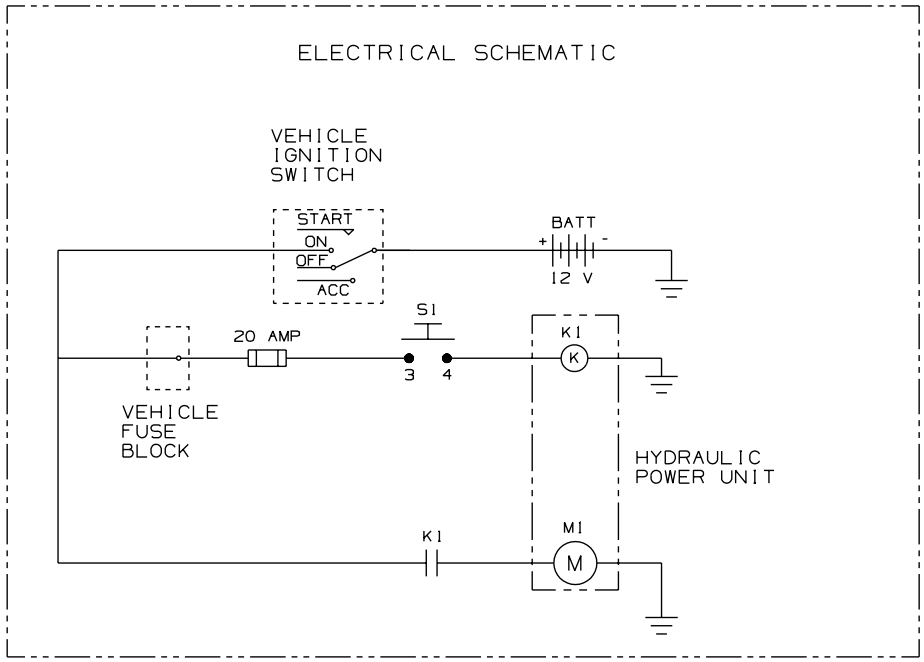


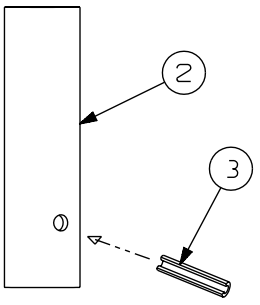
186159 HYDRAULIC POWER PACK GROUP - REAR ONLY
HYDRAULIC SYSTEM

ITEM	PART NO	DESCRIPTION	QTY
1	186119	Hydraulic Unit	1
2	F004683	Cap Screw, 3/8-16 x 5/8" GR 5 Hex Hd	2
3	F001025	SAE Lock Washer, 3/8"	2
4	F019242	Hose Clamp	5
5	F009825	Cap Screw, 1/4-20 x 1" GR 5 Hex Hd	5
6	F009535	SAE Lock Washer, 1/4"	5
7	F007022	Hex Nut, 1/4"-20	5
8	099137K	PRESSURE GAUGE ASSEMBLY	1
8a	F015110K	Female Coupler	1
8b	F015111	Dust Cap	1
8c	F012056	Adapter, 3/8 M NPT x 9/16 M JIC	1
8d	171878	Hose, 3/8 x 14" Swivel 9/16 F JIC Both Ends	1
8e	F011109	Adapter, 9/16 M JIC x 1/4 F NPT	1
8f	F011432K	Pressure Gauge - 0 to 3000 PSI, 1/4 M NPT	1
9	F015303K	Male Coupler	1
10	F015077	Dust Cap	1
11	F011604	Nipple, 3/8 M NPT x 3/8 M NPT	1
12	F012055	90° Elbow, 3/8 M NPT x 9/16 M JIC	3
13	F011594	Tee, 3/8 F NPT x 3/8 F NPT x 3/8 M NPT	1
14	154047	HOSE GROUP	1
14a	F010693	Hose, 5/16" I.D.	600"
14b	F011392	Swivel Hose Fitting, 9/16 F JIC	4

186159 HYDRAULIC POWER PACK GROUP - REAR ONLY
ELECTRICAL SYSTEM







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186159 HYDRAULIC POWER PACK GROUP - REAR ONLY
ELECTRICAL SYSTEM

ITEM	PART NO	DESCRIPTION	QTY
1	F025620	Switch	2
2	184549	Handle / Switch Mount Tube	2
3	700751087	Spring Pin, 3/16 x 7/8"	2
4	F017476	Fused Line Connector With 20 amp Fuse	1

DECAL SERVICE GROUP - 154528 - INSULATED

PART NO	DESCRIPTION	QTY
154528	DECAL SERVICE GROUP	1
154527	Decal, Operating Instructions	1
140220	Decal, Warning: Do Not Operate...	3
F018082	Decal, Safety Instructions: Lock Front Wheels...	1
F018083	Decal, Axle Lock Instructions	1
154529	Decal, Operation	2
155007	Decal, Vehicle Completed By...	1
163187	Decal, Axle Lock Instructions	1
020458	Decal Application Drawing	1
BUL #1183	Operator's Service and Parts Manual	1

DECAL SERVICE GROUP - 168046 - NON-INSULATED

PART NO	DESCRIPTION	QTY
168046	DECAL SERVICE GROUP - NON-INSULATED	1
154527	Decal, Operating Instructions	1
140220	Decal, Warning: Do Not Operate...	3
F018082	Decal, Safety Instructions: Lock Front Wheels...	1
F018083	Decal, Axle Lock Instructions	1
154529	Decal, Operation	2
155007	Decal, Vehicle Completed By...	1
163187	Decal, Axle Lock Instructions	1
159457	Decal, Warning: Non-Insulated	1
021500	Decal Application Drawing	1
BUL #1183	Operator's Service and Parts Manual	1

MOUNTING BRACKET GROUP - 159076

PART NO	DESCRIPTION	QTY
159076	MOUNTING BRACKET GROUP	1
Front Unit Mounting Parts		
159077	Side Bar	1
159081	Side Bar	1
156004	Shim (use as required)	2
156005	Shim (use as required)	2
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	6
F021924	Hex Flg Nut, 5/8"-11	12
F003566	Cap Screw, 5/8-11 x 1-1/2" GR 5 Hex Hd	4
F021924	Hex Flg Nut, 5/8"-11	12
F001304	Cap Screw, 5/8-11 x 2" GR 5 Hex Hd.	2
125978	Washer	4
154565	Bracket	1
154563	Bracket	1
F021192	Cap Screw, 1/4-20 x 3-3/4" Hex Hd	4
F009535	SAE Lock Washer, 1/4"	4
F007022	Hex Nut, 1/4"-20	4
F020598	Spring	1
F011954	Spring Pin, 3/8 x 1-1/2"	2
F020964	Collar	1
159090	Hook Rod	1
F014260K	Knob	1
F001104	Cotter Pin, 1/8 x 1"	2
F001267	Wrought Washer, 1/2".	2
130457	Axle Hook	2
130458	Axle Hook Arm	2
F015807	Cap Screw, 5/8-18 x 1-3/4" GR 5 Hex Hd	4
F020917	Hex Flg Nut, 5/8"-18	4
159095	Axle Hook Bracket	2
F007941	Cap Screw, 5/8-11 x 5" GR 5 Hex Hd.	2
F001103	SAE Lock Washer, 5/8"	2
F007023	Hex Nut, 5/8"-11	2
F020458	Cap Screw, 3/4-10 x 2-1/2" GR 8 Hex Hd	2
M022621	Spacer	2
F021137	Hardened Washer.	2
F023375	Hex Flg Nut, 3/4"-10	2
F025462	Cap Screw, 9/16-12 x 5" GR 8 Hex Hd.	2
021002	Front Unit Application Drawing	

MOUNTING BRACKET GROUP - 159076

PART NO	DESCRIPTION	QTY
159076	MOUNTING BRACKET GROUP	1

Rear Unit Mounting Parts

F020919	Hardened Washer	6
F001360	Cap Screw, 5/8-11 x 2-1/2" GR 5 Hex Hd	22
F021924	Hex Flg Nut, 5/8"-11	22
156004	Shim (use as required)	2
156005	Shim (use as required)	2
161999	Frame Extension (weld on)	2
162098	Frame Extension (weld on)	2
162102	Bar (weld on)	1
021003	Rear Unit Application Drawing	

