Group Index, Alphabetical

Section	Section Number
Air Compressor, Bendix BA-921	13.02
Air Compressor, Bendix Tu-Flo 550 and Tu-Flo 750	13.00
Air Compressor, WABCO	13.01

Contents

Subject	Subject Number
General Information	050
Service Operations	
Air Compressor Replacement	100
Troubleshooting	300
Specifications	400

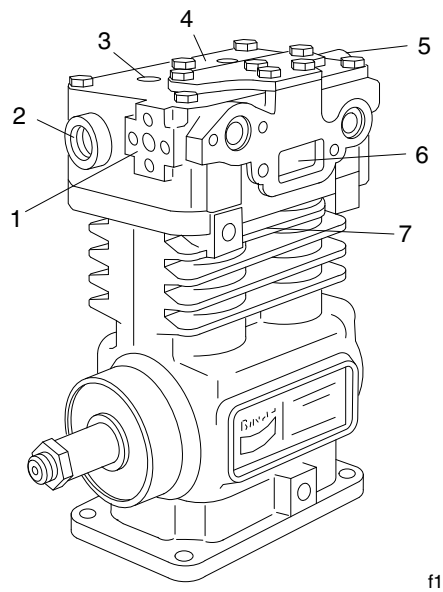
General Information

The Tu-Flo 550 and 750 air compressors are two-cylinder, single stage, reciprocating compressors. The Tu-Flo 550 air compressor has a rated displacement of 13.2 cubic feet (4 cubic meters) per minute at 1250 rpm. The Tu-Flo 750 air compressor has a rated displacement of 16.5 cubic feet (5 cubic meters) per minute at 1250 rpm.

The compressor consists of two major subassemblies, the cylinder head and the crankcase.

The cylinder head is an iron casting that houses the inlet, discharge, and unloader valving. The cylinder head contains the air inlet port and has both top and side air discharge ports. There are three water coolant ports on the cylinder head. Governor mounting surfaces are provided at both the front and rear of the cylinder head. The cylinder head is mounted on the crankcase and is secured by six capscrews.

The crankcase houses the cylinder bores, pistons, crankshaft and main bearings, and provides the flange or base mounting surface. See **Fig. 1** and **Fig. 2**.



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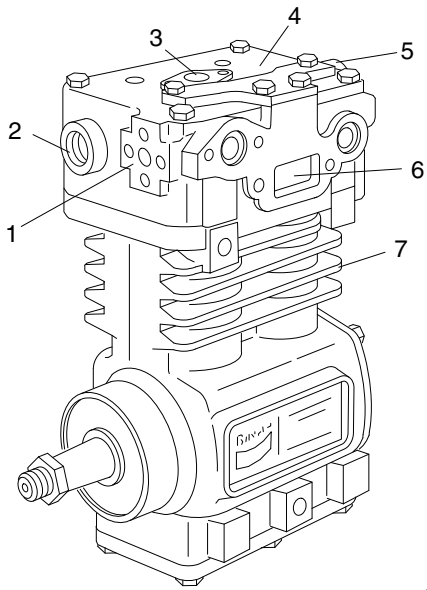
1. Governor Mounting Pad
2. Water Inlet Port
3. Air Discharge
4. Cylinder Head
5. Water Outlet Port
6. Air Inlet
7. Crankcase

Fig. 1, Tu-Flo 550 Air Compressor



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1. Governor Mounting Pad
2. Water Inlet Port
3. Air Discharge
4. Cylinder Head
5. Water Outlet Port
6. Air Inlet
7. Crankcase

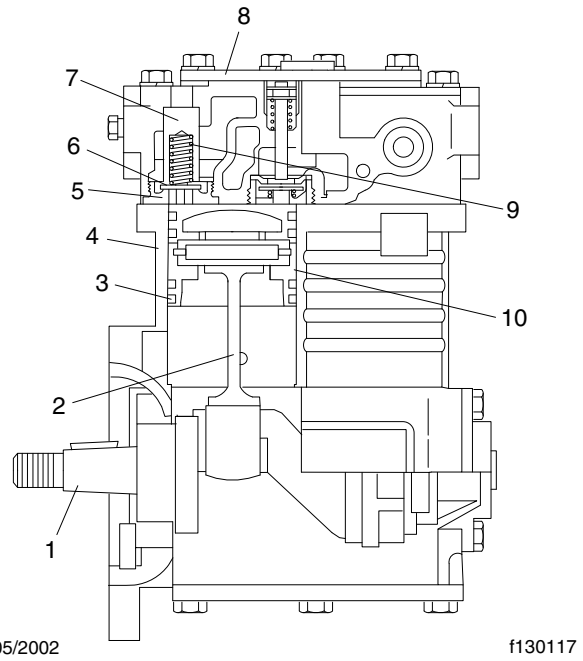
Fig. 2, Tu-Flo 750 Air Compressor

Operation

The compressor is driven by the vehicle engine and is operating continuously while the engine is running. Actual compression of air is controlled by the compressor unloading mechanism and the governor. The governor, which is generally mounted on the air compressor, maintains the brake system air pressure between a preset maximum and minimum pressure level.

See **Fig. 3** for a section view of the Tu-Flo 550 and 750 air compressors.

General Information



1. Crankshaft
2. Connecting Rod
3. Piston Ring
4. Crankcase
5. Discharge Valve Seat
6. Discharge Valve
7. Discharge Valve Stop
8. Unloader Cover
9. Discharge Valve Spring
10. Piston

Fig. 3, Tu-Flo 550 and 750 Air Compressor

Replacement

1. Apply the parking brakes, chock the tires, and open the hood.
2. Drain the air system.
3. Clean all the fittings and hose connections on the air compressor, power steering pump, and the supply and pressure lines on the power steering gear until they are free of dirt.
4. Drain the radiator coolant. For instructions, see **Section 20.01**, Subject 100.
5. Loosen the constant torque hose clamps at both ends of the charge air cooler outlet air piping. Remove the piping to access the air compressor.
6. Remove the pressure line on the power steering gear.
7. Remove the radiator support rods to access the air compressor.

NOTE: On vehicles with combined air dryers and air reservoir modules, the air governor is mounted on the air reservoir module not the air compressor.

