NEW FLYER

INSTRUCTION TO SERVICE

ITS: 6696	
SECTION:	204 Rear Suspension
WRITTEN BY:	Michael Rooney
SUBJECT:	HY-1336 to HY-1350 Rear Axle Conversion.

ITS6696

PROCEDURE:

Rear Axle Removal

1. Turn the main battery disconnect switch to the “OFF” position.
2. Drain the air from all the air tanks using the procedure in the Service Manual.
3. Raise coach in accordance with the New Flyer Service Manual and support with jack stands.
4. Using wheel lifts, support the weight of the rear axle and cradle assembly. Lower the rear wheel lifts slightly to allow the axle assembly to drop approximately 3”.
5. Disconnect the levelling valve linkages at the ends of the leveling valve arm on each side of the rear suspension, do not disturb adjustment. Pull the valve lever down to drain air from the air springs.
6. Locate the air-lines that run from the brake valve mounting plate to the rear brakes.
   a. Mark and disconnect the two air-lines that attach to the Relay Valve then tape the ends of the air-lines to prevent dirt entry.
   b. Mark and disconnect the two air-lines that attach to the Quick Release Valve then tape the ends of the air-lines to prevent dirt entry.

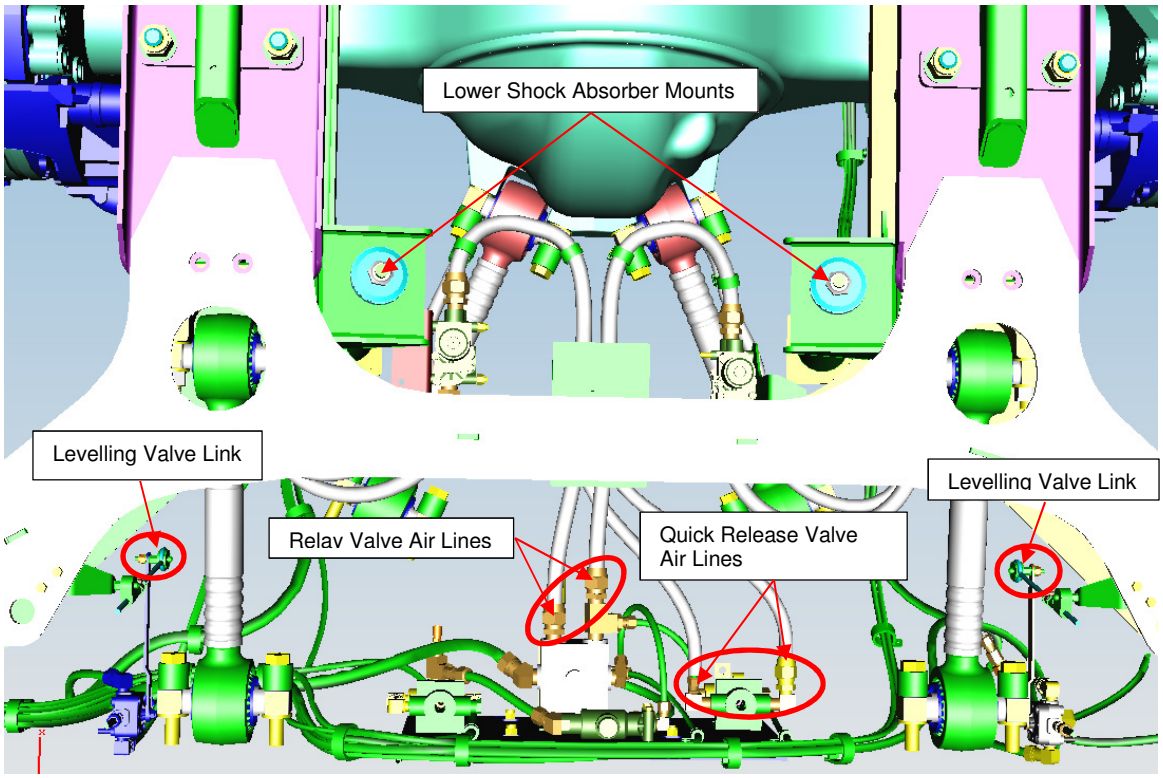

Figure 1: Air Line & Levelling Link Disconnection Points.

7. Unplug the ABS sensor harness pigtails at the points where they connect to the vehicle wire harness.
8. Unplug the brake wear sensor harness from the vehicle wire harness if equipped.