MOUNTING BRACKET GROUP - 161621

PART NO	DESCRIPTION	QTY
161621	MOUNTING BRACKET GROUP	1
Front Unit Mounting Parts		
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	6
F021924	Hex Flg Nut, 5/8"-11	6
161444	Side Bar, Right	1
161445	Side Bar, Left	1
138400	Tube	2
139104	Angle	2
F015134	Cap Screw, 3/4-10 x1-3/4" GR 5 Hex Hd	4
F021926	Hex Flg Nut, 3/4"-10	4
F023887	Cap Screw, M16 x 20 x 120 mm Hex Hd	2
F002753	Cap Screw, 1/2-13 x 2-1/4" GR 5 Hex Hd	6
F022037	Hex Flg Nut, 1/2"-13	6
154565	Bracket	1
161630	Clamp	2
F009535	SAE Lock Washer, 1/4"	4
F007022	Hex Nut, 1/4"-20	4
F020598	Spring	1
F011954	Spring Pin, 3/8 x 1-1/2"	2
F020964	Collar	1
161616	Axle Hook Rod	1
F014260K	Knob	1
F001104	Cotter Pin, 1/8 x 1"	2
F001267	Wrought Washer, 1/2"	2
161617	Axle Hook	2
F001547	Cotter Pin, 1/4 x 2"	2
F013412	Wrought Washer, 1"	2
138388	Axle Hook Bracket, Right	1
161614	Axle Hook Bracket, Left	1
F023644	Cap Screw, M12 x 1.75 x 120 mm Hex Hd	2
F016250	Cap Screw, 3/4-10 x 4" GR 5 Hex Hd	2
F021137	Hardened Washer	2
F001354	SAE Lock Washer, 3/4"	2
F013695	Hex Nut, 3/4"-10	2
156004	Shim (use as required)	2
156005	Shim (use as required)	2
021135	Front Unit Application Drawing	

MOUNTING BRACKET GROUP - 161621

PART NO	DESCRIPTION	QTY
161621	MOUNTING BRACKET GROUP	1

Rear Unit Mounting Parts

F020919	Hardened Washer	6
700566225	Cap Screw, 5/8-11 x 2-1/4" GR 8 Hex Hd	6
F017188	Hex Elastic Stop Nut, 5/8"-11	6
126023	Frame Extension (weld on)	2
156004	Shim (use as required)	2
156005	Shim (use as required)	2
021728	Rear Unit Application Drawing - HR2000A2	
020647	Rear Unit Application Drawing - HR2000A3	

MOUNTING BRACKET GROUP - 162099

PART NO	DESCRIPTION	QTY
162099	MOUNTING BRACKET GROUP	1
Front Unit Mounting Parts		
F024067	Machine Screw, #10-24 x 1/2" Hex Hd	1
162074	Side Bar	2
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	14
F021924	Hex Flg Nut, 5/8"-11	14
F009425	SAE Washer, 5/8"	8
F009541	SAE Lock Washer, #10	1
F009542	Hex Nut, #10-24	1
163612	Pin	2
163611	Axle Hook, Right	1
163608	Axle Hook, Left	1
F013412	Wrought Washer, 1"	4
F001547	Cotter Pin, 1/4 x 2"	2
163149	Pull Rod	1
F001267	Wrought Washer, 1/2"	2
F001104	Cotter Pin, 1/8 x 2"	2
168693	Bar	1
168691	Bracket	1
161630	Clamp	2
F020971	Quick Release Pin	1
F009535	SAE Lock Washer, 1/4"	4
F007022	Hex Nut, 1/4"-20	4
F014260K	Knob	1
F017082	Lanyard	1
156004	Shim (use as required)	2
156005	Shim (use as required)	2
F013412	Wrought Washer, 1"	2
F001657	SAE Lock Washer, 1"	2
F020616	Hex Nut, 1"-8	2
F008284	Grease Fitting, 1/4"-28 45°	2
021218	Front Unit Application Drawing	

MOUNTING BRACKET GROUP - 162099

PART NO	DESCRIPTION	QTY
162099	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
F020919	Hardened Washer	6
F001360	Cap Screw, 5/8-11 x 2-1/2" GR 5 Hex Hd	6
F021924	Hex Flg Nut, 5/8"-11	6
156004	Shim (use as required)	2
156005	Shim (use as required)	2
162100	Side Bar	2
F006382	Cap Screw, 3/4-10 x 2-1/2" GR 5 Hex Hd	6
F001753	Wrought Washer, 3/4"	6
F001354	SAE Lock Washer, 3/4"	6
F013695	Hex Nut, 3/4"-10	6
021217	Rear Unit Application Drawing	

MOUNTING BRACKET GROUP - 162460 - REAR ONLY

PART NO	DESCRIPTION	QTY
162460	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
162457	Side Bar, Right	1
162458	Side Bar, Left	1
156004	Shim (use as required)	2
156005	Shim (use as required)	2
F015134	Cap Screw, 3/4-10 x 1-3/4" GR 5 Hex Hd	4
099193	Washer	4
F001354	SAE Lock Washer, 3/4"	4
F013695	Hex Nut, 3/4"-10	4
F020919	Hardened Washer	6
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	6
F021924	Hex Flg Nut, 5/8"-11	6
F002753	Cap Screw, 1/2-13 x 2-1/4" GR 5 Hex Hd	2
F001075	SAE Lock Washer, 1/2"	2
F003598	Hex Nut, 1/2"-13	2
161895	Channel (weld on)	2
021195	Rear Unit Application Drawing - HR2000A3	
021272	Rear Unit Application Drawing - HR2000A3	

MOUNTING BRACKET GROUP - 164044 - REAR ONLY

PART NO	DESCRIPTION	QTY
164044	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
164040	Side Bar	1
164041	Side Bar	1
156004	Shim (use as required)	2
156005	Shim (use as required)	2
F001539	Cap Screw, 1/2-13 x 1-1/4" GR 5 Hex Hd	2
F001075	SAE Lock Washer, 1/2"	2
F003598	Hex Nut, 1/2"-13	2
F005192	Cap Screw, 5/8-11 x 1-3/4" GR 5 Hex Hd	4
125978	Washer	4
F001103	SAE Lock Washer, 5/8"	4
F007023	Hex Nut, 5/8"-11	4
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	6
F020919	Hardened Washer	6
F021924	Hex Flg Nut, 5/8"-11	6
021418	Rear Unit Application Drawing	

MOUNTING BRACKET GROUP - 164529

PART NO	DESCRIPTION	QTY
164529	MOUNTING BRACKET GROUP	1
Front Unit Mounting Parts		
164527	Side Bar, Right	1
164528	Side Bar, Left	1
138400	Tube	2
139104	Angle	2
F023147	Cap Screw, M16 x 2.0 x 110 mm Hex Hd	2
F002753	Cap Screw, 1/2-13 x 2-1/4" GR 5 Hex Hd	6
F001075	SAE Lock Washer, 1/2"	8
F003598	Hex Nut, 1/2"-13	8
F007985	Cap Screw, 3/4-10 x 2" GR 5 Hex Hd	4
F002929	SAE Washer, 3/4"	4
F001354	SAE Lock Washer, 3/4"	4
F013695	Hex Nut, 3/4"-10	4
156004	Shim (use as required)	2
156005	Shim (use as required)	2
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	6
F021924	Hex Flg Nut, 5/8"-11	6
139615	Bracket	2
F001007	Cap Screw, 3/8-16 x 1" GR 5 Hex Hd	2
F001025	SAE Lock Washer, 3/8"	2
F007020	Hex Nut, 3/8"-16	2
F020598	Spring	2
F015115	Spring Pin, 3/8 x 3/4"	4
F020964	Collar	4
168064	Axle Hook Rod	2
168065	Plate	1
F014260K	Knob	2
F001104	Cotter Pin, 1/8 x 1"	2
F001267	Wrought Washer, 1/2"	2
168037	Axle Hook	2
F001547	Cotter Pin, 1/4 x 2"	2
F013412	Wrought Washer, 1"	12
168066	Axle Hook Bracket, Right	1
168082	Axle Hook Bracket, Left	1
F021137	Hardened Washer	2
F001122	Cap Screw, 5/16-18 x 1-1/2" GR 5 Hex Hd	4
F001100	SAE Lock Washer, 5/16"	4
F007021	Hex Nut, 5/16"-18	4
138110	Bracket	1
F001090	Cap Screw, 1/2-13 x 1-1/2" GR 5 Hex Hd	2
F023012	Hardened Washer, 5/8"	2
021450	Front Unit Application Drawing	

MOUNTING BRACKET GROUP - 164529

PART NO	DESCRIPTION	QTY
164529	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
139647	Frame Extension (weld on)	2
164522	Side Bar	2
156004	Shim (use as required)	2
156005	Shim (use as required)	2
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	22
F020919	Hardened Washer	6
F021924	Hex Flg Nut, 5/8"-11	22
163636	Brace End	2
163634	Brace End	2
021451	Rear Unit Application Drawing	

