



NS SERIES

MAINTENANCE MANUAL

NS-400/450 Series Suspension/Slider for Van and Reefer Trailer Applications

Maintenance Manual



*For Parts Information, refer to
Parts List (Part No. XL-AR321).*

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INTRODUCTION

This manual provides you information necessary for the care, maintenance, inspection, and safe operation of SAF-HOLLAND's NS Series of trailer slider air suspensions.

The SAF-HOLLAND Trailer Air Suspension is designed and engineered to provide trouble-free service. In the event of minor breakdown, such as a loss of air in the air springs, there are safety features designed into the suspension that will allow the vehicle to be driven CAUTIOUSLY at slow speed, to the nearest service facility.

This suspension uses air drawn from the tractor air system to pressurize the air springs. The height control valve regulates the air pressure required for varying loads and maintains the design ride height. This suspension can provide a cushioned ride throughout the load range, from empty to fully loaded.

The suspension also provides excellent side-to-side and axle-to-axle loading which helps equalize and control braking.

WARRANTY

Refer to the complete warranty for the country in which the product will be used. A copy of the written warranty is included with the product as well as on the SAF-HOLLAND Web Site (www.safholland.us).

It may also be ordered directly from the address shown on the back cover.

NOTES, CAUTIONS, AND WARNINGS

You must read and understand all of the safety procedures presented in this manual before starting any work on the suspension.

Proper tools must be used to perform the maintenance and repair procedures described in this manual. Many of these procedures require special tools.

Failure to use the proper equipment could result in personal injury and/or damage to the suspension.

Safety glasses must be worn at all times when performing the procedures covered in this manual.

Throughout this manual, you will notice the terms "NOTE," "IMPORTANT," "CAUTION" and "WARNING" followed by important product information. So that you may better understand the manual, those terms are as follows:

NOTE: Includes additional information to enable accurate and easy performance of procedures.

IMPORTANT: Includes additional information that if not followed could lead to hindered product performance.

CAUTION Used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, may result in property damage.

▲CAUTION Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

▲WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

SERIAL NUMBER TAG INFORMATION

Model Identification

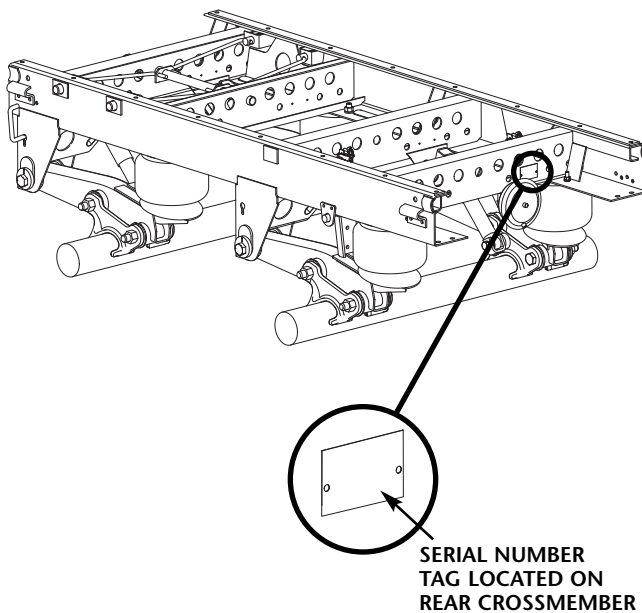
The NS Series Suspension Serial Tag is located on the rear crossmember (FIGURE 1).

NOTE: This manual applies to the suspension series or the models listed on the front cover. However, we urge you to determine your specific model number, write that information below and refer to it when obtaining information or replacement parts.

NOTE: Refer to the serial number tag attached to the slider rear crossmember for information.

Model Number _____
 Serial Number _____
 Parts List Number _____
 In Service Date _____

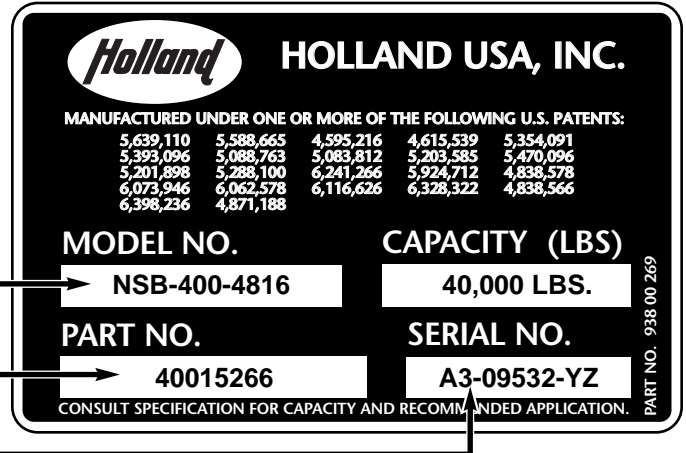
FIGURE 1
Serial Number Tag Location



Model Nomenclature

The sample tag shown below will help you interpret the information on the SAF-HOLLAND, USA, Inc. serial number tag. The model number is on the first line along with the suspension capacity. The second line contains the serial number and the third line has the parts list numbers (FIGURE 2).

FIGURE 2
Serial Number Tag



NS B 400 - 4 8 16

- NS Slider
- B Slider Box Rail Style
 - (B) Binkley
 - (H) Hutch
 - (T) TTMA Rail
- 4 Axle Capacity Suspension Series
 - 40,000 Tandem NS-400
 - 45,000 Tandem NS-450
- 0 Axle Spacing Width
 - (4) 49" (1245mm), NS-400, NS-450
 - (5) 61" (1549mm), NS-450 only
 - (6) 73" (1854mm), NS-450 only
 - (7) 60" (1524mm), NS-450 only
 - (8) 72" (1829mm), NS-450 only
- 8 Slider Box Width
 - (2) 42" (1067mm) Wide
 - (8) 48" (1219mm) Wide
- 16 Ride Height
 - 16" (406mm)
 - 16.5" (419mm)
 - 17" (432mm)
 - 18" (457mm)

OPERATION AND MAINTENANCE INSTRUCTIONS

The NS Series Trailer Air Suspension Slider package models covered in this manual are controlled by a single height control valve (standard air control system). When properly adjusted, the height control valve will maintain a constant ride height by controlling the air pressure in the air springs to support the load being carried.

The trailer air pressure must be maintained in excess of 75 psig (5.2 bars) before operation. The 75 psig (5.2 bars) is required to open the Air Pressure Protection Valve, which maintains safe air brake pressure in the event of an air loss in the suspension system.

In the event that an air loss should occur, it is recommended the Height Control Valve Linkage be disconnected to assure all air springs are completely deflated. The trailer can be temporarily operated on the air spring's internal rubber bumpers, which carry the load if there is tire clearance. In the event of inadequate air pressure, operate the trailer CAUTIOUSLY, at a slow speed, to the nearest place of repair. To deflate the air suspension, refer to page 14, step 2.

Before transporting the vehicle to a service center, check tire clearances. DO NOT operate the vehicle if any tire(s) is rubbing the vehicle.

⚠ WARNING Tire clearance must be maintained between tires and the nearest point of contact on the suspension or vehicle. Fire or loss of vehicle control could occur if clearances are not maintained which, if not avoided, could result in death or serious injury.

IMPORTANT

ROUTINE MAINTENANCE AND DAILY INSPECTION

Daily Inspection

Daily or before each trip, check the suspension to be sure it is fully operational. Visually inspect air springs for sufficient and equal pressure and to see that suspension is set at proper ride height. See page 8 for ride height measurement and re-setting instructions. Service as necessary.

Initial 5,000 Mile (8,000 km) Service Inspection

1. Suspension ride height (underside of frame to centerline of axle) MUST BE WITHIN $\pm 1/4"$ OF RECOMMENDED DESIGN HEIGHT. See page 8 for instructions on measuring ride height.

CAUTION An improperly set ride height could result in suspension component damage and/or poor vehicle ride performance.

2. After initial 5,000 miles (8,000 km) of service, inspect bolts and nuts at the pivot and axle connections to assure they are properly torqued. Check all other nuts and bolts for proper torque. Re-torque as necessary thereafter.
3. With vehicle on level surface and air pressure in excess of 75 psig, all air springs should be of sufficient and equal firmness.

NOTE: Check all air control system fittings for air leaks, by applying a soapy water solution and checking for bubbles at all air connections and fittings.

Routine Physical Inspections

Every 100,000 Miles (160,000 km) or 1 year, whichever comes first

When servicing vehicle brake system, inspect suspension components per pre-operational checklist on page 5. Also check all other suspension components for any sign of damage, looseness, torque loss, wear or cracks. Repair, tighten or replace damaged part(s) to prevent equipment breakdown.

Visual Inspection Procedure

IMPORTANT: A schedule for physical and visual inspections should be established by the operator based on severity of operation or damage to the vehicle could occur.

IMPORTANT: During each pre-trip and safety inspection of the vehicle, a visual inspection of the suspension should be done or damage to the vehicle could occur.

Visually check for:

- **Bolt movement** - loose dirt, rust or metal wear around bolt head and nut.
- **Air springs** - clearances, wear damage, and proper inflation.
- **Shock absorbers** - leaking or damaged.
- **Cracked parts or welds.**

PRE-OPERATIONAL CHECKLIST

Prior to placing unit in service, check the following items:

⚠ WARNING Failure to chock tires prior to beginning maintenance could allow vehicle rollaway which, if not avoided, could result in death or serious injury.

