



Auxiliary Power Unit



Operation & Service Manual

for

ComfortPro™ Auxiliary Power Unit

Models PC6011, PC6012, PC6013,
PC6014, PC6015, PC6018,
PC6019
PC6111, PC6112

Models covered by this publication

6000 SERIES

Model #	Description
PC6011	Carrier 12K BTU Integrated APU
PC6012	ComfortPro 12K BTU Integrated APU
PC6013	ComfortPro 12K BTU Integrated APU with DPF
PC6014	ComfortPro GENX APU Only
PC6015	ComfortPro GENX 12K CCU with SHORE POWER
PC6018	Carrier GENX APU ONLY
PC6019	Carrier GENX 12K CCU with SHORE POWER

6100 SERIES

Model #	Description
PC6111	Carrier 12K BTU Stand Alone APU
PC6112	ComfortPro 12K BTU Standalone APU

CONTENTS

INTRODUCTION

SAFETY

Safety Alerts	c-iii
Component Layout.....	c-v

GENERAL ARRANGEMENT

APU Dimensions	c-vi
CCU Dimensions	c-vii
Condenser Dimensions	c-vii

1.0 OPERATION OF MULTI-FUNCTION D.C.P

1.1 PREPARATION

1.1.1 Multi-Function D.C.P Components.....	1-1
1.1.2 How the ComfortPro Operates	1-2

1.2 MANUAL OPERATIONS

1.2.1 Starting the APU	1-5
1.2.2 Stopping the APU	1-5
1.2.3 Turning the Heater ON/OFF.....	1-5
1.2.4 Heating: Setting the Temperature	1-6
1.2.5 Turning the A/C ON/OFF	1-6
1.2.6 Setting the A/C Temperature	1-6
1.2.7 Fan Operation	1-6

1.3 AUTOMATIC OPERATIONS

1.3.1 Password Protection.....	1-7
1.3.2 Entering Password	1-8
1.3.3 Setting the Clock	1-8
1.3.4 Comfort Monitor.....	1-9
1.3.5 Timer	1-10
1.3.6 Temp Start	1-11
1.3.7 Maximum Run Time.....	1-12
1.3.8 Battery Monitoring.....	1-13

2.0 CLIMATE CONTROL UNIT (CCU)

2.1 PREPARATION

2.1.1 Charging the CCU.....	2-1
-----------------------------	-----

2.2 SERVICE

2.1.2 Maintenance Schedule	2-2
2.1.2 CCU Spring Tune-Up	2-3

3.0 TROUBLESHOOTING

3.0 MANUAL OPERATIONS

3.1 APU (Auxiliary Power Unit).....	3-2
3.2 GENERATOR	3-6
3.3 DRIVER CONTROL PANEL	3-7
3.4 CCU AIR CONDITIONING	3-8
3.5 CCU Fan	3-11
3.6 CCU Heat.....	3-11
3.7 RECEPTACLE PANEL.....	3-12

3.0 TROUBLESHOOTING (Cont.)

3.8 TESTING PROCEDURES

3.8.1 Testing AMP draw for components 3-13

3.8.2 Testing Voltage and Hz readings 3-13

3.9 ADDITIONAL INFORMATION

3.9.1 Adjusting the 120 A/C Voltage..... 3-14

3.9.2 Capacitor Troubleshooting 3-14

3.9.3 Capacitor Theory..... 3-14

3.9.4 Potential Relay Theory..... 3-15

3.9.5 Alternator Troubleshooting..... 3-15

3.9.6 Fuel Solenoid Troubleshooting 3-16

APPENDICES

CAPACITIES AND SPECIFICATIONS A-1

FUSE LOCATIONS A-4

CIRCUIT BREAKER LOCATIONS A-5

APU CONTROL UNIT A-6

CCU CONTROLLER..... A-7

FUEL SYSTEM PURGE PROCEDURE A-8

COOLANT PURGE PROCEDURE FOR INTEGRATED APU A-9

COOLANT FILL PROCEDURE FOR STAND-ALONE APU A-9

DEFROST/HEAT & DCP SENSOR..... A-11

INTEGRATED APU WIRING DIAGRAM (30-864-50B)..... A-12

INTEGRATED APU WIRING DIAGRAM (30-864-50C)..... A-13

STAND-ALONE APU WIRING DIAGRAM (30-S64-01A)..... A-14

SAFETY

Safety Alerts

Throughout this manual, you will see notes labeled "Warnings" or "Cautions" to alert you to special instructions or precautions concerning a particular procedure that would be hazardous if performed incorrectly or carelessly.

Observe them carefully!

These safety alerts alone cannot eliminate hazards that can occur. Strict compliance with these special instructions when performing the installation and maintenance, plus common sense, are major accident prevention measures.

DANGER

Immediate hazards that will result in severe personal injury or death.

WARNING

Hazards or unsafe practices that could result in severe personal injury or death.

CAUTION

Hazards or unsafe practices that could result in minor injury or product or property damage.

NOTICE

Information that is important to proper installation or maintenance, but is not hazard-related.

For example:

DANGER

A certified refrigeration technician must charge and test the CCU.

Safety Considerations

Exhaust

Inhalation of exhaust gas (containing carbon monoxide) may cause severe personal injury and/or death. Anyone suspected of suffering from CO inhalation should be removed from the hazardous area and given medical assistance immediately.

⚠ WARNING

California Proposition 65 Warning: This product contains lead, a chemical known to the State of California to cause cancer and birth defects and other reproductive harm.

Fuel/Batteries

Exercise extreme caution when working near fuel or fuel-filled equipment. Do not operate equipment during fueling operations. Use eye protection when working near batteries, which contain acid and can explode. Do not smoke or use open flames near batteries.

Electrical

Electric shock can cause severe personal injury, burns, and death. Before working on any unit, disconnect the batteries. Use only approved materials and methods when working on the electrical system, and follow local electrical codes. Never work on the APU or the electrical circuitry when the APU is running. Never work with electricity in wet conditions or when you are tired.

Toxic Substances

Fuel, oil, coolant, and refrigerant are toxic and in some cases, carcinogenic. Wear eye and hand protection at all times. Remove contaminated clothing immediately and wash contaminated skin. Do not breathe in vapors.

Hot or Moving Parts

Moving parts can cause severe injury and/or death. Before working on any unit, shut it off and disconnect the battery. Do not start until protective covers have been replaced. Also, loose parts falling into rotating machinery can cause severe accidents. Always ensure bolts and clamps are correctly torqued and secured. Inspect mechanical components periodically for damage, corrosion, and proper torque.

Misuse

The APU is designed to provide electrical power for heating and cooling vehicles in normal on-road conditions. Never use the APU to power critical medical equipment or sensitive electronic equipment without the manufacturer's express written approval.

Warnings/Cautions MUST be observed

⚠ WARNING

DO NOT start the APU when the enclosure cover is removed. Operating with the cover off may result in injury and/or death.

⚠ WARNING

When the APU is about to start, a buzzer sounds. Make sure no one is standing near the APU or touching it.

⚠ WARNING

Charging the CCU must be performed by a certified air conditioning technician who has experience with hermetic systems and Refrigerant R-134A.

⚠ WARNING

Vapor charge CCU only.

⚠ WARNING

Before undertaking ANY repair to the APU, CCU or component of the ComfortPro system disconnect the batteries from the APU.

COMPONENT LAYOUT

The main components of the ComfortPro are the Auxiliary Power Unit (APU), the Climate Control Unit (CCU) and the Driver Control Panel (DCP).

Note: In this manual, the term DCP refers generically to all models of Driver Control Panel, including DCP, DCP2, etc.

