INSTRUCTION TO SERVICE ITS: 3306

SECTION:	MODEL:	TYPE:	WRITTEN BY:
209 Steering	☐30FT ☒35FT ☒40FT ☒ 60FT ☒DSL ☒CNG ☒ LNG ☒ ELEC	☒ HIGH FLOOR ☐ LOW FLOOR	Grant Li July 24, 2007

OBJECTIVE/SUBJECT:

Inspect and replace U-Joint Assembly.

PROCEDURE:

1. Turn the main battery disconnect switch to the “OFF” position.

PART A: Inspect U-Joint Assembly and replace as required.

2. Locate U-Joint Assembly as shown in Figure 1.

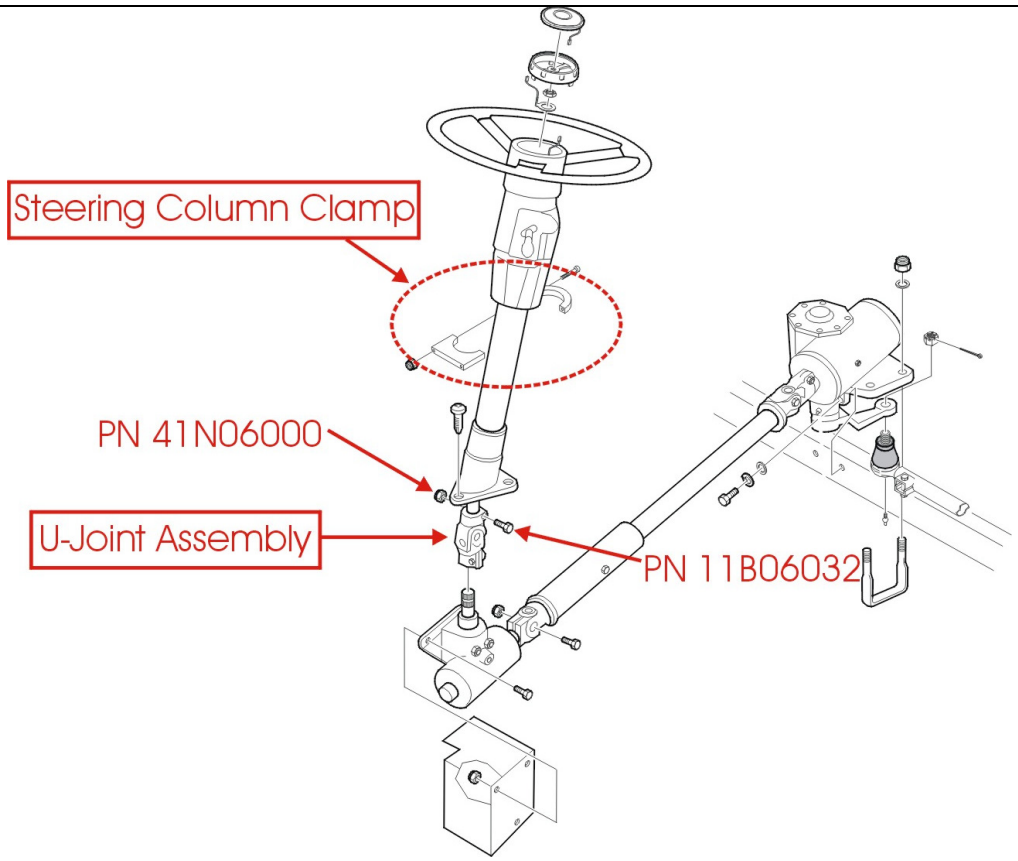


Figure 1: Steering column.

3. Inspect U-Joint Assembly. If either or both of the following are present, U-Joint Assembly must be replaced, otherwise ensure bolt torque is torqued between 30 to 35 ft-lbs. Then move on to step 13:
   a. "Spicer" logo stamped on the U-Joint. See Figure 2.
   b. One splined shaft protruding ¼" or more beyond yoke housing. **This side of the U-Joint indicates improper spline engagement.** See Figure 3.