MOUNTING BRACKET GROUP - 167788

PART NO	DESCRIPTION	QTY
167788	MOUNTING BRACKET GROUP	1
Front Unit Mounting Parts		
161989	Side Bar	1
161991	Side Bar	1
161897	Bar	2
F021857	Cap Screw, 5/8-11 x 6-1/2" GR 8 Hex Hd	4
F023012	Hardened Washer, 5/8"	4
F019503	Hex Nut, 5/8"-11	4
161992	Tube	4
F023743	Cap Screw, 5/8-11 x 5-1/2" GR 8 Hex Hd	4
F001103	SAE Lock Washer, 5/8"	4
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	6
F021924	Hex Flg Nut, 5/8"-11	6
162478	Bracket	2
F013412	Wrought Washer, 1"	4
F001547	Cotter Pin, 1/4 x 2"	2
167898	Axle Hook	2
M033360K1	Rod End	4
F005460	Yoke Pin	4
F018332	Threaded Rod, 36"	2
F002737	Hex Jam Nut, 1/2"-13	4
F001267	Wrought Washer, 1/2"	8
167789	Axle Hook Lever	2
F022846	Handle Grip	2
F004253	Cap Screw, 5/8-11 x 3-3/4" GR 5 Hex Hd	2
F001121	Wrought Washer, 5/8"	2
F012452	Hex Elastic Stop Nut, 5/8"-11	2
F017061	Machine Screw, #4-40 x 1" Rd Hd	2
F022981	Lock Washer, #4	2
F010193	Hex Nut, #4-40	2
F022104	Lock Pin And Lanyard	2
156004	Shim (use as required)	2
156005	Shim (use as required)	2
021645	Front Unit Application Drawing	

MOUNTING BRACKET GROUP - 167788

PART NO	DESCRIPTION	QTY
167788	MOUNTING BRACKET GROUP	1

Rear Unit Mounting Parts

F020919	Hardened Washer	6
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	6
F021924	Hex Flg Nut, 5/8"-11	6
156004	Shim (use as required)	2
156005	Shim (use as required)	2
161895	Channel (weld on)	2
021719	Rear Unit Application Drawing - HR2000A2	
021195	Rear Unit Application Drawing - HR2000A3	

MOUNTING BRACKET GROUP - 167889

PART NO	DESCRIPTION	QTY
167889	MOUNTING BRACKET GROUP	1
Front Unit Mounting Parts		
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	6
F021924	Hex Flg Nut, 5/8"-11	6
167873	Side Bar, Right	1
167872	Side Bar, Left	1
139104	Angle	2
F002753	Cap Screw, 1/2-13 x 2-1/4" GR 5 Hex Hd	6
F022037	Hex Flg Nut, 1/2"-13	6
F007985	Cap Screw, 3/4-10 x 2" GR 5 Hex Hd	6
F002929	SAE Washer, 3/4"	6
F001354	SAE Lock Washer, 3/4"	6
F013695	Hex Nut, 3/4"-10	6
154565	Bracket	1
161630	Clamp	2
F007022	Hex Nut, 1/4"-20	4
F020598	Spring	1
F011954	Spring Pin, 3/8 x 1-1/2"	2
F020964	Collar	1
161616	Axle Hook Rod	1
F014260K	Knob	1
F001104	Cotter Pin, 1/8 x 1"	2
F001267	Wrought Washer, 1/2"	2
161889	Axle Hook	2
161882	Axle Hook Bracket, Right	1
161885	Axle Hook Bracket, Left	1
F024054	Cap Screw, 5/8-11 x 4-1/4" GR 5 Hex Hd	4
F007023	Hex Nut, 5/8"-11	4
F001103	SAE Lock Washer, 5/8"	4
F001547	Cotter Pin, 1/4 x 2"	2
F023271	Washer	2
F001121	Wrought Washer, 5/8"	4
F001122	Cap Screw, 5/16-18 x 1-1/2" GR 5 Hex Hd	4
F001100	SAE Lock Washer, 5/16"	4
F007021	Hex Nut, 5/16"-18	4
138110	Bracket	1
F023690	Washer	6
156004	Shim (use as required)	2
156005	Shim (use as required)	2
F009535	SAE Lock Washer, 1/4"	4
021622	Front Unit Application Drawing	

MOUNTING BRACKET GROUP - 167889

PART NO	DESCRIPTION	QTY
167889	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
139647	Frame Extension	2
156004	Shim (use as required)	2
156005	Shim (use as required)	2
F001360	Cap Screw, 5/8-11 x 2-1/2" GR 5 Hex Hd	6
F020919	Hardened Washer	6
F012452	Hex Elastic Stop Nut, 5/8"-11	6
021623	Rear Unit Application Drawing	

MOUNTING BRACKET GROUP - 174348 - REAR ONLY

PART NO	DESCRIPTION	QTY
174348	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
163636	Brace End	1
163634	Brace End	1
F024047	Washer	4
174321	Side Bar, Right	1
174322	Side Bar, Left	1
108823	Shim (use as required)	4
108824	Shim (use as required)	4
F001539	Cap Screw, 1/2-13 x 1-1/4" GR 5 Hex Hd	2
F001075	SAE Lock Washer, 1/2"	2
F003598	Hex Nut, 1/2"-13 GR 5	2
F005192	Cap Screw, 5/8-11 x 1-3/4" GR 5 Hex Hd	4
125978	Washer	4
F001103	SAE Lock Washer, 5/8"	4
F007023	Hex Nut 5/8"-11 GR 5	4
F018860	Cap Screw, 1/2-13 x 2-3/4" GR 8 Hex Hd	6
F024047	Washer	6
174323	Bar	2
F014487	Elastic Stop Nut, 1/2"-13	6
021418	Rear Unit Application Drawing	

MOUNTING BRACKET GROUP - 175219 - REAR ONLY

PART NO	DESCRIPTION	QTY
175219	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
164040	Side Bar	1
164041	Side Bar	1
156004	Shim (use as required)	2
156005	Shim (use as required)	2
F001539	Cap Screw, 1/2-13 x 1-1/4" GR 5 Hex Hd	2
F001075	SAE Lock Washer, 1/2"	2
F003598	Hex Nut, 1/2"-13	2
F005192	Cap Screw, 5/8-11 x 1-3/4" GR 5 Hex Hd	4
125978	Washer	4
F001103	Lock Washer, 5/8"	4
F007023	Hex Nut, 5/8"-11	4
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	6
F020919	Hardened Washer	6
F021924	Hex Flg Nut, 5/8"-11	6
021418	Rear Unit Application Drawing	

MOUNTING BRACKET GROUP - 175221 - REAR ONLY

PART NO	DESCRIPTION	QTY
175221	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
162457	Side Bar, Right	1
162458	Side Bar, Left	1
156004	Shim (use as required)	2
156005	Shim (use as required)	2
F015134	Cap Screw, 3/4-10 x 1-3/4" GR 5 Hex Hd	4
099193	Washer	4
F001354	Lock Washer, 3/4"	4
F013695	Hex Nut, 3/4"-10	4
F020919	Hardened Washer	6
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	6
F021924	Hex Flg Nut, 5/8"-11	6
F002753	Cap Screw, 1/2-13 x 2-1/4" GR 5 Hex Hd	2
F001075	SAE Lock Washer, 1/2"	2
F003598	Hex Nut, 1/2"-13	2
021272	Rear Unit Application Drawing	

MOUNTING BRACKET GROUP - 175697 - REAR ONLY

PART NO	DESCRIPTION	QTY
175697	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
F020919	Hardened Washer	6
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	6
F021924	Hex Flg Nut, 5/8"-11	6
161895	Frame Extension	2
156004	Shim (use as required)	2
156005	Shim (use as required)	2
021719	Rear Unit Application Drawing - HR2000A2	
021195	Rear Unit Application Drawing - HR2000A3	

MOUNTING BRACKET GROUP - 179945 - REAR ONLY

PART NO	DESCRIPTION	QTY
179945	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
F020919	Hardened Washer	6
700566225	Cap Screw, 5/8-11 x 2-1/4" GR 8 Hex Hd	6
F017188	Hex Elastic Stop Nut, 5/8"-11	6
126023	Frame Extension (weld on)	2
156004	Shim (use as required)	2
156005	Shim (use as required)	2
021728	Rear Unit Application Drawing - HR2000A2	
020647	Rear Unit Application Drawing - HR2000A3	

MOUNTING BRACKET GROUP - 181482 - REAR ONLY

PART NO	DESCRIPTION	QTY
181482	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
139647	Frame Extension (weld on)	2
156004	Shim (use as required)	2
156005	Shim (use as required)	2
149966	Cap Screw, 5/8-11 x 2-1/2" GR 8 Hex Hd	6
F020919	Hardened Washer	6
F012452	Hex Elastic Stop Nut, 5/8"-11	6
022724	Rear Unit Application Drawing	

MOUNTING BRACKET GROUP - 181687 - REAR ONLY

PART NO	DESCRIPTION	QTY
181687	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
181661	Side Bar, Right	1
181662	Side Bar, Left	1
156004	Shim (use as required)	2
156005	Shim (use as required)	2
F020672	Cap Screw, 3/4-10 x 5 GR 8 Hex Hd	2
F013633	Elastic Stop Nut, 3/4"-10	2
F021137	Hardened Washer	2
F022822	Cap Screw, 5/8-11 x 4-1/2" GR 8 Hex Hd	2
F012452	Elastic Stop Nut, 5/8"	8
183875	Cap Screw, 1/2-13x4 1/2 Gr8 Hex Hd	4
F013500	Elastic Stop Nut, 1/2"-13	4
F001267	Wrought Washer, 1/2"	4
F016378	Cap Screw, 5/8-11 x 3-1/2" GR 8 Hex Hd	6
F023012	Hardened Washer	6
022910	Rear Unit Application Drawing	

