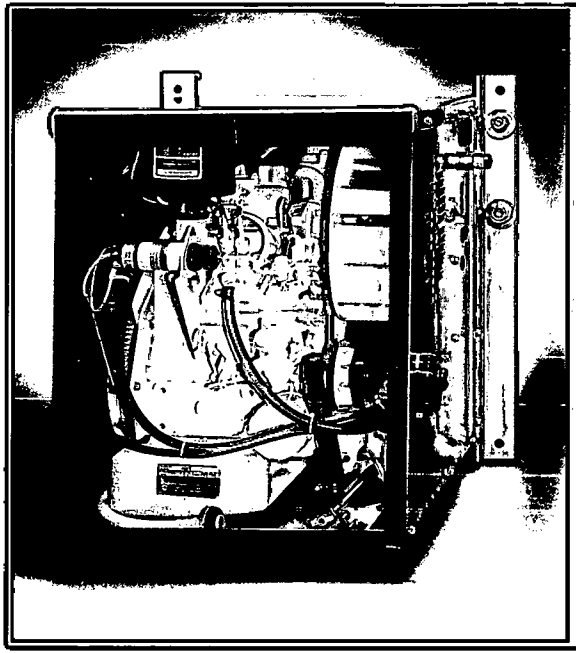
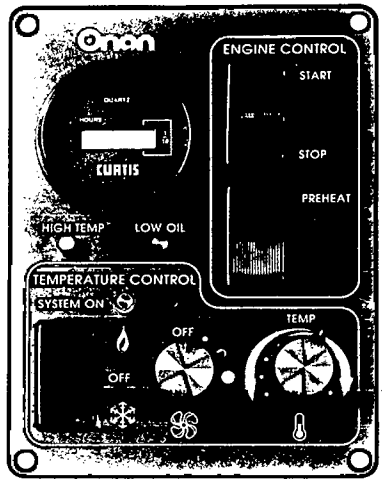
Onan® AUX™ Auxiliary Power System

Operator's Manual

AUX DKX Series





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California

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Table of Contents

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Before operating the Auxiliary Power Unit (APU), read this manual and become familiar with it and the equipment. **Safe and efficient operation can be achieved only if the unit is properly operated and maintained.** Many accidents are caused by failure to follow fundamental rules and precautions.

The following symbols, found throughout this manual, alert you to potentially dangerous conditions to the operator or service personnel, and to potential equipment damage.

⚠ DANGER ***This symbol warns of immediate hazards which will result in severe personal injury or death.***

⚠ WARNING ***This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.***

⚠ CAUTION ***This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.***

Read and observe each of the following safety precautions.

AIR CONDITIONING SYSTEMS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Freon released into the air creates the hazard of frostbite and severe eye damage. Freon also creates a hazard of respiratory problems that can lead to death. Have all air conditioning service work performed by a qualified service person.
- The AC system is under high pressure. Be extremely careful not to open any part of the system (hoses, valves, etc.) or severe personal injury could result.

HOT COOLANT CAN CAUSE SEVERE PERSONAL INJURY

- Hot coolant is under pressure. Do not loosen the coolant pressure cap while the engine is hot. Let the engine cool before opening the pressure cap.

Safety Precautions

EXHAUST GASES ARE DEADLY

- Provide an adequate exhaust system to properly expel discharged gases. Make sure that exhaust components are in good condition and that all connections are secure. Do not use exhaust gases to heat a compartment.
- Inspect the exhaust system daily for leaks per the maintenance schedule. Do not use engine cooling air to heat a compartment.

FUEL AND FUMES ARE FLAMMABLE

Fire, explosion, and personal injury can result from improper practices.

- DO NOT fill fuel tanks while the engine is running. Fuel contact with hot engine or exhaust is a potential fire hazard.
- Do not smoke or allow an open flame or spark producing equipment near the fuel system.
- Fuel lines must be adequately secured and free of leaks. Inspect the fuel lines and connections daily for leaks per the maintenance schedule.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Before starting work on the APU, disconnect the negative (–) cable(s) at the battery. This will prevent accidental arcing or starting.
- Do not remove any belt guards or covers while the power unit is running.
- Make sure that fasteners are secure. Tighten supports and clamps, keep guards in position over fans, etc.
- Keep your hands away from moving parts.
- Do not wear loose clothing or jewelry while working on equipment, because they can become caught in moving parts. Jewelry can short out electrical contacts and cause shock or burning.
- If adjustment must be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.

GENERAL SAFETY PRECAUTIONS

- Wear safety glasses and protective clothing when servicing batteries. DO NOT SMOKE while servicing batteries. Lead acid batteries emit a highly explosive hydrogen gas that can be ignited by electrical arcing or by smoking.
- Have a fire extinguisher rated ABC nearby. Maintain the fire extinguisher properly and become familiar with its use.
- Used engine oils have been identified by some state or federal agencies as causing cancer or reproductive toxicity. When checking or changing engine oil, take care not to ingest, breathe the fumes, or contact used oil.
- Remove all unnecessary grease and oil from the unit. Accumulated grease and oil can cause overheating, engine damage, and a potential fire hazard.
- Do not store anything in the power unit such as oil or gas cans, oily rags, chains, wooden blocks, portable propane cylinders, etc. A fire could result or the operation may be adversely affected. Keep the power unit floor clean and dry.
- Do not work on this equipment when mentally or physically fatigued, or after consuming any alcohol or drug that makes the operation of equipment unsafe.

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Disconnect the negative (–) cable(s) at the starting battery before removing protective shields or touching electrical equipment.
- Tag remote or open switches to avoid accidental closure or starting.

ADW-1

ABOUT THIS MANUAL

This manual covers operation and maintenance for the AUX (DKX) auxiliary power unit. The AUX is an integrated system that provides the following features:

- Air conditioning for the sleeper
- Heating for the sleeper
- Heating of the truck's main engine for cold weather starting
- 12-Volt DC power to run DC accessories and recharge the batteries

Study this manual carefully and comply with each of its warnings and cautions. The owner is responsible for maintaining the AUX according to the maintenance schedule. Using the AUX properly and performing regular maintenance will result in longer life, better performance and safer operation.

This manual also covers basic troubleshooting, how to obtain service, and product specifications. Keep this manual with the vehicle operator's manual in the glovebox.

Introduction

MODEL IDENTIFICATION

Always use the complete model number, serial number, and specification number when contacting a Cummins dealer or distributor for parts, service or product information. These numbers are on the nameplate that is located inside the left side panel on the Spec 2A and Spec 2B models (Figure 1). The nameplate is located on the front of the oil base on the Spec 1A models.

Record all of the numbers and letters that appear on the nameplate in the areas provided in Figure 1. It is important to record every letter and number in order to identify the unit correctly.

The original date of installation is recorded on the Date In Service label, located below the nameplate.

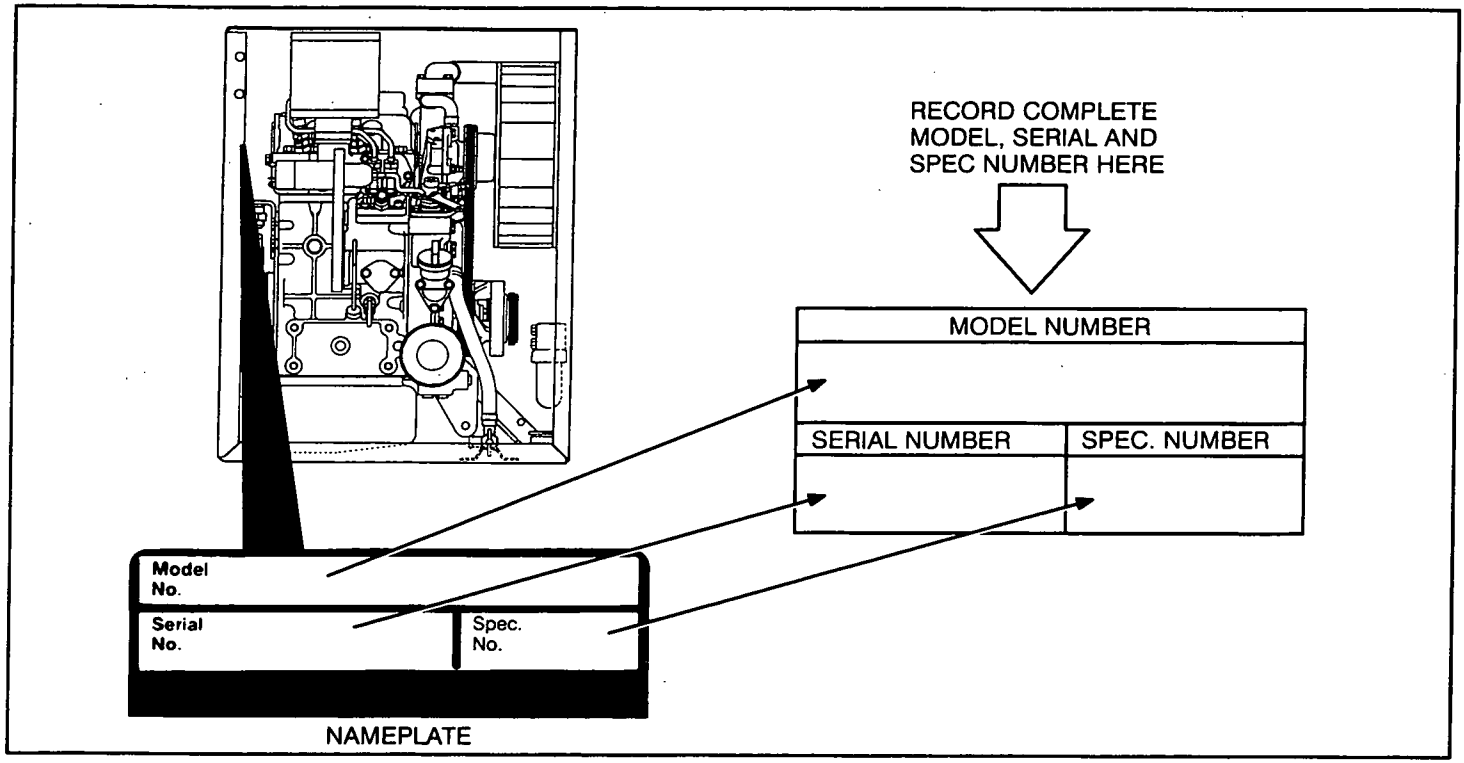

FIGURE 1. MODEL IDENTIFICATION

Introduction

COMPONENT SERVICE LOCATIONS

Routine maintenance items are located behind the access cover (Figure 2). The AUX control panel is normally located inside the sleeper area.