8. If the air governor is mounted on the compressor, remove it and the air governor gasket. Discard the gasket.
9. Remove the pressure line on the power steering pump and allow the power steering fluid to drain. After the fluid has drained, disconnect the other end of the pressure line and remove it. Plug the line and fittings to keep out dirt.
10. Remove the supply line from the power steering pump and plug the line and fitting.
11. Remove the capscrews that attach the power steering pump to the air compressor and remove the steering pump. Remove and discard the steering pump gasket.
12. Remove the cushion clamp from the air compressor.
13. Marking their locations and positions, disconnect all air, coolant, and oil lines attached to the air compressor. Plug the lines and fittings.
14. Remove the oil manifold that is attached to the engine. See **Fig. 1**.
15. Remove the two capscrews that attach the air compressor to the mounting bracket at the aft end of the air compressor. Remove the two capscrews that attach the mounting bracket to the engine and remove the mounting bracket. See **Fig. 2**.

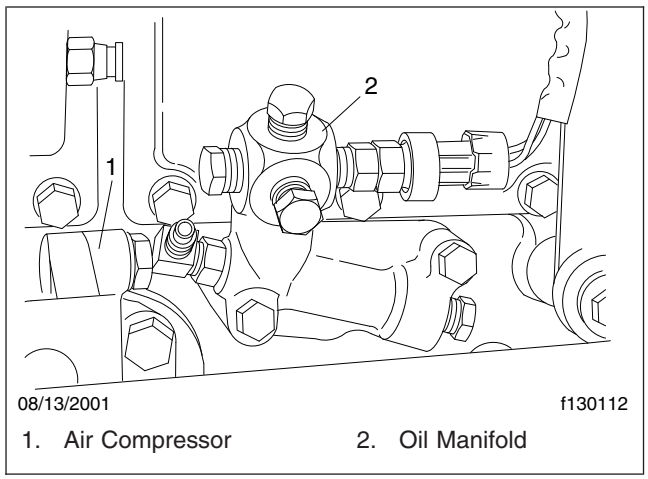


Fig. 1, Oil Manifold

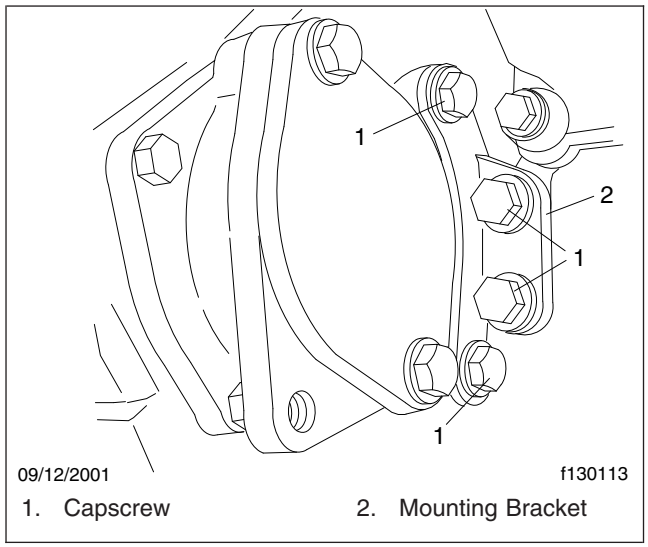


Fig. 2, Air Compressor Mounting Bracket

16. Support the air compressor and remove the two capscrews that attach the air compressor to the engine. Remove the air compressor and the gasket.
17. Inspect the condition of the air compressor gasket and replace the gasket if necessary.

NOTE: On Caterpillar engines, apply thread lock compound 9S-3263 to the mounting capscrews.

Air Compressor Replacement

18. Attach the air compressor to the front of the engine. Be sure that the drive gear engages correctly with the gear in the front of the engine. Install the capscrews on the air compressor and tighten 60 to 90 lbf·ft (80 to 100 N·m).
19. Install the oil manifold on the engine.
20. Using a capscrew, attach the cushion clamp to the air compressor and tighten 16 to 27 lbf·ft (21 to 35 N·m).
21. Install a new gasket on the power steering pump. Using capscrews, attach the power steering pump to the air compressor and tighten the capscrews 32 to 37 lbf·ft (43 to 50 N·m).
22. Unplug the air, coolant, and oil lines and attach them to the air compressor.
23. If the air governor is mounted on the compressor, install a new gasket on the air governor and attach the air governor to the compressor.
24. Attach the supply line and pressure line to the power steering pump.
25. Attach the pressure line to the power steering gear.
26. Using bolts and nuts, attach the radiator support rods to the mounting brackets.
27. Using constant torque hose clamps, install the charge air cooler outlet air piping. Tighten the hose clamps 45 lbf·in (500 N·cm).
28. Fill the power steering reservoir to between the MAX HOT and MIN COLD lines. For approved power steering fluids, see **Section 46.06**, Subject 400.
29. Fill the cooling system. For instructions, see **Section 20.01**, Subject 100.
30. Start the engine and turn the steering wheel from full right to full left two or three times to remove air from the lines.
31. Check the power steering reservoir again and add fluid if needed.
32. Check the hydraulic lines for leaks.
33. Remove the chocks from the tires and close the hood.