9. Remove the breather membrane and the bracket attached to the vehicle structure.
10. Disconnect the drive shaft:
    a. Mark the drive shaft with reference marks across the splines so that the yoke can be re-installed in the same orientation later.
    b. Remove the four bolts that attach the driveshaft to the differential and discard them.
    c. Slide the yoke assembly off the driveshaft and set it aside.
11. Remove the nuts that attach the four air bags to the suspension cradle. Set the bolts aside for re-use. The air bags will remain with the bus when the suspension is lowered.
12. Remove the hardware that attaches the lower ends of the four shock absorbers to the suspension cradle. Set the hardware aside for re-use. The shock absorbers will remain with the bus when the suspension is lowered.
13. Disconnect the upper and lower radius rods at their chassis mounting points but leave the opposite ends attached to the differential unit. Set aside the mounting hardware for reuse.
14. Carefully lower the axle and suspension cradle assembly to the floor with the wheel lift.

    ⚠ **WARNING: Make sure the assembly is strapped or chained to the lifting device to prevent it from tilting or falling.**

Axle Change Over.

15. Support the rear suspension unit on jack stands or suitable work stand.
16. Remove the wheel and tire assemblies from the axle.
17. Remove the brake chambers using the following steps:
    a. Mark the air-lines that attach to the brake chambers and disconnect them from the brake chambers. Cover the ends of the air-lines with tape to prevent dirt intrusion.
    b. Release and cage the spring brake by rotating the brake chamber release bolt counter-clockwise approximately 22 to 23 turns. The force to compress the spring must not exceed 74 ft-lb (100 Nm) during the caging process. The brake chamber is considered fully caged when the head of the release bolt extends approximately 1.30” beyond the surface of the brake chamber.

       NOTE: *For easier turning of the release bolt, apply 95 to 125 psi shop air pressure to the air inlet marked “Spring”. After caging, completely exhaust air from the spring chamber.*

    ⚠ **CAUTION: DO NOT use impact tools to cage or uncage the brake chamber.**

    c. Remove the two 16 MM lock nuts securing the brake chamber to the brake caliper assembly and remove the brake chamber from the vehicle.
    d. Cover the brake chamber openings and clean the brake chamber mounting surfaces.
    e. Place a protective cover over the brake caliper to prevent entry of contaminents.
18. Disconnect the brake drag sensors at either caliper.
19. Disconnect the ABS sensors at either wheel.

20. Remove nuts, spacers and jacking pad assembly from the four U-bolts that retain the axle tube to the suspension cradle. Inspect the spacers for corrosion damage, if they are in good condition they may be reused.

☞ **NOTE: Due to corrosion it may be necessary to heat the nuts that retain the U-bolts or cut the U-bolts. Sealant has been applied to the U-bolts stiffener plates and spacer tubes during the installation process. It may be necessary to pry mounting hardware pieces to release and fully remove them.**

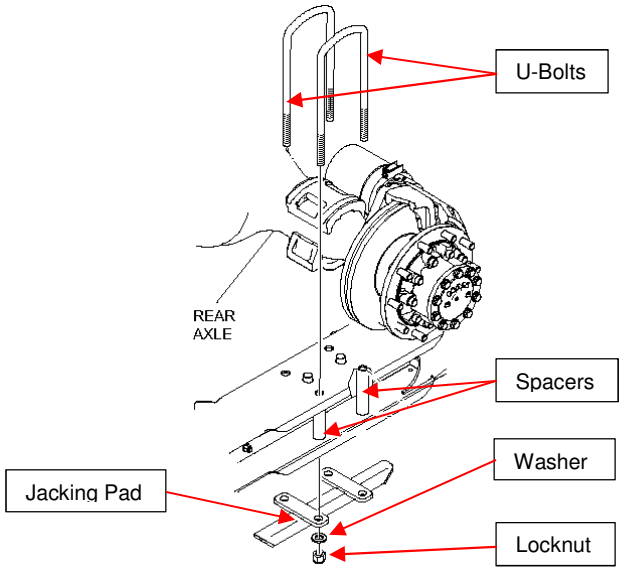

Figure 2: U-Bolts & Hardware.