Figure 2: U-Joint assembly requiring replacement.

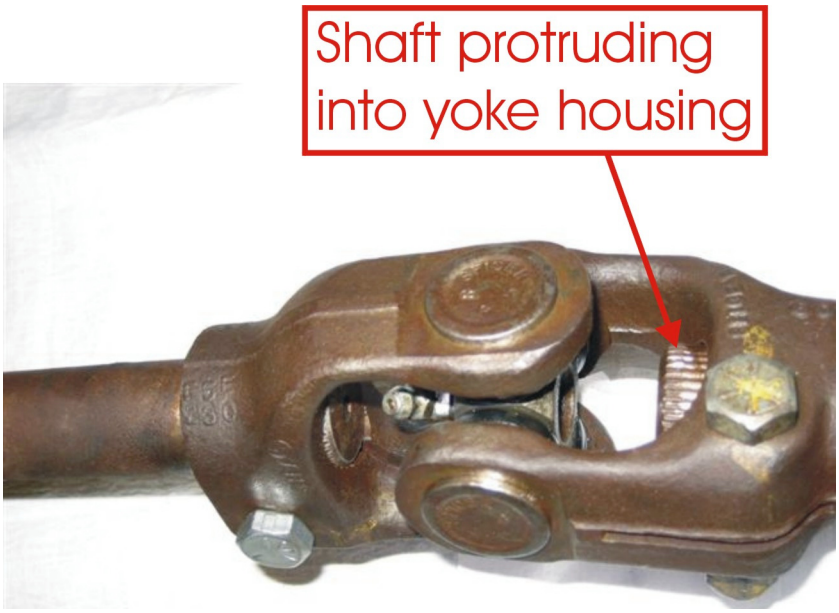


Figure 3: U-Joint assembly requiring replacement.

4. Call New Flyer Parts at 204-934-4802 to order required quantity of parts (see parts list on page 6). Place order as “Coach Down” to speed up delivery and reference ITS 3306.
5. Remove and discard existing bolts and nuts on the U-Joint Assembly.
6. Remove steering column clamp and hardware, set aside for reuse. See Figure 1.
7. With the help of an assistant, one person must lift up the steering column to allow enough room for the other person to remove the U-Joint Assembly from below the floor.
8. Clean splines on steering column and transfer gearbox with wire brush.
9. Install new U-Joint Assembly (PN 8112157) by installing it on the transfer gearbox first. Use Bolt (PN 11B06032) and Nut (PN 41N06000). Torque bolts between 30 to 35 ft-lbs. When bolt is installed, it must sit in the groove on the transfer gearbox shaft. See Figure 1 & 4.
10. The assistant must now lower the steering column and clamp into U-Joint Assembly. Use Bolt (PN 11B06032) and Nut (PN 41N06000). Torque bolts between 30 to 35 ft-lbs. When bolt is installed, it must sit in the groove on the steering column shaft. Similar to Figure 4.
11. Keep output shaft on transfer gearbox from moving with any means necessary. Have assistant move steering wheel back and forth slowly and inspect for looseness between splined connections:
    a. If looseness exist between U-Joint and steering column, replace steering column, refer to section B1.
    b. If looseness exist between U-Joint and transfer gearbox, replace transfer gearbox, refer to section B2.
    c. If looseness does not exist continue to next step.

☞ **NOTE: Fill in inspection sheet (attached in Appendix A) and fax to Attn: Grant Li at 204-224-0248.**

