Appendix

Notes

Appendix A

TORQUE CHART

CAPSCREW SIZE	GRADE 5 TORQUE	GRADE 8 TORQUE
1/4-20	8	12
1/2-28	10	14
5/16-18	17	24
5/16-24	19	27
3/8-16	31	44
3/8-24	35	49
7/16-14	49	70
7/16-20	55	78
1/2-13	75	105
1/2-20	85	120
5/8-11	150	210
5/8-18	170	240
3/4-10	270	375
3/4-16	295	420
7/8-9	395	605
7/8-14	435	675
1-8	590	910

Notes

Appendix B

MAINTENANCE CHECK LISTS

2,000 Mile Initial Service

Date _____ **Speedometer** _____

		Ok	Need Service	Date Repaired
1.	Adjust air brakes.			
2.	Check steering for noise or play.			
3.	Drain air tanks and check system build up time (5 minutes from 0 pressure).			
4.	Check parking brake.			
5.	Change oil and filter (initial 2,000 miles only).			
6.	Check radiator and all hoses for leaks.			
7.	Check all belts for tension and/or cracks.			
8.	Check all fluid levels.			
9.	Check, clean, tighten batteries and cables.			
10.	Check tire pressure with tire guage. Check tire wear.			
11.	Check and lube all steering joints/fittings.			
12.	Check fuel tank mounts and fuel lines.			
13.	Check driveline play and lube U-joints.			
14.	Check seals on transmission, differential, and wheels.			
15.	Drain grease from rear axle and refill.			
16.	Check exhaust system for leaks.			
17.	Check exhaust system clamps and hangers.			
18.	Check air restriction indicator. Replace filter element if necessary.			
19.	Check wiring for looseness or chafing, paying particular attention to battery cables and starter cables.			

6,000 Mile (or Semi-annual) Service

		Ok	Need Service	Date Repaired
1.	Adjust air brakes.			
2.	Check steering for noise or play.			
3.	Drain air tanks and check system build up time (5 minutes from 0 pressure).			
4.	Check parking brake function.			
5.	Change oil and filter.			
6.	Check radiator and all hoses for leaks.			
7.	Check belts for tension and/or cracks.			
8.	Check all fluid levels-engine, transmission, hydraulic, differential, etc.			
9.	Check, clean, tighten batteries and cables.			
10.	Check tire pressure with gauge. Check wear.			
11.	Check and lube all steering joints/fittings.			
12.	Check fuel tank mounts and fuel lines.			
13.	Check driveline play and lube U-joints.			
14.	Check seals on transmission, differential, and wheels.			
15.	Check exhaust clamps and hangers. Check exhaust system for leaks.			
16.	Check air restriction indicator and replace filter element if necessary.			
17.	Check tightness/wear on engine, transmission, and radiator mounts.			
18.	Check tightness of lug nuts inside and out. Check wheels and nuts for cracks.			
19.	Check wheel bearing adjustment.			
20.	Check all bolts in both suspension system mountings.			
21.	Check wiring for looseness or chafing, paying particular attention to battery cables and starter cables.			

NOTICE
This ervice should be performed every 6,000 miles.

12,000 Mile (or Annual) Service

	Ok	Need Service	Date Repaired
1. Adjust air brakes.			
2. Check steering for noise or play.			
3. Drain air tanks and check system. build up time (5 minutes from 0 pressure).			
4. Check parking brake function.			
5. Change oil and filter.			
6. Check radiator and all hoses for leaks.			
7. Check belts for tension and/or cracks.			
8. Check all fluid levels-engine, transmission, hydraulic, differential, etc.			
9. Check, clean, tighten batteries and cables.			
10. Check tire pressure with gauge. Check wear.			
11. Check and lube all steering joints/fittings.			
12. Check fuel tank mounts and fuel lines.			
13. Check driveline play and lube U-joints.			
14. Check seals on transmission, differential, and wheels.			
15. Check exhaust clamps and hangers. Check exhaust system for leaks.			
16. Check air cleaner indicator and replace element if necessary.			
17. Check tightness/wear on engine, transmission, and radiator mounts.			
18. Check tightness of lug nuts inside and out. Check wheels and nuts for cracks.			
19. Check wheel bearing adjustment.			
20. Wash or steam clean engine compartment.			
21. Drain and refill differential.			
22. Check wheel alignment and toe-in.			
23. Check brake shoes and linings.			
24. Check front wheel camber.			
25. Check air lines for rubbing or heat wear.			
26. Check all bolts in both suspension mountings.			
27. Check wiring for looseness or chafing, paying particular attention to battery cables and starter cables.			