MOUNTING BRACKET GROUP - 184094 - REAR ONLY

PART NO	DESCRIPTION	QTY
184094	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
184092	Channel	2
149966	Cap Screw, 5/8-11 x 2-1/2" GR 8 Hex Hd	6
F009425	SAE Washer, 5/8"	12
F017188	Hex Elastic Stop Nut, 5/8"-11	6
156004	Shim (use as required)	2
156005	Shim (use as required)	2
023095	Rear Unit Application Drawing - HR2000A2	

MOUNTING BRACKET GROUP - 184095 - REAR ONLY

PART NO	DESCRIPTION	QTY
184095	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
184092	Channel	2
149966	Cap Screw, 5/8-11 x 2-1/2" GR 8 Hex Hd	6
F009425	SAE Washer, 5/8"	12
F017188	Hex Elastic Stop Nut, 5/8"-11	6
156004	Shim (use as required)	2
156005	Shim (use as required)	2
023095	Rear Unit Application Drawing - HR2000A2	
023094	Rear Unit Application Drawing - HR2000A3	

MOUNTING BRACKET GROUP - 184098 - REAR ONLY

PART NO	DESCRIPTION	QTY
184098	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
184092	Channel	2
149966	Cap Screw, 5/8-11 x 2-1/2" GR 8 Hex Hd	6
F009425	SAE Washer, 5/8"	12
F017188	Hex Elastic Stop Nut, 5/8"-11	6
156004	Shim (use as required)	2
156005	Shim (use as required)	2
023095	Rear Unit Application Drawing - HR2000A2	
023094	Rear Unit Application Drawing - HR2000A3	

MOUNTING BRACKET GROUP - 184099 - REAR ONLY

PART NO	DESCRIPTION	QTY
184099	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
184092	Channel	2
149966	Cap Screw, 5/8-11 x 2-1/2" GR 8 Hex Hd	6
F009425	SAE Washer, 5/8"	12
F017188	Hex Elastic Stop Nut, 5/8"-11	6
156004	Shim (use as required)	2
156005	Shim (use as required)	2
023094	Rear Unit Application Drawing	

MOUNTING BRACKET GROUP - 184522 - REAR ONLY

PART NO	DESCRIPTION	QTY
184522	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
F002929	SAE Washer, 3/4"	4
700666075	Hex Lock Nut, 3/4"-10	2
F023012	Hardened Washer	20
F020460	Cap Screw, 5/8-11 x 2" GR 8 Hex Hd	4
F017188	Hex Elastic Stop Nut, 5/8"-11	10
F020458	Cap Screw, 3/4-10 x 2-1/2" GR 8 Hex Hd	2
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	6
184508	Side Bar, Right	1
184507	Side Bar, Left	1
156004	Shim (use as required)	2
156005	Shim (use as required)	2
023062	Rear Unit Application Drawing	

MOUNTING BRACKET GROUP - 186149 - REAR ONLY

PART NO	DESCRIPTION	QTY
186149	MOUNTING BRACKET GROUP	1
Rear Unit Mounting Parts		
F002929	SAE Washer, 3/4"	4
700666075	Hex Lock Nut, 3/4"-10	2
F023012	Hardened Washer	20
F020460	Cap Screw, 5/8-11 x 2" GR 8 Hex Hd	4
F017188	Hex Elastic Stop Nut, 5/8"-11	10
F020458	Cap Screw, 3/4-10 x 2-1/2" GR 8 Hex Hd	2
F005191	Cap Screw, 5/8-11 x 2-1/4" GR 5 Hex Hd	6
184508	Side Bar, Right	1
184507	Side Bar, Left	1
156004	Shim (use as required)	2
156005	Shim (use as required)	2
023062	Rear Unit Application Drawing	

WHEEL MODIFICATION GROUP - 156010

PART NO	DESCRIPTION	QTY
156010	WHEEL MODIFICATION GROUP	1
116833	Wheel, 16 x 6"	5
155057	SPACER ASSEMBLY	2
F024582	Stud, 5/8"-18	8
162432	Decal, Studs In This Drake Drum...	1
F017989	Hex Wheel Nut, 9/16"-18	16
F024581	Wheel Nut, 5/8"-18	16
020657	Wheel Modification Application Drawing	

WHEEL MODIFICATION GROUP - 159849

PART NO	DESCRIPTION	QTY
159849	WHEEL MODIFICATION GROUP	1
137670	Wheel, 19-1/2 x 6"	5
133600	Spacer	2
164036	Wheel Stud, M 14 x 1.5	16
137881	Steering Stop, Right	1
137882	Steering Stop, Left	1
F016365	Cap Screw, 3/8-24 x 1-1/2" GR 8 Hex Hd	4
F015839	Hex Lock Nut, 3/8"-24	4
159920	Bar	2
F001115	Wrought Washer, 3/8"	4
F001025	SAE Lock Washer, 3/8"	4
021102	Wheel Modification Application Drawing	

WHEEL MODIFICATION GROUP - 161620

PART NO	DESCRIPTION	QTY
161620	WHEEL MODIFICATION GROUP	1
161618	WHEEL SPACER ASSEMBLY	2
F025458	Wheel Stud, 5/8"-18	10
162432	Decal, Studs In This Drake Drum...	1
F014594	Wheel Nut, 5/8"-18	20
021222	Wheel Modification Application Drawing	

WHEEL MODIFICATION GROUP - 168119

PART NO	DESCRIPTION	QTY
168119	WHEEL MODIFICATION GROUP	1
162066	WHEEL, 19-1/2 x 6"	5
161453	Decal, Warning - When Wheel / Tire Modifications...	1
162064	Decal, Ratings Represent...	1
162065	Decal, Wheel Nut Torque...	1
168120	SPACER ASSEMBLY	2
F024582	Stud, 5/8"-18	10
162432	Decal, Studs In This Drake Drum...	1
F024581	Wheel Nut, 5/8"-18	20
021542	Wheel Modification Application Drawing	

WHEEL MODIFICATION GROUP - 168195

PART NO	DESCRIPTION	QTY
168195	WHEEL MODIFICATION GROUP	1
162126	SPACER ASSEMBLY	2
F025483	Stud, M 14 x 1.5	8
162432	Decal, Studs In This Drake Drum...	1
F025796	Wheel Nut, M 14 x 1.5	16
021552	Wheel Modification Application Drawing	

WHEEL MODIFICATION GROUP - 169031

PART NO	DESCRIPTION	QTY
169031	WHEEL MODIFICATION GROUP	1
133242	WHEEL, 19-1/2 x 6"	5
133243	Decal, Ratings Represent...	1
161453	Decal, Warning - When Wheel / Tire Modifications...	1
170774	Decal, Wheel Nut Torque...	1
184106	Hex Flange Nut	32
179142	Decal, Torque Specifications	5
F025796	Wheel Nut	16
171054	WHEEL SPACER ASSEMBLY REAR	2
F026230	Wheel Stud	8
162432	Decal, Studs In This Drake Drum...	1
171051	Wheel Spacer Front	2
F025952	Shock Absorber	2
169037	Bushing	4
169329	Decal	2
169036	Tube	2
F002929	SAE Washer, 3/4"	16
044564	Bearing Pad	2
116904	Pad	2
021758	Wheel Modification Application	1
021810	Steering Stop Application	1

WHEEL MODIFICATION GROUP - 170051

PART NO	DESCRIPTION	QTY
170051	WHEEL MODIFICATION GROUP	1
137649	Wheel, 19-1/2 x 6"	5
170736	Wheel Spacer	2
170735	WHEEL SPACER ASSEMBLY	2
178170	Stud, 9/16"-18	8
162432	Decal, Studs In This Drake Drum...	1
179141	Hex Flg Nut, 9/16"-18	32
F017989	Hex Wheel Nut, 9/16"-18	16
170390	Bar	2
M007298	Spring	2
F019582	Clip	2
F001099	Cap Screw, 5/16-18 x 1" Hex Hd	2
179142	Decal, Wheel Nut Torque	5
F001100	SAE Lock Washer, 5/16"	2
180015	Stud, 9/16"-18	16
F007021	Hex Nut, 5/16"-18	2
137349	Spring	2
021871	Wheel Modification Application Drawing	

WHEEL MODIFICATION GROUP - 175595

PART NO	DESCRIPTION	QTY
175595	WHEEL MODIFICATION GROUP	1
175260	SPACER ASSEMBLY	2
F024582	Stud, 5/8"-18	10
162432	Decal, Studs In This Drake Drum...	1
175593	Wheel Nut, 5/8"-18	20
022323	Wheel Modification Application Drawing	