21. Use hoisting equipment with a minimum of 10,000 lb. (4,550 kg) to lift the axle assembly off the cradle and onto an axle stand equipped to prevent the axle from rotating when set in place. If necessary, tie the axle to the stand with chains or straps.
22. Lift the new HY-1350 axle assembly NF P/N 559392 onto the suspension cradle.
    a. Install new U-bolts NF P/N 440517 (two per side), Spacers NF P/N 334596 (if required) and the stiffener plates and jacking pads removed earlier.
    b. Coat the threads on the U-bolts with Never Seez® NF P/N 5928660 and install new washers NF P/N 20W14000 and lock nuts NF P/N 504779. Torque the nuts initially to 50 ft-lb. (68 Nm).
    c. Working in a circular pattern from inner to outer bolts, torque bolts in increments of 100 ft-lb. (135 Nm) until 380 ft-lb. (515 Nm) is achieved.
    d. Apply Sikaflex 221 NF P/N 242702 to the edges of the spacer tubes and the stiffener plates to ensure a seal between the top and bottom plates. Also seal the U-bolt to the top plate holes in the suspension beam.

23. Install the brake chambers removed from the old axle on the new axle assembly:
    - ⚠ **CAUTION: Disc brake chambers must be inspected for seal condition and height measurement before a used brake chamber can be reinstalled.**
    a. Measure the height of the seal on the brake chamber. The seal must be in good condition and protrude at least 0.118” (3.0 mm) from the brake chamber mounting surface. If the seal measures less than 0.118” (3.0 mm) then the brake chamber must be replaced as an assembly.
    b. Check that the brake chamber mounting surface and brake caliper surface are clean, then remove protective covers over the openings on both components.
    c. Apply Renolit Unitemp 2 grease to the spherical cup located in the brake caliper and to the end of the brake chamber push rod. Do not apply an excessive amount of grease.
    - ⚠ **CAUTION: DO NOT attempt to loosen clamp band bolt in order to rotate and reposition the air inlet ports. DO NOT use clamping tools such as vise grips to hold the push rod. The spring brake actuator contains an internal boot to seal the caliper from contaminants and may be damaged if brake chamber is rotated or if clamping tools are used on the push rod.**
    - ⚠ **CAUTION: Ensure brake chamber is properly positioned so that the breather tube is facing directly downward toward the road surface.**
    d. Carefully install brake chamber on brake caliper assembly.
    e. Install the M16 lock nuts using Never Seez® NF P/N 5928660 and torque to 25 ft-lb (34 Nm) initially and then to 133 – 155 ft-lb (180 – 210 Nm).
    f. Connect air fittings for the air-lines as marked during removal, to the brake chamber and torque the air-line fittings to 25 – 30 ft-lb (34 – 40 Nm).
24. Re-install the ABS sensor wires at either wheel.
25. Re-install the brake drag sensors at either wheel.
26. Remove the upper radius rods from the old axle assembly and install them on the new axle assembly. Apply Never Seez® NF P/N 5928660 to the bolt threads. Snug the bolts but do not torque.
27. Remove the lower radius rods from the old axle assembly and install them on the new axle assembly. Apply Never Seez® NF P/N 5928660 to the bolt threads. Snug the bolts but do not torque.
28. Install the tire and wheel assemblies on the axle and torque the bolts to 425 ± 15 ft-lb (576 ± 20 Nm) using a cross pattern.

Rear Suspension Re-installation.

29. Install the membrane breather bracket NF P/N 393362 on the frame cross member above the curb side upper radius rod mounting bracket. See Figure 3 for location dimensions.
    a. Using the membrane breather bracket as a template, mark the drilling locations on the frame.
    b. Drill two .166” Dia mounting holes.

c. Secure the bracket with two #10 x 5/8” tapping screws NF P/N 34S00010 and two #10 flat washers NF P/N 10W00000.

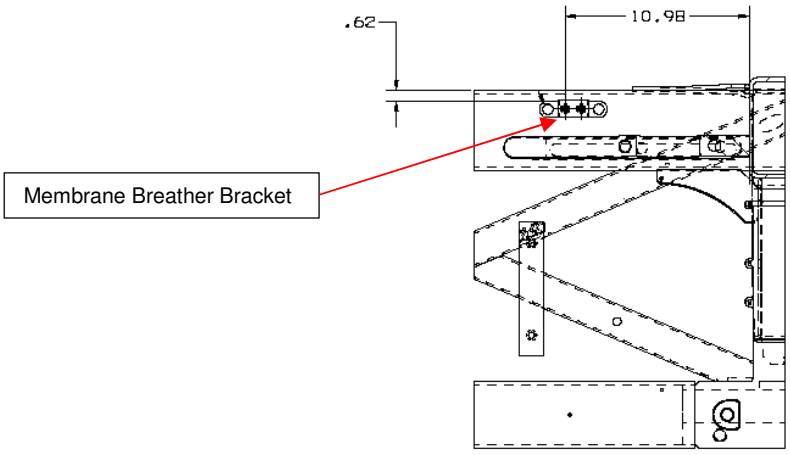

Figure 3: Membrane Breather Bracket Mounting Location.

d. Install the breather removed earlier on the new bracket using two screws 14S04024 and two washers NF P/N 10W04000.

e. Install the 90 deg breather elbow NF P/N 392738 on the breather then attach the breather line to the elbow. Figure 4.

f. Route the breather line across the chassis cross member towards the street side then rearward above the upper mount for the forward street side shock absorber. Secure the breather with four p-clamps NF P/N 092578 and four screws NF P/N 34S00010. Figure 4.