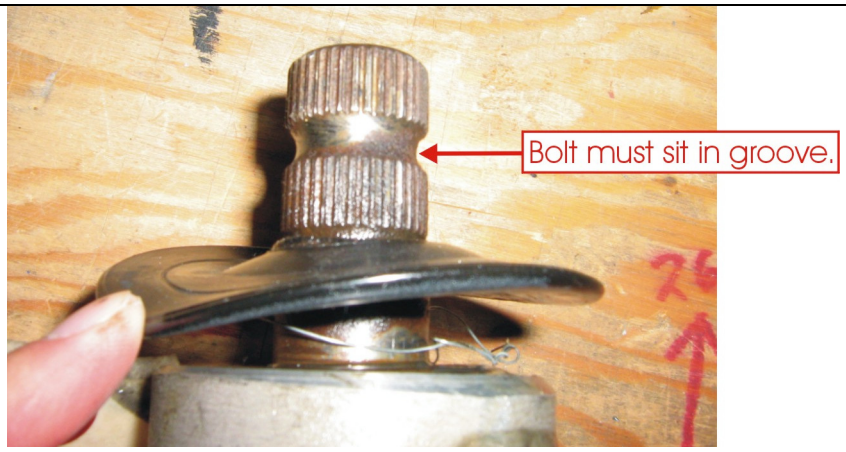


Figure 4: Transfer gearbox shaft.

12. Reinstall steering column clamp and hardware.
13. Turn the main battery disconnect switch to the "ON" position.

PART B: Replace steering column or transfer gearbox as required.

☞ **NOTE: Call New Flyer Parts at 204-934-4802 to order required quantity of parts (see parts list on page 6). Place order as "Coach Down" to speed up delivery and reference ITS 3306. Order a maximum of 5 new transfer gearboxes (PN 8111702) only, the rest should be rebuilt and reused as per section B3.**

B1. Procedure for replacing steering column:

a. Telescope the steering column out to its most outward position, and center the steering wheel.
b. Tilt the column all the way down and pull the upper cover off by grasping the cover at the bottom, closest to the dash. See Figure 5.

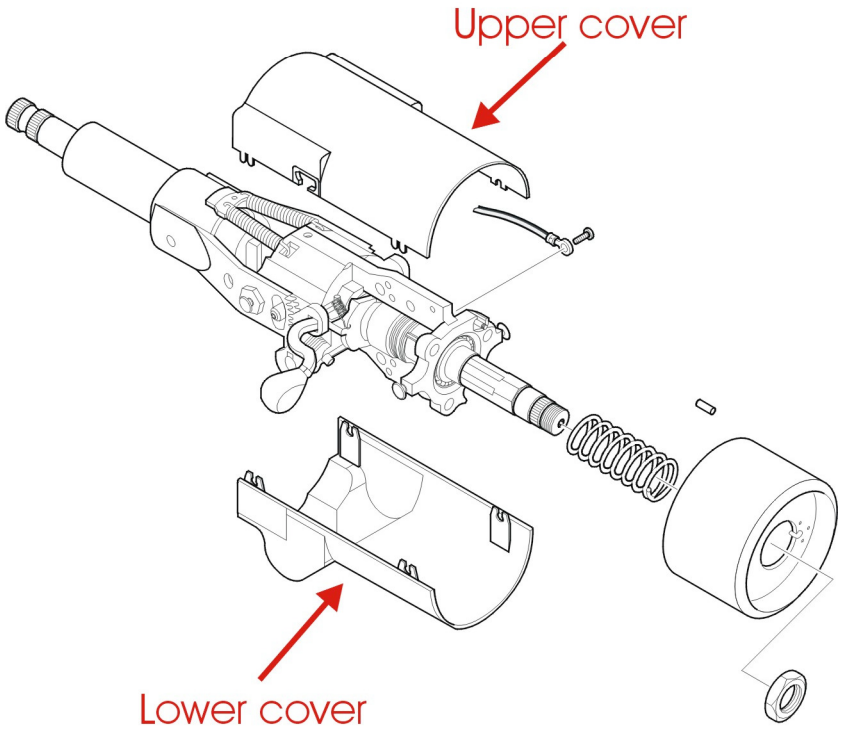


Figure 5: Steering column.