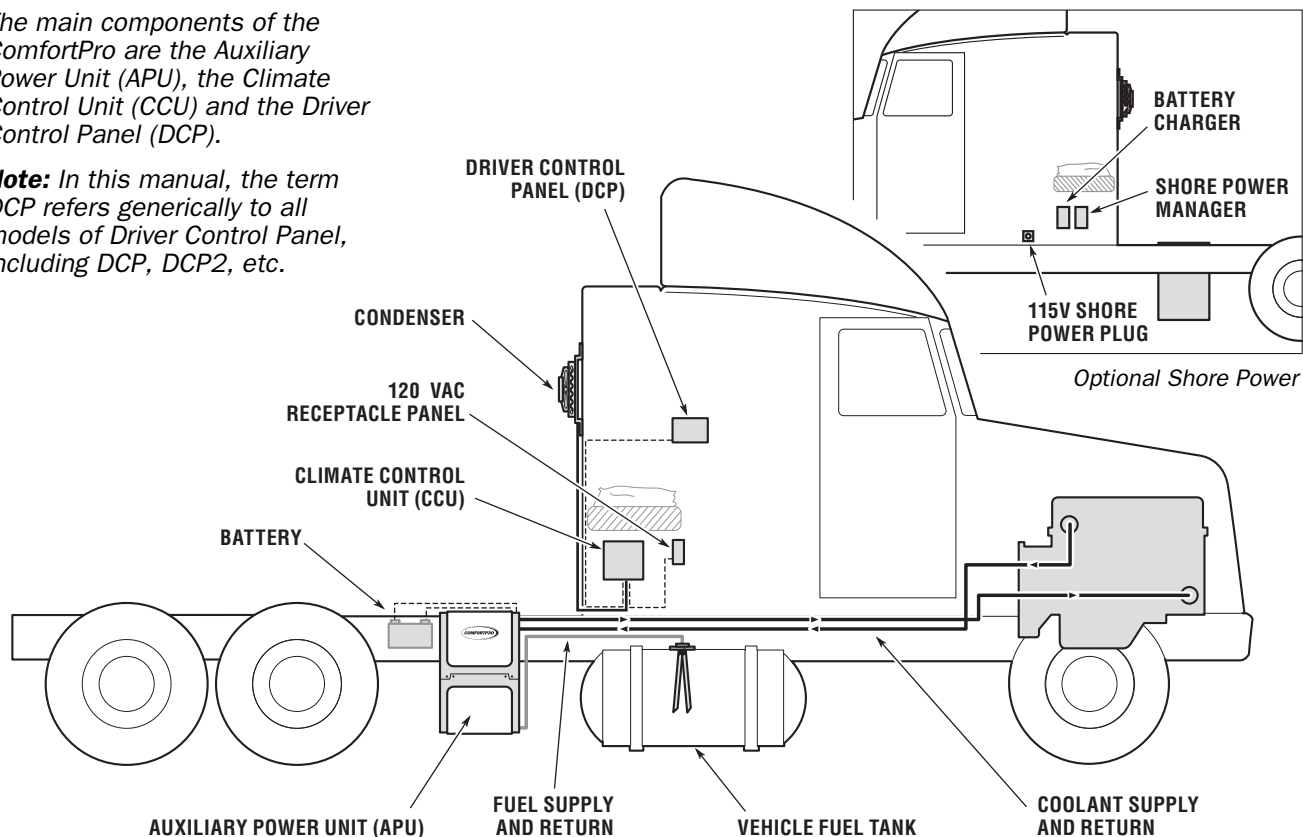


Figure C1: Main Components of the Carrier ComfortPro Integrated APU system and where they should best be installed on the truck.

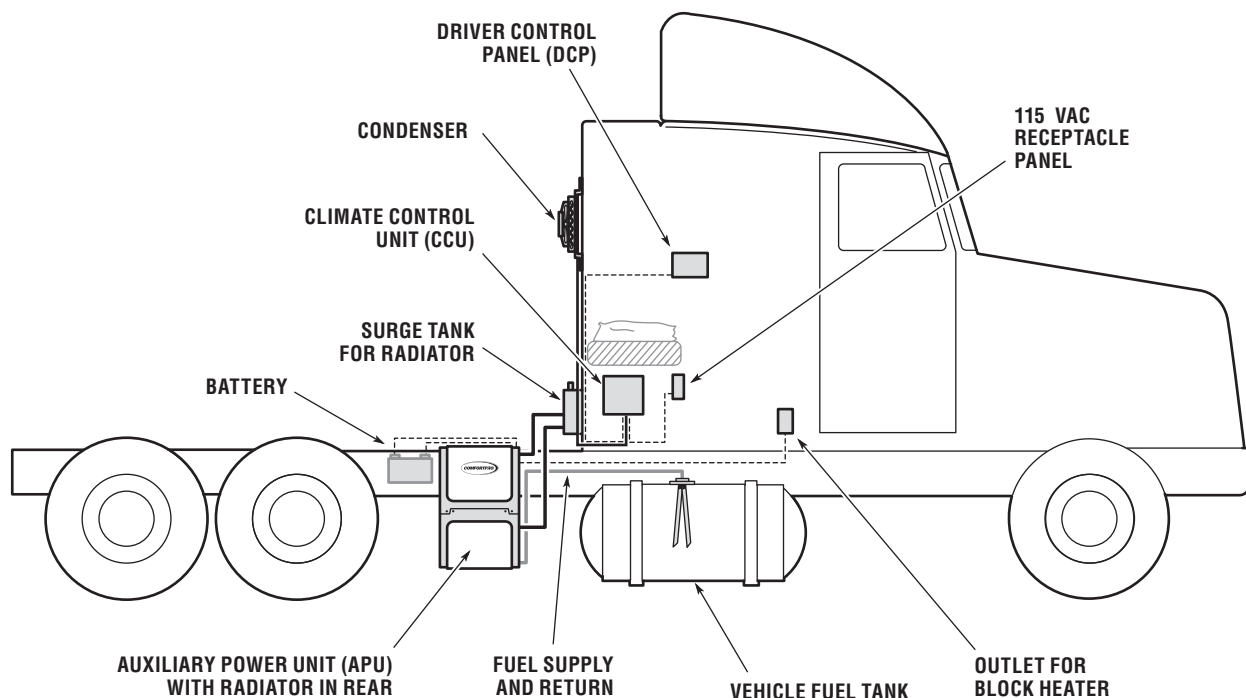
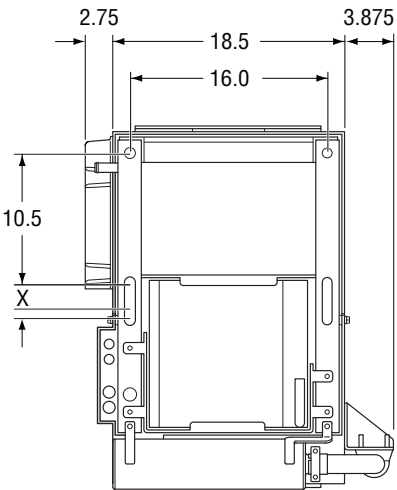


Figure C2: Main Components of the Carrier ComfortPro Stand Alone APU system and where they should best be installed on the truck.