184448 WHEEL MODIFICATION GROUP

PART NO	DESCRIPTION	QTY
184448	WHEEL MODIFICATION GROUP	1
181612	WHEEL, 19-1/2 x 6"	5
169051	Decal, Wheel Nut Torque...	1
161453	Decal, Warning: When Wheel...	1
184150	Decal, Ratings Represent...	1
186130	Spacer	2
184550	Hex Flange Nut	32
188359	Wheel Stop Assembly	2
187235	Bar	2
F014801	Hose Clamp, 1"	3
F002355	Cap Screw, 1/4-20 x 3/4" GR 5 Hex Hd	3
F013588	Elastic Stop Nut, 1/4"-20	3
187092	Bar	1
F019742	Cap Screw, 3/8-16 x 1-3/4" GR 8 Hex Hd	2
F011998	Elastic Stop Nut, 3/8"-16	2
F006471	Cap Screw, 1/4-20 x 1-3/4" GR 5 Hex Hd	2
023214	Wheel Modification Application Drawing	
023412	Wheel Stop Application Drawing	

187149 WHEEL MODIFICATION GROUP

PART NO	DESCRIPTION	QTY
187149	WHEEL MODIFICATION GROUP	1
184138	WHEEL, 19-1/2 x 6-3/4"	2
187291	Decal, Caution - Use As Inside Dual Only	1
187298	Decal, Ratings Represent	1
023228	Wheel Modification Application Drawing	

188439 WHEEL MODIFICATION GROUP

PART NO	DESCRIPTION	QTY
188439	WHEEL MODIFICATION GROUP	1
181612	WHEEL, 19-1/2 x 6"	5
169051	Decal, Wheel Nut Torque...	1
161453	Decal, Warning: When Wheel...	1
184150	Decal, Ratings Represent...	1
186130	Spacer	2
184550	Hex Flange Nut	32
188436	Wheel Stop	1
188437	Wheel Stop	1
F014801	Hose Clamp, 1"	3
F002355	Cap Screw, 1/4-20 x 3/4" GR 5 Hex Hd	3
F013588	Elastic Stop Nut, 1/4"-20	3
187091	Bar	2
187092	Bar	1
F019742	Cap Screw, 3/8-16 x 1-3/4" GR 8 Hex Hd	4
F011998	Elastic Stop Nut, 3/8"-16	4
023414	Wheel Modification Application Drawing	1
023413	Wheel Stop Application Drawing	1

WHEEL HOUSING MODIFICATION GROUP - 121658

PART NO	DESCRIPTION	QTY
121658	WHEEL HOUSING MODIFICATION GROUP	1
118074	Strip	2
118075	Sheet	4
F009602	Screw, #10 x 1/2 Self Tap	120
F001118	Carriage Bolt, 5/16-18 x 1-1/2"	6
F007120	Hex Grip Nut, 5/16"-18	6
F022221	Caulking, 12" Strip	30
017280	Modification Drawing, Metal Floor	
017281	Modification Drawing, Wood Floor	

WHEEL HOUSING MODIFICATION GROUP - 121659

PART NO	DESCRIPTION	QTY
121659	WHEEL HOUSING MODIFICATION GROUP	1
118016	Sheet	2
118017	Sheet	4
118018	Sheet	4
F009602	Screw, #10 x 1/2 Self Tap	120
F022221	Caulking, 12" Strip	30
017271	Modification Drawing, Wood Floor	

FRAME REINFORCEMENT GROUP - 140349

PART NO	DESCRIPTION	QTY
140349	FRAME REINFORCEMENT GROUP	1
140355	Bar	1
140353	Bar	1
140354	Bar	1
140350	Bar	1
140351	Bar	1
140352	Bar	1
F023690	Washer	4
F023872	Cap Screw, M 12 x 1.75 x 50 mm.	4
F023874	Retainer Clip	1
F023875	Retainer Clip	1
020251	Frame Reinforcement Application Drawing	

FRAME REINFORCEMENT GROUP - 167783

PART NO	DESCRIPTION	QTY
167783	FRAME REINFORCEMENT GROUP	1
167779	Bar	2
F023874	Retainer Clip	1
F023875	Retainer Clip	1
021640	Frame Reinforcement Application Drawing	

SECTION 8 - VEHICLE APPLICATIONS
TABLE OF CONTENTS

1996 CHEV/GMC
C30943 4 X 2
SIX MAN
CREW CAB
9,000 / 9,600
10,000 GVWR
HR1000A1 FRONT
HR2000A3 REAR

REQUIRED GROUPS

HY-RAIL® Application 170698
Rail Pilot Unit - Rear. 169314
Mounting Brackets 164044
Steering Lock 169632
Wheel Modification. 159849
Wheel Housing Modification. 121658
Application Drawing - Rear 021418

ACCESSORY GROUP OPTIONS

* Rail Sweeps
  Rear 154522
Hydraulic Power Pack - Rear Only. 168105
Brakes
  Electric / Air Brake Group - Full 163987
  Electric / Air Brake Group - Abbr. 163988
  Rear Unit Brake Group 163990
  Rear Brake Connection Group 163991

* Recommended Safety Option

	1996 CHEV/GMC C31003 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A2	1996 CHEV/GMC C31003 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	170699	170700
Non-Insulated	170704	170705
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	166464	169314
Front - Non insulated	168458	168458
Rear - Non insulated	168457	169318
Mounting Brackets	167788	167788
Steering Lock	169632	169632
Wheel Modification	168119	168119
Application Drawing - Front	021645	021645
Application Drawing - Rear	021719	021195
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1996 CHEV/GMC C31403 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A2	1996 CHEV/GMC C31403 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	170701	170702
Non-Insulated	170706	170707
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	166464	169314
Front - Non insulated	168458	168458
Rear - Non insulated	168457	169318
Mounting Brackets	167788	167788
Steering Lock	169632	169632
Wheel Modification	168119	168119
Application Drawing - Front	021645	021645
Application Drawing - Rear	021719	021195
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1996 CHEV/GMC K31403 HD 4 X 4 CHASSIS CAB 12,000 GVWR HR2000A3	1996 CHEV/GMC P30842 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	170703	167801
Non-Insulated	170708	———
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	169314	169314
Front - Non insulated	168458	———
Rear - Non insulated	169318	———
Mounting Brackets	162099	159076
Steering Lock	169632	170583
Wheel Modification	168195	161620
Application Drawing - Front	021218	021002
Application Drawing - Rear	021217	021003
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	154522
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Front Unit Brake Group	168477	163990
Rear Unit Brake Group	168477	163990
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

1997 CHEV/GMC	1997 CHEV/GMC
C30943 4 X 2	C30943 4 X 2
SIX MAN	SIX MAN
CREW CAB	CREW CAB
9,000 / 9,600	9,000 / 9,600
10,000 GVWR	10,000 GVWR
HR0307A1 FRONT	HR1000A1 FRONT
HR2000A3 REAR	HR2000A3 REAR

REQUIRED GROUPS

HY-RAIL® Application	175218	170698
Rail Pilot Unit - Rear	169314	169314
Mounting Brackets	175219	164044
Steering Lock	169632	169632
Wheel Modification	159849	159849
Wheel Housing Modification	121658	121658
Application Drawing - Rear	021418	021418

ACCESSORY GROUP OPTIONS

* Rail Sweeps		
Rear	168480	168480
Hydraulic Power Pack - Rear Only	168105	168105
Brakes		
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Unit Brake Group	168477	168447
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1997 CHEV/GMC C31003 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A2	1997 CHEV/GMC C31003 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	175596	175597
Non-Insulated	175598	175599
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	166464	169314
Front - Non insulated	168458	168458
Rear - Non insulated	168457	169318
Mounting Brackets	167788	167788
Steering Lock	169632	169632
Wheel Modification	175595	175595
Application Drawing - Front	021645	021645
Application Drawing - Rear	021719	021195
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1997 CHEV/GMC C31003 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR18A1 FRONT HR2000A2 REAR	1997 CHEV/GMC C31403 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR18A1 FRONT HR2000A2 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	175227	175227
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	166464
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	175697	175697
Steering Lock	169632	169632
Wheel Modification	175595	175595
Application Drawing - Rear	021195	021195
ACCESSORY GROUP OPTIONS		
* Rail Sweeps - Rear	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1997 CHEV/GMC C31403 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A2	1997 CHEV/GMC C31403 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	175596	175597
Non-Insulated	175598	175599
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	166464	169314
Front - Non insulated	168458	168458
Rear - Non insulated	168457	169318
Mounting Brackets	167788	167788
Steering Lock	169632	169632
Wheel Modification	175595	175595
Application Drawing - Front	021645	021645
Application Drawing - Rear	021719	021195
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1997 CHEV/GMC K31403 HD 4 X 4 CHASSIS CAB 12,000 GVWR HR2000A3	1997 CHEV/GMC P30842 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	170703	167801
Non-Insulated	170708	———
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	169314	169314
Front - Non insulated	168458	———
Rear - Non insulated	169318	———
Mounting Brackets	162099	159076
Steering Lock	169632	170583
Wheel Modification	168195	161620
Application Drawing - Front	021218	021002
Application Drawing - Rear	021217	021003
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