c. Tilt the column all the way up, and pull the lower cover off by grasping the cover at the bottom, closest to the dash. See Figure 5.
d. Pry out horn button and disconnect horn wire.
e. Remove steering wheel retaining nut.
f. Use a puller to remove steering wheel.
g. Disconnect wiring attached to steering column.
h. Remove U-Joint and steering column from vehicle.
i. Install new U-Joint Assembly (PN 8112157) by installing it on the transfer gearbox first. Use Bolt (PN 11B06032) and Nut (PN 41N06000). Torque bolts between 30 to 35 ft-lbs. When bolt is installed, it must sit in the groove on the transfer gearbox shaft. See Figure 1 & 4.
j. The assistant must now lower the steering column and clamp into U-Joint Assembly. Use Bolt (PN 11B06032) and Nut (PN 41N06000). Torque bolts between 30 to 35 ft-lbs. When bolt is installed, it must sit in the groove on the steering column shaft. Similar to Figure 4.

k. Pull up on the U-joint to straighten steering column before installing clamps.
l. Center and install steering wheel and steering wheel nut. Torque nut to 60 ft-lbs.
m. Tilt the column all the way up and reinstall the lower cover.
n. Tilt the column all the way down and reinstall the upper cover.
o. Hook up and install horn button.
p. Turn the main battery disconnect switch to the “ON” position.

B2. Procedure for replacing transfer gearbox:

a. Clean exterior of box. Remove U-Joint.
b. Remove bolt & nut connected to steering driveshaft. Discard hardware.
c. Remove bolts & nuts attaching box to mounting bracket and lower transfer gearbox out of vehicle. Discard hardware.
d. Install new transfer gearbox (PN 8111702). Raise box up into position and guide shaft into splined end of steering drive shaft. Rotate box shaft to allow spline to mesh. Install new box mounting bolts (PN 10B08024) and nuts (PN 40N08000). Torque to 53 ft-lbs wet. See Figure 6.

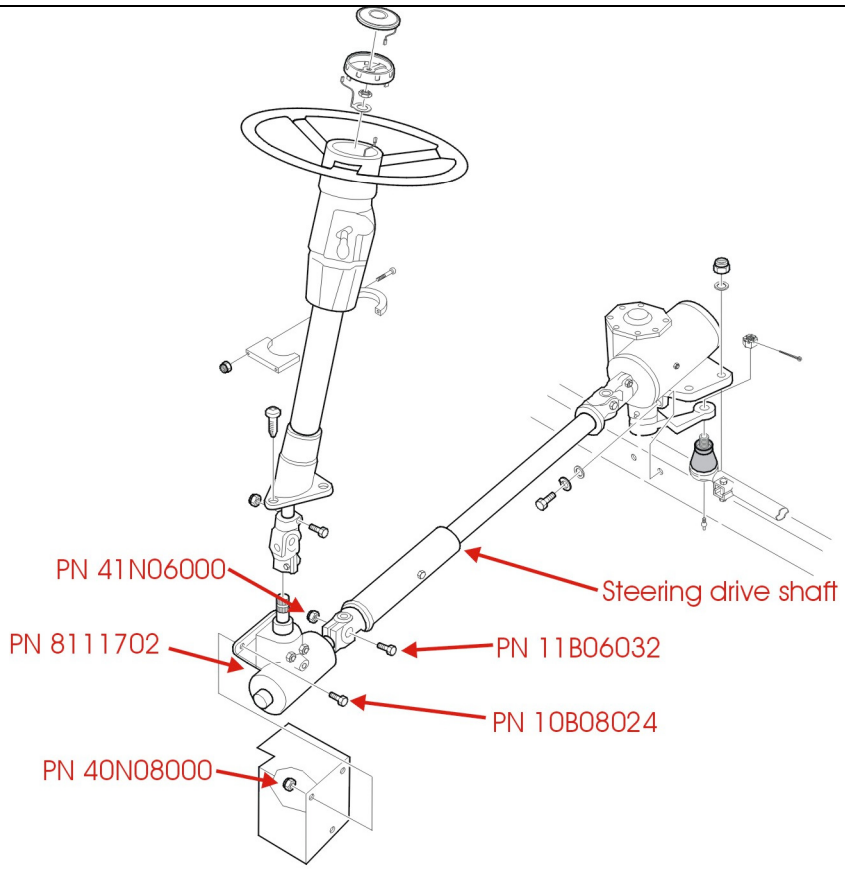


Figure 6: Steering system.

e. Install bolt (PN 11B06032) and nut (PN 41N06000) on steering driveshaft. Torque to 30 ft-lbs wet. See Figure 6.

f. Install new U-Joint Assembly (PN 8112157) by installing it on the transfer gearbox first. Use Bolt (PN 11B06032) and Nut (PN 41N06000). Torque bolts between 30 to 35 ft-lbs. When bolt is installed, it must sit in the groove on the transfer gearbox shaft. See Figure 1 & 4.