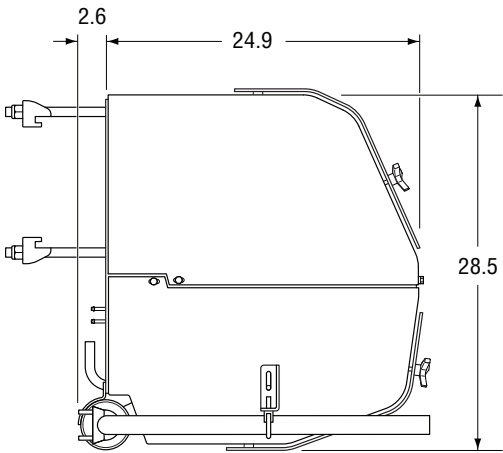
GENERAL ARRANGEMENT

APU Dimensions (Measurements in inches)

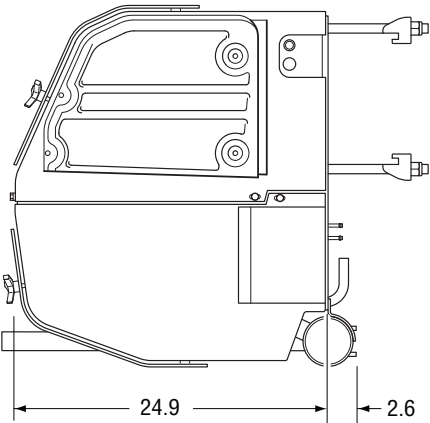
X = 1.9 STAND-ALONE APU
X = 3.0 INTEGRATED APU



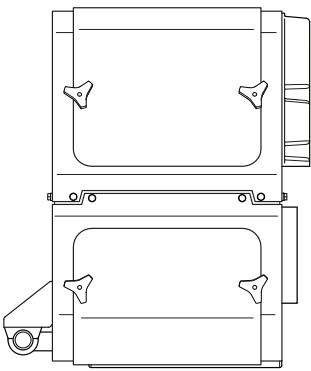
REAR



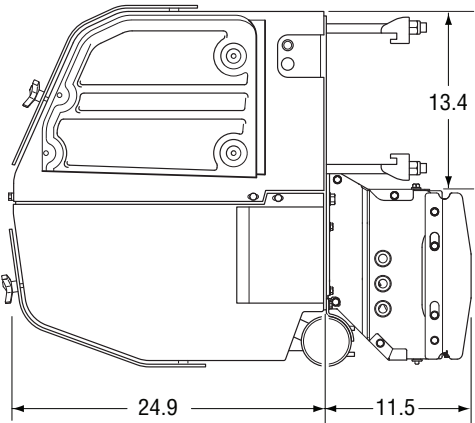
LEFT SIDE



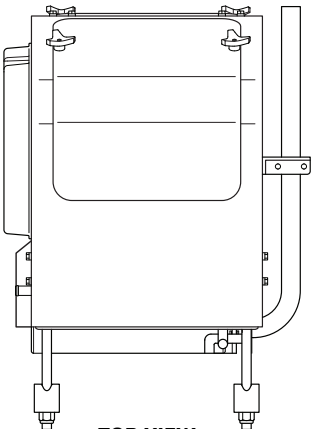
RIGHT SIDE (INTEGRATED APU)



FRONT VIEW



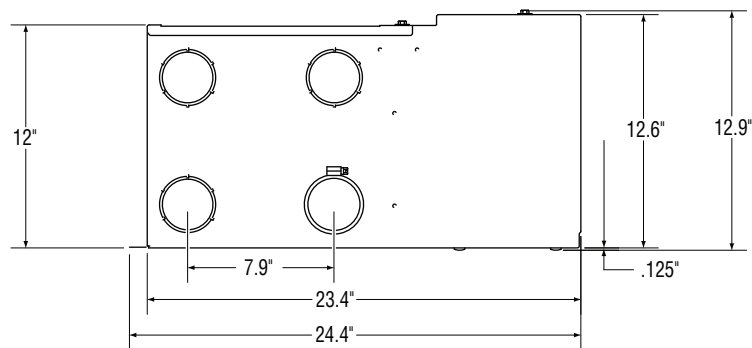
RIGHT SIDE (STAND-ALONE APU)



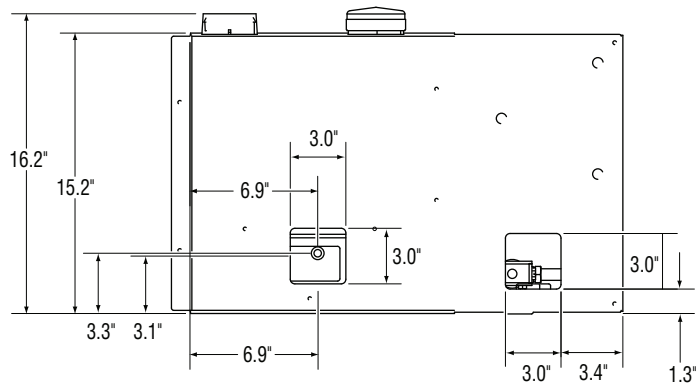
TOP VIEW

CCU Dimensions (Measurements in inches)

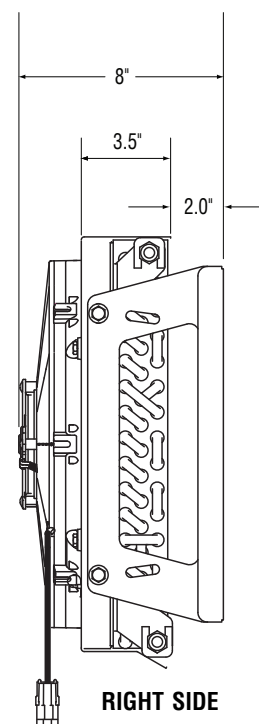
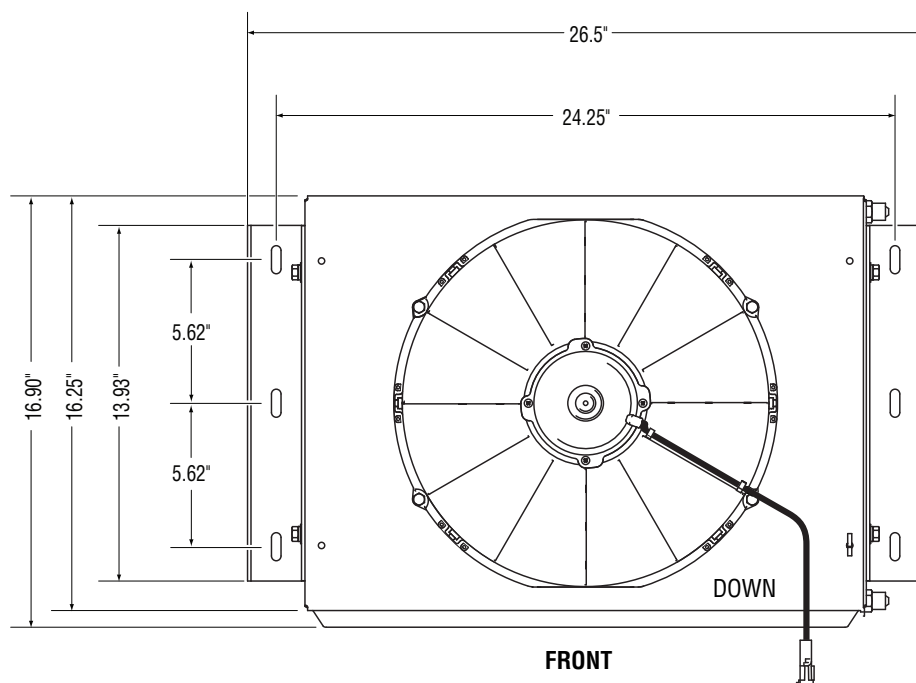
FRONT VIEW



BOTTOM VIEW



Condenser Dimensions (Measurements in inches)



1.0 OPERATION OF MULTI-FUNCTION DRIVER CONTROL PANEL

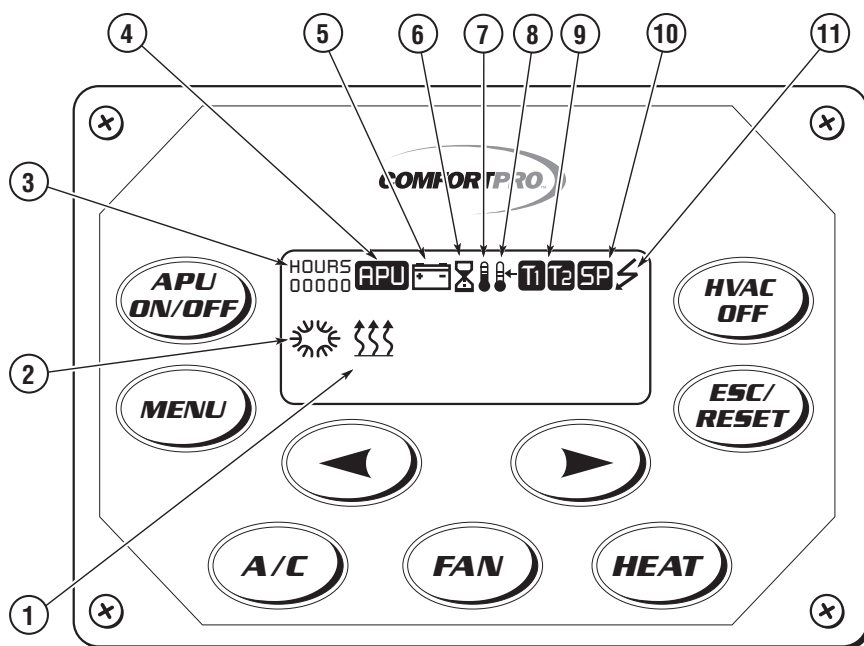


Figure 1-0: Multi-Function Driver Control Panel

1.1 PREPARATION

1.1.1 Multi-Function Driver Control Panel Components

NOTICE

The DCP (driver control panel), which is mounted inside the truck bunk, controls the APU and the CCU. The central panel on the DCP provides status information using words and icons.