NOTICE
This service should be performed every 12,000 miles. This service list includes service checks from the 6,000 miles service list.

Notes

Appendix C - Drive Belts

Proper care and maintenance of drive belts is an important part of good engine maintenance. Proper belt tension and the condition of the pulley grooves are of primary concern.

Since belts and pulleys wear with use, look at all frictional surface areas for signs of wear. Normal wear can be recognized as even wear, both on the belt and the grooves of the pulley. It is the unusual signs of wear that indicate some corrective action is necessary. When checking, remember that failed or partially failed belts shown to be defective may have been damaged by a bad pulley, a misaligned drive, or by some other faulty mechanical component.

Base Cracking

Excessive cross checking extending into the rubber on the base of a belt that shows little or no side wear indicates that the belt has been operated under incorrect tensioning, has been slipping, or is worn out due to excess use. In any case, the belt must be replaced and retensioned. This does not indicate any defect caused during manufacturing.

Belts may fail after three (3) or four (4) seasons of use due to fatigue. Small cracks in the cover material of a belt are not an indication of belt failure. However, if the base of the belt also shows cross checking, the belt has been exposed to weather to the extent that the inner fabric is beginning to rot and should be replaced.

Fabric Rupture

A fabric rupture can be caused by operating a belt over a badly worn pulley; by too much tension, which forces the belt down into the groove; or by foreign objects falling into the pulley groove while in operation.

Cover Tear

A tear in the cover of a belt is normally a result of the belt accidently coming into contact with some part of the motor home. It is no fault of the belt or its construction. Cover tears are usually caused by belts running too loosely, which allows them to be "thrown out" centrifugally and rub on other components of the vehicle. Proper belt tension will prevent this failure.

NOTICE
A slight raveling of the belt covering at the splice location does not indicate imminent belt failure. Simply cut off the loose raveling.

Slip Burn

Slip burn is caused by operating the belt too loosely. The belt slips under load, and when it finally grabs, it will snap. Maintaining proper belt tension will prevent this type of failure.

Gouged Edge

A gouged edge in a belt can be caused by a damaged pulley or from interference with some part of the motor home. Check the condition of the pulleys. Make sure the belt does not rub on any part of the motor home while in operation.

Worn Sides

Badly worn belt sides result from long operation without enough tension. The sides will be worn and slightly burned around the entire circumference. Check for proper belt tension and pulley alignment.

Excessive Stretch

A belt that stretches excessively is one that stretches beyond the adjustment provided to take up normal belt stretch.

Lumpy Belts

Lumpy belts usually occur, and are more noticeable, on variable speed drives and other high speed belt installations. The result is excessive vibration. If belts are not relieved of tension while the vehicle is stored, there will often be temporary vibration on start-up after the storage period. Give the belts time to straighten out before diagnosing lumpy belts.

Internal Cord Failure

Failure of one or more of the internal tension cords will result in the belt rolling out of the pulley groove. Cords may be broken by prying the belt over the pulley instead of properly loosening the tension adjustment.

Improper Length

It is possible that an improper length belt could accidently be installed on an engine. Always check to be certain that the belt length is correct prior to installation.

Belt Replacement Tips

1. Never replace just one belt on a two groove single pulley set up. Never install only one belt from a matched set; always install the complete set.

2. Always check the condition of the pulleys before replacing belts. Inspect the pulleys for chips, cracks, bent sidewalls, rust, corrosion, or other wear factors. Replace any pulleys found to be damaged or defective.

3. Misaligned pulleys result in shortened belt life.

4. Check the alignment between pulleys as follows:

   a. Position a straightedge or cord line to touch both pulleys at all points. The shafts must be parallel.

   b. Rotate each pulley a half revolution and note whether the contact of either pulley with the straightedge or cord line is disturbed. If so, this indicates a bent shaft or warped pulley.