Troubleshooting Tables

Problem—Excessive Oil Passage

Problem—Excessive Oil Passage	
Possible Cause	**Remedy**
Restricted air intake.	Check engine or compressor air cleaner and replace if necessary. Check compressor air inlet for kinks, excessive bends, and be certain inlet lines have the minimum specified inside diameter. Recommended minimum inlet line inside diameter is 5/8 inch (16 mm). Recommended maximum air inlet restriction is 25 inches of water.
Restricted oil return to engine.	Oil return to the engine should not be restricted in any way. Check for excessive bends, kinks, and restrictions in the oil return line. Minimum recommended oil return line size is 5/8-inch (16 mm) outside diameter or equivalent inside diameter of 1/2 inch (13 mm). The return line **must constantly descend** from the compressor to the engine crankcase. Make certain oil drain passages in the compressor and mating engine surfaces are unobstructed and aligned. Special care must be taken when sealants are used with, or instead of, gaskets.
Poorly filtered air inlet.	Check for a damaged or dirty air filter on the engine or compressor. Check for leaking or damaged compressor air intake components such as induction line, fittings, gaskets, and filter bodies. The compressor intake should not be connected to any part of the exhaust gas recirculation (E.G.R.) system on the engine.
Insufficient compressor cooling (compressor runs hot).	For air-cooled portions of the compressor: • Remove accumulated grease and dirt from the cooling fins. Replace components found damaged. • Check for damaged cooling fins. Replace compressor if found damaged. For a water-cooled compressor or water-cooled portions of the compressor: • Check for proper coolant line sizes. Minimum recommended line outside diameter is 1/2 inch (13 mm). • Check the coolant flow through the compressor. Minimum allowable flow is 2.5 gallons per minute at engine governed speed. If low coolant flow is detected, inspect the coolant lines and fittings for accumulated rust scale, kinks, and restrictions. • Water temperature should not exceed 200°F (93°C). • Optimum cooling is achieved when engine coolant flows as shown in **Fig. 1**.
Contaminants not being regularly drained from system reservoirs.	Check reservoir drain valves to insure that they are functioning properly. It is recommended that the vehicle be equipped with functioning automatic drain valves or have all reservoirs drained to zero psi daily, or optimally, to be equipped with a desiccant-type air dryer prior to the reservoir system.
Compressor runs loaded an excessive amount of time.	Vehicle system leakage should not exceed 1 psi (7 kPa) pressure drop per minute without brakes applied and 3 psi (21 kPa) pressure drop per minute with brakes applied. If leakage is excessive, check for system leaks and repair.

Troubleshooting

Problem—Excessive Oil Passage	
Possible Cause	**Remedy**
Excessive engine crankcase pressure.	Test for excessive engine crankcase pressure and repair or replace ventilation components as necessary. NOTE: An indication of crankcase pressure is a loose or partially lifted dipstick.
Excessive engine oil pressure.	Check the engine oil pressure with a test gauge and compare the reading to the engine specifications. Bendix does not recommend restricting the compressor oil supply line because of the possibility of plugging the restriction with oil contaminants. Minimum oil supply line size is 3/16-inch (5 mm) inside diameter.
Malfunctioning compressor.	Replace or repair the compressor only after making certain none of the preceding conditions exist.

Problem—Noisy Compressor Operation

Problem—Noisy Compressor Operation	
Possible Cause	**Remedy**
Loose drive gear or components.	Inspect the fit of the drive gear on the compressor crankshaft. The pulley or gear must be completely seated and the crankshaft nut must be tight. If the compressor crankshaft surface or keyway is damaged, it is an indication of loose drive components. If damage to the compressor crankshaft is detected, replace the compressor. When installing the pulley or drive gear, torque the crankshaft nut to the appropriate torque specifications. Do not back off the crankshaft nut once it is tightened to the proper torque. Do not use impact wrenches to install the crankshaft nut.
Excessively worn drive couplings or gears.	Inspect drive gear, couplings, and engine for excessive wear. Replace as necessary. NOTE: Nonmetallic gears should be replaced when the compressor is changed.
Compressor cylinder head or discharge line restrictions.	Inspect the compressor discharge port and discharge line for carbon buildup. If carbon is detected, check for proper compressor cooling. See the remedy for insufficient compressor cooling in the previous table. Inspect the discharge line for kinks and restrictions. Replace the discharge line as necessary.
Worn or burned out bearings.	Check for proper oil pressure in the compressor. Minimum required oil pressure is 15 psi (103 kPa) when engine is idling and 15 psi (103 kPa) maximum governed engine rpm. Check for excessive oil temperature; oil temperature should not exceed 240°F (115°C).
Malfunctioning compressor.	Repair or replace the compressor after making certain none of the preceding conditions exist.

Problem—Excessive Buildup and Recovery Time

Problem—Excessive Buildup and Recovery Time*	
Possible Cause	**Remedy**
Dirty induction air filter.	Inspect engine or compressor air filter and replace if necessary.

Problem—Excessive Buildup and Recovery Time*	
Possible Cause	**Remedy**
Restricted induction line.	Inspect the compressor air induction line for kinks and restrictions and replace as necessary.
Restricted discharge line or compressor discharge cavity.	Inspect the compressor discharge port and line for restrictions and carbon buildup. If carbon buildup is found, check for proper compressor cooling. Replace faulty sections of the discharge line.
Slipping drive components.	Check for faulty drive gears and couplings and replace as necessary. Check the condition of drive belts and replace or tighten, whichever is appropriate.
Excessive air system leakage.	Test for excessive system leakage and repair as necessary. Use the following as a guide: Build system pressure to governor cutout and allow the pressure to stabilize for one minute. Using a test gauge, note the system pressure drop after two minutes. The pressure drops should not exceed: • 2 psi (14 kPa) in each reservoir for a single vehicle; • 6 psi (41 kPa) in each reservoir for a tractor and trailer; • 8 psi (55 kPa) in each reservoir for a tractor and two trailers.
Sticking unloader pistons.	Check the operation of the unloading mechanism. Check for proper operation of the compressor air governor. If the governor is operating properly, replace the unloader mechanism. Inspect for bent, kinked, or blocked tubing leading to or from the governor.
Malfunctioning compressor.	Repair or replace the compressor after making certain none of the preceding conditions exist.

* Compressor should be capable of building air system pressure from 85 to 100 psi (552 kPa to 689 kPa) in 40 seconds with engine at full governed rpm. Minimum compressor performance is certified to meet Federal requirements by the vehicle manufacturer. Do not downsize the original compressor.

Problem—Compressor Does Not Unload

Problem—Compressor Does Not Unload	
Possible Cause	**Remedy**
Malfunctioning governor or improper governor installation.	Test the governor for proper operation and inspect air lines to and from the governor for kinks or restrictions. Repair or replace the governor or connecting air lines.
Malfunctioning or worn unloader pistons or bores.	Inspect for worn, dirty, or corroded unloader pistons and their bores. Replace as necessary.

Problem—Compressor Leaks Oil

Problem—Compressor Leaks Oil	
Possible Cause	**Remedy**
Damaged mounting gasket.	Check the compressor mounting bolt torque. If the mounting bolt torque is low, replace the compressor mounting gasket before retorqueing the mounting bolts.
Cracked crankcase or end cover.	Visually inspect the compressor exterior for cracked or broken components. Cracked or broken crankcases or mounting flanges can be caused by loose mounting bolts. The end cover can be cracked by overtorquing fittings or plugs installed in the end cover. Repair or replace the compressor as necessary.