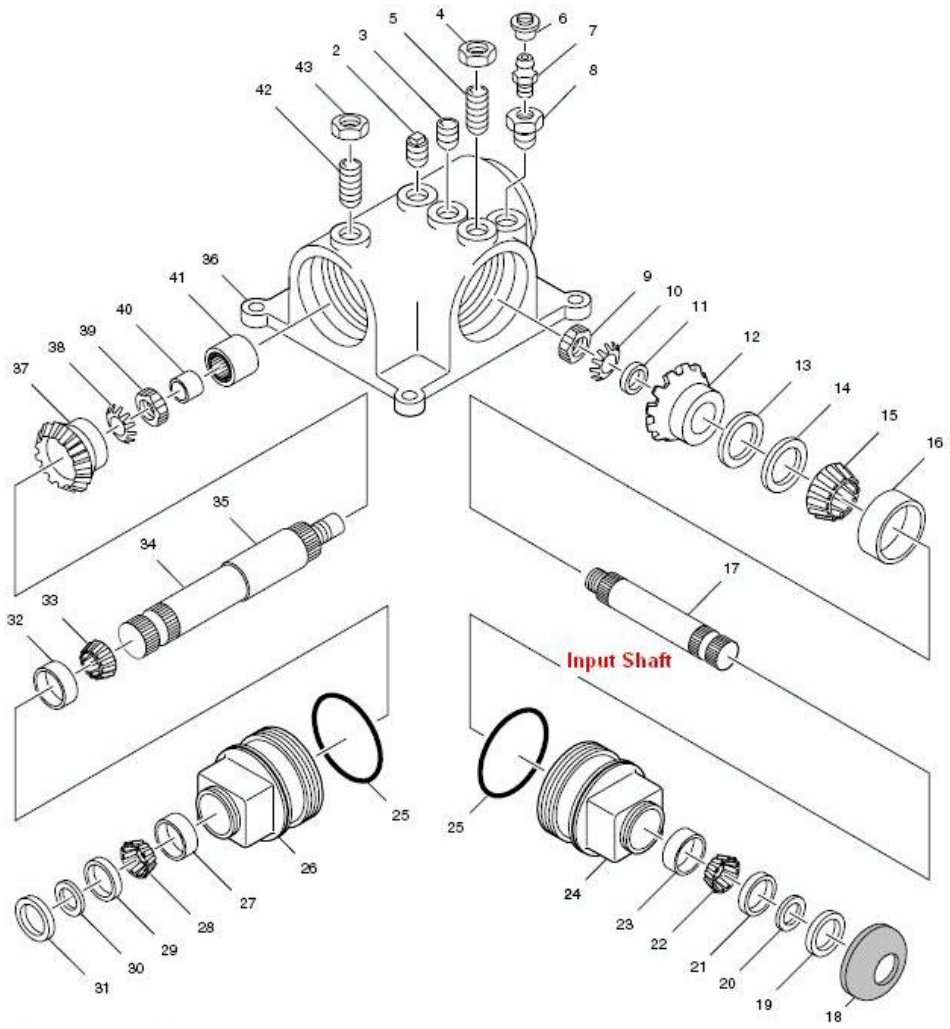
g. The assistant must now lower the steering column and clamp into U-Joint Assembly. Use Bolt (PN 11B06032) and Nut (PN 41N06000). Torque bolts between 30 to 35 ft-lbs. When bolt is installed, it must sit in the groove on the steering column shaft. Similar to Figure 4.

h. Reinstall steering column clamp and hardware.

i. Turn the main battery disconnect switch to the “ON” position.