1. Build air pressure above 75 psig (5.2 bars). With the vehicle shut off, check the system for air leaks.
2. With the vehicle on a level surface and air supply pressure in excess of 75 psig (5.2 bars), check the air springs for equal firmness.
3. Check the shock absorbers for proper installation. The 3/4" shock absorber nuts must be torqued to specifications (see Table 1, Torque Chart, on page 6).
4. The 1/2" and 3/4" air spring mounting nuts must be torqued to specifications (see Table 1, Torque Chart, on page 6).
5. Check for 1" (25mm) minimum clearance around the air springs with vehicle loaded (**FIGURE 3**).
6. The 1 1/8" axle connection nuts must be torqued to specifications (see Table 1, Torque Chart, on page 6).
7. The suspension ride height should be within $\pm 1/8$ " of the recommended design height. See "Height Control Valve Adjustment" on page 8 for the proper setting.
8. Visually check the welding of all axle adapters to axles — 1/2" (13mm) minimum fillet weld required (**FIGURE 3**).
9. Visually check the welding of all curbside fixed alignment pivot connections on both sides of frame bracket (**FIGURE 5**).

If welds are not present, weld the alignment plates in-board and out-board of the frame bracket per SAF-HOLLAND NS-65-07-CI specification—consult publication XL-AR353—and as shown in **FIGURE 5**. Weld all around with 5/16" (8mm) weld.

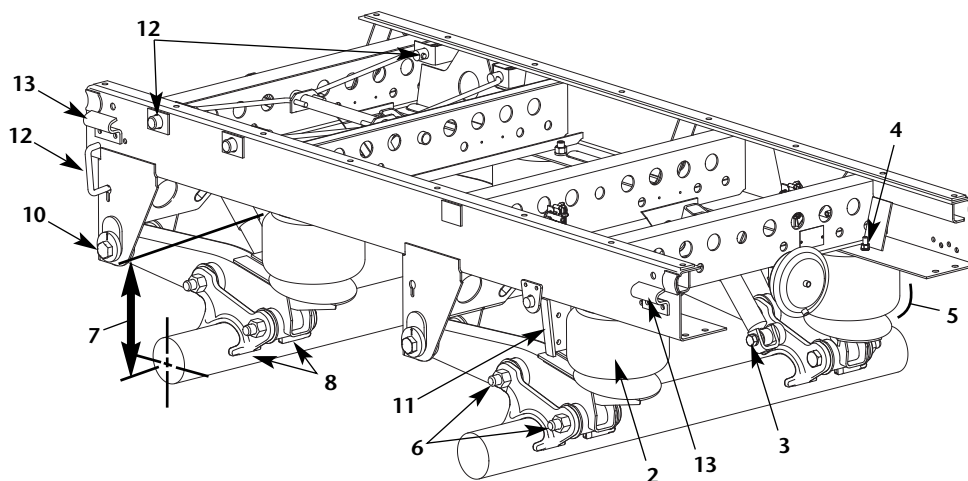
IMPORTANT: The EZ-Align design maintains proper alignment under correct torque without welding; DO NOT weld alignment blocks (**FIGURE 4**).

NOTE: EZ-Align pivot connections (non-welded) are on roadside and fixed alignment pivot connections (welded) are on curbside. However, some manufacturers use EZ-Align on both sides. See page 12 for EZ-Align (Non-welded) Connection Axle Alignment procedure.

10. A 1 1/8" pivot nut must be torqued to specifications (see Table 2, Torque Chart, on page 6).
11. If your vehicle is equipped with an EDL (External Dock Lock) device, 5/8" minimum clearance must exist between bottom of flipper plate and top of beam pad; see decal XL-AR364. Refer to EDL/ARF Operation Information Manual for detailed information (Part No. XL-AR363).
12. Check the slider locking pins, slider pull-bar mechanism, and slider wear pads for proper operation (**FIGURE 3**). For slider repositioning instructions, see page 13.
13. Inspect the front and rear hold down clips to ensure that they are secured correctly around the body rails (not shown) (**FIGURE 3**). Torque all 1/2" nuts to 75 - 90 ft. lbs. (102 Nm - 122 Nm).

continued

FIGURE 3
NS Series Suspension/Slider Pre-Operational Checklist Items



PRE-OPERATIONAL CHECKLIST *continued*

TABLE 1
Torque Chart

SIZE	TORQUE FT. LBS.	TORQUE NM
3/4"	140 - 175	189 - 237
1 1/8" (Axle Conn.)	800	1083
1 1/8" (Pivot Conn.)	See Table 2	
1/2" - Air Spring	30 - 40	41 - 54
3/4" - Air Spring	40 - 45	54 - 61


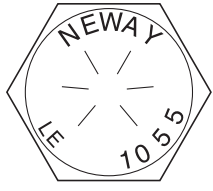
BOLT SIZE	SOCKET SIZE
1/2"	3/4"
3/4"	1 1/8"
1 1/8"	1 11/16"*

*Deep Well Socket

IMPORTANT: Torque requirements listed are for clean and lubricated threads.

Use of special lubricants with friction modifiers, such as Anti-Seize or Never-Seize, without written approval from SAF-HOLLAND Engineering will void warranty and could lead to premature bolt failure or other component issues.

TABLE 2
Pivot Bolt Torque Chart

IDENTIFIER	NEW PIVOT BOLT	OLD PIVOT BOLT
Bolt Head Marking		
Color	Silver	Black
Surface Appearance	Dry	Wet - Oily
Torque Specification	550 - 600 FT. LBS. (745 - 812 Nm)	800 FT. LBS. (1083 Nm)

WARNING DO NOT torque **old** pivot bolt to the new torque specification of 550 ft. lbs. (745 Nm). Pivot may loosen causing premature wear or fracturing of the bolt and other suspension components that could result in a loss of vehicle control and could cause serious injury or death.

CAUTION DO NOT torque **new** pivot bolt to the old torque specification of 800 ft. lbs. (1083 Nm). Removal or loosening of pivot bolt for service, repair, or axle alignment may become difficult if the new bolt is torqued to 800 ft. lbs. (1083 Nm).

FIGURE 4
EZ-Align (Non-welded) Axle Alignment

NON-WELDED STYLE SIDE VIEW

IMPORTANT: The EZ-Align design maintains proper alignment under correct torque without welding. See page 12 for EZ-Align (Non-welded) Connection Axle Alignment procedure.

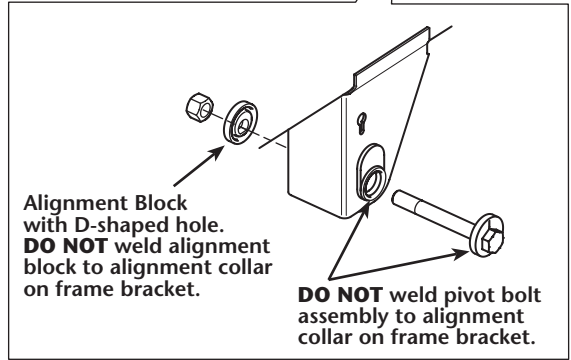
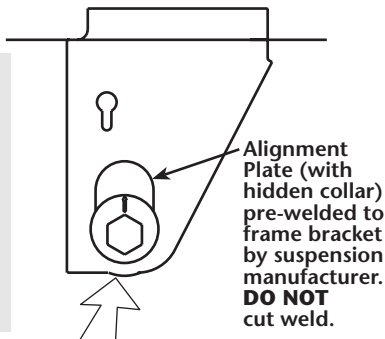
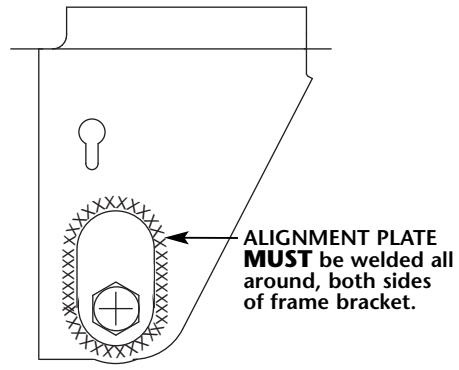


FIGURE 5
Fixed (welded) Axle Alignment

WELDED STYLE SIDE VIEW



STANDARD AIR CONTROL SYSTEM

The Air Control System shown (FIGURE 6) depicts a standard NS Series piping diagram.

IMPORTANT: If your suspension is equipped with an External Dock Lock and Automatic Reset Feature (EDL/ARF) refer to EDL/ARF Operation Information Manual (XL-AR363) for detailed air control piping information.