In this manual, the term DCP refers generically to all models of Driver Control Panels, including DCP, DCP2, etc.

- 1 When visible, the heating system is heating.
- 2 When visible, the A/C is cooling.
- 3 Indicates the number of operating hours on the APU.
- 4 Indicates the state of the APU.
 - The APU engine is running.
 - The APU engine is off.
 - The APU engine is in the starting process (flashing).
- 5 Indicates that Battery Monitor mode is enabled.
- 6 Indicates that maximum run time is enabled.
- 7 Indicates that Temp Start mode is enabled.
- 8 Indicates that Comfort Monitor mode is enabled.
- 9 Indicates that Timer 1 or Timer 2 mode is enabled.
- 10 Indicates that the ComfortPro is connected to shore power. The APU cannot be started in Shore Power mode.
- 11 Indicates the state of the 115V outlet and CCU auto-reset breakers.
 - 115 VAC power is being supplied to the outlet.
 - No power is being supplied to the outlet.
 - Outlet breaker has tripped.
 - High Heat/Outlet breaker has tripped.
 - The breaker that tripped has reset automatically and the DCP needs to be reset.

1.1.2 How the ComfortPro Operates

The ComfortPro has two modes of operation: manual and automatic.

Manual Mode

You start the APU from within the truck bunk using the APU On/Off button on the driver control panel (DCP). Once the APU is running, you can start and stop the fan, heater and air conditioning using the DCP. See page 1-5. Once the heater or A/C is running, it will cycle (automatically turn on and off) in order to keep the truck bunk at the temperature you specify. The HVAC will continue to cycle until you turn it off. While the HVAC is cycling, the APU remains on and will only turn off when you manually turn it off using the button on the DCP.

Note that in manual mode, the APU remains on until you turn it off. But in Comfort Monitor mode (described below), the APU automatically turns off and on as required.

When the APU is running, power is supplied to the power outlet in the truck bunk (except in high heat).

In manual mode, the APU will turn off automatically if the Maximum Run Time is reached.

Automatic Mode

The ComfortPro has several functions that will start it in automatic mode.

FEATURE	DESCRIPTION
Comfort Monitor (page 1-9)	<p>Comfort Monitor is intended to maintain the truck cabin temperature at a desired set point by cycling both the APU and HVAC on and off as required. While operating in Comfort Monitor mode, the HVAC will only operate at high output settings, i.e. either High Heat or High A/C.</p> <p>MENU ITEMS AND PASSWORD PROTECTION</p> <p>Comfort Monitor is one of the main items in the DCP/DCP2 menu tree and may be password protected independently of the other main menu items. Within the Comfort Monitor menu, three settings are available:</p> <p>ON/OFF: Allows the user to enable or disable the Comfort Monitor feature.</p> <p><i>Note: Comfort Monitor Mode and Manual APU operation are mutually exclusive, i.e. An ON setting enables CM mode and disables Manual APU operation. An OFF setting disables CM mode and enables Manual APU operation.</i></p> <p>SET DURATION: Allows the user to set the maximum session time that the APU can remain in Comfort Monitor mode. The duration timer may be set between 0.0 HRS to 24.0 HRS in increments of 0.5 HRS.</p> <p><i>Note: A duration setting of 0.0 HRS will restore the earlier Comfort Monitor functionality. In this configuration, Comfort Monitor cannot be de-activated by the operator. Comfort Monitor can only be enabled via the menu settings (typically subject to password protection).</i></p> <p><i>Specifically: The operator cannot activate / de-activate Comfort Monitor using the ON/OFF key (see below). The CM icon stays visible on the display.</i></p> <p><i>When used with an engine interlock, Comfort Monitor operation will automatically re-activate when the main engine is turned off. The CM icon disappears while the main engine is running.</i></p> <p><i>The operator has the ability to enter and exit manual mode.</i></p>

FEATURE	DESCRIPTION
Comfort Monitor Cont. (page 1-9)	<p>SET TEMP: Allows the user to set the desired ambient temperature in the range from 18°C (64°F) to 30°C (86°F).</p> <p>COMFORT MONITOR OPERATION</p> <p>APU ON/OFF key With Comfort Monitor enabled and its duration timer set to a non-zero value in the menu, the APU ON/OFF key may be used to activate / de-activate Comfort Monitor mode.</p> <p>Duration Timer The Comfort Monitor session duration timer begins counting down from its set value each time that Comfort Monitor mode is activated via the APU ON/OFF key. When the timer has elapsed, Comfort Monitor mode will de-activate. The driver may re-activate Comfort Monitor for a new session if desired by pressing the APU ON/OFF key.</p> <p><i>Note: The intent is that the driver should de-activate Comfort Monitor when leaving the truck for a period of time in which comfort monitor is not required. If Comfort Monitor is not manually de-activated, it will continue to operate until the duration timer has expired.</i></p> <p>Other Control Panel Keys The MENU, ESC/RESET and ARROW keys may continue to be used for accessing and navigating the menu. The balance of front panel keys, including HVAC OFF, A/C, FAN, and HEAT, have no associated functionality while the system operates in Comfort Monitor. Additionally the ARROW Keys may not be used to adjust the temperature set point.</p> <p>APU Interlock This applies only to APUs equipped with main engine interlocks. If the APU has Comfort Monitor enabled, and the main engine interlock activates to signal that the main engine has started and is running, then Comfort Monitor will be de-activated. Additionally, Comfort Monitor cannot be activated with an active engine interlock.</p> <p>If desired, the driver may re-activate Comfort Monitor for a new session by pressing the APU ON/OFF key, but only after the main engine interlock has de-activated, i.e. the main engine has shut off.</p> <p>Other Automatic Modes If enabled in the menu, other automatic modes may become active while the APU operates in Comfort Monitor mode. Activation of any of the other automatic modes will temporarily override Comfort Monitor, however APU operation will return to Comfort Monitor mode if all automatic mode duration timers have expired but the Comfort Monitor duration timer has not expired.</p>
Timer (page 1-10)	At the specified time, the APU and HVAC automatically turn on. During the specified timer duration, the HVAC cycles on and off to maintain the desired temperature. When the timer duration expires, both the APU and HVAC turn off automatically and remain off.

Temp Start (page 1-11)	The APU and heater on the HVAC automatically turn on in order to prevent the APU engine and truck engine from getting too cold. (Turning on the heater creates a "load" that makes the APU work harder and therefore warm up faster). Both the APU and HVAC turn off automatically once the preset duration time expires.
Battery Monitor (page 1-13)	The APU automatically turns on for 90 minutes in order to recharge the batteries. The HVAC does not turn on. After the 90 minute run time, the system will sense voltage for 10 minutes, before restarting if needed.

There are icons on the DCP that flash when the APU and HVAC are running. See page 1-1. If you enter the truck bunk and APU or HVAC is on but you did not start it, you can assume it has started in one of the automatic modes, as described above. On the DCP, one icon will be flashing steadily: this is the icon for the mode that is currently operating.