B3. Procedure for servicing transfer gearbox input shaft:

☞ **NOTE: See Figure 7 for major components of transfer gearbox.**



1. Transfer Gear Box Assembly
2. Oil Plug
3. Vented Pipe Plug
4. Lock Nut
5. Set Screw
6. Grease Fitting Cover
7. Grease Fitting
8. Fitting Reducer
9. Lock Nut
10. Lock Washer
11. Washer
12. Gear
13. Nylon Ring
14. Shim
15. Bearing Cone
16. Bearing Cup
17. Shaft PN 6304835
18. Umbrella
19. Seal PN 6304837
20. Retaining Ring
21. Collar
22. Bearing Cone
23. Bearing Cup
24. Cap
25. O-Ring PN 5942272
26. Cap
27. Bearing Cup
28. Cone Bearing
29. Collar
30. Retaining Ring
31. Seal
32. Bearing Cup
33. Cone Bearing
34. Shaft
35. Spacer
36. Housing
37. Gear
38. Lock Washer
39. Lock Nut
40. Bearing Race
41. Needle Bearing
42. Set Screw
43. Lock Nut

Figure 7: Transfer gearbox.

a. Remove oil plug and vented pipe plug from housing. Drain lubricant from transfer gearbox.
b. Remove lock nuts and set screws. Remove the reducer. Unscrew input shaft cap assembly from housing.
c. Bend tab on lock washer out of its slot in the lock nut. Remove lock nut, lock washer and flat washer from the shaft. The gear and roller bearing can now be removed by sliding them off the threaded end of the shaft.
d. Press against the threaded end of shaft to push the oil seal out of cap. Remove shaft assembly from cap. Remove oil seal, roller bearing and collar from shaft.
e. Remove retaining ring from shaft by taking a punch and placing the end of it against the ring and driving the ring out of the groove. Remove the O-ring from its groove in the cap.
f. Remove the bearing cups from the cap by using a bearing puller. Come in from the square end of the cap and press both bearings down and out of the cap.
g. Clean all parts in cleaning solvent and use a stiff brush to remove grease and dirt. Dry parts completely. Inspect all parts for damage or excessive wear.
h. Inspect bevel gears for damage or wear. Replace both gears if one is found to be defective.

☞ **NOTE: Shaft (PN 6304835), Shaft Seal (PN 6304837) and O-Ring (PN 5942272) must be replaced on transfer gearbox, all other parts are reusable unless damaged.**

i. Reassemble transfer gearbox by pressing a bearing cup into the bearing seat machined for it. Press another bearing cup into the other end of the cap.
j. Install retaining ring into the groove in shaft (shaft with extension beyond threads).
k. Slide collar over the threaded end of the shaft with its open end facing the retaining ring. Slide collar over the retaining ring. Slide roller bearing over the threaded end of the shaft and push it against the collar.
l. Insert threaded end of shaft assembly into the square end of the cap. The tapered roller bearing will mate with the cup and the threaded shaft end will extend from the threaded end of the cap.
m. Slide another roller bearing over threaded shaft end and push it up into cap bore. Slide spacer over threaded end of shaft and then place gear over the same shaft end. Gear teeth must face towards the cap.

n. Place lock washer with external teeth facing away from gear, so that the internal locking tang on the washer is down in the key way in the shaft thread.

o. Install lock nut onto threaded end of shaft and torque to 30 ft-lbs. and bearing drag becomes excessive enough that the cap will not turn freely on the shaft. Then back the lock nut off 1/2 turn until the bearing drag is minimal and the cap spins freely. There should be no end play in the shaft. Bend the lock washer external tooth into the lock slot on the lock nut tang.

p. Apply a heavy grease to O-ring and install over square end of cap and roll ring into the cap O-ring groove. Apply Permatex sealant to outside diameter of the oil seal and slide over splined end of shaft. Press seal into the cap oil seal bore.

q. Apply the heavy grease to the threaded diameter of the cap. Carefully screw cap assembly into housing until the top of the O-ring surface is flush with the cast surface of the housing.