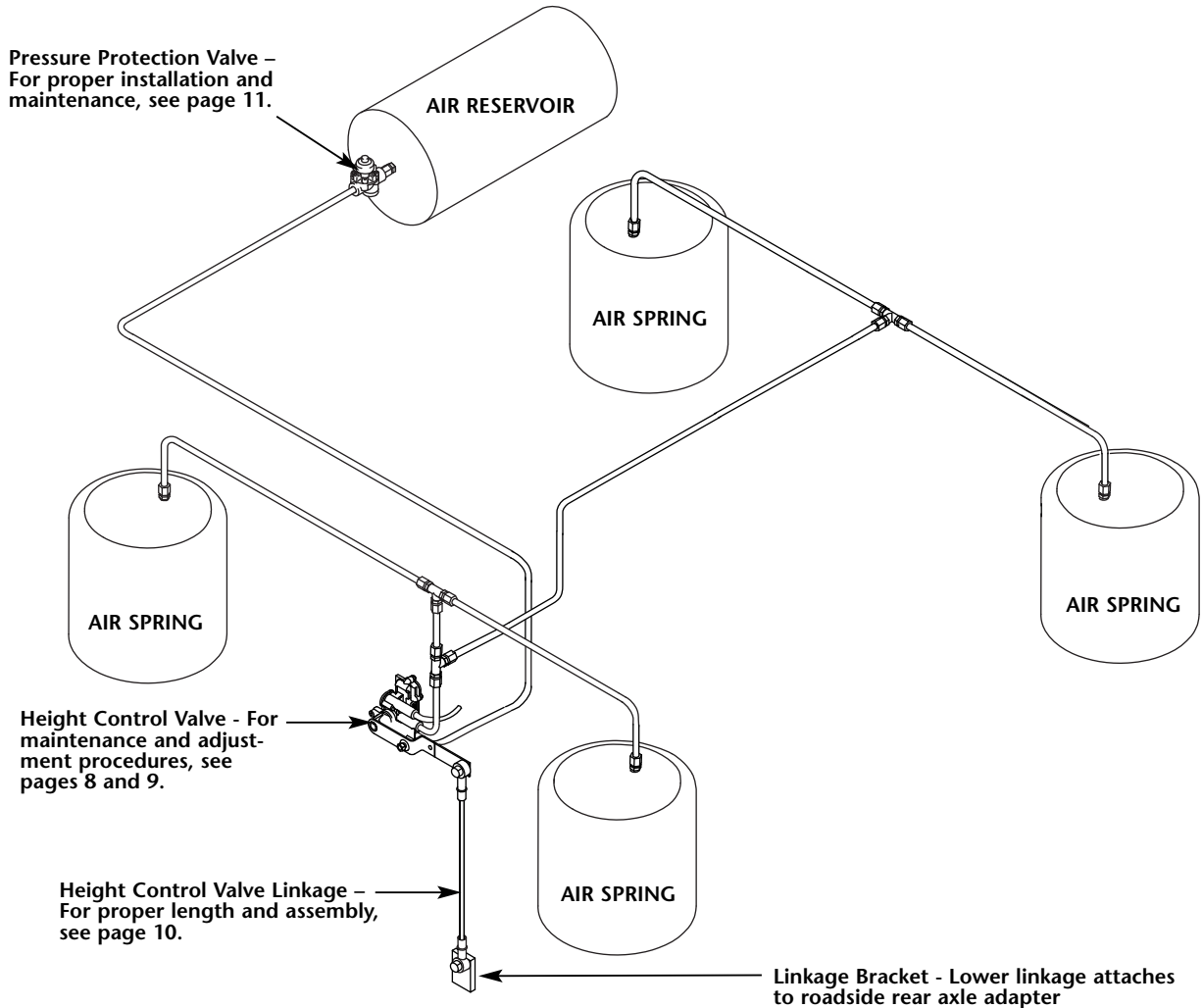
The air control system of the NS Series suspension uses air drawn from the tractor air system to pressurize the suspension's air springs. The suspension, working with the air control system, provides optimum suspension performance only when all air control system components are installed and operating properly.

The height control valve regulates the air pressure required for varying capacities of load. It is critical to make sure the height control valve is set at the proper suspension ride height (FIGURE 8). See pages 8-10 for height control valve detail.

A pressure protection valve is attached to the air reservoir and must be used to maintain proper air pressure. See page 11 for maintenance.

IMPORTANT: Air pressure protection valve maintains safe brake pressure. Approximately 75 psig (5.2 bars) opens valve, and 65 psig (4.5 bars) closes valve (FIGURE 6).

FIGURE 6
Air Control System



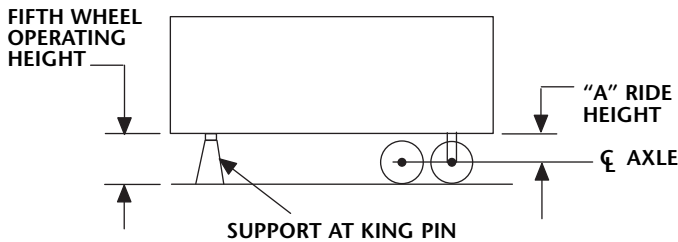
HEIGHT CONTROL VALVE INFORMATION

Adjustment Procedure for a One HCV System

⚠ WARNING Failure to properly support suspension during maintenance may allow suspension to fall which, if not avoided, could result in death or serious injury..

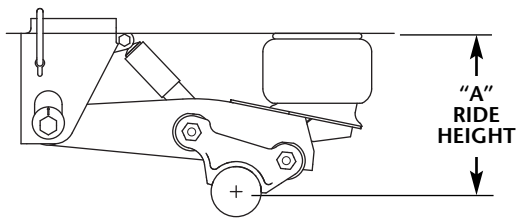
1. Prior to adjustment, the vehicle must be in an unladen condition on a level floor and supported on a king pin stand or coupled to a tractor (*FIGURE 7*). If supported with a king pin stand, front of trailer must be supported at operating height.

FIGURE 7
Trailer Supported at Fifth Wheel Height



2. Disconnect height control valve linkage to lower mounting bracket (*FIGURE 11*, page 10), move control arm to "up" (45°) position and hold for 10-15 seconds to raise vehicle (*FIGURE 9*). Return control arm to center (neutral) position (*FIGURE 10*).

FIGURE 8
Obtaining Proper Ride Height



⚠ WARNING Failure to properly support suspension during maintenance may allow suspension to fall which, if not avoided, could result in death or serious injury.

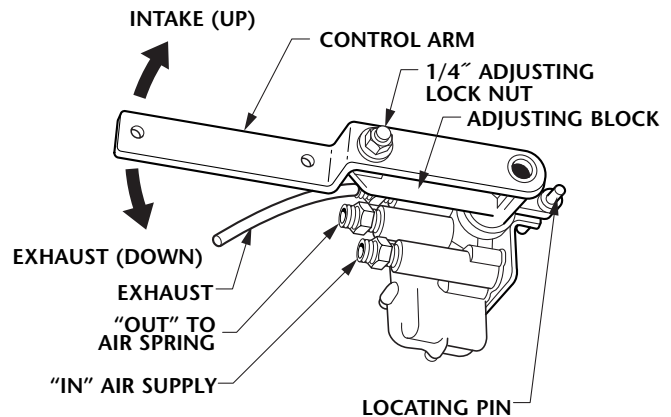
NOTE: It may be necessary to shim jack stands to achieve proper ride height.

3. Place jack stands between the trailer frame and ground. Place one stand on each side at proper ride height (*FIGURE 8*). With jack stands in position, move control arm to 45° "down" position and lower vehicle and deflate all air from air springs and system. Return control arm to center (neutral) position and recheck for proper "A" ride height (*FIGURE 8*).

Ride Height Chart

MODEL	"A" RIDE HEIGHT
NS-400/450-16	16
NS-400/450-16.5	16.5
NS-400/450-17	17
NS-400/450-18	18

FIGURE 9
Height Control Valve



4. With the control arm in the center position (*FIGURE 10*), insert locating pin into the adjusting block and bracket on the height control valve (*FIGURE 9*). Loosen the 1/4" adjusting lock nut located on the adjusting block (*FIGURE 9*). This will allow the control arm to move up and down approximately 1" (25mm).
5. Reconnect the lower linkage, and torque to 30 - 40 in. lbs. (3.75 - 5 Nm).
6. Retighten the 1/4" lock nut at the adjusting block to 30 - 40 in. lbs. (3.75 - 5 Nm).
7. Remove locating pin inserted in Step 4, then raise vehicle to remove the jack stands.

NOTE: The height control valve may be used as an improvised jack by disconnecting the linkage at the lower bracket. Move control arm 45° to an "up" position to raise vehicle and remove jack stands. Move control arm 45° to "down" position, completely exhausting system, then reconnect lower linkage, and torque to 30 - 40 in. lbs. (3.75 - 5 Nm). The suspension system will return to and maintain the proper ride height.

HEIGHT CONTROL VALVE MAINTENANCE

Height Control Valve Inspection

IMPORTANT: DO NOT grease height control valve.

1. Visually inspect the valve and linkage on a regular basis for proper clearance, operation and adjustment.
2. Dirt or foreign particles in the air line may harm the internal workings of the valve. Even though it contains a protective filter to eliminate foreign matter, normal air brake system maintenance should be practiced.
3. Drain moisture from air tank periodically. In severe cold weather an air dryer and/or an alcohol evaporator is recommended to avoid valve freezing and damage.