Whenever the ComfortPro is running in automatic mode (except for Comfort Monitor mode), if you then press the heat, A/C or fan buttons on the DCP, the ComfortPro will switch to manual mode. The APU will not automatically turn off! This icon on the DCP will also stop flashing.

When the ComfortPro is operating in Comfort Monitor mode, manual APU operation is locked out.

Automatic Mode and Minimum Time Off

All these automatic functions work on a "minimum time off": the ComfortPro must be off for at least 10 minutes before the automatic function will turn it on again. For example, the Timer function may be set to turn on the ComfortPro at 10:00 a.m. You have been running the ComfortPro in manual mode. You turn off the ComfortPro at 9:55 a.m. The timer will only turn on the ComfortPro again 10 minutes later, at 10:05 a.m.

Clock

In order to use the Timer correctly, you must set the DCP clock. See page 1-8.

Maximum Run Time

You can set the maximum time that the APU is allowed to continuously run in manual mode. See page 1-12.

Password Protection

You can add a password to the DCP, then you can protect one or more functions so that only a person who knows the password can set the function. See page 1-7.

1.2 MANUAL OPERATIONS

1.2.1 Starting the APU "One Touch Start"

⚠ WARNING


Do not start the APU when the enclosure cover is removed. Operating with the cover off may result in injury and/or death.

⚠ WARNING

When the APU is about to start, a buzzer sounds. Make sure no one is standing near the APU or touching it.

Press and release  once.

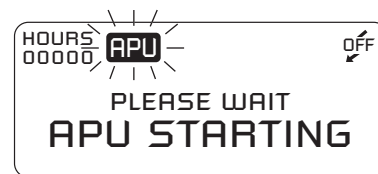
The display shows **"PLEASE WAIT – APU STARTING"** and  flashes.

When  stops flashing, then the APU has started successfully.

The APU startup sequence consists of 20 seconds of glowing (30 seconds when the ambient temperature is below -5°C or 23°F) and up to 10 seconds of cranking.


If the sequence fails, **"RESTARTING"** appears for six seconds. Then the startup sequence automatically repeats up to five times or until the APU starts.

If **"CRANK LIMIT"** appears, see Troubleshooting section.



1.2.2 Stopping the APU

Press .

The APU will stop. The display shows .


Make sure to shut down HVAC before stopping APU!




1.2.3 Turning the Heater ON/OFF

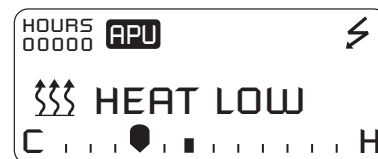
NOTICE



The heat mode will not function if the temperature is higher than 29.5°C (85°F).

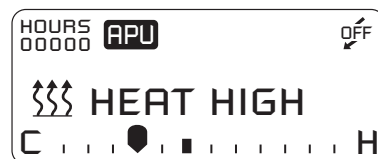
- 1 Press  to activate the heater.


The display shows **"HEAT LOW"**.

The heater will turn on only if the temperature is too low (to adjust the temperature, see below). When the heater is on,  appears.





- 2 Press  again to switch between high and low heat to heat the truck bunk more or less quickly. In **"HEAT HIGH"** mode, the power outlet is disabled and the display indicates . The heat will turn off when the desired temperature is reached.



- 3 Press  to deactivate heating.

1.2.4 Heating: Setting the Temperature


Press  or  when the heater is on ("HEAT LOW" or "HEAT HIGH" shows).

The notch on the temperature bar moves. The heater will automatically turn on and off to maintain this temperature.


1.2.5 Turning the A/C ON or OFF


NOTICE


The air conditioning function will not operate if the temperature is lower than 18.5°C (65°F).

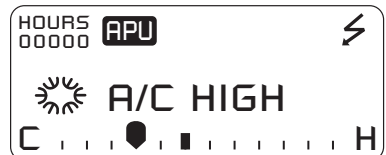
- 1 Press  to activate the A/C.

The display shows "A/C LOW".



The A/C will turn on only if the temperature is too high (to adjust the temperature, see below). When the A/C is on,  appears.

- 2 Press  again to switch between high and low A/C to cool the truck bunk more or less quickly.

- 3 Press  to deactivate the A/C.



1.2.6 A/C Setting the Temperature


Press  or  when the A/C is on ("A/C LOW" or "A/C HIGH" shows).

The notch on the temperature bar moves. The A/C will automatically turn on and off to maintain this temperature.

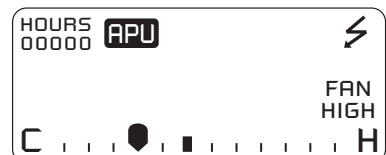
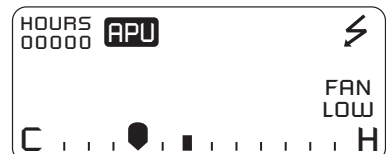
1.2.7 Fan Operation

You can still have the fan working even when the temperature is not low or high enough for the heat or A/C to come on.

The fan operation is independent of the air conditioning and heat modes. When the fan speed is manually set to high or low, the fan will return to that setting when the desired temperature has been reached as the air conditioning or heat cycles off.

Press  to toggle between low, high and off.

The speed of the fan may automatically change when the heat or A/C comes on, then automatically change back when the heat or A/C goes off.



1.3 AUTOMATIC OPERATIONS

WARNING

Once Automatic functions are set the system could start at anytime. Before servicing the unit be sure to disconnect the unit from the batteries to prevent injury should the unit attempt to start while servicing. All presets will remain once battery cable is reconnected.

1.3.1 Password Protection

You can add a password to the DCP, then you can protect one or more functions so that only a person who knows the password can set the function.











On a newly installed DCP, the password is always 000, which means that no password protection is in place.

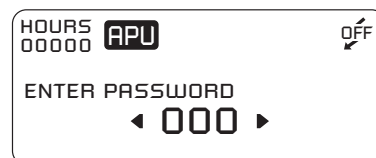
To password-protect functions, first change the factory password; see 'Setting up for Password Protection'. All functions will now be password protected. Then remove password protection from chosen functions, as desired; see 'Protect Functions with a Password'.

If you know the password, you can change it at any time, if you need to. Note that if you change the password to 000, you will remove password protection from all functions.



If the password is ever lost, contact your dealer to have the password reset to 000.

Setting up for PASSWORD PROTECTION

- 1 Press .
- 2 Press  or  until "**SET/CHANGE PASSWORD**" is displayed, then press .
"ENTER PASSWORD" is displayed with three blank squares, one for each digit in the password. The first digit flashes.
- 3 Press  or  until the first number in the password is displayed.
For example, if your password is "**432**" press  until "**4**" shows, then press .
- 4 Repeat for each digit in the password.
- 5 Press  again after entering the last digit. "**NEW PASSWORD**" is displayed.
- 6 Repeat the above steps to enter the new password. "**CONFIRM**" is displayed.
- 7 Enter the new password again, then press  to exit this function.



PROTECT FUNCTIONS with a PASSWORD

- 1 Press .
- 2 Press  or  until "**PASSWORD PROTECT**" is displayed, then press .
If this menu item does not appear, then you have not yet changed the factory password from 000. Change the password and then try again.



"ENTER PASSWORD" is displayed with three blank squares, one for each digit in the password. The first square flashes.

- 3 Press or until the first number in the password is displayed, then press .
- 4 Repeat for each digit in the password.
- 5 Press again after entering the last digit.
The first feature that can be password protected is displayed with "YES" or "NO" (indicating whether it is currently password protected).
- 6 Press or to change the "YES" or "NO".
- 7 Press to move to the next feature.
Or press or to skip to the next feature.

1.3.2 Entering the Password

When you try to set up a function, you may be prompted to enter the password.

- 1 Press or until the first number in the password is displayed, then press .
- 2 Repeat for each digit in the password.
- 3 Press again after entering the last digit.