1998 CHEV/GMC	1998 CHEV/GMC
C30943 4 X 2	C30943 4 X 2
SIX MAN	SIX MAN
CREW CAB	CREW CAB
9,000 / 9,600	9,000 / 9,600
10,000 GVWR	10,000 GVWR
HR0307A1 FRONT	HR1000A1 FRONT
HR2000A3 REAR	HR2000A3 REAR

REQUIRED GROUPS

HY-RAIL® Application	175218	170698
Rail Pilot Unit - Rear	169314	169314
Mounting Brackets	175219	164044
Steering Lock	169632	169632
Wheel Modification	159849	159849
Wheel Housing Modification	121658	121658
Application Drawing - Rear	021418	021418

ACCESSORY GROUP OPTIONS

* Rail Sweeps		
Rear	168480	168480
Hydraulic Power Pack - Rear Only	168105	168105
Brakes		
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Unit Brake Group	168477	168447
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

1998 CHEV/GMC
K30943 4 X 4
REGULAR AND
CHASSIS CAB
WITH SRW
9,200 GVWR
HR0307A1
HR2000A3

REQUIRED GROUPS

HY-RAIL® Application
Insulated 181688
Non-Insulated . . . . . ———
Rail Pilot Unit
Front - Insulated. . . . . ———
Rear - Insulated 169314
Front - Non insulated . . . . . ———
Rear - Non insulated . . . . . ———
Mounting Brackets 181687
Steering Lock 169632
Wheel Modification. 169031
Wheel Housing Modification. 121658
Application Drawing - Rear 022910

ACCESSORY GROUP OPTIONS

* Rail Sweeps 168480
Rear Bumper Group. 168682
Hydraulic Power Pack - Rear Only. 168105
Brakes
Rear Unit Brake Group 168477
Electric / Air Brake Group - Full 163987
Electric / Air Brake Group - Abbr. 163988
Rear Brake Connection Group 163991

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* Recommended Safety Option

	1998 CHEV/GMC C31003 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A2	1998 CHEV/GMC C31003 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	175596	175597
Non-Insulated	175598	175599
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	166464	169314
Front - Non insulated	168458	168458
Rear - Non insulated	168457	169318
Mounting Brackets	167788	167788
Steering Lock	169632	169632
Wheel Modification	175595	175595
Application Drawing - Front	021645	021645
Application Drawing - Rear	021719	021195
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1998 CHEV/GMC C31003 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR18A1 FRONT HR2000A2 REAR	1998 CHEV/GMC C31403 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR18A1 FRONT HR2000A2 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	175227	175227
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	166464
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	175697	175697
Steering Lock	169632	169632
Wheel Modification	175595	175595
Application Drawing - Rear	021719	021719
ACCESSORY GROUP OPTIONS		
* Rail Sweeps - Rear	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1998 CHEV/GMC C31403 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A2	1998 CHEV/GMC C31403 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	175596	175597
Non-Insulated	175598	175599
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	166464	169314
Front - Non insulated	168458	168458
Rear - Non insulated	168457	169318
Mounting Brackets	167788	167788
Steering Lock	169632	169632
Wheel Modification	175595	175595
Application Drawing - Front	021645	021645
Application Drawing - Rear	021719	021195
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1998 CHEV/GMC K31403 HD 4 X 4 CHASSIS CAB 12,000 GVWR HR2000A3	1998 CHEV/GMC P30842 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	170703	167801
Non-Insulated	170708	———
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	169314	169314
Front - Non insulated	168458	———
Rear - Non insulated	169318	———
Mounting Brackets	162099	159076
Steering Lock	169632	170583
Wheel Modification	168195	161620
Application Drawing - Front	021218	021002
Application Drawing - Rear	021217	021003
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

1999 CHEV/GMC
K30903 4 X 4
REGULAR AND
CHASSIS CAB
WITH SRW
9,200 GVWR
HR0307A1
HR2000A3

REQUIRED GROUPS

HY-RAIL® Application
- Insulated 181688
- Non-Insulated . . . . . ———

Rail Pilot Unit
- Front - Insulated. . . . . ———
- Rear - Insulated 169314
- Front - Non insulated . . . . . ———
- Rear - Non insulated . . . . . ———

Mounting Brackets 181687
Steering Lock 169632
Wheel Modification. 169031
Wheel Housing Modification. 121658
Application Drawing - Rear 022910

ACCESSORY GROUP OPTIONS

* Rail Sweeps 168480
Rear Bumper Group. 168682
Hydraulic Power Pack - Rear Only. 186159
Brakes
- Rear Unit Brake Group 168477
- Electric / Air Brake Group - Full 163987
- Electric / Air Brake Group - Abbr. 163988
- Rear Brake Connection Group 163991

* Recommended Safety Option

1999 CHEV/GMC	1999 CHEV/GMC
C30943 4 X 2	C30943 4 X 2
SIX MAN	SIX MAN
CREW CAB	CREW CAB
9,000 / 9,600	9,000 / 9,600
10,000 GVWR	10,000 GVWR
HR0307A1 FRONT	HR1000A1 FRONT
HR2000A3 REAR	HR2000A3 REAR

REQUIRED GROUPS

HY-RAIL® Application	175218	170698
Rail Pilot Unit - Rear	169314	169314
Mounting Brackets	174348	164044
Steering Lock	169632	169632
Wheel Modification	159849	159849
Wheel Housing Modification	121658	121658
Application Drawing - Rear	021418	021418

ACCESSORY GROUP OPTIONS

* Rail Sweeps		
Rear	168480	168480
Hydraulic Power Pack - Rear Only	186159	186159
Brakes		
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Unit Brake Group	168477	168447
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 CHEV/GMC C31003 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A2	1999 CHEV/GMC C31003 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	175596	175597
Non-Insulated	175598	175599
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	166464	169314
Front - Non insulated	168458	168458
Rear - Non insulated	168457	169318
Mounting Brackets	167788	167788
Steering Lock	169632	169632
Wheel Modification	175595	175595
Application Drawing - Front	021645	021645
Application Drawing - Rear	021719	021195
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186158	186158
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 CHEV/GMC C31003 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR18A1 FRONT HR2000A2 REAR	1999 CHEV/GMC C31403 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR18A1 FRONT HR2000A2 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	175227	175227
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	166464
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	175697	175697
Steering Lock	169632	169632
Wheel Modification	175595	175595
Application Drawing - Rear	021719	021719
ACCESSORY GROUP OPTIONS		
* Rail Sweeps - Rear	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 CHEV/GMC C31403 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A2	1999 CHEV/GMC C31403 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	175596	175597
Non-Insulated	175598	175599
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	166464	169314
Front - Non insulated	168458	168458
Rear - Non insulated	168457	169318
Mounting Brackets	167788	167788
Steering Lock	169632	169632
Wheel Modification	175595	175595
Application Drawing - Front	021645	021645
Application Drawing - Rear	021719	021195
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186158	186158
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 CHEV/GMC K31403 4 X 4 CHASSIS CAB 12,000 GVWR HR2000A3	1999 CHEV/GMC P30842 4 X 2 CHASSIS CAB 14,500 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	170703	167801
Non-Insulated	170708	———
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	169314	169314
Front - Non insulated	168458	———
Rear - Non insulated	169318	———
Mounting Brackets	162099	159076
Steering Lock	169632	170583
Wheel Modification	168195	161620
Application Drawing - Front	021218	021002
Application Drawing - Rear	021217	021003
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186158	186158
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

2000 CHEV/GMC
K30903 4 X 4
CHASSIS CAB
WITH SRW
9,200 GVWR
HR0307A1
HR2000A3

REQUIRED GROUPS

HY-RAIL® Application
Insulated 181688
Non-Insulated . . . . . ———
Rail Pilot Unit
Front - Insulated. . . . . ———
Rear - Insulated 169314
Front - Non insulated . . . . . ———
Rear - Non insulated . . . . . ———
Mounting Brackets 181687
Steering Lock 169632
Wheel Modification. 169031
Wheel Housing Modification. 121658
Application Drawing - Rear 022910

ACCESSORY GROUP OPTIONS

* Rail Sweeps 168480
Rear Bumper Group. 168682
Hydraulic Power Pack - Rear Only. 186159
Brakes
Rear Unit Brake Group 168477
Electric / Air Brake Group - Full 163987
Electric / Air Brake Group - Abbr. 163988
Rear Brake Connection Group 163991