To remove the access cover: Release the rubber straps by pulling them forward and away from the door flanges. Grip the flanges and slide the cover up, then pull the bottom of the cover away from the unit and down to remove.

To secure the access cover: Insert the top of the cover inside the top lip of the housing cover, then push the bottom of the cover in and lower the cover into position. Pull rubber straps out and secure them to the side mounting flanges.

⚠WARNING ***Operation of the AUX with the access cover removed can result in severe personal injury or equipment damage. Hot and rotating components are exposed when the access cover is removed and cooling air does not circulate properly. Do not operate the power unit with the access cover removed.***

⚠WARNING ***Incorrect service or parts replacement can result in severe personal injury, death, and/or equipment damage. Service personnel must be qualified to perform electrical and/or mechanical service. Service work on the air conditioning system must be performed by persons certified to do air conditioning service work.***

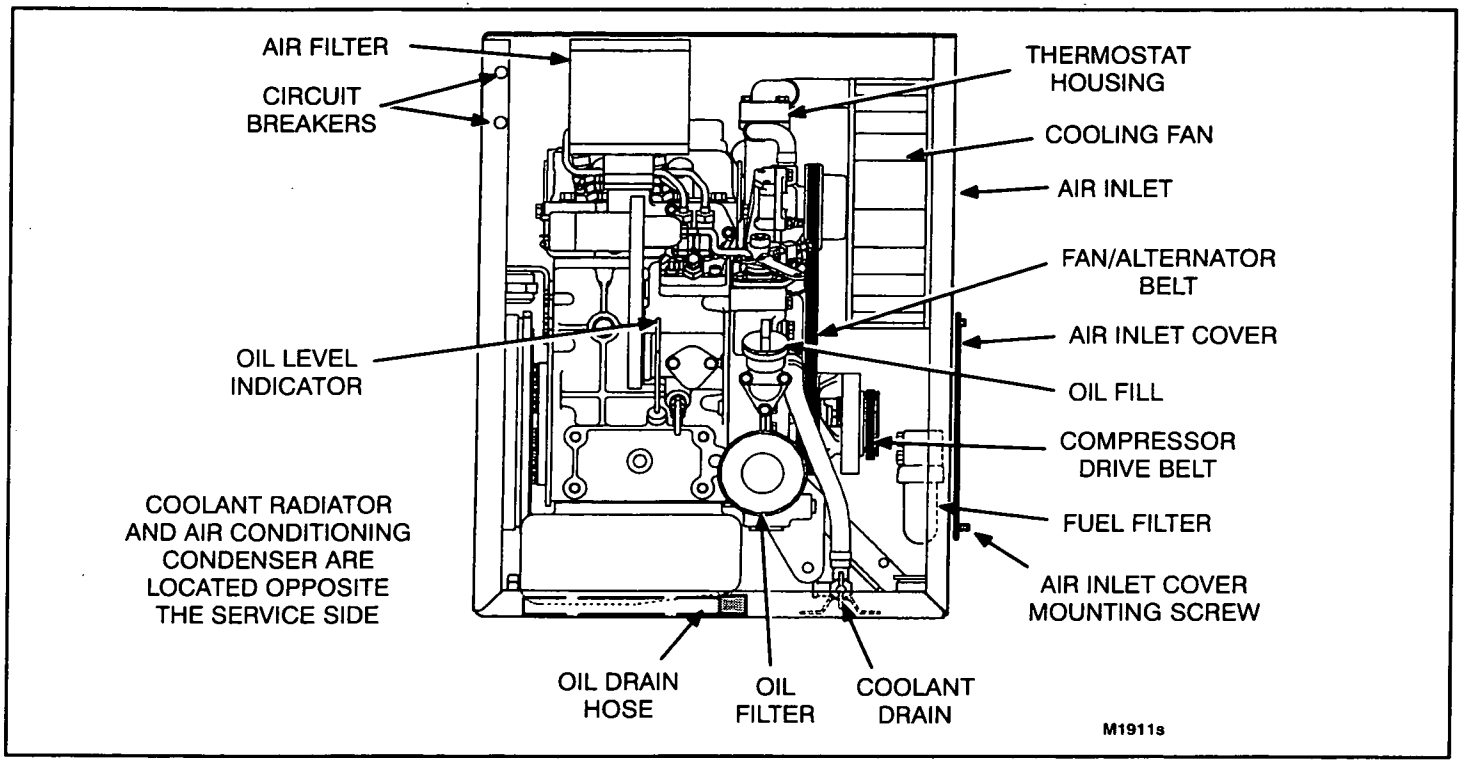

FIGURE 2. COMPONENT LOCATIONS

Pre-Start Checks

ENGINE OIL

Check the engine oil level before each start. New power units are shipped with oil and a tag in the unit that indicates oil viscosity. Check to make sure that the oil viscosity is correct for the expected temperature range (Figure 3). The engine oil capacity is 5 quarts (4.7 liters).

Oil Recommendations

Use premium quality oil with the API (American Petroleum Institute) designation CC/CD/CE on the container.

Select the oil viscosity that is right for the lowest temperature range expected (Figure 3). Oil that is too thick will not provide proper lubrication when the engine is started. Use a lower viscosity oil as the ambient temperature gets colder.

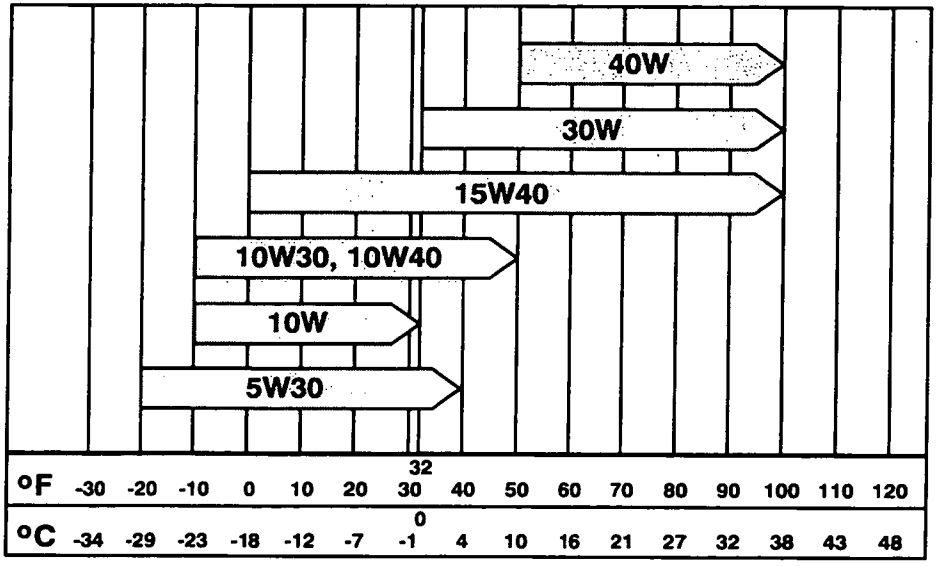

FIGURE 3. OIL VISCOSITY VS. TEMPERATURE

Pre-Start Checks

Checking Engine Oil Level

Check the engine oil level before each start. If adding oil between changes, use the same brand: different brands might not be compatible. Be careful not to overfill the crankcase because the oil will foam, resulting in engine shutdown.

Make sure that the power unit is level and that it has had time to cool down. Do not check the oil level while the power unit is running.

⚠WARNING ***Hot oil can cause severe personal injury. Do not check the oil level while the power unit is running because hot oil could blow out of the oil fill tube causing severe burns.***

1. Remove the dipstick and wipe it with a clean rag (Figure 4).
2. Insert the dipstick into the engine.
3. Remove the dipstick and check the oil level on the indicator stem.
4. If low, add oil until the Full mark is reached.
5. Insert the dipstick into the engine securely to prevent oil leakage.