1.3.3 Setting the Clock

You can set the clock on the DCP. This clock is used by the Timer function (page 1-10). If you use the Timer function, remember that as you move from one time zone to another, you must adjust the clock. Otherwise the Timer will start the APU at the wrong time.

The clock settings remain even when the APU is turned off.

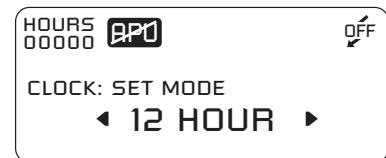
NOTICE

The clock does not automatically adjust for time zone changes; you must adjust it.

- 1 Press .
- 2 Press or until "CLOCK" is displayed, then press .

If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).

The clock function takes you through several settings: 12/24-hour-clock, hour set, minutes set, am/pm-set (for 12-hour clock only), and day of the week.











- 3 Press or to change the setting.
- 4 Press to move to the next setting. Or press to cancel any changes you have not yet accepted.
- 5 When done, press to exit.

1.3.4 Comfort Monitor

You can specify the temperature you want in the truck bunk. Whenever the truck bunk temperature goes 2° above or below this temperature, the APU starts and the HVAC turns on until that temperature is reached or for fifteen minutes, whichever is longer.





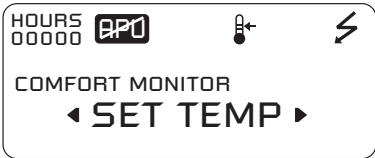








Enabling COMFORT MONITOR

- 1 Press .
- 2 Press  or  until "COMFORT MONITOR" is displayed, then press .

If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).
- 3 Press  or  to display "ON" or "OFF".
- 4 Press  to confirm this setting.
The current setting remains until you change it; turning off the APU or manually starting the APU does not permanently cancel this setting.

NOTICE

Factory Default Temperature Setting is 21°C (70°F). Range is 18°C (64°F) to 30°C (86°F).





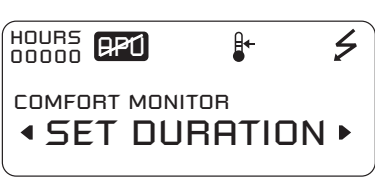








Setting the Comfort Monitor TEMPERATURE

- 1 Press .
- 2 Press  or  until "COMFORT MONITOR" is displayed, then press .

If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).
- 3 Press  or  to display "SET TEMP".
- 4 Press  to confirm this setting. The current temperature is displayed.
- 5 Press  or  to scroll to the desired temperature.
- 6 Press  to confirm this setting. **Or** press  to cancel and retain the current temperature.
- 7 Press  to exit.

NOTICE

Factory Default Duration Setting is 8 hours. Range is 0 hours to 24 hours (in 0.5 hour increments).

Setting the DURATION in Comfort Monitor

- 1 Press .
- 2 Press  or  until "COMFORT MONITOR" is displayed, then press .

If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).
- 3 Press  or  to display "SET DURATION".
- 4 Press  to confirm this setting. The current duration is displayed.
- 5 Press  or  to scroll to the desired duration.
- 6 Press  to confirm this setting. **Or** press  to cancel and retain the current duration.
- 7 Press  to exit.





1.3.5 Timer

You can set up the ComfortPro so that the APU and CCU run automatically for a specified time on specified days of the week. There are two timers, so you can set up two schedules.

For example, one schedule may be to run every day at 6:00 p.m. for .5 hours and the other schedule may be to run every Monday at 6:00 a.m. for .5 hours.




You must set up the timer as follows: Specify the day and time you want the APU to run, specify the duration (the length of time you want the APU to run for) and specify the temperature you want maintained in the truck bunk while the APU is running.

Turning TIMER On or Off

- 1 Press .
- 2 Press  or  until "TIMER 1" or "TIMER 2" is displayed, then press .







If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).

- 3 Press  or  to display "ON" or "OFF".
- 4 Press  to confirm this setting.







The current setting remains until you change it; turning off the APU or manually starting the APU does not cancel the timer function.

Setting the Start Time/Day





- 1 Press .
- 2 Press  or  until "TIMER 1" or "TIMER 2" is displayed, then press .

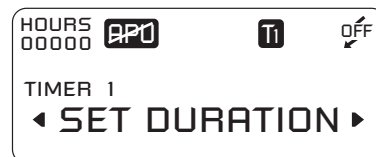


If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).









- 3 Press  or  to display "SET START".
- 4 Press  to confirm this setting. The current start time is displayed.
- 5 Press  or  to set the hours, minutes and day.
- 6 Press  to confirm each setting.

Setting the DURATION

- 1 Press .
- 2 Press  or  until "TIMER 1" or "TIMER 2" is displayed, then press .



If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).

- 3 Press  or  to display "SET DURATION".
- 4 Press  to confirm this setting. The current duration time is displayed.
- 5 Press  or  to scroll to the length of time to run the APU.
- 6 Press  to confirm this setting. Or press  to cancel and retain the current duration.
- 7 Press  to exit.





NOTICE

Factory Default Duration Setting is 1 hour.
Range is 0.5 hrs - 10 hrs (in 0.5 hr increments).

NOTICE









Factory Default Temperature Setting is 21°C (70°F). Range is 18°C (64°F) to 30°C (86°F).

Setting the TEMPERATURE for the Timer

- 1 Press .
- 2 Press  or  until "TIMER 1 or TIMER 2" is displayed, then press .



If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).

- 3 Press  or  to display "SET TEMP".
- 4 Press  to confirm this setting. The current temperature is displayed.
- 5 Press  or  to scroll to the desired temperature.
- 6 Press  to confirm this setting. Or press  to cancel and retain the current temperature.
- 7 Press  to exit.





1.3.6 Temp Start

You can set up the APU so that it automatically runs for a specified time whenever the ambient temperature goes below a specified value. This feature ensures that the APU engine and truck engine do not get so cold that they will not start.

This feature is not intended to maintain a comfortable truck bunk temperature; instead, see "Comfort Monitor".




NOTE: In Temp Start the HVAC will turn on the heat to 'LOAD' the engine and warm up the engine faster.

Turning Temp Start On and Off

- 1 Press .
- 2 Press  or  until "TEMP START" is displayed, then press .







If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).

- 3 Press  or  to display "ON" or "OFF".
- 4 Press  to confirm this setting.

The current setting remains until you change it; turning off the APU or manually starting the APU does not permanently cancel this setting.

Setting the START TEMPERATURE

- 1 Press .
- 2 Press  or  until "TEMP START" is displayed, then press .



If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).

NOTICE

Factory Default Temperature Setting -10°C (14°F). Range is -20°C (-4°F) to 5°C (41°F).

- 3 Press or to display "**SET TEMP**".
- 4 Press to confirm this setting. The current start temperature is displayed.
- 5 Press or to scroll to the desired start temperature.
- 6 Press to confirm this setting. Or press to cancel and retain the current start temperature.
- 7 Press to exit.

NOTICE

Factory Default Duration Setting is 2 hours. Range is 1 hr to 4 hrs.

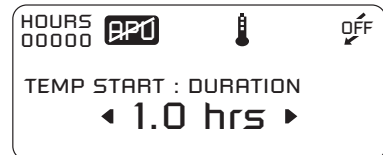
Setting the DURATION

- 1 Press .
- 2 Press or until "**TEMP START**" is displayed, then press .



If "**ENTER PASSWORD**" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).

- 3 Press or to display "**SET DURATION**".
- 4 Press to confirm this setting. The current duration is displayed in hours.
- 5 Press or to scroll to the amount of time you want the APU to run before automatically shutting off.
- 6 Press to confirm this setting.



Or press to cancel and retain the current start temperature.

- 7 Press to exit.

1.3.7 Maximum Run Time

You can set the maximum time that the APU is allowed to run continuously. If the APU runs for longer than the specified time, it automatically shuts off. You can then start it manually, if desired; the "run time" clock will start counting again.