* Recommended Safety Option

2000 CHEV/GMC C30943 4 X 2 SIX MAN CREW AND CHASSIS CAB 9,000 / 9,200 10,000 GVWR HR0307A1 FRONT HR2000A3 REAR	2000 CHEV/GMC C30943 4 X 2 SIX MAN CREW AND CHASSIS CAB 9,000 / 9,200 10,000 GVWR HR1000A1 FRONT HR2000A3 REAR

REQUIRED GROUPS

HY-RAIL® Application	175218	170698
Rail Pilot Unit - Rear	169314	169314
Mounting Brackets	174348	164044
Steering Lock	169632	169632
Wheel Modification	159849	159849
Wheel Housing Modification	121658	121658
Application Drawing - Rear	021418	021418

ACCESSORY GROUP OPTIONS

* Rail Sweeps		
Rear	168480	168480
Hydraulic Power Pack - Rear Only	186159	186159
Brakes		
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Unit Brake Group	168477	168447
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 CHEV/GMC C31003 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A2	2000 CHEV/GMC C31003 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	175596	175597
Non-Insulated	175598	175599
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	166464	169314
Front - Non insulated	168458	168458
Rear - Non insulated	168457	169318
Mounting Brackets	167788	167788
Steering Lock	169632	169632
Wheel Modification	175595	175595
Application Drawing - Front	021645	021645
Application Drawing - Rear	021719	021195
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186158	186158
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 CHEV/GMC C31003 HD 4 X 2 CHASSIS CAB 15,000 GVWR HR18A1 FRONT HR2000A2 REAR	2000 CHEV/GMC K31403 4 X 4 CHASSIS CAB 12,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	175227	170703
Non-Insulated	———	170708
Rail Pilot Unit		
Front - Insulated	———	166463
Rear - Insulated	166464	169314
Front - Non insulated	———	168458
Rear - Non insulated	———	169318
Mounting Brackets	175697	162099
Steering Lock	169632	169632
Wheel Modification	175595	168195
Application Drawing - Front	———	021218
Application Drawing - Rear	021719	021217
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186158
Brakes		
Front Unit Brake Group	———	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1996 FORD F350 4 X 2 REGULAR CHASSIS CAB WITH DRW 136.8" WB 11,000 GVWR HR2000A3	1996 FORD F350 4 X 4 REGULAR CAB STYLESIDE WITH SRW 9,000 GVWR SERIES 0307 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	169338	170395
Non-Insulated	169333	———
Rail Pilot Unit		
Front - Insulated	166463	———
Rear - Insulated	169314	169314
Front - Non insulated	168458	———
Rear - Non insulated	169318	———
Mounting Brackets	167889	162460
Steering Lock	158687	158687
Wheel Modification	156010	170051
Wheel Housing Modification	———	121659
Frame Reinforcement	167783	———
Application Drawing - Front	021622	———
Application Drawing - Rear	021623	021195
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	154522	154522
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	———
Hydraulic Power Pack - Rear Only	———	168105
Brakes		
Front Unit Brake Group	163990	———
Rear Unit Brake Group	163990	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1996 FORD F350 4 X 4 REGULAR CHASSIS CAB WITH DRW 160.8" WB 11,000 GVWR HR2000A3	1996 FORD F350 4 X 4 CREW CAB STYLESIDE WITH SRW 9,200 GVWR SERIES 0307 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	168331	170395
Non-Insulated	169332	———
Rail Pilot Unit		
Front - Insulated	166463	———
Rear - Insulated	169314	169314
Front - Non insulated	168458	———
Rear - Non insulated	169318	———
Mounting Brackets	164529	162460
Steering Lock	158687	158687
Wheel Modification	156010	170051
Wheel Housing Modification	———	121659
Application Drawing - Front	021450	———
Application Drawing - Rear	021451	021272
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	154522	154522
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	———
Hydraulic Power Pack - Rear Only	———	168105
Brakes		
Front Unit Brake Group	163990	———
Rear Unit Brake Group	163990	163990
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

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	1996 FORD F-SUPER DUTY 4 X 2 REGULAR CHASSIS CAB 136.8" WB 15,000 GVWR HR2000A2	1996 FORD F-SUPER DUTY 4 X 2 REGULAR CHASSIS CAB 136.8" WB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	168774	167803
Non-Insulated	168775	169337
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	166464	169314
Front - Non insulated	168458	168458
Rear - Non insulated	168457	169318
Mounting Brackets	161621	161621
Steering Lock	158687	158687
Application Drawing - Front	021135	021135
Application Drawing - Rear	021728	020647
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1996 FORD F-SUPER DUTY 4 X 2 REGULAR CHASSIS CAB 160.8" WB 15,000 GVWR HR2000A2	1996 FORD F-SUPER DUTY 4 X 2 REGULAR CHASSIS CAB 160.8" WB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	168772	167802
Non-Insulated	168773	169335
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	166464	169314
Front - Non insulated	168458	168458
Rear - Non insulated	168457	169318
Mounting Brackets	161621	161621
Steering Lock	158687	158687
Frame Reinforcement	140349	140349
Application Drawing - Front	021135	021135
Application Drawing - Rear	021728	020647
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

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* Recommended Safety Option

	1997 FORD F350 4 X 4 REGULAR CAB STYLESIDE WITH SRW 9,000 GVWR SERIES 0307 FRONT HR2000A3 REAR	1997 FORD F350 4 X 4 REGULAR CAB STYLESIDE WITH SRW 9,000 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	170395	175220
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	169314	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	162460	175221
Steering Lock	158687	158687
Wheel Modification	170051	170051
Wheel Housing Modification	121659	121659
Application Drawing - Rear	021272	021272
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack - Rear Only	168105	168105
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1997 FORD F350 4 X 4 CREW CAB STYLESIDE WITH SRW 9,200 GVWR SERIES 0307 FRONT HR2000A3 REAR	1997 FORD F350 4 X 4 CREW CAB STYLESIDE WITH SRW 9,200 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	170395	175220
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	169314	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	162460	175221
Steering Lock	158687	158687
Wheel Modification	170051	170051
Wheel Housing Modification	121659	121659
Application Drawing - Front	———	———
Application Drawing - Rear	021272	021272
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack - Rear Only	168105	168105
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

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* Recommended Safety Option

	1997 FORD F350 4 X 2 REGULAR CHASSIS CAB WITH DRW 11,000 GVWR HR2000A3	1997 FORD F350 4 x 2 REGULAR CHASSIS CAB WITH DRW 11,000 GVWR HR18A1 FRONT HR2000A2 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	169338	181481
Non-Insulated	169333	———
Rail Pilot Unit		
Front - Insulated	166463	———
Rear - Insulated	169314	166464
Front - Non insulated	168458	———
Rear - Non insulated	169318	———
Mounting Brackets	167889	181482
Steering Lock	158687	158687
Wheel Modification	156010	156010
Frame Reinforcement	167783	167783
Application Drawing - Front	021622	———
Application Drawing - Rear	021623	022724
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Front Unit Brake Group	168477	———
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

1997 FORD
F350 4 X 4
REGULAR CHASSIS
CAB WITH DRW
11,000 GVWR
HR2000A3

REQUIRED GROUPS

HY-RAIL® Application
- Insulated 169331
- Non-Insulated 169332

Rail Pilot Unit
- Front - Insulated. 166463
- Rear - Insulated 169314
- Front - Non insulated 168458
- Rear - Non insulated 169318

Mounting Brackets 164529
Steering Lock 158687
Wheel Modification. 156010
Application Drawing - Front 021450
Application Drawing - Rear 021451

ACCESSORY GROUP OPTIONS

* Rail Sweeps 168480
Rear Bumper Group. 168682
Hydraulic Power Pack 168104
Brakes
- Front Unit Brake Group 168477
- Rear Unit Brake Group 168477
- Electric / Air Brake Group - Full 163987
- Electric / Air Brake Group - Abbr. 163988
- Rear Brake Connection Group 163991