5. Move the belt tension adjustment to the position where it provides the most slack. In some cases it may be necessary to remove the accessory to install the belt.

6. Place belts in the pulley grooves by hand.

NOTICE
Never pry or force a belt onto the pulley with a screwdriver, crow-bar, wedge, etc. Both belt and drive may be damaged by such abuse.

To carry their full loads, belts must grip the entire area of contact with the pulley. When operated too loosely belts can slip, heat, burn, grab, or snap. Many more belts fail from under tightening than from over tightening. When operated too tightly, belts can damage the engine by causing side loading on the crankshaft, crankshaft bearings, and accessory bearings. Excess tension also stretches and weakens belts.

Belt Inspection

The 3116 engine is equipped with a water pump belt, and one belt for the fan drive, alternator and accessories. These belts should be checked during regular engine maintenance inspections for any of the conditions previously decribed in this Appendix. Check and adjust the belt tension to minimize belt slippage which decreases belt life and causes poor performance of the alternator, water pump and any driven equipment.

Belt Adjustment

New drive belts will stretch after the first few hours of operation. Run the engine for fifteen (15) seconds to seal the belts, then retighten them. Retighten drive V-belts after half an hour or fifteen (15) miles and again after eight (8) hours or 240 miles of operation. Thereafter, check the tension of the drive belts during every preventative maintenance check and adjust as necessary.

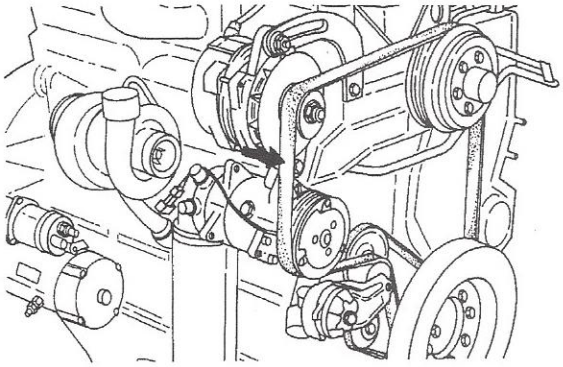

Figure C-1. 3116 Belt Placement

WARNING
To avoid personal injury, when checking belt movement with the engine running, extreme caution should be used to avoid coming in contact with any moving parts of the engine.

To check the belt tension, apply 25 lbs (110 N) of force midway between the pulleys. A correctly adjusted belt will deflect 1/2 to 3/4 inch (13 to 19 mm).

Automatic Belt Tensioner

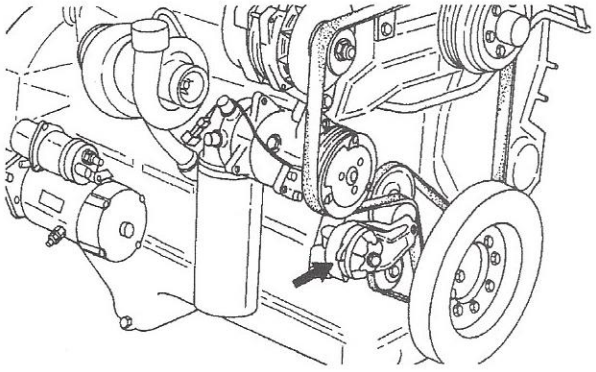

Figure C-2. Automatic Belt Tensioner

If the 3116 is equipped with a Freon compressor, the belt for the fan drive, alternator and accessories will have an automatic belt tensioner. If the engine is not equipped with a Freon compressor, the alteranator is used for tension adjustment.