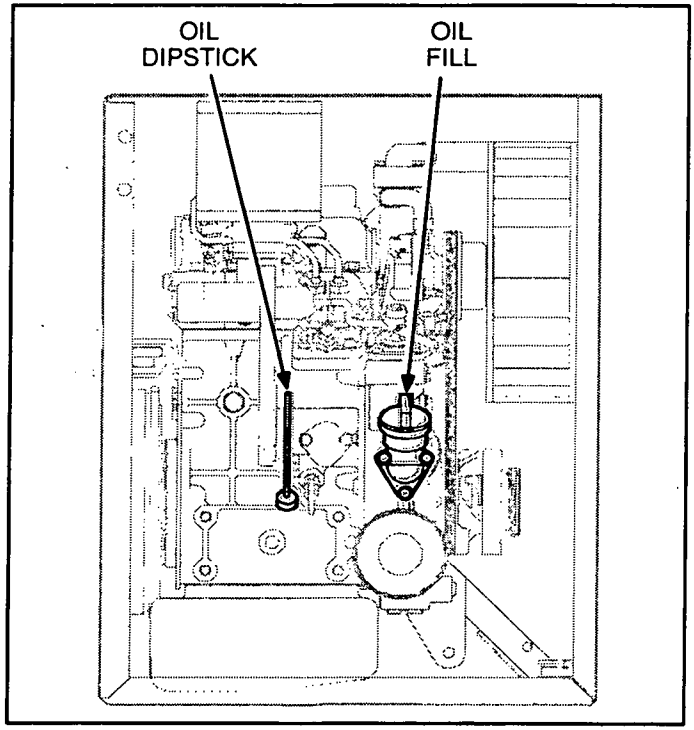

FIGURE 4. OIL CHECK AND FILL

EXHAUST CHECK

Thoroughly inspect the exhaust system for leaks or corrosion. Have any problems repaired before operating the power unit.

⚠WARNING ***Exhaust gas presents the hazard of severe personal injury or death. Make certain that all exhaust components are operational and that there are no exhaust leaks.***

Do not start the power unit if exhaust gases will not effectively expel away from the vehicle. Be aware that any vent, window or opening that is not permanently sealed from the sleeper or cab can be an avenue for carbon monoxide.

⚠WARNING ***Exhaust gases can cause severe personal injury or death. Never operate the power unit unless the exhaust outlet is clear of walls, snow banks, or any obstructions that can prevent exhaust gases from dissipating.***

FUEL CHECK

Carefully inspect the fuel system for leaks or corrosion. Have any problems repaired immediately.

⚠WARNING ***Fuel presents the hazard of fire or explosion, which can cause severe personal injury or death. Do not permit any flame, spark, pilot light, cigarette, or other ignition source near the fuel system.***

Use the best fuel available. Fuel quality is important for dependable performance and satisfactory engine life.

Pre-Start Checks

Fuel Recommendation

Use ASTM 2-D (No. 2 Diesel) or ASTM 1-D (No. 1 Diesel) fuel with a minimum Cetane number of 45. Number 2 diesel fuel gives the best economy and good performance under most conditions. Use number 1 diesel fuel when ambient temperatures are below 32° F (0° C), and during long periods of light engine load.

Use low sulfur content fuel with a cloud point at least 10 degrees below the lowest expected fuel temperature. (Cloud point is the temperature at which wax crystals begin to form in diesel fuel.)

Fuel Handling Precautions

Prevent dirt, water or other contaminants from entering the fuel system. Filter or strain the fuel as the tank is filled.

Condensation (water) can cause clogging of fuel filters as well as freezing problems. Water mixing with the sulfur in the fuel forms acid which can corrode and damage engine parts.

⚠CAUTION ***Due to the precise tolerances of diesel injection systems, dirt or water in the system will cause severe damage to both the injection pump and the injection nozzles. It is extremely important to keep the fuel clean and water free.***

Low fuel in the tank promotes condensation. In warm weather, the fuel tank cools at night quicker than the fuel. If the fuel level is low, the upper portion of the tank will cool more rapidly, forming condensation. In cold weather, the warm fuel returning from the injectors heats the fuel in the supply tank. If the fuel is low, condensation will form on the upper part of the tank. To avoid condensation, fill the fuel tank(s) frequently.

The fuel system must be primed before initial start-up or whenever the fuel supply to the AUX power unit runs out. This procedure is normally done during installation and should not be necessary for initial operation. This procedure is described in the *Maintenance Procedures* section.

GENERAL INSPECTION

Check the AUX for damaged or loose parts. Make sure the air inlet and outlet areas are not blocked. Investigate any abnormal operating noises and make sure that the power unit is securely mounted.

Check both drive belts for signs of wear or glazing and for proper belt tension (see *Maintenance Procedures* section). Inspect the heater hoses for defects and loose fittings.

⚠WARNING ***Do not operate the AUX when the vehicle is parked in high grass or brush. Engine exhaust could ignite the grass, and the resulting fire could cause severe personal injury or death, and/or property damage.***

Check to see that the truck is not parked in high grass or brush.

Control Panel

The control panel is used to start the power unit and to control the sleeper heating and air conditioning. The control panel also monitors power unit fault conditions for high coolant temperature and low oil pressure. The control panel features are described in the following section (Figure 5).

Control Panel Features

Preheat Switch: Placing the Preheat switch in the Preheat position will heat the glow plugs to aid cold weather starting. The preheat feature should be used when outside temperatures are below 50°F (10°C). See the *Operating Procedures* section for preheat times.

Start/Stop-Reset Switch: The engine is started by holding the switch in the Start position. The engine is stopped by pressing the switch to the Stop-Reset position. Engine operation is indicated by the light on the switch.

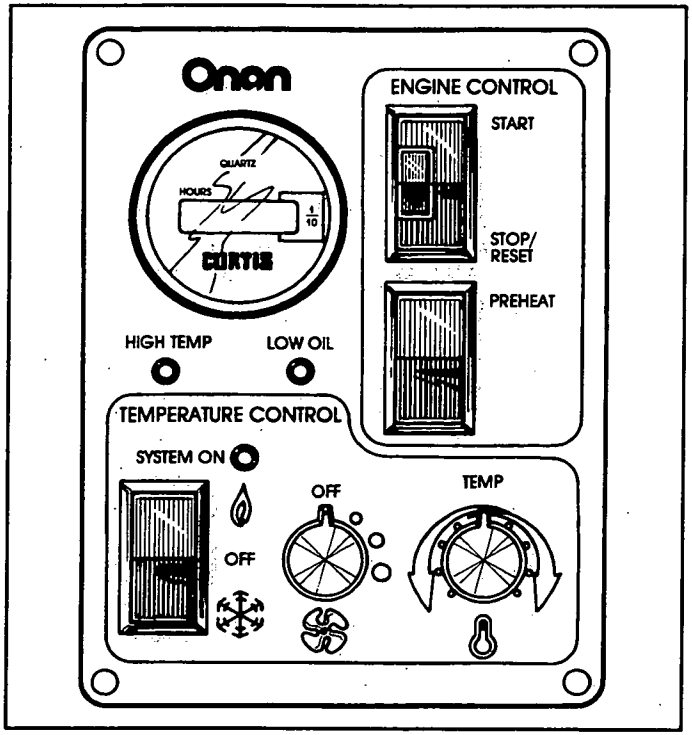

FIGURE 5. CONTROL PANEL

If a high engine temperature or low oil pressure fault occur, the engine will automatically shut down. The Start/Stop-Reset switch must be pushed to the Stop-Reset position before the engine can be re-started.

Heat/AC Switch: Select the Heat position to heat the sleeper compartment or the AC position to cool the sleeper compartment. The Heat position is signified by the flame and the AC position is signified by the snow flake. Select the center (Off) position when heating or cooling are not needed or whenever the AUX is not in use.

Temp control: The TEMP control thermostat is used to adjust the temperature of the air in the sleeper compartment.

Fan Speed Switch: The fan has three speed settings and an Off position. When using the heating or cooling features select the low, medium or high fan speed setting. Use the fan speed in conjunction with the TEMP control to achieve the desired sleeper temperature.

Hour Meter: The hour meter records the cumulative number of hours that the engine has been running. Use this meter to record the number of hours between periodic maintenance intervals and for fuel savings records.

High Temp - Low Oil Fault Lights: The appropriate fault light will illuminate and the engine will shut down when high engine coolant temperature or low oil pressure are sensed. Let the power unit cool down before checking the cooling system or oil level. The Stop-Reset must be pushed before re-starting.

System On Light: This light will illuminate when one of the fan speed settings is selected and the Heat/AC switch is in either the Heat or AC position. This light acts as a reminder to turn the fan off when the AUX is not in use, to prevent battery discharge.

⚠WARNING

EXHAUST GAS IS DEADLY!

Exhaust gases contain carbon monoxide, an odorless and colorless gas. Carbon monoxide is poisonous and can cause unconsciousness and death. Symptoms of carbon monoxide poisoning can include:

- ***Dizziness***
- ***Nausea***
- ***Headache***
- ***Weakness and Sleepiness***
- ***Throbbing in Temples***
- ***Muscular Twitching***
- ***Vomiting***
- ***Inability to Think Coherently***

IF YOU OR ANYONE ELSE EXPERIENCE ANY OF THESE SYMPTOMS, GET OUT INTO THE FRESH AIR IMMEDIATELY. If symptoms persist, seek medical attention. Shut down the unit and do not operate until it has been inspected and repaired.

Be sure to park in open areas where exhaust gases can not accumulate and enter the sleeper or cab. A carbon monoxide detector with an audible alarm is recommended. Protection against carbon monoxide inhalation also includes proper exhaust system installation and visual and audible inspection of the complete exhaust system at the start of each operation. *AUX–1*

STARTING PROCEDURE

Perform each of the checks described in the *Pre-Start Checks* section before starting the power unit.