* Recommended Safety Option

	1997 FORD F-SUPER DUTY 4 X 2 REGULAR CHASSIS CAB 15,000 GVWR HR2000A2	1997 FORD F-SUPER DUTY 4 X 2 REGULAR CHASSIS CAB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	168774	167803
Non-Insulated	168775	169337
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	166464	169314
Front - Non insulated	168458	168458
Rear - Non insulated	168457	169318
Mounting Brackets	161621	161621
Steering Lock	158687	158687
Application Drawing - Front	021135	021135
Application Drawing - Rear	021728	020647
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1997 FORD F-SUPER DUTY 4 X 2 REGULAR CHASSIS CAB 15,000 GVWR HR18A1 FRONT HR2000A2 REAR	1997 FORD F-SUPER DUTY 4 X 2 REGULAR CHASSIS CAB 15,000 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	179937	179938
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	179945	179945
Steering Lock	158687	158687
Application Drawing - Rear	021728	020647
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1997 FORD F-SUPER DUTY 4 X 2 REGULAR CHASSIS CAB 15,000 GVWR HR2000A2	1997 FORD F-SUPER DUTY 4 X 2 REGULAR CHASSIS CAB 15,000 GVWR HR2000A3
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	168772	167802
Non-Insulated	168773	169335
Rail Pilot Unit		
Front - Insulated	166463	166463
Rear - Insulated	166464	169314
Front - Non insulated	168458	168458
Rear - Non insulated	168457	169318
Mounting Brackets	161621	161621
Steering Lock	158687	158687
Frame Reinforcement	140349	140349
Application Drawing - Front	021135	021135
Application Drawing - Rear	021728	020647
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Front Unit Brake Group	168477	168477
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1997 FORD F-SUPER DUTY 4 X 2 REGULAR CHASSIS CAB 15,000 GVWR HR18A1 FRONT HR2000A2 REAR	1997 FORD F-SUPER DUTY 4 X 2 REGULAR CHASSIS CAB 15,000 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	179939	179940
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	179945	179945
Steering Lock	158687	158687
Frame Reinforcement	140349	140349
Application Drawing - Rear	021728	020647
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	168104	168104
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 2 REGULAR CAB PICKUP WITH SRW 9,200 GVWR HR0307A1 FRONT HR2000A3 REAR	1999 FORD F350 4 X 2 SUPER CAB PICKUP WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	186148	186148
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	169314	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	186149	186149
Steering Lock	181548	181548
Wheel Modification	184448	184448
Application Drawing - Rear	023062	023062
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 2 CREW CAB PICKUP WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR	1999 FORD F350 4 X 4 REGULAR CAB PICKUP WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	186148	184523
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	169314	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	186149	184522
Steering Lock	181548	181548
Wheel Modification	184448	184448
Application Drawing - Rear	023062	023062
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 4 SUPER CAB PICKUP WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR	1999 FORD F350 4 X 4 CREW CAB PICKUP WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	184523	184523
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	169314	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184522	184522
Steering Lock	181548	181548
Wheel Modification	184448	184448
Application Drawing - Rear	023062	023062
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 2 REGULAR CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A2 REAR	1999 FORD F350 4 X 2 REGULAR CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	186151	184103
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184095	184095
Steering Lock	181548	181548
Wheel Modification	184448	184448
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 2 SUPER CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A2 REAR	1999 FORD F350 4 X 2 SUPER CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	186151	184103
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184095	184095
Steering Lock	181548	181548
Wheel Modification	184448	184448
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 2 CREW CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A2 REAR	1999 FORD F350 4 X 2 CREW CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	186151	184103
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184095	184095
Steering Lock	181548	181548
Wheel Modification	184448	184448
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 4 REGULAR CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A2 REAR	1999 FORD F350 4 X 4 REGULAR CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	184104	186154
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184098	184098
Steering Lock	181548	181548
Wheel Modification	184448	184448
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 4 SUPER CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A2 REAR	1999 FORD F350 4 X 4 SUPER CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	184104	186154
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184098	184098
Steering Lock	181548	181548
Wheel Modification	184448	184448
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 4 CREW CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A2 REAR	1999 FORD F350 4 X 4 CREW CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	184104	186154
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184098	184098
Steering Lock	181548	181548
Wheel Modification	184448	184448
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 4 REGULAR CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A2 REAR	1999 FORD F350 4 X 4 REGULAR CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	187170	187169
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 4 SUPER CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A2 REAR	1999 FORD F350 4 X 4 SUPER CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	187170	187169
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 4 CREW CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A2 REAR	1999 FORD F350 4 X 4 CREW CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	187170	187169
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 2 REGULAR CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A2 REAR	1999 FORD F350 4 X 2 REGULAR CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	184101	184105
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 2 SUPER CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A2 REAR	1999 FORD F350 4 X 2 SUPER CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	184101	184105
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F350 4 X 2 CREW CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A2 REAR	1999 FORD F350 4 X 2 CREW CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	184101	184105
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F450 4 X 2 REGULAR CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A2 REAR	1999 FORD F450 4 X 2 REGULAR CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	187148	187147
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Wheel Modification	187149	187149
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F450 4 X 4 REGULAR CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A2 REAR	1999 FORD F450 4 X 4 REGULAR CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	187148	187147
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Wheel Modification	187149	187149
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F450 4 X 2 CREW CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A2 REAR	1999 FORD F450 4 X 2 CREW CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	187148	187147
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Wheel Modification	187149	187149
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	1999 FORD F450 4 X 4 CREW CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A2 REAR	1999 FORD F450 4 X 4 CREW CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	187148	187147
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Wheel Modification	187149	187149
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 2 REGULAR CAB PICKUP WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR	2000 FORD F350 4 X 2 SUPER CAB PICKUP WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	186148	186148
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	169314	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	186149	186149
Steering Lock	181548	181548
Wheel Modification	184448	184448
Application Drawing - Rear	023062	023062
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 2 CREW CAB PICKUP WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR	2000 FORD F350 4 X 4 REGULAR CAB PICKUP WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	186148	184523
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	169314	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	186149	184522
Steering Lock	181548	181548
Wheel Modification	184448	188493
Application Drawing - Rear	023062	023062
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 4 SUPER CAB PICKUP WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR	2000 FORD F350 4 X 4 CREW CAB PICKUP WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	184523	184523
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	169314	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184522	184522
Steering Lock	181548	181548
Wheel Modification	188439	188439
Application Drawing - Rear	023062	023062
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 2 REGULAR CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A2 REAR	2000 FORD F350 4 X 2 REGULAR CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	186151	184103
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184095	184095
Steering Lock	181548	181548
Wheel Modification	184448	184448
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 2 SUPER CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A2 REAR	2000 FORD F350 4 X 2 SUPER CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	186151	184103
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184095	184095
Steering Lock	181548	181548
Wheel Modification	184448	184448
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 2 CREW CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A2 REAR	2000 FORD F350 4 X 2 CREW CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	186151	184103
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184095	184095
Steering Lock	181548	181548
Wheel Modification	184448	184448
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 4 REGULAR CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A2 REAR	2000 FORD F350 4 X 4 REGULAR CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	184104	186154
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184098	184098
Steering Lock	181548	181548
Wheel Modification	188439	188439
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 4 SUPER CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A2 REAR	2000 FORD F350 4 X 4 SUPER CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	184104	186154
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184098	184098
Steering Lock	181548	181548
Wheel Modification	188439	188439
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 4 CREW CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A2 REAR	2000 FORD F350 4 X 4 CREW CHASSIS CAB WITH SRW 9,900 GVWR HR0307A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	184104	186154
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184098	184098
Steering Lock	181548	181548
Wheel Modification	188439	188439
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186159	186159
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 4 REGULAR CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A2 REAR	2000 FORD F350 4 X 4 REGULAR CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	187170	187169
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 4 SUPER CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A2 REAR	2000 FORD F350 4 X 4 SUPER CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	187170	187169
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 4 CREW CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A2 REAR	2000 FORD F350 4 X 4 CREW CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	187170	187169
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 2 REGULAR CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A2 REAR	2000 FORD F350 4 X 2 REGULAR CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	184101	184105
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 2 SUPER CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A2 REAR	2000 FORD F350 4 X 2 SUPER CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	184101	184105
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F350 4 X 2 CREW CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A2 REAR	2000 FORD F350 4 X 2 CREW CHASSIS CAB WITH DRW 11,200 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	184101	184105
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F450 4 X 2 REGULAR CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A2 REAR	2000 FORD F450 4 X 2 REGULAR CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	187148	187147
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Wheel Modification	187149	187149
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F450 4 X 4 REGULAR CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A2 REAR	2000 FORD F450 4 X 4 REGULAR CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	187148	187147
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Wheel Modification	187149	187149
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
* Rail Sweeps	168480	168480
Rear Bumper Group	168682	168682
Hydraulic Power Pack	186157	186157
Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F450 4 X 2 CREW CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A2 REAR	2000 FORD F450 4 X 2 CREW CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	187148	187147
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Wheel Modification	187149	187149
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
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Rear Bumper Group	168682	168682
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Brakes		
Rear Unit Brake Group	168477	168477
Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

	2000 FORD F450 4 X 4 CREW CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A2 REAR	2000 FORD F450 4 X 4 CREW CHASSIS CAB WITH DRW 15,000 GVWR HR18A1 FRONT HR2000A3 REAR
REQUIRED GROUPS		
HY-RAIL® Application		
Insulated	187148	187147
Non-Insulated	———	———
Rail Pilot Unit		
Front - Insulated	———	———
Rear - Insulated	166464	169314
Front - Non insulated	———	———
Rear - Non insulated	———	———
Mounting Brackets	184094	184099
Steering Lock	181548	181548
Wheel Modification	187149	187149
Application Drawing - Rear	023095	023094
ACCESSORY GROUP OPTIONS		
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Electric / Air Brake Group - Full	163987	163987
Electric / Air Brake Group - Abbr.	163988	163988
Rear Brake Connection Group	163991	163991

* Recommended Safety Option

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