Height Control Valve Performance Check

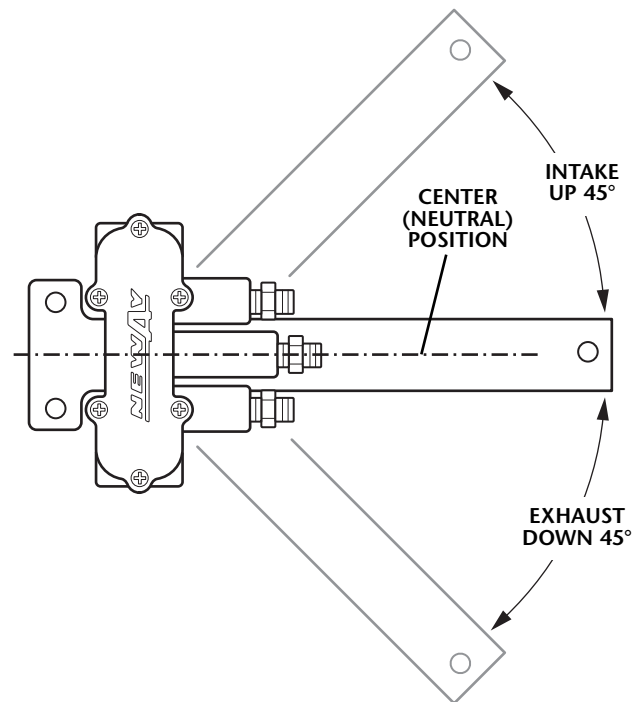
IMPORTANT: Proper inspection can eliminate unnecessary replacement of height control valve.

1. Apply air system pressure in excess of 75 psig (5.2 bars).
2. Disconnect lower connection of the link assembly from mounting bracket (*FIGURE 11*).
3. Move control arm up to 45° for 10-15 seconds - air should flow to air spring(s) (*FIGURE 10*).
4. Move control arm to center (neutral) position - valve should shut off air flow (*FIGURE 10*).
5. Move control arm down 45° for 10-15 seconds - air should exhaust (*FIGURE 10*).
6. Move control arm to center (neutral) position - valve should shut off air flow.
7. Valve is good if performance is as noted.

NOTE: If the valve does not perform correctly, replace the valve.

8. Reconnect lower link assembly to mounting bracket and torque to 30 - 40 in. lbs. (3.75 - 5 Nm).

FIGURE 10
Height Control Valve Performance Check



IMPORTANT: If 75 psig (5.2 bars) air system pressure cannot be achieved, check pressure protection valve and vehicle air compressor to see if they are operating properly. Also check the air lines for obstructions caused by dirt particles, foreign debris, ice, etc.

continued

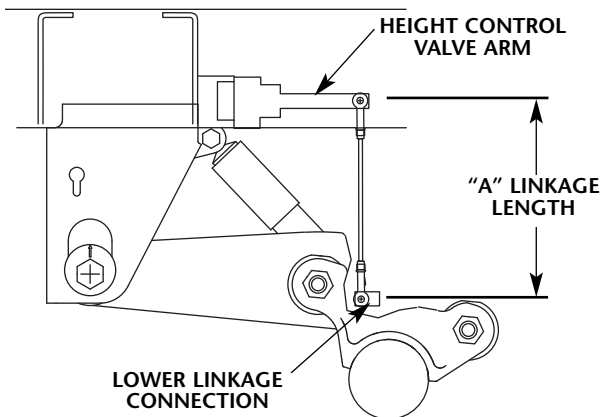
HEIGHT CONTROL VALVE MAINTENANCE *continued*

Check Height Control Valve Linkage for proper length and assembly

1. With suspension set at proper ride height, determine length of link assembly required ("A" Dim.) (FIGURE 12). This can be achieved by measuring the distance from centerline of height control valve arm hole to centerline of lower connection bracket hole (FIGURE 11).

IMPORTANT: "A" measurement must be taken with suspension set at proper ride height (see FIGURE 8 on page 8).

FIGURE 11
Linkage Length



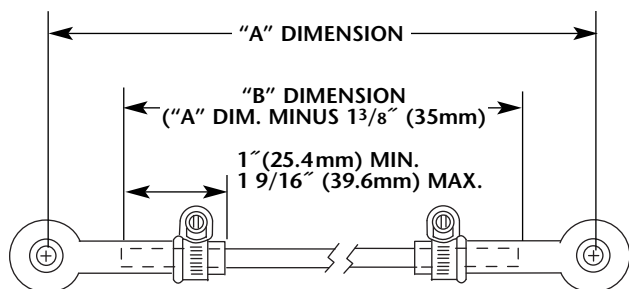
2. Determine length of rod required ("B" Dim.) by subtracting 1 3/8" (35mm) from "A" Dim. (FIGURE 12).

Example:

13 3/4" (349mm) "A" Dim. minus
 1 3/8" (35mm) = 12 3/8" (314mm)
 "B" Dim. is the length of the Rod required.

3. If new rod link is required, cut rod to length required; remove any sharp edges that may cause damage to the rubber link ends during assembly.

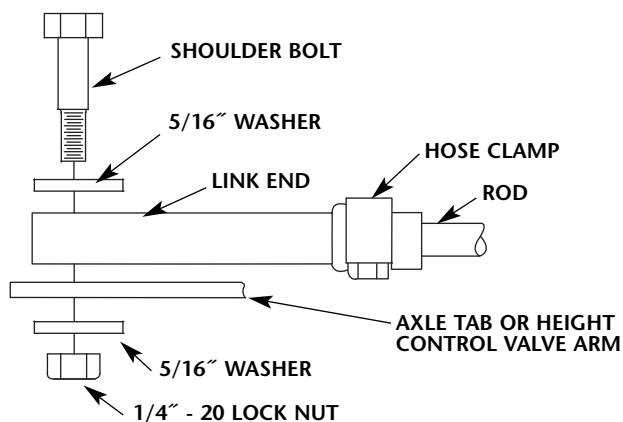
FIGURE 12
Determine Length of Link Assembly



4. Assemble clamps, link ends and rods as shown (FIGURE 12). Insert rod into link end equal distance both ends, observing the minimum and maximum tolerance. Be certain the link ends are aligned to each other (FIGURE 12).
5. With link ends properly aligned and link assembly at required length, tighten clamps.
6. Install link assembly.

IMPORTANT: 5/16" washers **must** be inserted between nut and control arm or axle tab bracket, 5/16" washer between bolt head and rubber link. Torque to 30 - 40 in. lbs. (3.75 - 5 Nm) (FIGURE 13).

FIGURE 13
Link End Assembly



PRESSURE PROTECTION VALVE INFORMATION

Proper Installation

The new Air Pressure Protection Valve (PPV) (*FIGURE 14A*) should be installed so that the air supplied from the Air Reservoir enters the port marked "IN" on the PPV. If the Optional valve is used (*FIGURE 14B*), the arrows on the bottom of the valve should point away from the Air Reservoir towards the air suspension, while making sure the Cap is in the upright (TOP) position.

Install air lines to the air suspension and support lines where necessary (*FIGURE 6*), using clip supports, grommets and bulk head fittings. When installing pressure protection valve (PPV), use a drop of oil or loctite to lubricate threaded connections. **DO NOT USE** a pipe compound or teflon tape as they may clog valve. After PPV has been installed, pressurize air system with a constant supply of air in excess of 75 psig (5.2 bars), and check all connections for air leaks (*FIGURE 6*).

Periodic Maintenance

IMPORTANT: Air pressure protection valves maintain safe brake pressure; **only** optional valve (905 54 107) cleans air by using a removable filter. Set at factory, approximately 75 psig (5.2 bars) opens the valve and 65 psig (4.5 bars) closes valve. (Attach PPV onto air reservoir—see *FIGURE 6*).

Drain all moisture from the Air Reservoir at regular intervals. Check the PPV for proper air flow. If optional PPV is used replace the filter every 3 months or when the air flow is reduced (*FIGURE 14B*).

The PPV must be checked for proper operation during each brake system inspection. The purpose of the valve is to maintain at least brake operating pressure in event of a serious air leak in the suspension system.

To test the PPV, charge the air system to 90+ psig and disconnect air line supply from downstream (suspension) side of PPV. Air should stop flowing through the PPV before the spring brakes begin to apply or before the tank pressure is reached.

IMPORTANT: If air does not stop flowing, replace the pressure protection valve.

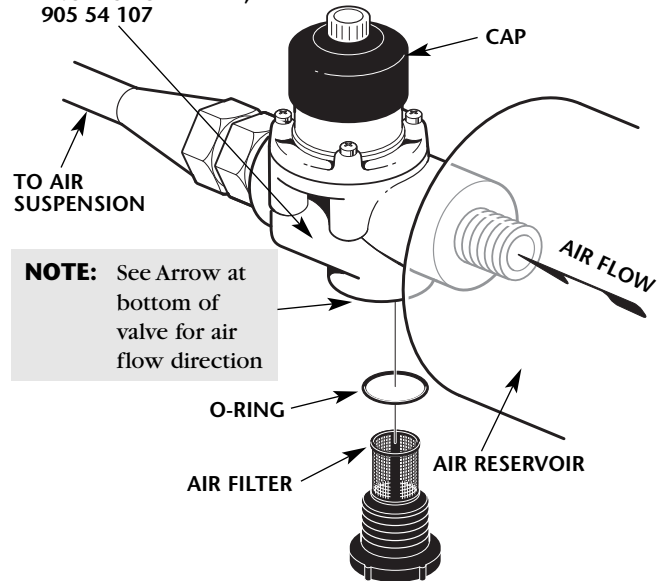
FIGURE 14A
Pressure Protection Valve

PRESSURE PROTECTION VALVE,
905 60 109



FIGURE 14B
Optional Pressure Protection Valve

PRESSURE PROTECTION VALVE,
905 54 107



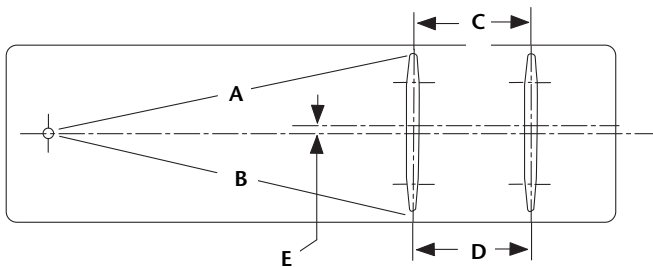
NOTE: See Arrow at bottom of valve for air flow direction

AXLE ALIGNMENT

IMPORTANT: Axle alignment can only be achieved if the lockpin holes are the same distance from the kingpin, left and right. Axle alignment should always be done while the trailer is empty.