⚠WARNING ***Contact with hot or moving parts can cause severe personal injury. Do not operate the AUX with the access cover removed.***

⚠WARNING ***Use of ether or starting fluid can cause an explosion resulting in severe personal injury and equipment damage. Do not use ether or any starting fluid as a starting aid.***

⚠CAUTION ***Operating with the access cover removed will cause engine overheating and reduced engine life. Make certain that the access cover is in place during operation.***

1. When the temperature is below 50°F (10° C), hold the Preheat switch in for the amount of time indicated in Table 2. Do not use preheat if the engine is already warm.

   ⚠CAUTION ***Do not hold the Preheat switch in for longer than 20 seconds, or damage to the glow plugs can occur.***

TABLE 1. PREHEAT TIME vs. TEMPERATURE

Ambient Temperature	Preheat Time
Above 50°F (10°C)	Not Required
Between 23°F to 50°F (-5°C to 10°C)	5 seconds
Below 23°F (-5°C)	10 seconds

⚠CAUTION ***Excessive cranking can damage the starter from overheating. Do not engage the starter for longer than 10 seconds at a time. Wait 30 seconds between starting attempts to allow the starter to cool.***

2. Press the Start switch. Release the switch when the engine starts. The indicator light on the switch lights when the engine is running.

3. If the engine does not start after cranking for 10 seconds, release the switch. Wait for 30 seconds, then press the Start switch again.

4. If the engine still does not start, wait for 30 seconds, then hold the Preheat switch and the Start switch in at the same time for up to 10 seconds.
5. If the engine does not start on the third try:
   - Check the fuel supply
   - Make sure the fuel system has been primed
   - Check the oil level

   Fuel Level: The fuel pickup tube stops two inches (51 mm) above the bottom of the fuel tank. This prevents the AUX engine from using all of the fuel, so fuel is available for starting the truck engine. If the fuel tank is allowed to run low, the AUX will run out of fuel. When this happens, the power unit may need priming before the engine can be restarted. Refer to Priming the Fuel System in the *Maintenance* Section.

If the engine stops running shortly after starting, check the oil and fuel level. Make sure that the access cover is securely installed and make sure that nothing is blocking the air inlet. See the *Troubleshooting* section for additional checks.

HEATING THE SLEEPER

Start the engine as described in the Starting Procedure section.

1. Push the Heat/AC switch to the heat position (see Figure 5).
2. Adjust the TEMP dial to the desired setting.
3. Set the Fan switch to the desired setting.
4. Return the Heat/AC switch to the center (Off) position when the AUX is not in use and turn the fan switch to Off.

Additional heat output can be obtained by loading the alternator on the AUX engine with DC loads. Turn on running lights, fans, head lights, etc. Do not exceed alternator output (see Battery Charging section). Refer to the Low Temperature/High Altitude section for instructions on covering the air inlet to increase heat output in cold weather.

Sleepers that previously had a two speed fan will continue to operate with two speeds.

AIR CONDITIONING THE SLEEPER

Start the engine as described in the Starting Procedure section. Allow the engine to warm up for a few minutes before turning on the air conditioning.

1. Push the Heat/AC switch to the AC position (see Figure 5).
2. Adjust the TEMP dial to the desired setting.
3. Set the Fan switch to the desired setting.
4. Return the Heat/AC switch to the center (Off) position when the AUX is not in use.

HEATING THE TRACTOR ENGINE FOR COLD WEATHER STARTING

Start the power unit as described in the Starting Procedure section. If heat is not needed in the sleeper, heat output can be directed to the tractor engine for cold weather starting. Set the controls as follows:

1. Push the Heat/AC switch to the center Off position (see Figure 5).
2. If the outside temperature is below 10°F (–12°C), cover the air inlet on the side of the power unit. Loosen the bottom cover screw, rotate the cover up over the air inlet and secure the cover to the top mounting hole. Return the cover to the open position when outside temperature is above 10°F (–12°C).

Additional heat output can be obtained by loading the alternator on the AUX engine with DC loads. This can be done by turning on running lights, fans, head lights, etc. Do not exceed alternator output (see Battery Charging section).

Operating Procedures

STOPPING THE ENGINE

1. Push the Heat/AC switch to the center Off position.
2. Push the Start/Stop - Reset switch to the Stop position.

FAULT CONDITIONS

The engine control monitors high engine temperature and low oil pressure. When a fault condition occurs, the appropriate fault light will illuminate on the control panel and the engine will shut down. Let the power unit cool down before inspecting the cooling system or oil level. The Reset (Start/Stop - Reset switch) must be pushed to the Stop-Reset position before restarting.

The engine should be stopped immediately if engine problems or loss of coolant are evident. Stop the engine if speed increases or decreases, unusual noises are heard or if the exhaust suddenly turns dark. After stopping the engine, inspect the AUX as described in the *Maintenance* section.

BATTERY CHARGING

A 12-volt DC output of 35 amps is produced by the alternator in the power unit. The DC output will power DC accessories (lights, radio etc.) and the AUX components, including the blower motor. The alternator will also charge the batteries if the DC accessory loads do not exceed the alternator output.

BREAK-IN PROCEDURE

After the first 50 hours of operation, drain the crankcase oil, replace the oil filter and clean the fuel filter. See the *Maintenance* section of this manual for the service procedures.

EXTREMELY DUSTY OPERATING CONDITIONS

If running the power unit in extremely dusty or dirty environments, do the following:

- Keep the air intake and radiator cooling surfaces clean.
- Service the air cleaner more frequently.
- Change crankcase oil more frequently.

LOW TEMPERATURE/HIGH ALTITUDE OPERATION

1. Use the correct SAE oil rating for the current temperature conditions. See Table 1.

2. Use No. 1 diesel fuel for temperatures lower than 32°F (0°C) or for all temperatures if altitude is above 5000 feet (1500 m). The fuel should have a cetane rating of at least 40. Shorten the oil change interval by half if the sulfur content of the fuel is higher than 0.5%.

To increase heat output from the AUX when the outside temperature is below 10°F (–12°C), close the air inlet on the side of the power unit (Figure 2). Loosen the bottom cover screw, rotate the cover up over the air inlet and secure the cover to the top mounting hole. Make sure that the air inlet is uncovered when the outside temperature is above 10°F (–12°C).

EXERCISE PERIOD

Infrequent use can result in difficult starting, moisture condensation problems in the engine and freon leakage due to dry seals. Run the power unit at least ten minutes every month and turn the air conditioner on for at least five minutes during each exercise period.

During the winter months it is important that the air conditioning be turned on for at least five minutes every 30 days to prevent seals in the air conditioning system from drying out.

⚠CAUTION ***Not exercising the power unit periodically can result in engine damage and loss of freon. Operate the AUX at least once a month and turn on the air conditioning for at least five minutes each month.***

Maintenance Schedule

TABLE 2. PERIODIC MAINTENANCE SCHEDULE

SERVICE THESE ITEMS	SERVICE INTERVAL				
	Daily or Every 8 hours	Every 250 hours	Every 500 hours	Every 3 Years	PAGE
AUX Inspection	x[1]				22
Check Oil Level	x				8
Check Coolant Level	x				36
Check Fuel Level	x				9
Exercise Air Conditioner (monthly)		x			19
Clean Spark Arrester		x			25
Clean Fuel Filter		x[2]			26
Check/Adjust Drive Belts		x[2, 3]			30
Change Crankcase Oil and Filter		x[2]			34
Check Coolant Hoses and Clamps		x			36
Clean Air Filter		x[4]			24
Replace Fuel Filter (If Needed)			x		26
Replace Receiver Drier (yearly)			x[5]		–
Clean Coolant System				x[5]	38
Replace Coolant Hoses and Clamps				x[5]	39

See notes on page 21.

Following the maintenance schedule and using the AUX properly will result in longer life, better performance, and safer operation. Perform each maintenance procedure at the time period indicated or after the number of operating hours indicated, whichever comes first. Refer to the following *Maintenance Procedures* section for instructions.

Log all service and maintenance for warranty support (see the *Maintenance Record* section).

⚠WARNING ***Accidental starting of the AUX during maintenance can cause severe personal injury or death. Disconnect both starting battery cables, before performing maintenance. Remove the negative (–) cable first to reduce the risk of arcing.***

Notes to Periodic Maintenance Schedule – Table 2

1. Check for oil, fuel and exhaust system leaks. Check exhaust system audibly and visually with the power unit running. Repair any leaks immediately. Replace corroded exhaust and fuel line components before leaks occur.
2. Change oil filter and clean fuel filter after first 50 hours of operation on new units. Also, adjust compressor belt tension after first 50 hours of operation.
3. Adjust compressor belt tension.
4. Clean air filter more frequently in extremely dusty conditions.
5. Have the Cummins service center perform.

AUX INSPECTION

Inspect the AUX daily or after every eight hours of operation, whichever comes first. Check the exhaust, fuel, DC electrical systems and mechanical condition as described in the following sections.

Exhaust System

With the unit running, inspect the exhaust system. Visually and audibly check for leaks at all connections, welds, gaskets, and joints. If any leaks are detected, shut down the unit and do not operate until corrected. Replace corroded exhaust components before leaks occur.

⚠WARNING ***Inhalation of exhaust gases can result in severe personal injury or death. Inspect exhaust system audibly and visually for leaks daily. Repair all leaks immediately.***

Fuel System

With the unit running, inspect the fuel supply and return lines, fuel filter, and fittings for leaks. Check flexible sections for cuts, cracks and abrasions. See that the fuel lines do not rub against anything that could damage them. Replace worn fuel line components before leaks occur.