Troubleshooting

Problem—Compressor Leaks Oil	
Possible Cause	**Remedy**
Loose end cover.	Check the capscrew torques and tighten as necessary. Replace gaskets or O-rings.
Loose oil supply or return line fittings.	Check the torque of external oil line fittings and tighten as necessary.
Porous compressor casting.	Replace the compressor if porosity is found.
Mounting flange or end cover, O-ring or gasket missing, cut, or damaged.	Replace as necessary.

Problem—Compressor Constantly Cycles; Compressor Remains Unloaded for a Very Short Time

Problem—Compressor Constantly Cycles; Compressor Remains Unloaded for a Very Short Time	
Possible Cause	**Remedy**
Leaking compressor unloader pistons.	Remove the compressor inlet strainer or fitting. With the compressor unloaded (not compressing air), check for air leakage. Replace as necessary.
Malfunctioning governor.	Test the governor for proper operation and repair or replace as necessary.
Excessive air system leakage.	Test for excessive system leakage and repair as necessary. Use the following as a guide: Build system pressure to governor cutout and allow the pressure to stabilize for one minute. Using a test gauge, note the system pressure drop after two minutes. The pressure drops should not exceed: • 2 psi (14 kPa) in each reservoir for a single vehicle; • 6 psi (41 kPa) in each reservoir for a tractor and trailer; • 8 psi (55 kPa) in each reservoir for a tractor and two trailers.
Excessive reservoir contaminants.	Drain reservoirs.

Problem—Compressor Leaks Coolant

Problem—Compressor Leaks Coolant	
Possible Cause	**Remedy**
Improperly installed plugs and coolant line fittings.	Check torque of fittings and plugs and tighten as necessary. Overtorqued fittings and plugs can crack the head or block casting.
Freeze cracks due to improper antifreeze strength.	Test antifreeze and strengthen as necessary. Check coolant flow through compressor to assure the proper antifreeze mixture reaches the compressor.
Malfunctioning compressor due to porous castings.	If casting porosity is detected, replace the compressor.

Problem—Compressor Head Gasket Malfunction

Problem—Compressor Head Gasket Malfunction	
Possible Cause	**Remedy**
Restricted discharge line.	Clear restriction or replace line.
Loose cylinder head capscrews.	Tighten evenly to a torque of 25 to 30 lbf·ft (34 to 41 N·m).
Malfunctioning compressor or head gasket.	Check for rough or poorly machined head or block surfaces. Replace compressor as necessary.

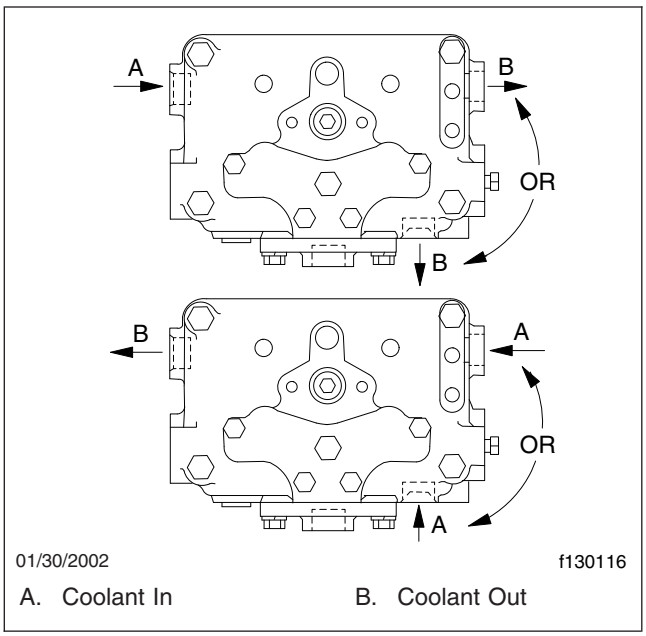


Fig. 1, Coolant Flow Options

Specifications

Tu-Flo 550 and 750 Specifications

- Displacement at 1250 rpm:
  - Tu-Flo 550: 13.2 cfm
  - Tu-Flo 750: 16.5 cfm
- Maximum recommended rpm:
  - Tu-Flo 550: 3000 rpm
  - Tu-Flo 750: 2400 rpm
- Minimum oil pressure required at engine idle speed: 15 psig (103 kPa)
- Maximum inlet air temperature: 250°F (121°C)
- Minimum Coolant Flow (water cooled) at:
  - Maximum rpm: 2.5 gpm (9.5 L/min)
  - Minimum rpm: 5 gpm (19 L/min)
- Maximum discharge air temperature: 400°F (204°C)
- Minimum oil pressure required at maximum governed engine speed: 15 psig (103 kPa)
- Number of cylinders: 2
- Weight: 50 pounds (23 kilograms)

Fastener Torque Values	
Description	**Torque**
Cylinder Head Capscrews	440 to 500 lbf·in (4970 to 5650 N·cm)
End Cover Capscrews	175 to 225 lbf·in (1980 to 2540 N·cm)
Bottom Cover Capscrews	175 to 225 lbf·in (1980 to 2540 N·cm)
Unloader Cover Plate	175 to 225 lbf·in (1980 to 2540 N·cm)
Crankshaft Nut: Marsden or Castle	100 to 120 lbf·ft (136 to 163 N·m)
Discharge Valve Seat	70 to 90 lbf·ft (95 to 122 N·m)
Inlet Valve Stop	70 to 90 lbf·ft (95 to 122 N·m)

Table 1, Fastener Torque Values

Contents

Subject	Subject Number
Service Operations	
Air Compressor Removal, Inspection, and Installation	100

Air Compressor Removal, Inspection, and Installation

Special Tools

A special tool is needed to replace the drive gear on the WABCO 15.5 cfm and 28.1 cfm air compressors. See **Table 1**.