Water Pump Belt Adjustment

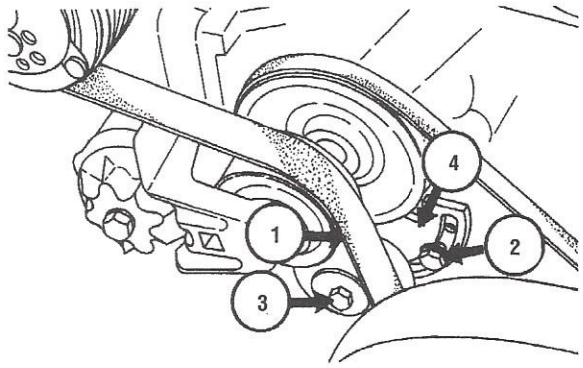

Figure C-3. Water Pump Belt Adjustment

1. To adjust the water pump drive belt, loosen the mounting bolt (1) and bracket bolt (2).
2. Move the idler pulley in or out as required to obtain the correct adjustment.
3. To make correct adjustment, use the bolt in the center of the tightener pulley (3) or the square hole in the mounting bracket (4).
4. Tighten the mounting bolt (1) and the bracket bolt (2).
5. If a new belt is installed, check the belt adjustment again after 30 minutes of engine operation at rated speed.

Notes

Appendix D - Maintenance Schedule

Lubrication service **must** be performed every twelve (12) months regardless of accumulated mileage. To protect seals, bearings, and gaskets, the motor home must be driven at least **twenty (20) miles bimonthly (every two {2} months)**. If driven less, the seals, bearings, and gaskets may not be properly lubricated.

ITEM	SERVICE	INTERVAL	LUBE	PAGE
Engine Oil	Oil and Filter Chg	3,000	EO	1-3
Engine Fuel	Filter Change	6,000		1-9
Engine Coolant	Filter & Coolant Ch	6,000	AF	1-12
Transmission	Fluid and Filter Chg	20,000	TF	2-2
Driveline	Lube	6,000	CL	3-1
Tires	Wear, Studs Tight	6,000		4-4
Rear Axle	Grease Change	12,000	MP	4-3
Frt Wheel Brgs	Repack	12,000	HT	5-4
Air Dryer	Replace Dessicant	6,000		6-1
Hydraulic Resv	Replace Filter	6,000	7-3	
Steering Column	Lube	6,000	CL	7-4
Booster Pump	Replace Brushes	12,000	8-1	
Battery Terminal	Clean and Coat	3,000	CL	9-2

Table D-1. Maintenance Schedule

LUBE KEY:

1. Lubricant specifications are provided on Page I-6.
2. Rear axle on new chassis is delivered filled with run in grease, which must be drained and replaced at 3,000 miles.

AF = Antifreeze	**HT** = High temperature grease
CL = Chassis lube	**MP** = Multi-purpose gear lube
EO = Engine oil	**TF** = Transmission fluid
HF = Hydraulic Fluid	

Notes

Appendix E - Front End Specifications

CAMBER

Conditions	Left (Driver's) Side	Right Side
1. Camber angles of axle equipped with hubs. • axle not mounted under vehicle. • no load	+3/4° (±7/16°) or +1-3/16° to +5/16° (final reading)	+1/4° (±7/16°) or +11/16° to -3/16° (final reading)
2. Camber angles under rated load.	+11/16° to -3/16° (final reading)	+3/16° to -11/16° (final reading)

CASTER

Caster is adjusted using the top and bottom radius rods. Example: If a 1° adjustment is required, turn the top radius rod .5° and the bottom radius rod .5°.

TOE-IN

Unloaded vehicle — 1/16 inch (1.587 mm) ± 1/32 inch (0.794 mm). It is recommended that the vehicle be empty and on the ground (not jacked up) for accurate measurement.

Loaded vehicle — 1/32 inch (0.794 mm) ± 1/32 inch (0.794 mm)

ROCKWELL FRONT AXLE TORQUE VALUES (Straight King Pin Models)