⚠WARNING ***Fuel leakage will create a fire hazard that can result in severe personal injury or death if ignited. While checking for leaks, do not smoke or allow any spark, flame, pilot light or other ignition source in the area. If any leaks are detected, have them corrected immediately.***

DC Electrical System

With the unit off, check the battery terminals for clean and tight connections. Loose or corroded connections create resistance that can impede starting. Clean and reconnect loose battery cables. Always disconnect the negative (–) battery cables first and connect them last, to reduce the possibility of arcing.

⚠WARNING ***Ignition of explosive battery gases can cause severe personal injury. Do not smoke or allow any other ignition source near the battery. Wear goggles, protective rubber gloves and an apron when servicing batteries.***

Coolant System

⚠WARNING ***Coolant in a warm engine is under pressure and can flash to steam, causing severe burns if the radiator cap or drain cock are opened. Let the engine cool down before opening the radiator cap or drain cock.***

Check the entire system for coolant leaks. A small amount of coolant leakage from the water pump pressure release opening is normal.

The coolant system for the AUX is connected to the tractor engine coolant system. Coolant for the AUX can only be added through the tractor engine coolant system. Check the coolant level in the tractor engine recovery tank (or separate expansion tank) when the system is cold. Engine coolant is at the proper level when the recovery tank level is between the LOW and FULL marks.

Mechanical

Check for any signs of mechanical damage. Start the power unit and listen for any unusual noises that may indicate mechanical problems. Have any problems corrected immediately.

Check the mounting fasteners to make sure the power unit is secure to the vehicle. Check the condition of the mounting brackets and hardware to make sure they are in good condition.

Make sure that the power unit air inlet and outlet areas are not blocked with debris.

Clean the power unit whenever dust and dirt begin to accumulate. Dust and dirt can usually be removed with a damp cloth. Steam cleaning may be needed to remove road contaminants. Do not clean the AUX while the engine is running. Cover the air inlet and outlet areas to protect the inside of the AUX from cleaning solvents. Cleaning solvents can damage electrical connectors.

Maintenance Procedures

AIR FILTER

The air filter is a one-piece dry element (Figure 6). Clean the air filter at the interval indicated in the maintenance schedule. Replace the air filter after it has been cleaned three times. Clean the air filter more often when the unit is operated in extremely dusty conditions.

Loosen the screw on the mounting clamp and lift the filter to remove it. Cover the engine air inlet opening to prevent the entrance of dirt or debris.

Keep a spare filter for use while the other filter is drying. Clean the air filter as follows:

1. Run low pressure water, warm or cold, into the filter outlet neck. This will cause dirt to flow out the air inlet. (Water should flow opposite the normal airflow direction.) Detergent can be used to clean the filter as long as the filter is thoroughly rinsed with clean water.
2. Always allow the air filter to dry before use. Do not use compressed air to dry a wet filter or damage to the filter could result.
3. Place mounting clamp on filter and reinstall filter. Tighten screw on air filter mounting clamp securely.

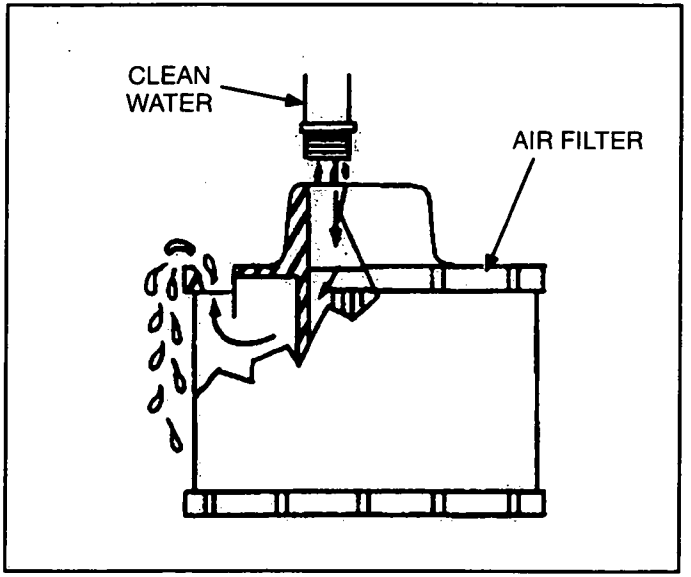

FIGURE 6. AIR FILTER CLEANING

SPARK ARRESTER

The exhaust spark arrester, mounted inside the muffler, requires periodic cleaning for continued safe and efficient operation.

To clean the spark arrester, remove the 1/8-inch pipe plug from the bottom of the muffler (Figure 7). Run the power unit with the AUX control set to heat or AC for five minutes. Stop the power unit and allow the muffler to cool. Replace the pipe plug in the muffler.

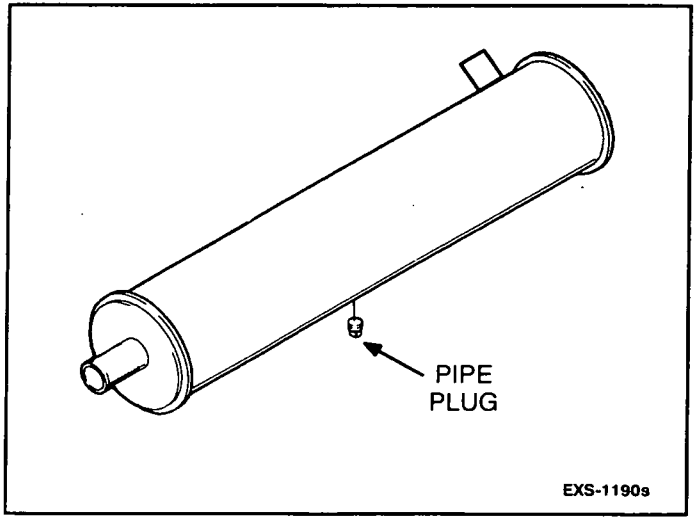

FIGURE 7. EXHAUST MUFFLER

FUEL SYSTEM

Use the best fuel available. Fuel quality is important for dependable performance and satisfactory engine life. Figure 8 illustrates the fuel system.

⚠WARNING ***Ignition of fuel can cause severe personal injury or death by fire or explosion. Do not permit any flame, cigarette, pilot light, spark or other igniter near the fuel system.***

Keep the fuel tank(s) full when operating the AUX. In most installations the AUX will run out of fuel when the fuel level is less than 2 inches (51 mm) from the bottom of the tank. If this happens, use the following procedure to prime the fuel system.

Low Pressure Fuel System: The electric fuel pump, fuel filter and injection pump inlet comprise the low pressure fuel system. To prime these components (remove the trapped air), see Priming the Fuel System.

High Pressure Fuel System: The injection pump, fuel injection lines and fuel injectors make up the high pressure fuel system. The high-pressure system is self-priming; trapped air is forced out through the injection nozzles.

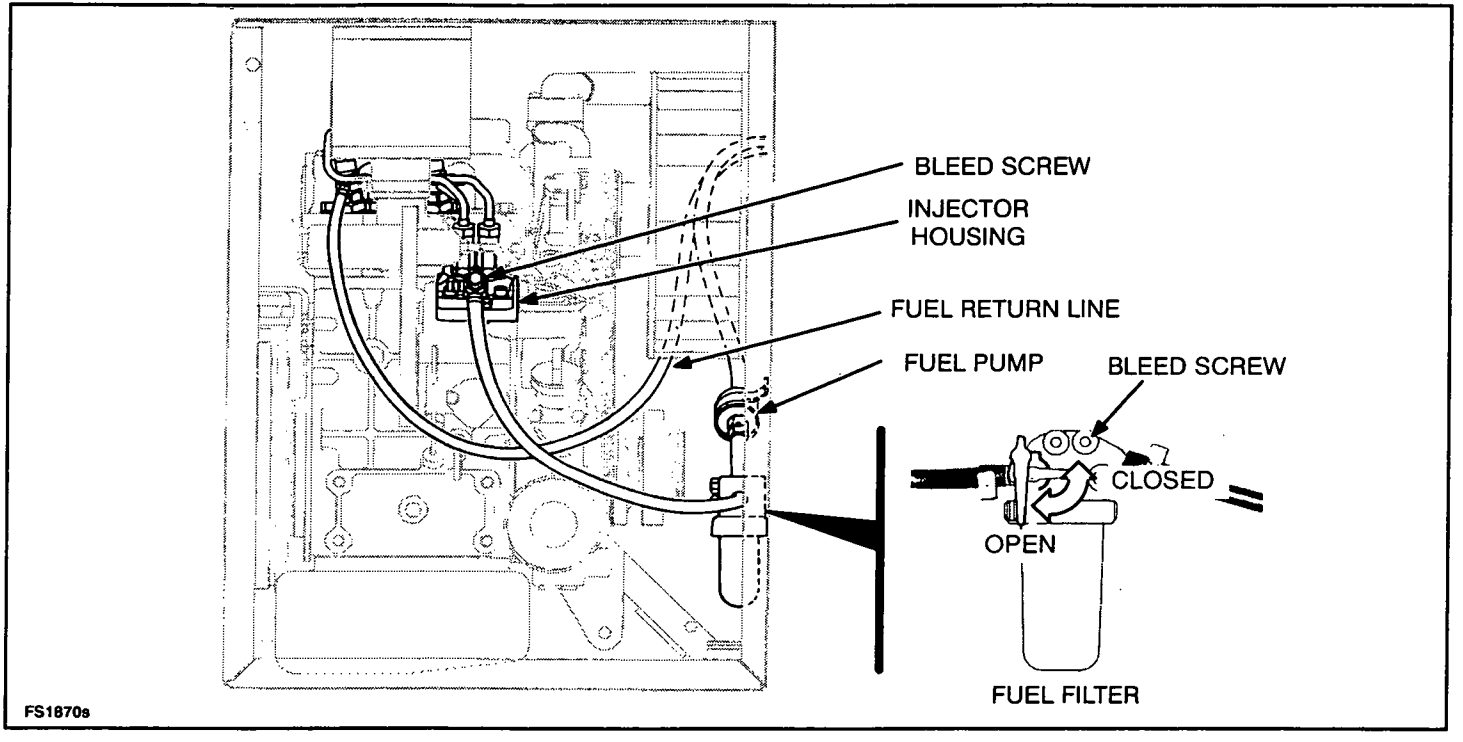

FIGURE 8. FUEL SYSTEM

Fuel Filter Service

Refer to the *Periodic Maintenance Schedule* for the recommended filter cleaning/change interval. The wrong fuel or dirty fuel will shorten the life of the fuel filter. Clean or replace the fuel filter as follows:

⚠ CAUTION ***Dirt or water in the system will cause severe damage to both the injection pump and the injection nozzles. It is extremely important that the fuel be kept clean and free of water.***

1. Close the fuel shutoff lever (Figure 8). Place a container under the fuel filter to collect fuel.
2. Loosen the bleed screw (Figure 9). Remove the screw ring and remove the filter cup.
3. Take out the fuel filter and rinse it in kerosene to clean it, or replace it (refer to Maintenance Schedule).
4. Lubricate the element and gasket with clean diesel fuel. Install the clean filter into the filter cup and reassemble the filter cup to the housing. Tighten the screw ring securely to prevent fuel leakage.
5. Proceed to Priming the Fuel System.

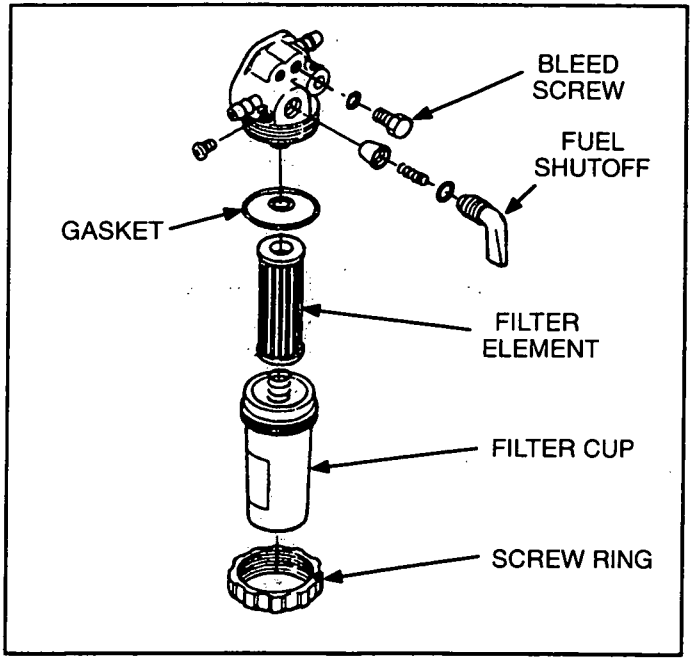

FIGURE 9. FUEL FILTER ASSEMBLY

Priming the Fuel System

To prevent accidental starting of the power unit, do not allow anyone inside the sleeper during this operation.

⚠WARNING ***Accidentally starting the power unit can cause severe personal injury or death. Do not allow anyone inside the sleeper during this operation.***

1. Make sure that the fuel shutoff valve is in the open position (Figure 8).
2. Place a container under the fuel filter to collect fuel. Loosen the fuel filter assembly bleed screw (Figure 8).
3. Disconnect the tan (positive) lead from the fuel pump at the inline harness connector.
4. Attach a jumper lead with a normally open switch, between the alternator B+ terminal (large top terminal) or the battery positive (+) terminal and the tan fuel pump lead.
5. Close the jumper switch to energize the fuel pump until fuel purges at fuel filter bleed screw opening.
6. Secure bleed screw in the fuel filter housing. Place a container under the injector pump to collect fuel.
7. Loosen the bleed screw on the injector pump housing (Figure 8). Close the jumper switch to energize the fuel pump until fuel purges from the bleed screw opening at the injector pump housing.
8. Secure bleed screw in injector pump housing.
9. Remove the jumper lead from the alternator B+ terminal or the battery positive + terminal. Remove the jumper lead from the tan fuel pump lead.
10. Reconnect the fuel pump tan (positive) lead in-line connector to the harness.
11. Wipe the fuel off the engine and fuel filter housing with a clean rag.

DRIVE BELTS

Inspect the fan/alternator and compressor belts for signs of wear or glazing. If either belt is defective, have it replaced by a Cummins service center. Also check belts for tension as follows:

Fan/Alternator Belt

A loose fan/alternator belt can cause the engine to overheat and decrease alternator efficiency. The belt tension must be correct for the unit to run properly.

Disconnect the starting battery cables (negative [–] cables first) to prevent accidental starting.

⚠WARNING ***Accidental starting of the AUX can cause severe personal injury or death. Stop the AUX and disable it by disconnecting the starting battery cables (negative [–] cables first) before when maintaining or repairing the AUX.***

To adjust the belt, loosen the bolts that secure the alternator (Figure 10). Adjust the position of the alternator until the belt tension is correct. Belt tension is correct when a finger pressure of 22 pounds (10 kg) at the middle of the belt deflects it about 0.4 inch (10 mm).

Tighten the bolt on the adjustment bracket first, then tighten the lower mounting bolt.

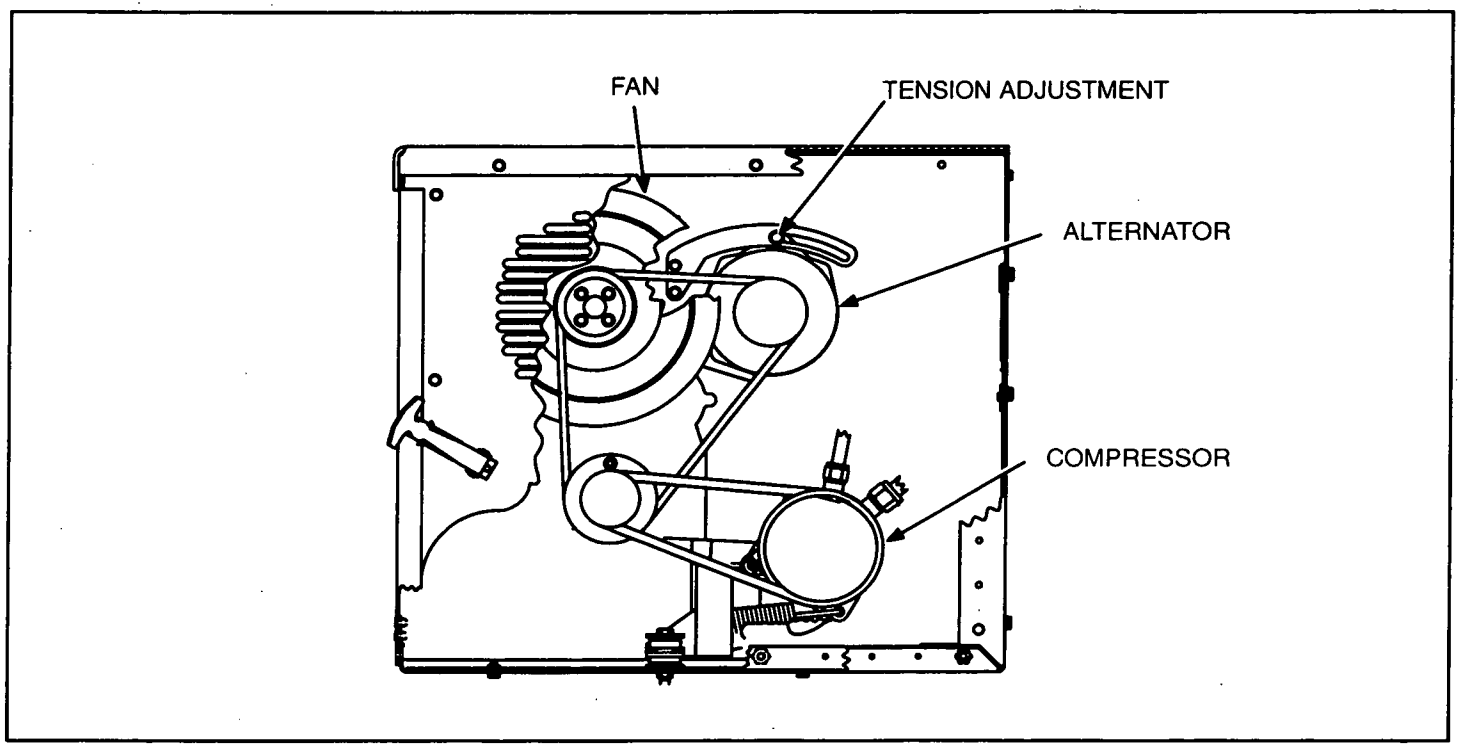

FIGURE 10. FAN/ALTERNATOR BELT ADJUST

Maintenance Procedures

Compressor Belt

Improper belt alignment and tension can cause inefficient compressor clutch operation and reduced bearing life. The compressor is mounted on a spring bracket that is designed to maintain proper belt tension.