1. To properly align the suspension attached to your slider, the trailer should be pulled in a straight line for a sufficient distance to insure there are no binds in the suspension.
2. The trailer should then be pulled straight forward with the trailer brakes locked, so the locking pins rest against the rear of the holes in the body rails. This approximates the position of the pins when the trailer is being pulled on the highway and insures proper trailer tracking.
3. Alignment can be achieved with an optical device designed especially for this purpose or manually by the following manner: Measure the distance from the king pin to the centerline of the spindles on the front axles. It is recommended that spindle extensions be utilized. Dimensions A and B must be equal within 1/8" (3mm). Dimension E is equal to the distance between the trailer centerline and the axle centerline (FIGURE 15).
4. Relocate the slider to the forward position and recheck the king-pin alignment. Variance in "A" and "B" dimensions would indicate lock pin hole location discrepancies.

FIGURE 15
Slider Suspension Alignment



$$A = B \pm 1/8'' (3\text{mm})$$

$$C = D \pm 1/16'' (1.6\text{mm})$$

$$E = \leq 1/16'' (1.6\text{mm})$$

EZ-Align (Non-welded) Connection Axle Alignment

1. Loosen the 11/8" pivot bolt connection nut (FIGURE 16).

IMPORTANT: DO NOT remove weld from bolt head.

2. Rotate bolt head clockwise to move axle forward (A arrows); counterclockwise to move axle rearward (B arrows) (FIGURE 16).
3. Retorque the pivot bolt connection nut, no weld required (see FIGURE 4 on page 6). See TABLE 2 Pivot Bolt Torque Chart on page 6.

IMPORTANT: DO NOT weld EZ-Align pivot bolt (alignment block) assembly to alignment collars on frame brackets (FIGURE 17).

FIGURE 16
EZ-Align

Alignment arrow indicates (neutral position of) alignment adjustment

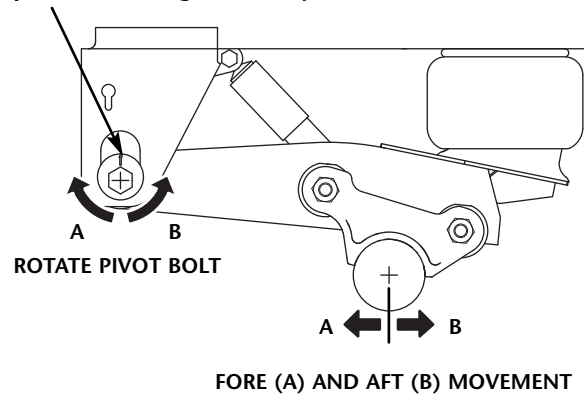
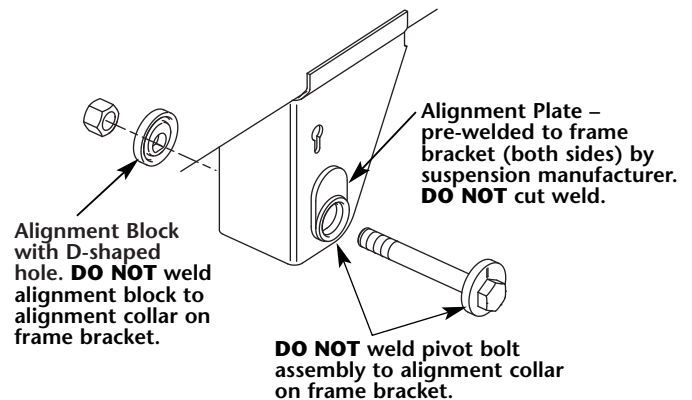


FIGURE 17
EZ-Align Non-Welded Style Assembly



IMPORTANT: The EZ-Align design maintains proper alignment under correct torque without welding.

SUSPENSION SLIDER

Slider Positioning Instructions

1. Set both tractor and trailer brakes.
2. Remove stop bar from behind slider and move to desired location.
3. To release the lock pins, pull operating handle all the way out and lock in place (*FIGURE 18*).
4. Release the tractor brakes and carefully drive forward or backward until the slider suspension is at the desired location.
5. Release operating handle and visually check all lock pins for full engagement. The main body of each lock pin must extend through the holes in the rails (*FIGURE 18*).
6. Lock stop bar in both body rails immediately behind slider.
7. With the trailer brakes applied, gently rock trailer backward and forward to ensure sliding suspension is properly locked and follow procedure set out above before pulling the trailer. The lock pins must be checked at each stop to ensure each is locked.

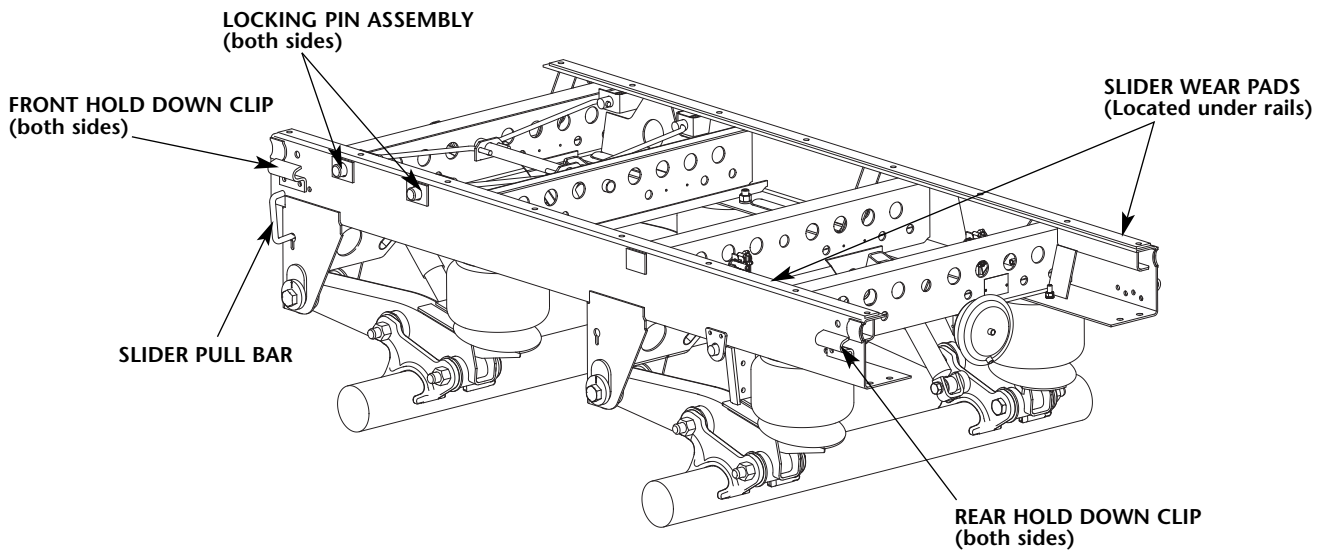
Slider Maintenance Inspection

1. Inspect for loose, broken or missing fasteners. Repair or replace as needed.

WARNING Loose, damaged, or missing fasteners can cause loss of vehicle control which, if not avoided, could result in death or serious injury.

2. Check the slider locking pins, slider pull-bar mechanism and slider wear pads for signs of excessive wear or binding. Repair or replace as needed (*FIGURE 18*).
3. Inspect the structure of the slider box and cross members for damage. Repair or replace as needed (*FIGURE 18*).
4. Inspect the front and rear hold down clips to ensure that they are secured correctly around the body rails (*FIGURE 18*). Torque all 1/2" nuts to 75 - 90 ft. lbs. (102 Nm - 122 Nm).

FIGURE 18
Slider Maintenance Inspection



COMPONENT REPLACEMENT INSTRUCTIONS

Suspension Air Springs

IMPORTANT: Air springs must be replaced with the proper air spring for your application. Check the flexible member and piston for the part number. If the part number is not available, refer to **FIGURE 2** on page 3 to identify your specific model or refer to the OEM vehicle build specifications.

NOTE: For further assistance with air spring part number identification contact SAF-HOLLAND technical assistance at 888-396-6501.

IMPORTANT: It is recommended that the vehicle be unloaded before beginning service procedures.

1. Support vehicle frame with adequate jack stands. Set jack stand height at approximately 2" (51mm) above the suspension's specified ride height (**FIGURE 8** on page 8).