Fastener	Size	Initial Range (lb ft)	Max. Torque (lb ft)
Steering Arm Ball Nut	5/8" - 16	60-80	115
	5/8" - 18	60-80	115
	3/4" - 16	90-120	170
	7/8" - 14	160-215	300
Cross Tube Arm Nut	1" - 14	390-525	725
	1-1/8" - 12	550-740	1025
	1-1/4" - 12	775-1050	1450
Knuckle Cap Capscrews	5/16" - 18	20-30	
Stop Screw Locknut	1/2" - 13	50-65	
Cross Tube End Nut	9/16" - 18	40-55	75
	5/8" - 16	60-80	115
	5/8" - 18	60-80	115
	3/4" - 16	90-120	170
	7/8" - 14	160-215	300
	1" - 14	250-325	450
	1-1/8" - 12	350-475	650
Steering Arm Nut	7/8" - 14	250-325	450
	1" -14	390-525	725
	1-1/8" - 12	550-740	1025
	1-1/4" - 12	775-1050	1450
	1-1/2" - 12	1350-1825	2525
Draw Key Wedge (aluminum center)	M10 x 1.5	30-40	
Draw Key Nut (steel center)	3/8" - 24	20-30	
	7/16" - 20	30-40	

NOTE:
- All torques given apply to parts lightly coated with rust preventative type oil.
- For dry parts — increase torques 10%.
- For parts heavily coated with oil — decrease torques 10%.

Chassis Warranty

The Gillig Corporation warrants that each new chassis shall be free from defects in material and workmanship under normal use and service for a period of one year from date of purchase or 24,000 miles, whichever comes first.

Gillig's obligation under this warranty is limited, at Gillig's option, to:

A. Reimbursing the owner for necessary replacement parts and reasonable labor costs;

or

B. Repairing or replacing a defective part at the Gillig factory or a facility designated by Gillig.

To be covered under this warranty, all work must receive **PRIOR** approval from Gillig Corporation **BEFORE** being performed.

To obtain approval call or write:

GILLIG CORPORATION
SERVICE DEPARTMENT
PO BOX 3008
HAYWARD, CALIFORNIA 94540

(415) 785-1500

This warranty **DOES NOT** cover:

1. Malfunction due to misuse, negligence, modification, accident, or failure to perform scheduled maintenance as directed in the Owner's Manual or Service Bulletins.

2. Any part, subsystem, or component which must be repaired or replaced due to normal wear and tear.

3. Scheduled maintenance items including, but not limited to, belts, filters, seals, fluids, and brake linings.

4. Tires and batteries.

5. Equipment used in a rental operation.

6. Towing charges.

7. Claims for loss of time, loss of the use of the motor home, inconvenience, or other related damages.

TRANSFERABILITY
This warranty is to the first retail purchaser and subsequent owners **DURING THE ORIGINAL WARRANTY PERIOD** of one year or 24,000 miles.

NOTICE
THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY OTHER OBLIGATIONS OR LIABILITY ON THE PART OF THE GILLIG CORPORATION. THE GILLIG CORPORATION NEITHER ASSUMES NOR AUTHORIZES ANY PERSON TO ASSUME FOR IT ANY OTHER OBLIGATIONS OR LIABILITY IN CONNECTION WITH THE SALES OF CHASSIS. GILLIG SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, HOWEVER CAUSED.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

IMPORTANT: Promptly fill out and return the WARRANTY REGISTRATION card so that you can be sure to reliably receive Service Bulletins or other information.

Engine and Transmission Warranty

The warranty on both engine and transmission is provided by Detroit Diesel Allison, Division of General Motors Corporation. Detailed descriptions of the warranty can be found in the **WARRANTY INFORMATION** pamphlet provided with each chassis.

Extended warranties are available from Detroit Diesel Allison at a reasonable cost. This coverage must be purchased within 90 days of vehicle delivery from a Detroit Diesel Allison distributor or authorized service dealer.

CHASSIS WARRANTY REGISTRATION

1. Vehicle Identification Number (Chassis) _____

2. Coach Brand/Serial Number_____

3. Buyer's Name and Address:

_____
First Middle Last Name

_____
Number and Street

_____
City State Zip

_____
Area Code Telephone

4. Retail Seller's Name and Address:

_____
Name

_____
Number and Street

_____
City State Zip

5. Original Retail Delivery Date or First Use (Whichever Occurred First) and Mileage:

Date of Retail Sale:_____/_____/_____
Month Day Year

Mileage at Time of Retail Sale: _____
(no tenths)

_____ _____
Retail Buyer's Signature Date

Complete and Mail To:
GILLIG CORPORATION
SERVICE DEPARTMENT
PO BOX 3008
HAYWARD, CA 94540

Notes