Adjust the compressor belt in conjunction with the oil change intervals (after the initial 50 hours of operation and then every 250 hours) as follows:

1. Remove the hole plug from the air inlet side of the power unit (Figure 11).
2. Loosen the adjustment bolt located behind the access hole approximately two turns counterclockwise. (Requires a 17 mm socket.) The tension spring will set the compressor belt to the proper tension. Retighten the belt tension adjustment bolt.
3. Insert the hole plug back into the side panel.

If a problem with the belt is suspected, have a Cummins service center inspect the power unit.

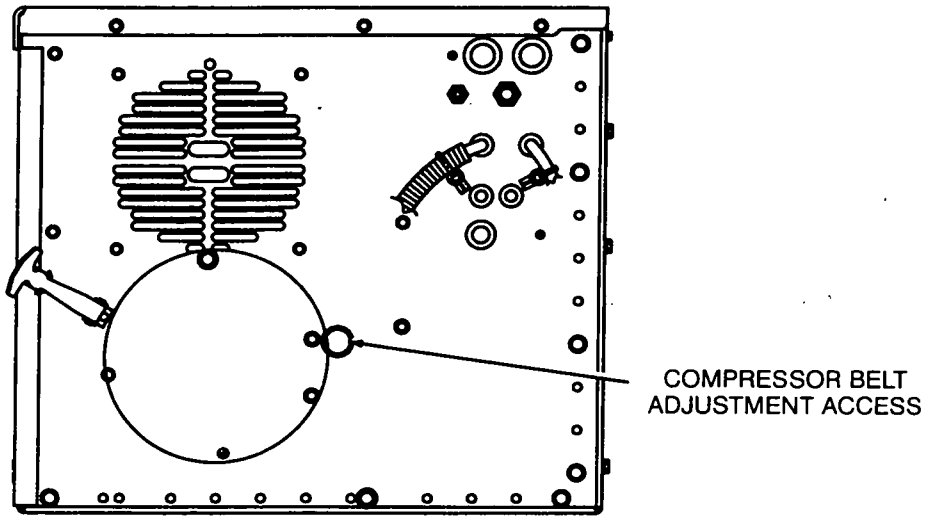

FIGURE 11. COMPRESSOR BELT ADJUSTMENT – ACCESS LOCATION

OIL AND OIL FILTER CHANGE

Change the oil and filter at the intervals listed in the Maintenance Schedule. Use oil that meets the API classification and SAE viscosity grade indicated in the *Pre-Start* section.

⚠WARNING ***Hot crankcase oil can cause burns if it is spilled or splashed on skin. Keep fingers and hands clear when removing the oil drain plug and wear protective clothing.***

⚠WARNING ***State or federal agencies have determined that prolonged contact with used engine oil can cause cancer or reproductive toxicity. When adding, changing or working with used oil, take care not to breathe, ingest or come into excessive contact with these substances. Wash hands after use. Wear protective clothing and equipment. Provide adequate ventilation.***

Run the engine until thoroughly warm. Stop the engine. Remove the drain plug from the end of the oil drain hose (Figure 12). Drain the oil into a container. After draining, securely install the drain plug onto the end of the drain hose.

Remove the oil filter and discard it. Thoroughly clean the filter mounting surface. Apply a thin film of oil to the filter gasket, and screw in the filter by hand until the gasket just touches the mounting pad. Then turn an additional 3/4 turn. Do not over-tighten the filter.

Used oil is harmful to the environment. Collect used oil in a sealed container and deliver it to the nearest recycling center or automotive service station.

Fill the lubrication system with the recommended oil. The engine oil capacity is 5 quarts (4.7 liters).

With oil in the crankcase, start the power unit and check for leakage around the filter gasket. Tighten the filter only enough to eliminate leaks.

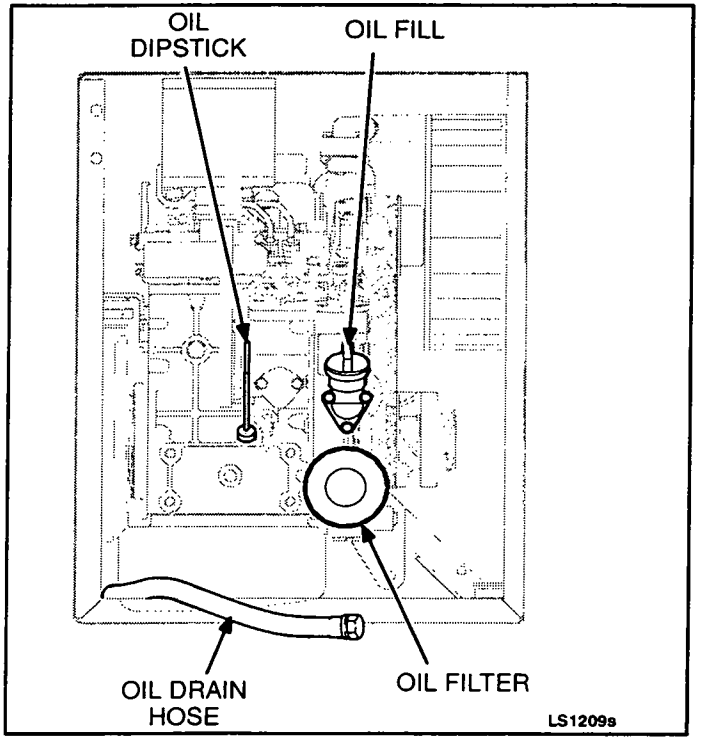

FIGURE 12. OIL AND OIL FILTER CHANGE

COOLING SYSTEM

Cooling systems vary with tractor engine types: for this reason it is recommended that the cooling system be serviced by Cummins service centers. The cooling system capacity for the AUX is listed in the *Specifications* section.

Coolant Requirements

Engine coolant must inhibit corrosion and protect against freezing. A 50/50 mixture of antifreeze and water is recommended for normal operation and storage. Use a good brand of antifreeze that contains a rust and corrosion inhibitor, such as ethylene glycol or propylene glycol (follow the recommendations in the tractor engine operator's manual). The antifreeze should not contain a stop-leak additive.

Do not add more than 50 percent antifreeze to the coolant mixture. A higher proportion of antifreeze will alter the heat transfer properties of the coolant. A 50/50 mixture will provide freeze protection to -34°F (-37°C).

Water used for engine coolant should be clean, low in minerals, and free of corrosive chemicals. Use distilled or soft water if available. Avoid the use of well water, which may contain minerals that can clog the heat exchanger core and reduce cooling efficiency.

Filling the Cooling System

Verify that all drain cocks are closed and all hose clamps are secure. Remove the truck engine coolant pressure cap and slowly fill the cooling system as described in the truck engine operator's manual.

⚠ CAUTION ***Exceeding the recommended fill rate can cause incomplete filling of the engine block, leading to engine damage during warm-up. Always follow vehicle operator's instructions for the recommended fill procedure.***

Purge air from the cooling system as follows:

1. Start the main truck engine. Set the truck cab heater control to maximum heat. Allow the coolant temperature to reach 170°F.
2. Start the AUX and let it run for 5 minutes.
3. Turn off the main truck engine, set the AUX control to Heat and set the TEMP control and fan switch to the maximum settings.
4. Run the AUX unit until the radiator is functioning (indicated by an increase in heat discharged from the radiator, located opposite the access cover side).
5. Turn off the AUX and allow the system to cool down. Check the coolant level at the tractor engine cooling system.

If the AUX unit shuts down on overheat, air could be trapped in the power unit. Allow it to cool down and purge the air as follows:

Loosen the hose clamp on the top of the thermostat housing and pull the hose back slightly (Figure 13). Or connect a drain hose with a Schrader valve to the Schrader fitting on the top the AUX radiator outlet tube. When coolant begins to escape, return the thermostat hose to its original position and secure it, or remove the Schrader valve drain hose assembly. Push the AUX Start/Stop-Reset switch to Stop-Reset, then repeat step 4.

Coolant Level

Check the coolant level at the intervals specified in the Maintenance Schedule. Check by observing the coolant level in the tractor engine recovery tank (or separate expansion tank) when the system is cold. Engine coolant is at the proper level when the recovery tank level is between the LOW and FULL marks.

⚠WARNING ***Coolant in a warm engine is under pressure and can flash to steam, causing severe burns if the radiator cap or drain cock are opened. Let the engine cool down before opening the radiator cap or drain cock.***

Maintenance Procedures

Flushing and Cleaning

Drain, flush and refill the AUX cooling system with new coolant at the intervals listed in the Maintenance Schedule. (Refer to the truck operator's manual for instructions on flushing and cleaning the truck engine). To drain the AUX system, open the coolant drain (Figure 13.) Be aware that the main truck coolant system will be drained through the AUX coolant drain if the coolant hoses to the AUX are not closed off.

⚠WARNING ***Contact with hot coolant can cause severe burns. Do not bleed hot, pressurized coolant from the cooling system.***

Chemical Cleaning: Rust and scale slow heat absorption and can block coolant flow. Clean the cooling system if rust and scale have collected on the engine water jacket or in the heat exchanger. Use a commercial cleaning compound and follow the manufacturer's instructions.