⚠ WARNING Failure to properly support suspension during maintenance may allow suspension to fall which, if not avoided, could result in death or serious injury.

NOTE: The height control valve may be used as an improvised jack by disconnecting the lower height control valve (HCV) linkage and moving the HCV control arm to "up" position to raise vehicle (**FIGURE 10** on page 9). With vehicle raised above the height specified in step 1, position jack stands under vehicle frame at OEM specified locations and move control arm to "down" position to lower vehicle onto jack stands. Hold control arm down until air springs are completely exhausted.

2. Exhaust air from suspension system by:
 - Automatic control - use height control valve by disconnecting link at lower connection, then rotate control arm to exhaust (approx. 45° down) position, or
 - Disconnect air supply line from air spring.

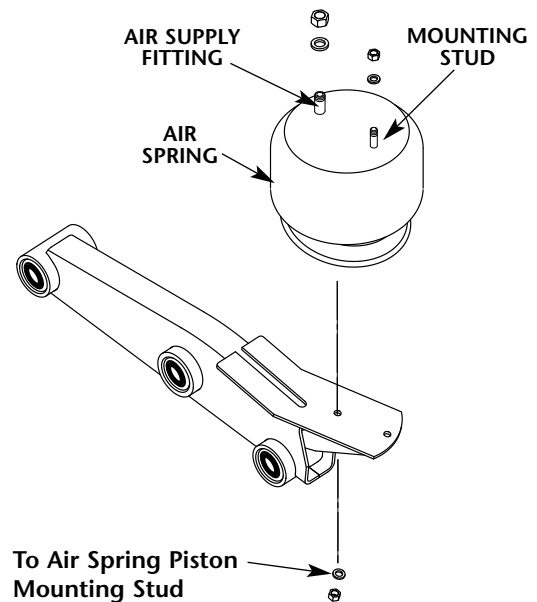
IMPORTANT: If air spring has a leak and is deflated, step 2 must still be performed.

3. Disconnect and remove old air spring assembly (**FIGURE 19**).
4. Install new air spring assembly and torque fasteners (see Torque Charts on page 6).
5. Reconnect air supply line and link connections.
6. Recharge air system in excess of 75 psig (5.2 bars), and check system for leaks.

IMPORTANT: It is the responsibility of the air system installer to secure all air lines and check for any air leaks. If air leaks are detected, repair as required. Failure to eliminate the air leaks may compromise the suspension performance.

FIGURE 19
Suspension Air Spring

NOTE: Refer to NS Series Parts List, XL-AR321, for correct part replacements.



NOTE: Some NS-450 models have one or two spacers mounted under the air spring.

Shock Absorbers

IMPORTANT: Shock absorber must be replaced with the proper shock absorber. Check shock for part number. If part number is not available, refer to **FIGURE 2** on page 3 to identify your specific model (the last two digits of the model number relate to ride height), or refer to the OEM vehicle build specifications.

1. It is recommended the vehicle be unloaded. Block vehicle to prevent rolling.

⚠ WARNING Failure to chock tires prior to beginning maintenance could allow vehicle rollaway which, if not avoided, could result in death or serious injury.

2. Vehicle must be at model's specified ride height or below to assure that tension is relieved on shocks.
3. Remove upper and lower mounting bolts and shock absorber.
4. Replace with correct shock absorber and fasteners.
5. Torque nuts to 140-175 ft. lbs. (189-237 Nm) lubricated.
6. If ride height was changed, you must return the ride height to your model's ride height requirement.

continued

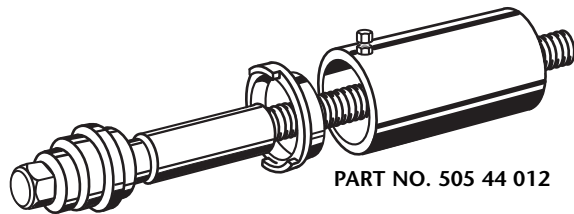
COMPONENT REPLACEMENT INSTRUCTIONS *continued*

Pivot and Axle Connection Rubber Bushings

IMPORTANT: When replacing the rubber bushings at these connections be sure the proper SAF-HOLLAND SRK (Service Repair Kit) is used as they contain all necessary parts to service one axle (2 kits per tandem). Refer to Service Repair Kit section of NS Series Suspension/Slider Parts List (XL-AR321) for proper SRK. It may be advantageous to service both pivot and axle connections at the same time.

NOTE: The SAF-HOLLAND Bushing Service Tool, Part No. 505 44 012 is available to ease removal and replacement of bushings. Contact your SAF-HOLLAND distributor or Parts List for details.

FIGURE 20
Bushing Service Tool



IMPORTANT: It is recommended that the vehicle be unloaded before beginning service procedures.

1. Support vehicle frame with adequate jack stands. Set jack stand height at approximately 2" (51mm) above the suspension's specified ride height (**FIGURE 8** on page 8).

WARNING Failure to properly support suspension during maintenance may allow suspension to fall which, if not avoided, could result in death or serious injury.

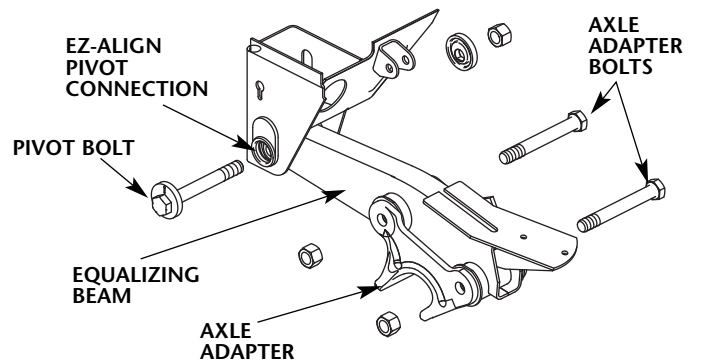
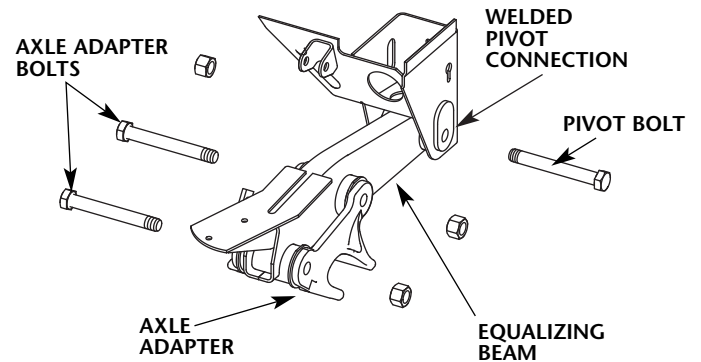
NOTE: The height control valve may be used as an improvised jack by disconnecting the lower height control valve (HCV) linkage and moving the HCV control arm to "up" position to raise vehicle (**FIGURE 10** on page 9). With vehicle raised above the height specified in step 1, position jack stands under vehicle frame at OEM specified locations and move control arm to "down" position to lower vehicle onto jack stands. Hold control arm down until air springs are completely exhausted.

2. Exhaust air from the suspension system by:
 - Automatic control — use height control valve by disconnecting link at lower connection, then rotate control arm to exhaust (approx. 45° down) position, or
 - Disconnect air supply line from air spring.
3. If servicing all equalizing beam bushings, equalizing beam must be completely removed.

NOTE: If servicing the front pivot bushing only and using the SAF-HOLLAND Bushing Service Tool, remove the pivot bolts and rotate front of equalizing beams downward to gain access to bushing.

4. Disconnect air spring and shock absorber at lower connections.
5. Disconnect height control valve linkage at lower connection (**FIGURE 11**, page 10).
6. Disconnect front pivot and axle connection hardware then remove equalizing beam (**FIGURE 21**).

FIGURE 21
Pivot and Axle Connections



7. Inspect axle adapters for wear, cracks and failed welds. Axle adapters should have a 1/2" (13mm) (3 pass) fillet weld (refer to proper SAF-HOLLAND NS-65-83 specifications for NS Series). Replace all worn or cracked axle adapters.
8. Inspect equalizing beams for wear, cracks and failed welds. Replace cracked equalizing beams.

IMPORTANT: NEVER repair a cracked equalizing beam. DO NOT weld cracks. Secondary weld failures during use may cause loss of vehicle control.

WARNING Failure to replace a cracked equalizing beam may cause loss of vehicle control which, if not avoided, could result in death or serious injury.

9. Inspect frame brackets for cracks or out-of-round holes in alignment plates.

continued

COMPONENT REPLACEMENT INSTRUCTIONS *continued*

Pivot and Axle Connection Rubber Bushings *continued*

9. Press out old bushing(s) using a SAF-HOLLAND Bushing Service Tool, Part No. 505 44 012.

IMPORTANT: DO NOT use an open flame or other heat source to remove the bushings.

10. Clean out all foreign material from bushing receptacle(s). Lubricate new bushing(s) with approved lubricant, or a soap and water solution.

IMPORTANT: DO NOT use oil-based lubricant or brake fluid, as it can cause damage to the rubber.