r. Look through plug hole in the housing, you will be able to see the tooth side of the gears. Continue to adjust the cap assembly (inward or outward) until the angles on the tooth side of the gears come together and match.

s. Turn the shafts and check for gear interference or excessive backlash on the gear set.

t. If there is interference, both cap assemblies are to be turned jointly until interference quits and gears mesh freely without rubbing.

u. If there is excessive backlash, the cap assemblies are to be moved jointly (as in step r.) until interference is reached and then adjust as in step t. The ideal gear setting on this assembly is at the point where there is no gear interference. This keeps the backlash on this assembly at its closest possible minimum.

v. Put the set screws into the 3/8” drilled and tapped holes in the housing. Torque set screws to 20 ft-lbs.

w. When set screws are tightened, interference on the gear set sometimes occurs. Rotate shafts on unit to check. If gear interference occurs, loosen set screw above the cap. This is the cap with the lubrication weep holes machined into it. Back this cap off one-eighth turn and retorque the set screw to 20 ft-lbs. Check to see the gear set turns freely. If there is still interference, loosen the other screw and turn the other cap pin 1/8 turn, retorque set screw to 20 ft-lbs.

x. Put the lock nut on the set screw and torque to 20 ft-lbs.

y. Fill transfer gearbox with DEXRON-III fluid through the pipe fitting hole that the vented plug goes into. Fill until the lubrication comes out of the hole that the square headed oil plug is to be installed in. Install oil plug.

z. Install vented pipe plug. Install the reducer in the housing and then install the zerk in the reducer. Return to step B2 16d. and follow instructions for installing transfer gearbox.

☞ **NOTE: All replaced steering columns or transfer gearbox shafts which qualify for warranty replacement must be returned through the New Flyer Warranty Procedure (i.e. claim tag with date, part #, bus #, and claim #), to confirm damage. Packaging must clearly be marked with "ITS 3306".**

LABOUR ESTIMATE PER COACH

	Operation	Men	Hours	Labour Time M X HR
1	Inspect and replace U-Joint Assembly.	2	0.25	0.5
2	Replace steering column or transfer gearbox.	2	0.75	1.5

Part A: Inspect and replace U-Joint Assembly.

PARTS PER COACH AS REQUIRED

Item	Part Number	Description	Qty. per Coach	Units	Notes
1	8112157	UNIVERSAL JOINT ASSY	1	EA	
2	11B06032	BOLT HEX 3/8" 24 UNF X 2" LG	2	EA	
3	41N06000	NUT LOCK NYLON 3/8" 24 UNF	2	EA	

Part B: Replace Steering Column, or Transfer Gearbox, or Transfer Gearbox Input Shaft as required.

PARTS PER COACH AS REQUIRED

Item	Part Number	Description	Qty. per Coach	Units	Notes
1	135318	COLUMN-STEERING LFB STD	1	EA	*
2	8111702	GEAR TRANSFER STRG	1	EA	**
3	6304837	SEAL SHAFT	1	EA	***
4	5942272	O RING	1	EA	***
5	6304835	SHAFT	1	EA	***
6	10B08024	BOLT HEX 1/2" 13 UNC X 1 1/2" LG	3	EA	***
7	40N08000	NUT-HEX LOCK 1/2 NC	3	EA	***
8	11B06032	BOLT HEX 3/8" 24 UNF X 2" LG	1	EA	***
9	41N06000	NUT LOCK NYLON 3/8" 24 UNF	1	EA	***

* Parts required to replace steering column. (Refer to part B1)
** Parts required to replace Transfer Gearbox. (Refer to part B2)
*** Parts required to replace Transfer Gearbox Input Shaft. (Refer to part B3)

Appendix A: Inspection Sheet

Property Name: _____ SR #: _____

Unit #	Spicer U-Joint on coach. Yes/No	U-Joint replaced. Yes/No	Improper spline engagement on steering column. Yes/No	Steering column replaced. Yes/No	Improper spline engagement on transfer gear box. Yes/No	Transfer gearbox replaced. Yes/No	Date	Initials

Photocopy as required.