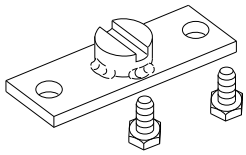
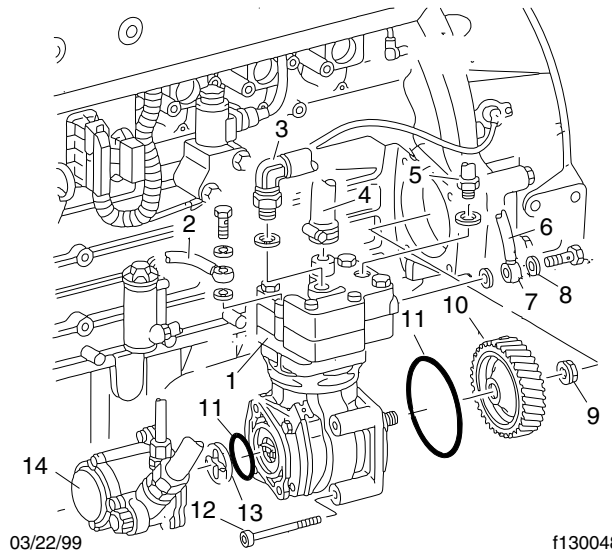
Special Tool			
Tool	**Description**	**Manufacturer**	**Part Number**
 f580250	Air Compressor Locking Device	SPX Kent-Moore	KM 904 589 03 63 00

Table 1, Special Tool

Removal

1. Shut off the engine, apply the parking brakes, and chock the tires.
2. Drain the air tanks.
3. Open the hood and clean all the fittings and hose connections on the air compressor and power steering pump until they are free of dirt.
4. Drain the radiator coolant. For instructions, see **Section 20.01**, Subject 100.
5. Remove the engine trim panel.
6. Disconnect the discharge line from the air compressor and move it away from the compressor. See **Fig. 1**.
7. Remove the air governor unloader line from the compressor.
8. Remove the capscrew that attaches the air governor to the engine and move the governor away from the air compressor.
9. Disconnect the air inlet line from the air compressor and plug the hole on the compressor.
10. Remove the tie straps on the wiring harnesses as needed to access the coolant line. Disconnect the rear coolant line from the cylinder head.
11. Disconnect the front coolant line at the compressor.



1. Air Compressor
2. Front Coolant Line
3. Discharge Line
4. Air Inlet Line
5. Unloader Air Line
6. Rear Coolant Line
7. Banjo Fitting
8. Washer
9. Drive Nut
10. Drive Gear
11. O-Ring
12. Capscrew
13. Cross Plate
14. Power Steering Pump

Fig. 1, Air Compressor Installation

12. Remove the capscrews that attach the power steering pump to the air compressor and move the steering pump away from the compressor.

Air Compressor Removal, Inspection, and Installation

IMPORTANT: Do not remove the power steering lines. Secure the lines and the pump so they are out of the way.

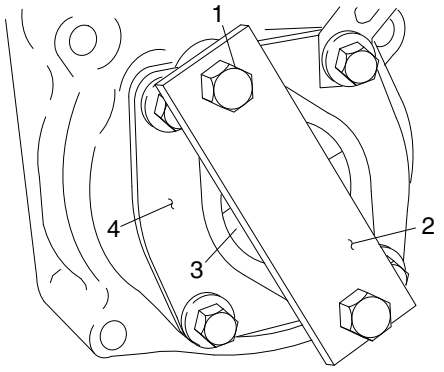
13. Remove the cross plate between the compressor and the power steering pump. See **Fig. 1**.

NOTE: On vehicles with automatic transmissions, it may be necessary to remove the brackets that attach the automatic transmission cooler lines to the engine to obtain enough room to remove the compressor.

14. Use a drain pan to catch any oil or water when the compressor is removed. Remove the capscrews that attach the air compressor to the engine and remove the compressor.

Inspection

1. Attach the fittings to the replacement compressor and replace damaged O-rings and fittings as needed. Note the position of the rear coolant line on the back of the compressor for reference during installation.
2. Replace the O-ring between the power steering pump and the air compressor.
3. Inspect the drive gear for worn or broken teeth, or spalling. If necessary, replace the drive gear. If replacing the drive gear, use the instructions in the following substeps; otherwise proceed to the next step.
   - 3.1 Using two capscrews, install the SPX Kent-Moore locking device (PN KM 904 589 03 63 00) on the air compressor where the power steering pump connects to the air compressor. Tighten the capscrews until the air compressor drive is locked. See **Fig. 2**.
   - 3.2 Place the air compressor securely in a vise.
   - 3.3 Using an impact wrench, remove the drive nut from the drive gear.
   - 3.4 Remove the drive gear from the air compressor. If necessary, use a gear puller to remove the drive gear.
   - 3.5 Install a new drive gear and nut on the drive shaft. Torque the nut 200 lbf·ft (270 N·m).



1. Capscrew
2. Locking Device
3. End of Drive Shaft
4. Air Compressor

Fig. 2, Locking Device Installation

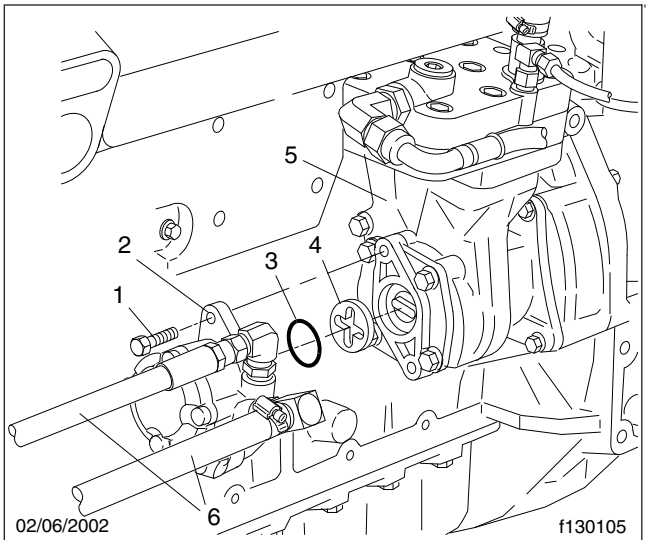
   - 3.6 Remove the locking device from the air compressor.

Installation

1. Using four capscrews, attach the air compressor to the engine. Torque the capscrews 30 lbf·ft (40 N·m).

IMPORTANT: Before installing the power steering pump, make sure the cross plate is installed on the air compressor. See **Fig. 3**.

2. Using two capscrews, attach the power steering pump to the air compressor. Torque the capscrews 30 lbf·ft (40 N·m).
3. Install the two coolant lines. Tighten the banjo fittings 30 lbf·ft (40 N·m). Use tie straps to secure the crank angle position sensor wires to the coolant line as needed.
4. If the brackets that attach the automatic transmission cooler lines to the engine were removed, use capscrews to install the brackets.
5. Install the air inlet line.
6. Using a capscrew, install the air governor on the engine.
7. Attach the unloader line to the air compressor.
8. Attach the discharge line to the air compressor.
9. Install the engine trim panel.