FIGURE 22
Equalizing Beam Bushings Location

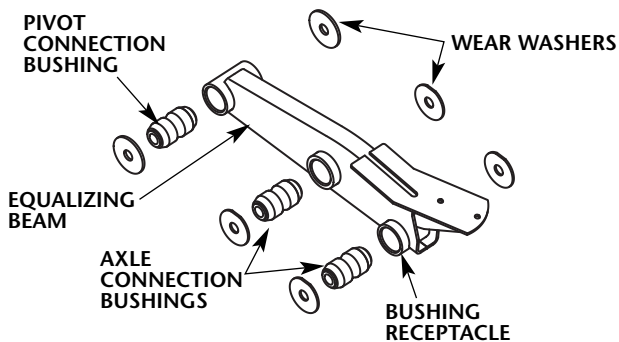


FIGURE 23
Centering Bushings in Equalizing Beam

Top View of Beam

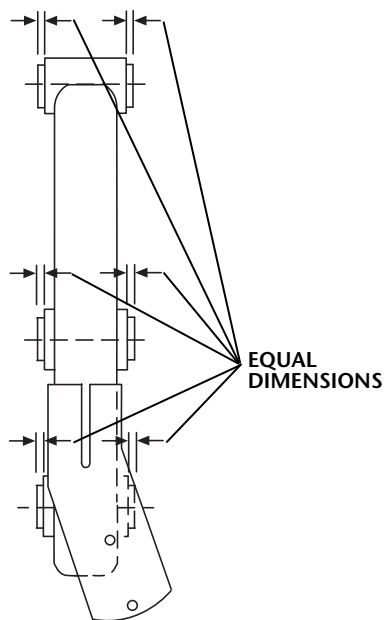
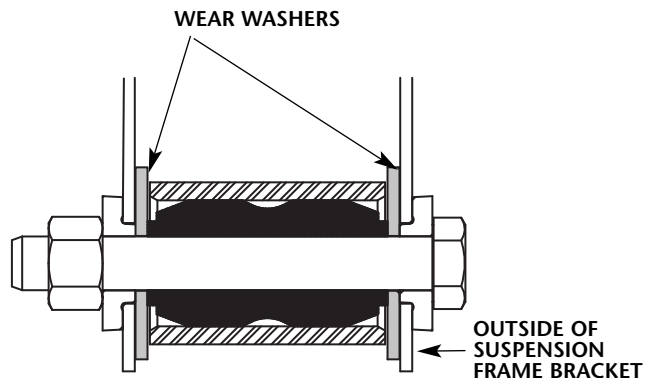
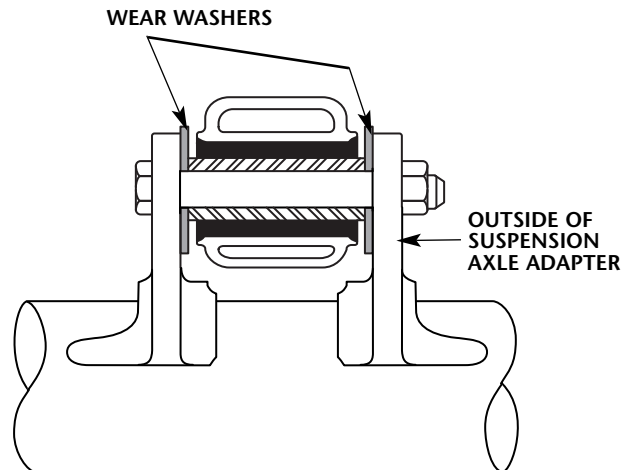


FIGURE 24
Wear Washer Locations

Pivot Connection



Axle Connection



11. Press new bushing(s) in beam. Bushing(s) must be centered in beam receptacles. It may be necessary to push bushing past center approximately 1" (25.4mm) and then re-center the bushing to relieve the rubber (**FIGURES 22** and **23**).
12. Re-install equalizing beam with new wear washers, bolts and nuts. Be sure to install wear washers in proper locations (**FIGURE 24**). Position at ride height and properly torque fasteners (see Torque Charts on page 6).
13. Reconnect air springs, shock absorbers and height control valve linkage. Properly torque fasteners (see Torque Chart on page 6).
14. Remove jack stands. Build system air pressure in excess of 75 psig (5.2 bars) and check for leaks in air system at all connections.

IMPORTANT: It is the responsibility of the air system installer to secure all air lines and check for any air leaks. If air leaks are detected, repair as required. Failure to eliminate the air leaks may compromise the suspension performance.

continued

COMPONENT REPLACEMENT INSTRUCTIONS *continued*

Equalizing Beam

IMPORTANT: It is recommended that the vehicle be unloaded before beginning service procedures.

1. Support vehicle frame with adequate jack stands. Set jack stand height at approximately 2" (51mm) above the suspension's specified ride height (**FIGURE 8** on page 8).

WARNING Failure to properly support suspension during maintenance may allow suspension to fall which, if not avoided, could result in death or serious injury.

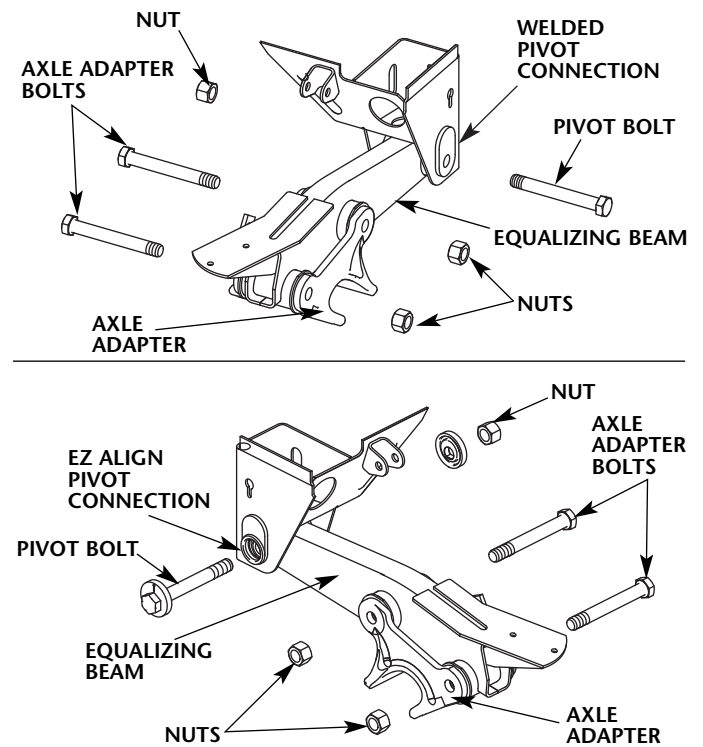
NOTE: The height control valve may be used as an improvised jack by disconnecting the lower height control valve (HCV) linkage and moving the HCV control arm to "up" position to raise vehicle (Fig. 10 - page 9). With vehicle raised above the height specified in step 1, position jack stands under vehicle frame at OEM specified locations and move control arm to "down" position to lower vehicle onto jack stands. Hold control arm down until air springs are completely exhausted.

2. Exhaust air from the suspension system by:
 - Automatic control — use height control valve by disconnecting link at lower connection, then rotate control arm to exhaust (approx. 45° down) position, or
 - Disconnect air supply line from air spring.
3. Disconnect air springs, shock absorbers and height control valve linkage at the lower connections.
4. Disconnect front pivot and axle connection hardware then remove equalizing beam(s) (**FIGURE 25**).
5. Install new equalizing beam(s) with new wear washers, bolts and nuts. Be sure to install wear washers in proper location (**FIGURE 24**). Position at ride height and properly torque fasteners (see Torque Charts on page 6).
6. Reconnect air springs, shock absorbers and height control valve linkage. Properly torque fasteners (see Torque Charts on page 6). Check air system connections, including air springs for leaks.

IMPORTANT: It is the responsibility of the air system installer to secure all air lines and check for any air leaks. If air leaks are detected, repair as required. Failure to eliminate the air leaks may compromise the suspension performance.

7. Remove jack stands. Build system air pressure in excess of 75 psig (5.2 bars).

FIGURE 25
Pivot and Axle Connections



Frame Bracket

When replacing frame bracket(s), see NS-400/450 Series Suspension/Slider Parts List Manual, XL-AR321, for correct Service Repair Kit.

1. Place jack stands at necessary height.

WARNING Failure to properly support suspension during maintenance may allow suspension to fall which, if not avoided, could result in death or serious injury.

2. Remove tires.
3. On the side of the slider box, mark the mounting location of the frame bracket to be replaced.
4. Remove old frame bracket.

IMPORTANT: Carefully air arc the welds connecting the frame bracket to the frame. **Do not** use frame if frame material is damaged. Repair the frame and then install the frame brackets.

CAUTION Failure to repair damaged frame may cause damage to suspension with possible loss of vehicle control which, if not avoided, could result in death or serious injury.