Turning MAXIMUM RUN TIME ON OR OFF

- 1 Press .
- 2 Press or until "**MAXIMUM RUN TIME**" is displayed, then press .



If "**ENTER PASSWORD**" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).

- 3 Press or to display "**ON**" or "**OFF**".
- 4 Press to confirm this setting.

NOTICE









Factory Default Run Time Setting is 8 hours. Range is 2 to 24 hours.

Setting the DESIRED RUN TIME

- 1 Press .
- 2 Press  or  until "MAXIMUM RUN TIME" is displayed, then press .



If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).





- 3 Press  or  to display "SET".
- 4 Press  to confirm this setting. The current duration is displayed.
- 5 Press  or  to scroll to the desired number of hours.
- 6 Press  to confirm this setting. Or press  to cancel and retain the current duration.
- 7 Press  to exit.

1.3.8 Battery Monitoring

You can set up the APU so that it automatically runs for 90 minutes when the truck batteries are low.




When you set up this feature, you must enter the current voltage of the batteries (see "Set the Initial Voltage"). The ComfortPro can then calculate how much the voltage drops, as the batteries are used.

Set the INITIAL VOLTAGE





1. Press .
- 2 Press  or  until "CALIBRATE VOLTAGE" is displayed, then press .



If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).




- 3 Press  or  to set the current voltage of the batteries.
- 4 Press  to confirm this setting.

Turning BATTERY MONITORING ON and OFF

- 1 Press .
- 2 Press  or  until "BATTERY MONITOR" is displayed, then press .



If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).

- 3 Press  or  to display "ON" or "OFF".
- 4 Press  to confirm this setting.

The current setting remains until you change it; turning off the APU or manually starting the APU does not permanently cancel this setting.

The APU starts if the battery voltage goes below the level you specify here.





NOTICE

*Factory Default Voltage Setting is 11.8V.
Range is 11.0V to 13.5V.*

NOTICE









*APU will not start until battery voltage
has been below the specified level for
10 minutes.*

Setting the Voltage Level

- 1 Press .
- 2 Press  or  until "BATTERY MONITOR" is displayed, then press .



If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7).

- 3 Press  or  to display "SET".
- 4 Press  to confirm this setting. The current voltage level is displayed and flashes.
- 5 Press  or  to scroll to the desired voltage.
- 6 Press  to confirm this setting. Or press  to cancel and retain the current voltage.
- 7 Press  to exit.

2.0 CLIMATE CONTROL UNIT (CCU)

2.1 PREPARATION

⚠ WARNING

This procedure must be performed by a certified air conditioning technician who has experience with hermetic systems and Refrigerant R-134A.

⚠ CAUTION

Vapor charge CCU only.

NOTICE

Refrigerant Recovery:

Venting of refrigerant is against the law and subject to fines and loss of certification.

EPA regulations require that all CFC and HCFC refrigerants be recovered before any system can be opened for service.

Recovery of refrigerant is done using a certified recovery unit.

- *Before a refrigeration system can be opened to make repairs.*
- *Before pressurizing the system with nitrogen for leak testing.*
- *Before disposing of any system or component containing refrigerants.*
- *When it is necessary to remove excess charge from an overcharged system.*

NOTICE

Total System Capacity is 50–55 oz. A scale must be used to measure the refrigerant weight. No other method is acceptable. Failure to follow this procedure exactly will result in improper air conditioning function.

2.1.1 Charging the CCU

- 1 Pressure test the system for leaks with nitrogen.
- 2 Vacuum all the nitrogen for a minimum of 30 minutes to 500 microns.
- 3 With the high and the low side valves open, charge the system with R-134A vapor to break the vacuum. Once the scale stabilizes and the high and the low side pressures match, close the high side valve.
- 4 With only the low side valve open, start the A/C compressor by selecting High A/C (APU Running). If needed lower the temperature set point to start the A/C compressor.
- 5 Continue charging the system with vapor, on the low side only, until a total of 50–55 oz of R-134A refrigerant has been added as measured by the scale.

NOTICE

The air conditioning system has a 5 minute delay timer (minimum time between cycles is 5 minutes).