1. Capscrew
2. Power Steering Pump
3. O-Ring, Power Steering Pump
4. Cross Plate
5. Air Compressor
6. Hydraulic Lines

Fig. 3, Power Steering Pump Installation

10. Fill the cooling system. For instructions, see **Section 20.01**, Subject 100.
11. Remove the chocks from the tires and close the hood.

Contents

Subject	Subject Number
General Information	050
Service Operations	
Air Compressor Replacement	100
Troubleshooting	300
Specifications	400

General Information

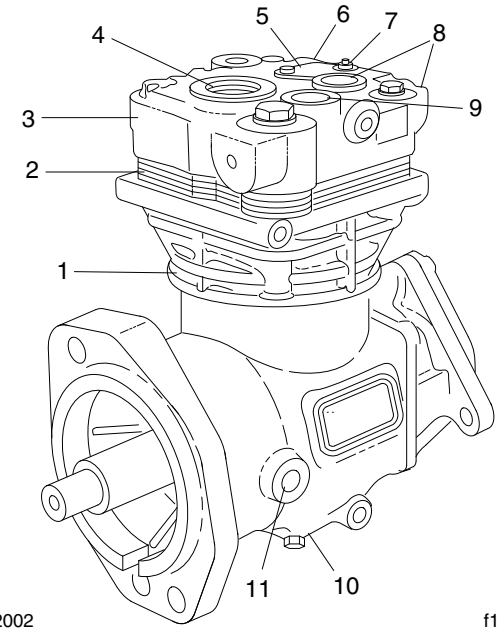
The BA-921 air compressor is a single-cylinder reciprocating compressor with a rated displacement of 15.8 cubic feet per minute at 1250 rpm. The compressor consists of a water-cooled cylinder head, a valve plate assembly, and an air-cooled integral crankcase and cylinder block. See **Fig. 1**. The cylinder head is an aluminum casting that contains the required air and water ports as well as an unloader piston. The valve plate assembly consists of laminated and brazed steel plates that incorporate various valve openings and channels for conducting air and engine coolant in to and out of the cylinder head.

The discharge valves are part of the valve plate assembly. The cylinder head and the valve plate comprise a complete cylinder head assembly. The cast iron crankcase and cylinder block assembly houses the piston, connecting rod, crankshaft, and related bearings.

The BA-921 crankcase cover is stamped with information identifying the compressor model, customer piece number, Bendix piece number, and serial number. See **Fig. 2**.

Principles of Operation

The compressor is driven by the vehicle engine and functions continuously while the engine is in operation. Actual compression of air is controlled by the compressor unloading mechanism operating in conjunction with a governor.



1. Crankcase
2. Valve Plate Assembly
3. Cylinder Head
4. Air Inlet Port
5. Unloader Cover
6. Water Port
7. Governor Connection
8. Discharge Port
9. Water Port
10. Crankcase Cover
11. Oil Port

Fig. 1, BA-921 Air Compressor

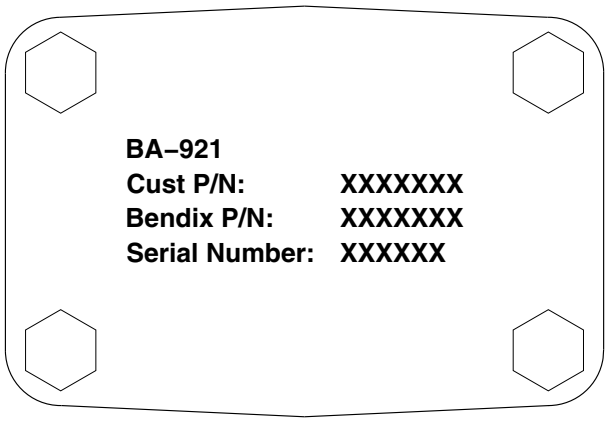


Fig. 2, BA-921 Crankcase Cover

Replacement

1. Shut down the engine, apply the parking brakes, chock the tires, and open the hood.
2. Drain the air system.

⚠ WARNING

Wear goggles when using compressed air to clean or dry parts, as permanent eye injury could result from flying debris.

3. Using a cleaning solvent, remove road dirt and grease from the outside of the air compressor. Then dry the compressor with compressed air.
4. Drain the radiator coolant. For instructions, see **Group 20**.
5. Identify and disconnect all air, water, and oil lines attached to the air compressor.
6. Remove the air governor and the air governor mounting gasket.
7. Remove any components attached to the air compressor, such as a fuel pump or power steering pump.
8. Support the air compressor and remove the capscrews that attach the compressor to the gear case. Remove the air compressor.
9. Discard all gaskets.

IMPORTANT: Be sure the new gaskets are clean and not damaged.

10. Install a new air compressor gasket on the compressor.
11. Using capscrews, attach the air compressor to the gear case. For torque specifications, see the engine manufacturer's service manual.
12. Install any components that were removed from the air compressor, such as a fuel pump or power steering pump.
13. Install a new gasket on the air governor. Then install the air governor on the engine.
14. Identify and connect the air, coolant, and oil lines to the air compressor.
15. Fill the engine cooling system. For instructions, see **Group 20**.
16. Turn on the engine and check for leaks.
17. Remove the chocks from the tires and lower the hood.

Troubleshooting Tables

Problem—Noisy Compressor Operation

Problem—Noisy Compressor Operation	
Possible Cause	**Remedy**
Loose drive gear or components.	Inspect the fit of the drive gear on the compressor crankshaft. The gear or coupling must be completely seated and the crankshaft nut must be tight. If the compressor crankshaft surface is damaged, it is an indication of loose drive components. If damage to the compressor crankshaft is detected, replace the compressor. When installing the drive gear or pulley, torque the crankshaft nut to the appropriate torque specifications and use care when pressing drive components on to the crankshaft. Do not back off the crankshaft nut once it is tightened to the proper torque. Do not use impact wrenches to install the crankshaft nut.
Excessively worn drive couplings or gears.	Inspect drive gear, couplings, and engine for excessive wear. Replace as necessary. NOTE: Nonmetallic gears should be replaced when the compressor is changed.
Compressor cylinder head or discharge line restrictions.	Inspect the compressor discharge port and discharge line for carbon buildup. If carbon is detected, check for proper cooling to the compressor. See the remedy for insufficient compressor cooling in the table titled Problem—Excessive Oil Passage. Inspect the discharge line for kinks and restrictions. Replace the discharge line as necessary.
Worn or burned out bearings.	Check for proper oil pressure in the compressor. Minimum required oil pressure is 15 psi (103 kPa) when engine is idling and 15 psi (103 kPa) maximum at governed engine rpm. Check for excessive oil temperature; oil temperature should not exceed 240°F (115°C).
Malfunctioning compressor.	Repair or replace the compressor after making certain none of the preceding conditions exist.