5. Install a new frame bracket per location marks, and weld per SAF-HOLLAND NS-65-07-CI specification (**FIGURE 26**).
6. Re-align trailer per instructions on page 12.
7. Re-install tires and other suspension components, then remove jack stands.

continued

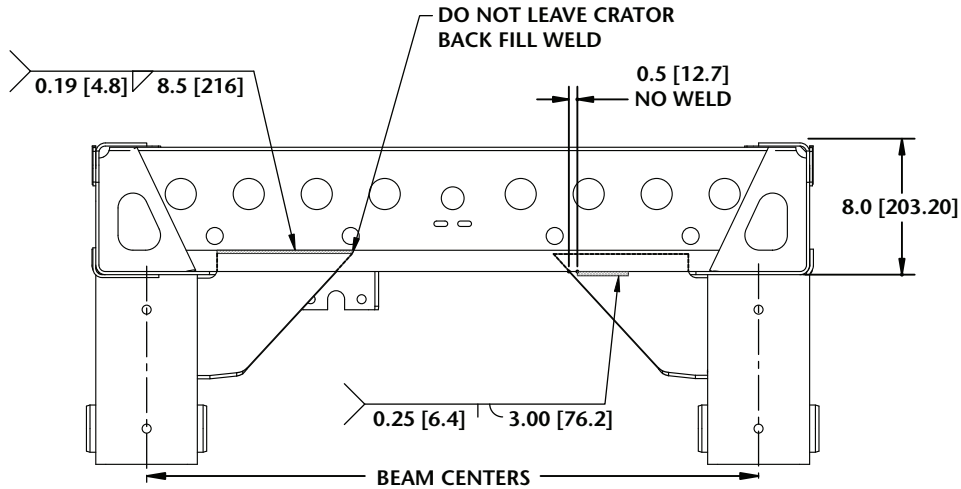
COMPONENT REPLACEMENT INSTRUCTIONS *continued*

Frame Bracket *continued*

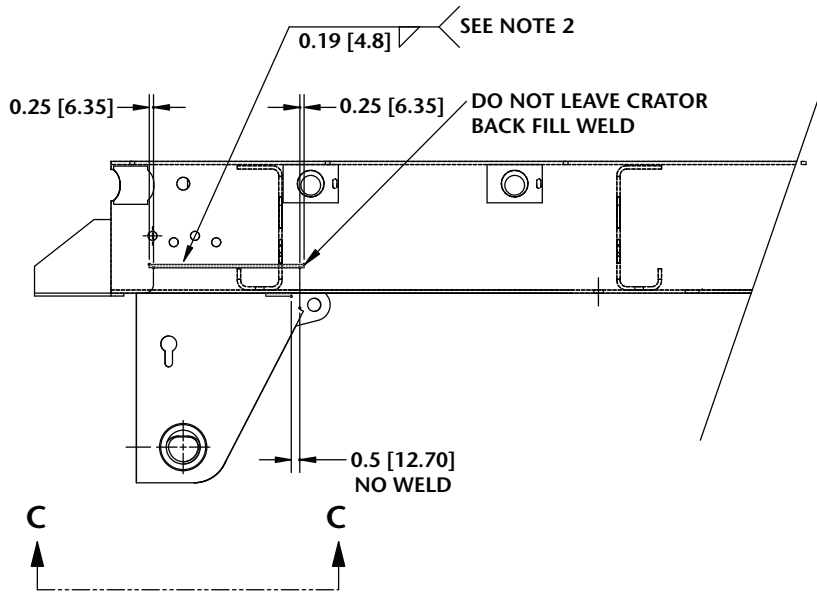
FIGURE 26

Weld Size and Location

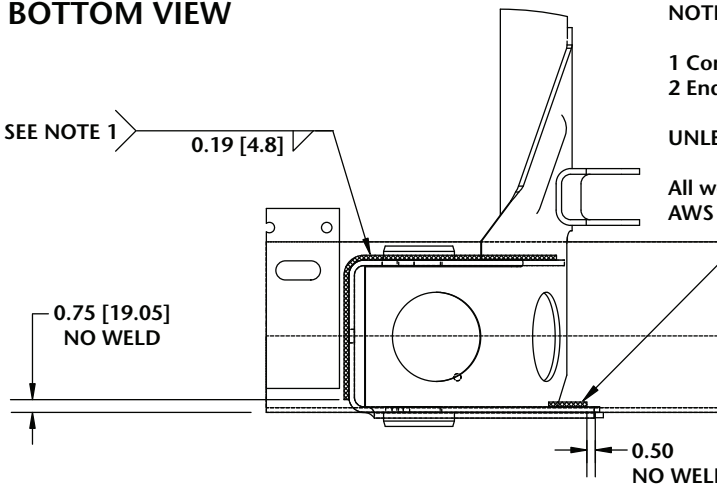
FRONT VIEW



ROADSIDE VIEW



BOTTOM VIEW



NOTES:

- 1 Continuous weld around corner, no starts, no stops.
- 2 End weld $0.25 [6.4]$ after material edge.

UNLESS OTHERWISE SPECIFIED:

All welding in accordance with AWS welding handbook and AWS structural code.

$0.19 [4.8]$ SEE NOTE 2

VIEW FROM BOTTOM (C-C)

TROUBLESHOOTING

Problem	Possible Cause and Remedy
All air springs flat (no air).	<p>Insufficient air pressure to suspension. Build air pressure in excess of 75 psig (5.2 bars). Malfunctioning air pressure protection valve – test the valve using instructions on page 11. Replace if necessary. Check air compressor. HCV control valve not working – follow HCV inspection procedure (see page 9).</p> <p>Air leakage from the suspension air system or the air brake system. Test for air leakage due to loose fittings or damaged air lines, air springs, brake actuators or control valve. Tighten loose fittings to stop leakage and/or replace worn or damaged parts.</p>
Air springs deflate rapidly when vehicle is parked.	<p>Air leakage from the suspension air system. Test for air leakage due to loose fittings between air tank and air suspension or damaged air lines, air springs or height control valve. Apply a soapy solution to connections and air springs if necessary to check for bubbles (leaks). Tighten loose fittings to stop leakage and/or replace worn or damaged parts with new ones.</p>
Ride height too high or too low.	<p>Height control valve out of adjustment. Re-adjust the height control valve.</p>
Air springs ruptured.	<p>Tire, tire rim or brake component rubbing air spring. Check inside to inside tire dimension. There must be 1" (25.4mm) minimum clearance around air spring. If not, it may be necessary to reinstall suspension. Use tire rim back spacers to provide more clearance.</p> <p>Spring brake chamber rubbing air spring. Relocate chamber or rotate clamp ring for more clearance.</p>
Air spring failed.	<p>Continual or repeated over-extension of the air spring. Visually inspect for broken or loose shock absorber or shock absorber mounting bracket. Reconnect loose parts and replace any defective parts. Check the adjustment of the height control valves (see page 8).</p> <p>Air spring(s) worn out. Replace.</p> <p>Air leak or damaged line. Locate and repair. Air spring punctured or leaking – replace with proper air spring. Then check for proper clearance around air spring, 1" (25.4mm) minimum. Also check shock absorbers.</p> <p>“Temporary Operation.” If air loss occurs in the air suspension system and after attempts to repair have failed to correct the problem, it is recommended that the Height Control Valve Linkage be disconnected and all air exhausted from the system. There is an internal rubber bumper built into the air spring which makes it possible to operate the vehicle cautiously while driving at a reduced speed to the nearest place of repair.</p> <p>Restricted air lines(s) between the height control valve and the air spring(s). Disconnect the height control valve linkage and rotate the actuating lever to the 45° down position. If the air spring(s) remain inflated, check for pinched or blocked line(s).</p>
Front pivot connection worn and loose.	<p>Welded pivot alignment plate(s) not welded. Weld per installation instructions (see SAF-HOLLAND NS-65-111 and also <i>FIGURE 5</i> on page 6).</p> <p>Worn pivot alignment plate(s). If alignment plates are worn, replace and realign axles (see page 12).</p> <p>EZ-Align pivot alignment block(s) worn. If alignment blocks are worn, replace and realign axles (see page 12).</p> <p>Front pivot bolt loose. Connection not properly tightened, refer to page 5, step 10 for tightening procedure. Replace all worn or damaged components.</p> <p>Excessive lateral axle walk. 3/4" (19mm) is maximum. Axle connection bolts loose – properly tighten, see step 6 on page 5. Axle adapter welds failed – replace adapters or remove old welds and reweld. Refer to proper SAF-HOLLAND specifications for applicable model. Front pivot and/or axle connection bushings worn – replace with proper SRK (see NS-400/450 Suspension/Slider Parts List Manual, XL-AR321).</p>

continued

Problem	Possible Cause and Remedy
Shock absorber failures.	Over-extending shock absorbers. Suspension set at improper ride height - re-adjust height control valve. Suspension mounted at wrong ride height - check specification sheet, or refer to page 8 for correct ride height and adjustment procedure. Wrong length or improper replacement shock absorber(s) - replace if necessary (see page 14).
Excessive tire wear.	Alignment plates are not welded, are worn, or the axle is out of alignment. Inspect for damage and replace components as necessary or realign and weld to specifications on welded style alignments. Realign and tighten to specifications on EZ-Align (non-weld) style alignments (see page 6). Loose or worn bushings at pivot or axle connection. Inspect for damage and replace components as necessary (see pages 15 and 16), or if loose, tighten connection(s) to proper specification (see page 6). Then, check axle alignment and realign if necessary (see page 12). If worn, replace with proper Service Repair Kit (see NS-400/450 Series Parts List Manual, XL-AR321). Worn bushing tube ends and/or face of wear washers at axle connections. Contact SAF-HOLLAND Service Department. Suspension not properly installed. Contact SAF-HOLLAND Service Department and/or check Trailer manufacturer for proper suspension installation; correct where necessary.



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