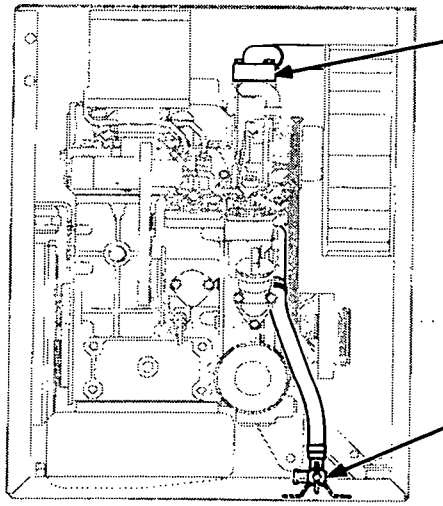

FIGURE 13. COOLING SYSTEM

Flushing: After cleaning, drain the system and fill with clean water. Run the unit for 10 minutes, then drain the system completely. Refill with the coolant mixture (refer to Filling the Cooling System).

⚠CAUTION ***Never pour hot water into a cold engine or cold water into a hot engine. Doing so can crack the head or the cylinder block. Do not operate the unit without water for even a few minutes.***

Thermostat

If the engine overheats or does not reach and maintain a minimum operating temperature, remove and test the thermostat as follows:

1. Let the engine cool, then drain the cooling system.
2. Remove the capscrews and washers that secure the thermostat cover to the water pump housing.
3. Raise the thermostat cover with its radiator hose intact, and position it to one side.
4. Remove the thermostat cover gasket and thermostat.
5. Clean, inspect, and remove any gasket material from the thermostat cover and housing.
6. Attach a string to the thermostat and lower it into water that has been heated to at least 170°F (77°C): the thermostat should gradually open.

Replace the thermostat if it is broken, corroded, or if it sticks in the open or closed position. Use a new gasket when replacing the thermostat.

Hoses and Clamps

Replace hoses and clamps at the interval indicated in the Maintenance Schedule, or sooner if hoses are swollen, hardened or cracked.

Troubleshooting

The following guide applies to basic troubleshooting. If these recommendations fail to resolve the problem, contact an authorized Cummins service center.

⚠WARNING ***Many troubleshooting procedures present hazards that can result in severe personal injury or death. Only qualified service personnel with knowledge of fuels, electricity, and machinery hazards should perform service procedures. Review safety precautions pages iii, iv and v.***

TABLE 3. ENGINE TROUBLESHOOTING GUIDE

Problem	Probable Cause	Solution
FAILS TO CRANK	1. Weak battery. 2. Bad battery connection. 3. Open circuit breaker (10A).	1. Check battery electrolyte level. 2. Clean and tighten all battery cable connections. 3. Check for short in control wiring, reset breaker (Figure 2).
CRANKS SLOWLY	1. Weak battery. 2. Bad battery connection. 3. Oil is too heavy.	1. Check battery electrolyte level. 2. Clean and tighten all battery cable connections. 3. Replace with lighter oil.

TABLE 4. ENGINE TROUBLESHOOTING GUIDE – Continued

Problem	Probable Cause	Solution
CRANKS BUT WON'T START	1. Fuel below fuel pickup. 2. Fuel shutoff valve closed. 3. Bad fuel or wrong fuel. 4. Low oil level.	1. Add fuel. Prime the fuel system. 2. Fully open fuel supply valve. 3. Use correct fuel for ambient temperature. Clean fuel filter if suspect. 4. Add oil if necessary.
EXHAUSTING BLACK SMOKE	1. Poor fuel quality. 2. Bad injector or other engine component. 3. Dirty air filter.	1. Use good quality fuel. 2. Contact Cummins service for repair. 3. Clean or replace filter.
UNIT RUNS, THEN STOPS OR STOPS WHEN DRIVING AROUND A CORNER	1. Low on fuel. 2. Low oil level. 3. Excess oil. 4. Low coolant level. 5. Air inlet blocked.	1. Fill fuel tank. 2. Add oil if necessary. 3. Reduce engine oil level. 4. Add coolant. 5. Remove debris from air inlet.
UNIT RUNS, THEN SURGES	1. Dirty air filter. 2. Dirty fuel filter. 3. Bad fuel injector or wrong injector pressure.	1. Replace air filter. 2. Clean fuel filter. 3. Contact Cummins service for repair.

Troubleshooting

⚠WARNING ***Many troubleshooting procedures present hazards that can result in severe personal injury or death. Only qualified service personnel with knowledge of fuels, electricity, and machinery hazards should perform service procedures. Review safety precautions on pages iii, iv and v.***

TABLE 5. SYSTEM TROUBLESHOOTING GUIDE

Problem	Probable Cause	Solution
SLEEPER FAN DOES NOT OPERATE	1. Controls not set correctly. 2. Circuit breaker overloaded: a. Breaker (10A) tripped. b. Breaker (25A) tripped. 3. Defective blower. 4. Defective control.	1. The Heat/AC switch must be in the Heat or AC position. 2a. Check for short in control wiring, reset breaker (Figure 2). 2b. Check for short in fan wiring, reset breaker. 3. Contact Cummins service center. 4. Contact Cummins service center.
LOW OR NO HEAT	1. Controls not set correctly. 2. Outside temp below 10°F (–12°C). 3. Low coolant level, restricted coolant hose or airflow. 4. Insufficient DC load. 5. Defective control or heating system.	1. Review Operating Procedures. 2. Close the power unit air inlet cover. 3. Check coolant level and hoses. Also check air inlet to sleeper fan. 4. Add DC load to AUX alternator (turn on running lights, headlights etc.). 5. Contact Cummins service center.

TABLE 6. SYSTEM TROUBLESHOOTING GUIDE – Continued

Problem	Probable Cause	Solution
LOW OR NO AIR CONDITIONING	1. Controls not set correctly. 2. Compressor belt loose or defective. 3. Freon hose or airflow restriction. 4. Defective control or air conditioning system.	1. Review Operating Procedures. 2. Contact Cummins service center. 3. Check for bent or pinched hose. Also check air inlet to sleeper fan. 4. Contact Cummins service center.
NO DC OUTPUT VOLTAGE FROM THE ALTERNATOR	1. Loose or defective drive belt. 2. Defective alternator. 3. Dash ammeter gives a negative reading when the power unit is running and lights etc. are on.	1. Check fan/alternator belt. 2. Contact Cummins service center. 3. This is normal; the ammeter only measures DC output from the truck engine alternator and does not measure output from the alternator in the power unit.

Notes: The sleeper fan does not cycle to regulate sleeper heat or cooling. Sleepers that previously had a two speed fan will still operate with two speeds.

How To Obtain Service

Locating Service Assistance

When the AUX needs parts or service, contact the nearest Cummins service center. Cummins Parts and Service representatives are factory-trained to handle all of your service needs. Locate the nearest Cummins service center as follows:

1. Contact the Cummins service center that installed the AUX.

-OR-

2. For the name of your nearest Cummins distributor in the United States or Canada, call 1-800-DIESELS.

If you need additional assistance, please call Onan Corporation, 1-612-574-5000, 7:30 AM to 4:00 PM, Central Standard Time, Monday through Friday.

Scheduling Service

1. Before calling for service, have the following information available:

   The complete model number and serial number (see Model Identification on page 2)

   Date of purchase

   Nature of the problem

2. Contact the service center nearest you to explain the problem and make a service appointment.
3. If you have difficulty in arranging for service or resolving a problem, please contact the service manager at the nearest Cummins distributor for assistance.

⚠WARNING ***Incorrect service or parts replacement can result in severe personal injury, death, and/or equipment damage. Service personnel must be qualified to perform electrical and/or mechanical service. Service work on the air conditioning system must be performed by persons certified to do air conditioning service work.***

TABLE 7. SPECIFICATIONS

MODELS	DKX–AUXA 1A DKX–AUXA 2A/B
ENGINE	
Engine Model	Kubota® Z482B
Engine Type	Two cylinder, Vertical, Water Cooled, 4-Cycle Diesel
Engine Speed	2600 rpm
Fuel	Diesel Fuel No. 2 (No. 1 Below 32°F [0°C])
Average Fuel Consumption:	
Heating Mode	0.25 gph (0.95 L/h)
Air Conditioning Mode	0.32 - 0.38 gph (1.21 -1.44 L/h)
Engine Oil Capacity (with Oil Filter)	5 qt (4.73 L)
Coolant Capacity (Engine and Radiator)*	3 qt (2.8 L)
Starting System	12-Volt Electric Start

*Coolant capacity does not include hose and heater coil capacity.

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Specifications

TABLE 8. SPECIFICATIONS – Continued

MODELS	DKX–AUXA 1A DKX–AUXA 2A/B
POWER UNIT DIMENSIONS	
Length	25.5 in (647.7 mm)
Width	18 in (457.2 mm)
Height	23 in (584.2 mm)
Weight	260 lb (118 kg)
ALTERNATOR OUTPUT (12 VDC)	35 Amp (90 Amp Optional)
HEATING CAPACITY	12,500 btu/hr
COOLING CAPACITY	9,000 btu/hr
REFRIGERANT	
Model DKX–AUXA 1A	R-12
Model DKX–AUXA 2A	R-134a
Model DKX–AUXA 2B	R-134a

Maintenance Record

Keep a record of all maintenance. Record the service date and the number of operating hours from the hour meter on the AUX control panel.

Refer to the Maintenance Schedule for the time interval between maintenance procedures. Keep all of your service receipts.

RECORD THE NAME, ADDRESS, AND PHONE NUMBER OF YOUR CUMMINS SERVICE CENTER

DATE	HOUR METER READING	SERVICE PERFORMED / NOTES

Maintenance Record

DATE	HOUR METER READING	SERVICE PERFORMED / NOTES

Onan

Onan Corporation, 1400 73rd Avenue N.E., Minneapolis, MN 55432-USA