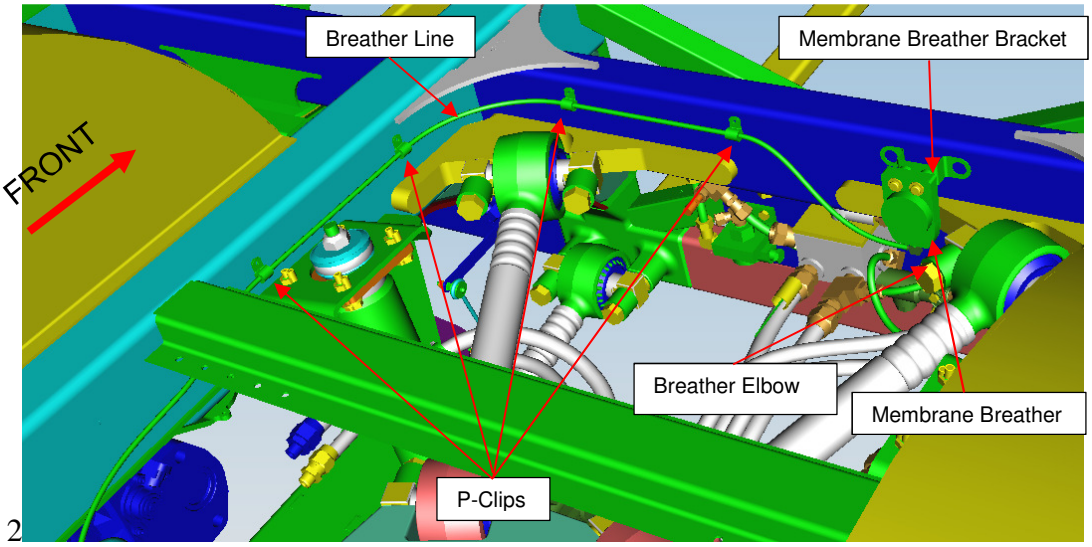

Figure 4: Rear Axle Breather Installation.

30. Position the suspension cradle and axle under the bus. Using wheel lifts raise the assembly into position.

⚠ **WARNING: Make sure the assembly is strapped or chained to the lifting device to prevent it from tilting or falling.**

31. Re-attach the upper radius rods to the chassis using the hardware removed earlier. Using Never Seez® NF P/N 5928660 on the threads, snug the bolts but do not torque.
32. Re-attach the lower radius rods to the chassis using the hardware remover earlier. Using Never Seez® NF P/N 5928660 on the threads, snug the bolts but do not torque.
33. Align lower air spring mounting hole with suspension beam mounting pad. Using Never Seez® NF P/N 5928660 on the threads, torque the lock nuts to 20 ft-lb (27 Nm).
34. Install lower end of shock absorbers to suspension cradle with rubber isolators, cupped washers and locknuts. Using Never Seez® NF P/N 5928660 on the threads, torque the locknuts to 56 ft-lb (76 Nm).
35. Re-connect the air-lines at the rear brake valve mounting plate.
    a. Attach the two previously removed hoses to the quick release valve.
    b. Attach the two previously removed hoses to the relay valve.
36. Re-connect the ABS harness to the vehicle harness.
37. Re-connect the brake wear sensor harness to the vehicle wiring harness.