Problem—Compressor Does Not Unload

Problem—Compressor Does Not Unload	
Possible Cause	**Remedy**
Malfunctioning governor or installation.	Test the governor for proper operation and inspect air lines to and from it for kinks or restrictions. Repair or replace the governor or connecting air lines.
Malfunctioning or worn unloader pistons or bores.	Inspect for worn, dirty, or corroded unloader piston and bore. Replace as necessary.

Problem—Compressor Leaks Oil

Problem—Compressor Leaks Oil	
Possible Cause	**Remedy**
Damaged mounting gasket.	Check the compressor mounting capscrew torque. If the mounting capscrew torque is low, replace the compressor mounting gasket before retorquing the mounting capscrews.

Troubleshooting

Problem—Compressor Leaks Oil	
Possible Cause	**Remedy**
Cracked crankcase or end cover.	Inspect the compressor exterior for cracked or broken components. Cracked or broken crankcases or mounting flanges can be caused by loose mounting bolts. The end cover can be cracked by overtorquing fittings or plugs installed in the end cover. Repair or replace the compressor as necessary.
Loose crankcase end cover or bottom cover.	Check the capscrew torques and tighten as necessary. Replace gaskets or O-ring.
Loose oil supply or return line fittings.	Check the torque of external oil line fittings and tighten as necessary.
Porous compressor casting.	Replace the compressor if porosity is found.
Mounting flange or end cover, O-ring or gasket missing, cut, or damaged.	Replace as necessary.

Problem—Compressor Constantly Cycles; Compressor Remains Unloaded for a Very Short Time

Problem—Compressor Constantly Cycles; Compressor Remains Unloaded for a Very Short Time	
Possible Cause	**Remedy**
Leaking compressor unloader pistons.	Repair or replace as necessary. Remove the compressor inlet air strainer or fitting. With the compressor unloaded (not compressing air), listen for air escaping.
Malfunctioning governor and installation.	Test the governor for proper operation and inspect air lines for kinks or restrictions. Repair or replace the governor or connecting air lines as required.
Excessive system leakage.	Test for excessive system leakage and repair as necessary. Use the following as a guide. Build system pressure to governor cutout and allow the pressure to stabilize for one minute. Using a test gauge, note the system pressure and the pressure drop after two minutes. The pressure drops should not exceed: • 2 psi (14 kPa) in each reservoir for a single vehicle; • 6 psi (41 kPa) in each reservoir for a tractor and trailer; • 8 psi (55 kPa) in each reservoir for a tractor and two trailers.
Excessive reservoir contaminants.	Drain reservoirs.

Problem—Compressor Leaks Coolant

Problem—Compressor Leaks Coolant	
Possible Cause	**Remedy**
Improperly installed plugs and coolant line fittings.	Check torque of fittings and plugs and tighten as necessary. Overtorqued fittings and plugs can crack the head or block casting.
Freeze cracks due to improper antifreeze strength.	Test antifreeze and strengthen as necessary. Check coolant flow through compressor to assure the proper antifreeze mixture reaches the compressor.
Malfunctioning compressor due to porous castings.	If casting porosity is detected, replace the compressor.

Problem—Compressor Head Gasket Malfunction

Problem—Compressor Head Gasket Malfunction	
Possible Cause	**Remedy**
Restricted discharge line.	Clear restriction or replace line.
Loose cylinder head capscrews.	Tighten evenly to a torque of 265 to 292 lbf·in (2990 to 3300 N·cm).
Malfunctioning compressor or head gasket.	Check for rough or poorly machined head or block surfaces. Replace compressor as necessary.

Problem—Excessive Oil Passage

Problem—Excessive Oil Passage*	
Possible Cause	**Remedy**
Restricted air intake.	Check engine air cleaner and replace if necessary. Check compressor air inlet for kinks and excessive bends, and be certain inlet lines have the minimum specified inside diameter. Recommended maximum air inlet restriction is 25 inches of water.
Restricted oil return to engine.	Oil return to the engine should not be in any way restricted. Make certain oil drain passages in the compressor and mating engine surfaces are unobstructed and aligned. Correct gaskets must be used. Special care must be taken when sealants are used with, or instead of, gaskets.
Poorly filtered air inlet.	Check for a damaged or dirty air filter on the engine or compressor. Check for leaking or damaged compressor air intake components such as induction line, fittings, gaskets, and filter bodies. The compressor intake should not be connected to any part of the exhaust gas recirculation (E.G.R.) system on the engine.
Insufficient compressor cooling (compressor runs hot).	For air-cooled portions of the compressor: • Remove accumulated grease and dirt from the cooling fins. Replace damaged components. • Check for damaged cooling fins. Replace compressor if damaged. For water-cooled portions of the compressor: • Check for proper coolant line sizes. Minimum recommended line i.d. is 3/8 inch (10 mm). • Check the coolant flow through the compressor. Minimum allowable flow is 2.5 gallons (9 L) per minute at engine governed speed. If low coolant flow is detected, inspect the coolant lines and fittings for accumulated rust scale, kinks, and restrictions. • Water temperature should not exceed 200°F (93°C). • Optimum cooling is achieved when engine coolant flows as shown in **Fig. 1**.
Contaminants not being regularly drained from system reservoirs.	Check reservoir drain valves to insure that they are functioning properly. It is recommended that the vehicle be equipped with functioning automatic drain valves or have all reservoirs drained to zero psi daily, or optimally, to be equipped with a desiccant-type air dryer prior to the reservoir system.