☞ **NOTE: If the round sensor connector between the wear sensor harness and the extension harness is unplugged during the removal procedure, check that the rubber seal is not damaged or deformed. Ensure the rubber seal is not damaged or deformed. Ensure the wear sensor is properly pushed into the cable extension connector upon re-installation. The cable extension connector has locking tabs which lock in position when the sensor's plug is inserted correctly. A damaged seal or improperly seated connector will not provide a watertight seal between the sensor connector and the extension cable connector.**

38. Re-connect the levelling valve linkages at the street side and curb side of the suspension.
39. Connect the end of the breather line to the breather port on the rear axle.
40. Reinstall the yoke on the drive shaft using the alignment marks to ensure that the splines are correctly matched to maintain balance.
    a. Attach the drive shaft to the differential using four new lock screws NF P/N 6312877. Thread the lock screws into the threaded holes in the differential input flange. Torque the lock screws to 81 ± 3 ft-lb (110 ± 4 Nm).
41. Lower the bus and chock the wheels.
42. Turn the main battery disconnect switch to the "ON" position.
43. Start the engine and allow the air system to pressurize and the suspension to rise to normal ride height.

⚠ **CAUTION: Ensure the vehicle wheels are chocked during the following procedure.**

a. Release the parking brake.
b. Use soapy water or leak detection solution to inspect for air leaks at the spring brake air inlet fittings.
c. With the parking brake still released still released and spring brake fully pressurized, fully apply the brake treadle (minimum 100 psi at service brake chamber).
d. Check for air leaks at the service brake air inlet fittings.
e. Release the brake treadle and exhaust air from the service brake chamber and with air pressure still applied to the spring brake chamber, tighten the release bolt clockwise until it is seated against the head insert. Torque release bolt to 50 – 60 ft-lb (66 – 81 Nm).
f. Apply parking brake and confirm that the spring brakes apply.
g. Check rear ride height to ensure that it is to spec. If the height is not to spec, adjust the height using the procedure in the Service Manual.
h. Check the brake hose connections at the relay and quick release valves for air leaks and repair if necessary.

44. Torque the radius rod mounting bolts to spec at ride height:
    a. Use wheel lifts to raise the bus and with the suspension at ride height, torque the upper and lower radius rod mounting bolts on both sides of the suspension where they attach to the chassis to 300 ft-lb (407 Nm).
    b. With the suspension at ride height, torque the upper radius rod mounting bolts at the axle housing to 300 ft-lb (407 Nm).
    c. With the suspension at ride height, torque the lower radius rod mounting bolts at the axle housing to 193 ft-lb (262 Nm).
    d. Check the oil level in the differential unit to make sure that it is filled to the bottom of the oil fill plug. Add oil if necessary. See Service Manual for list of approved lubricants. Re-install the oil fill plug and torque to 70 ft-lbs (95 Nm).
    NOTE: The axle is filled with break in oil which should be changed before 3000 miles (5000 Km).
    e. Lower the bus.
45. Update the Cummins ECM with Insight to account for the revised rear axle parameters.
46. Update the Allison/BAE transmission software to account for the revised rear axle parameters.
47. Once the rear axle has been installed, it is recommended that a rear axle alignment be performed. See Service Manual for alignment specs.
48. Test drive the bus to check for brake operation, unusual noises and proper suspension function.
49. Remove all tools and debris to return the bus to service condition.

NEW FLYER

LABOUR ESTIMATE

	Operation	Men	Hours	Labour Time M X HR
1	Remove HY-1336 axle and replace with HY-1350 axle.	2	7.0	14

PARTS REQUIRED

Item	Part Number	Description	Qty. per Coach	Units	Notes
1	559392	HY-1350 AXLE, 4.56 W/O WEAR SENSORS, MINERAL OIL	1	EA	
2	6312877	SCREW LOCK M12 X 40 MM LG	4	EA	
3	092578	CLAMP-P 0.250	4	EA	
4	34S00010	SCREW PH CROSS RECESS TPG. TYPE F#10 24 UNC X 5/8” LG	6	EA	
5	392738	ELBOW-90, BREATHER 6 MM	1	EA	
6	10W04000	WASHER-FLAT ¼ NOM	2	EA	
7	14S04024	SCREW PH CROSS RECESS SS ¼” @) UNC X 1 ½” LG	2	EA	
8	10W00000	WASHER-FLAT #10 NOM	2	EA	
9	393362	ASSY-BRKT, MEMBRANE BREATHER	1	EA	
10	440517	BOLT-U REAR MAN AXLE	4	EA	
11	504779	NUT-PREV TOTQUE 7/8-14	8	EA	
12	20W14000	WASHER FLAT HARDENED 7/8"	8	EA	
13	242702	ADHESIVE- WHITE SIKA 221	286	ML	
14	5928660	NEVER SEIZE	0.010	EA	
15	334596	TUBE-REAR SUSPENSION BEAM	8	EA	As Required

SPECIAL TOOLS REQUIRED

Item	Part Number	Description	Qty. per Coach	Units	Notes
1		Enter part description from Oracle		EA	