Troubleshooting

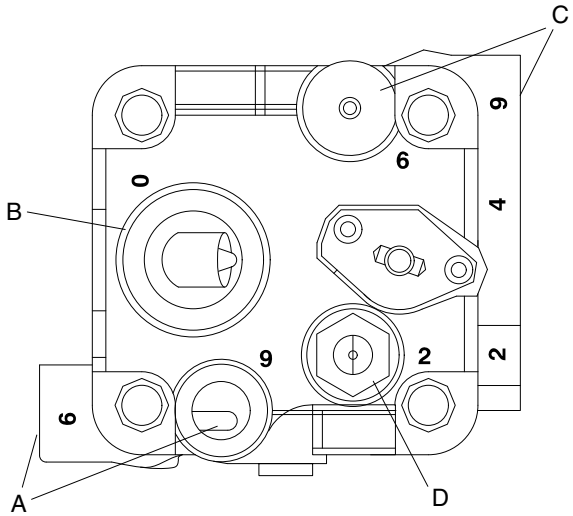
Problem—Excessive Oil Passage*	
Possible Cause	**Remedy**
Compressor runs loaded an excessive amount of time.	Vehicle system leakage should not exceed 1 psi (7 kPa) pressure drop per minute without brakes applied and 3 psi (21 kPa) pressure drop per minute with brakes applied. If leakage is excessive, check for system leaks and repair any leaks.
Excessive engine crankcase pressure.	Test for excessive engine crankcase pressure and repair or replace ventilation components as necessary. NOTE: An indication of crankcase pressure is a loose or partially lifted dipstick.
Excessive engine oil pressure.	Check the engine oil pressure with a test gauge and compare the reading to the engine specifications. Bendix does not recommend restricting the compressor oil supply line because of the possibility of plugging the restriction with oil contaminants. Minimum oil supply line size is 3/16-inch (5-mm) i.d. tubing.
Malfunctioning compressor.	Replace or repair the compressor only after making certain none of the preceding conditions exist.

* Compressor passes excessive oil as evidenced by presence of oil at the exhaust ports of valving.

Problem—Excessive Buildup and Recover Time

Problem—Excessive Buildup and Recover Time*	
Possible Cause	**Remedy**
Dirty induction air filter.	Inspect engine or compressor air filter and replace if necessary.
Restricted induction line.	Inspect the compressor air induction line for kinks and restrictions and replace as necessary.
Restricted discharge line or compressor discharge cavity.	Inspect the compressor discharge port and line for restrictions and carbon buildup. If carbon buildup is found, check for proper compressor cooling. Replace faulty sections of the discharge line.
Slipping drive components.	Check for faulty drive gears and couplings and replace as necessary. Check the condition of drive belts and replace or tighten, whichever is appropriate.
Excessive air system leakage.	Test for excessive system leakage and repair as necessary. Use the following as a guide. Build system pressure to governor cutout and allow the pressure to stabilize for one minute. Using a test gauge, note the system pressure and the pressure drop after two minutes. The pressure drops should not exceed: • 2 psi (14 kPa) in each reservoir for a single vehicle; • 6 psi (41 kPa) in each reservoir for a tractor and trailer; • 8 psi (55 kPa) in each reservoir for a tractor and two trailers.
Sticking unloader pistons.	Check the operation of the unloading mechanism. Check for proper operation of the compressor air governor. Make certain the air connections between the governor and compressor are correct. See **Fig. 2**. If the governor is operating properly, replace the unloader mechanism. Inspect for bent, kinked, or blocked tubing leading to or from the governor.
Malfunctioning compressor.	Repair or replace the compressor after determining none of the preceding conditions exist.

* Compressor should be capable of building air system pressure from 85 to 100 psi (586 to 689 kPa) in 40 seconds with engine at full governed rpm. Minimum compressor performance is certified to meet Federal requirements by the vehicle manufacturer. Do not downsize the original equipment compressor.

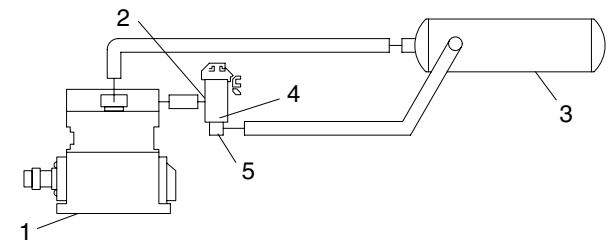


11/14/2002 f130121

NOTE: The cylinder head connection ports are identified with the following numbers which are cast into the compressor: 0–Air In; 2–Compressed Air Out; 9–Coolant In or Out; 4–Governor Control.

A. Coolant In or Out (One of the two ports is plugged.)
B. Inlet Port
C. Coolant In or Out (One of the two ports is plugged.)
D. Discharge Safety Valve

Fig. 1, Cylinder Head Port Identification



07/15/2002 f130120

1. Compressor
2. Governor Unloader Port
3. Supply Reservoir
4. Governor
5. Reservoir Port

Fig. 2, Plumbing Diagram

Specifications

BA-921 Specifications:

- Flow capacity at 1800 rpm and 120 psi (827 kPa): 11.8 cfm
- Flow capacity at 3000 rpm and 120 psi (827 kPa): 16.5 cfm
- Approximate horsepower required:
  - loaded 1800 rpm at 120 psig (827 kPa): 4.5 hp
  - unloaded 1800 rpm: 1.3 hp
- Minimum governor cutout pressure: 130 psi (896 kPa)
- Maximum inlet air temperature: 250°F (121°C)
- Maximum discharge air temperature: 400°F (204°C)
- Minimum oil pressure required at engine idle speed: 15 psi (103 kPa)
- Minimum oil pressure required at maximum governed engine speed: 15 psi (103 kPa)
- Number of cylinders: 1
- Weight: 28 pounds (13 kilograms)

Fastener Torque Values	
Description	**Torque lbf·in (N·cm)**
Cylinder Head Capscrews	265 to 292 (2990 to 3300)
Unloader Cover Capscrew	62 to 71 (700 to 800)
Rear End Cover Capscrews	195 to 213 (2200 to 2400)
Governor Adapter	300 to 325 (3390 to 3672)
Crankcase Cover Capscrew	62 to 71 (700 to 800)
Crankshaft Nut	220 to 254 lbf·ft (298 to 344 N·m)

Table 1, Fastener Torque Values

Group Index, Alphabetical

Section	Section Number
Alternator	15.00
Starter	15.01