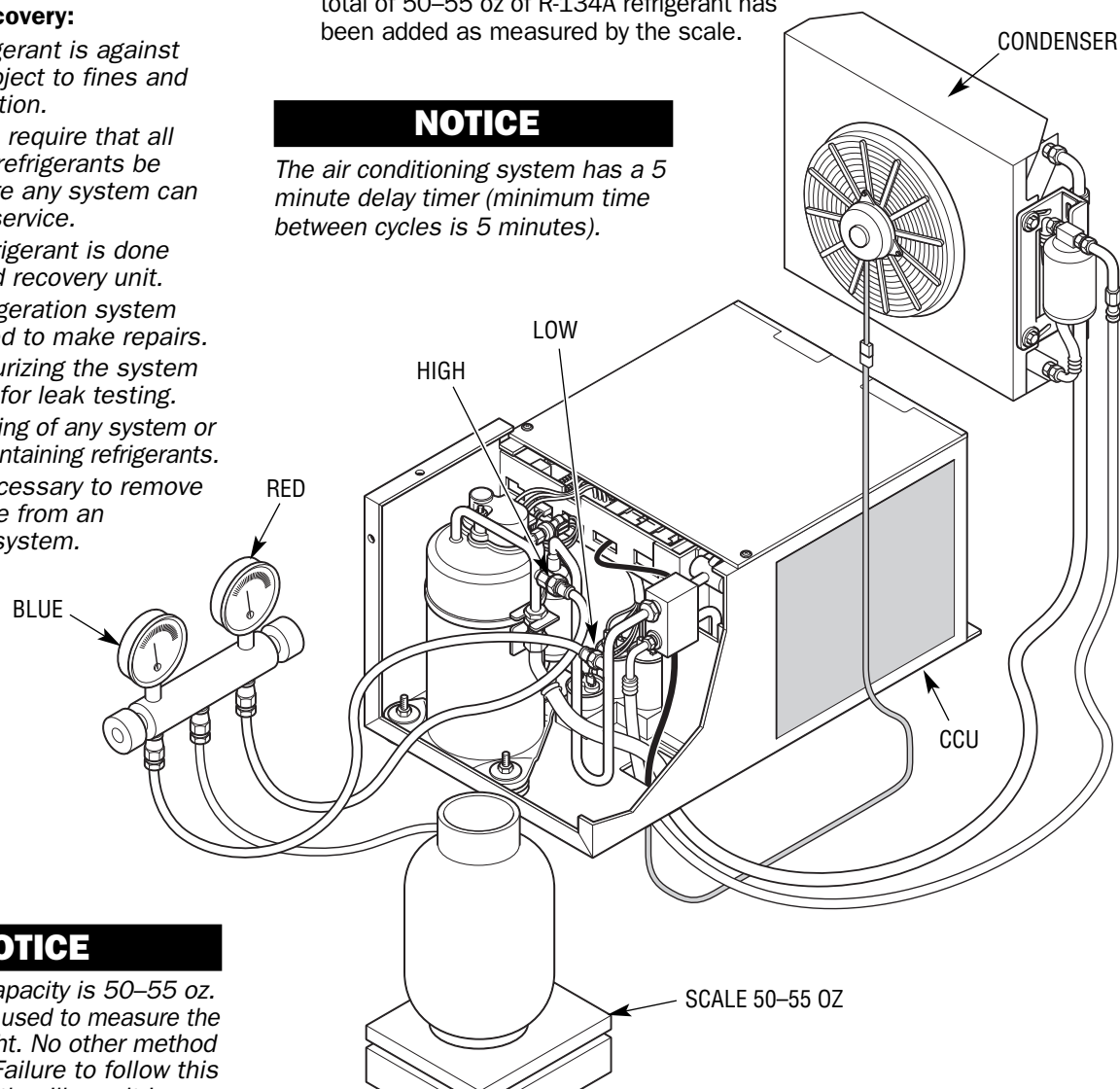


Figure 2- 1: Connecting hoses to CCU to Condenser

2.2 SERVICE

2.2.1 Service/Preventive Maintenance Schedule

Interval between checks (in hours of operation)	First	Every		
	50	500	1000	2000
Change oil and oil filter	X		X	
Check fuel hoses, fuel pipes, and clamps	X	X		
Check fasteners, muffler clamps and frame grippers	X	X		
Check battery cable connections	X	X		
Check coolant hoses and clamps	X	X		
Check all belts for tension, alignment & condition	X	X		
Check APU air filter, clean or replace as necessary		X		
Change Alternator belt regardless of condition			X	
Change fuel filters			X	
Change Integrated APU Generator belt			X	
Change Stand-Alone APU Generator belt regardless of condition every 3000 hours				
Adjust valve lash			X	
Clean inside enclosure			X	
Clean radiator fins			X	
Clean condenser fins			X	
Check fuel hoses and clamps for abrasion and damage. Change as necessary			X	
Check CCU air filter, clean or replace as necessary. To clean, remove the mesh filter and vacuum or wash (soap and water). Shake dry and reattach.				X
Check injection nozzle opening pressure				X
Check injection pump timing				X
Check water pump performance				X
Check alternator performance				X
Check starter performance				X
Check air conditioning performance (HVAC)				X
Check heater performance (HVAC)				X
Check generator line voltage				X
Check coolant hoses and clamps (from APU to main engine on Integrated APU, from APU to radiator surge tank on Stand-Alone APU)				X
Check engine thermostat				X
Check air intake hose and clamps on APU				X
Drain and replace long-life coolant every 2 years				

2.2.2 CCU Spring Tune-Up

Purpose:

Recommended service and maintenance:

- Condenser.
- Air ducting and outlets.
- Evaporator and temperature sensor.
- Refrigerant lines connections and routing.
- Harness Connections and wiring.
- A/C operating efficiency - charge level.

Frequency:

Annually – preferably in the spring for the coming A/C season.

Recommended Service Actions:

1 Check the condenser for:

Damage, leakage and/or contaminated fins that may restrict air flow.

2 Check air ducting and outlets for:

Damage and/or restrictions.

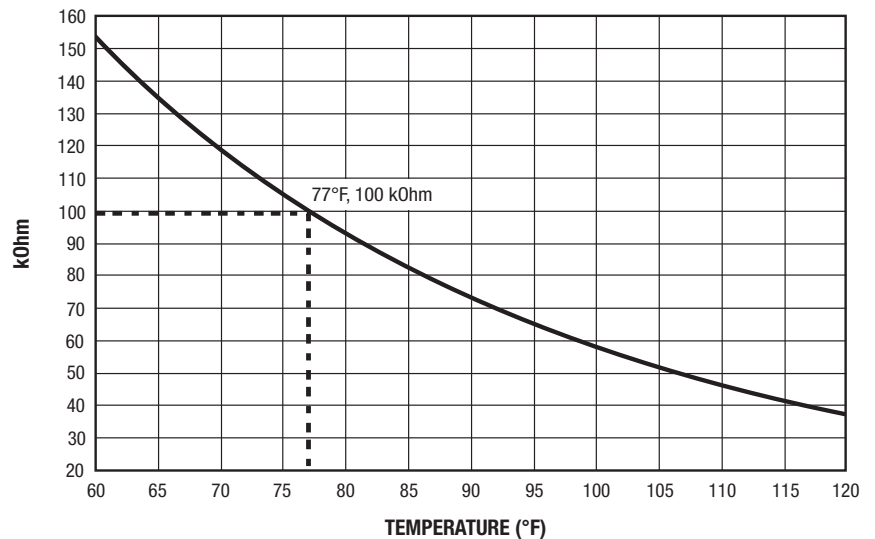
3 Check electrical harnesses for:

Tight connections and harness abrasions.

4 Check the evaporator for:

- Intake filter cleanliness, clean if required.
- Damaged and/or contaminated fins that may restrict air flow.
- Refrigerant leaks indicated by wet spots or dark stains on the evaporator fins and connections.
- Check evaporator temperature sensor for proper function (see chart).

COMFORTPRO CCU EVAPORATOR DEFROST SENSOR TEMPERATURE – RESISTANCE CHART



5 Check the Refrigerant lines and connections for:

- Abrasion and wear points.
- Connection wet spots that may indicate refrigerant leakage.

6 Check the refrigerant charge level:

- Install the A/C gauges as shown in the ComfortPro Installation Manual. Operate the A/C on high.
- Refer to chart below for high and low reference pressure.

COMFORTPRO AIR CONDITIONING OUTDOOR AMBIENT TEMPERATURE AND PRESSURE CHART

OUTDOOR TEMPERATURE	70°F	95°F	110°F
SUCTION PRESSURE	20 PSI	35 PSI	45 PSI
DISCHARGE PRESSURE	110 PSI	175 PSI	225 PSI
OVERALL CURRENT Note: A/C - High Measure at 120 volt teck cable	5-9 AMPS	9-12 AMP	12-15 AMP
FAN ONLY AMP READING			
FAN LOW	1.2-1.5 AMP		
FAN HGH	1.8-2.2 AMP		
If both suction and discharge pressure is lower than the chart, the system is undercharged.			
If both suction and discharge pressure is higher than the chart, the system is overcharged.			

If level is not ok, recover and recharge the A/C system with the correct amount of refrigerant as shown on page 2-1.

7 Check the CCU drain:

For damage and that it operates correctly.

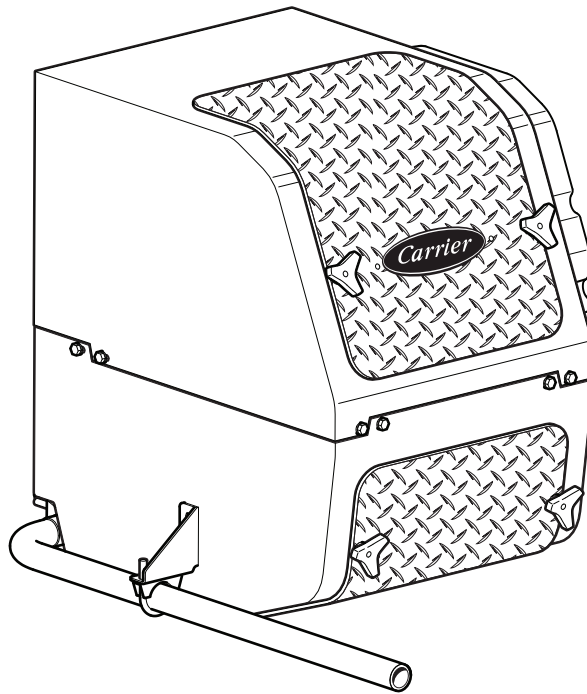
3.0 TROUBLESHOOTING

WARNING

Before undertaking ANY repair to the APU, CCU or component of the ComfortPro system disconnect the batteries from the APU.

3.1 APU (AUXILIARY POWER UNIT)	3-2
3.2 GENERATOR	3-6
3.3 DRIVER CONTROL PANEL	3-7
3.4 CCU AIR CONDITIONING	3-8
3.5 CCU FAN	3-11
3.6 CCU HEAT	3-11
3.7 RECEPTACLE PANEL	3-12
3.8 ADDITIONAL INFORMATION	3-13

3.1 APU (AUXILIARY POWER UNIT)



⚠ WARNING

Disconnect the batteries from the APU before performing any repairs.

Each symptom is followed by a probable cause and suggested solution. To isolate the possible cause, proceed in a systematic manner to determine the faulty component. This guide does not cover all possible situations that may occur under all conditions of operation.

Before using this guide verify correct voltage and ground to components.

SYMPTOM	PROBABLE CAUSE	SOLUTION	REFERENCE
Engine does not start (starter works)	<ul style="list-style-type: none"> No fuel Air in the fuel system Water in fuel system Fuel solenoid faulty. No continuity from Red to Black wires or from White to Black wires Fuel pipe/line clogged Fuel filters clogged Excessively high viscosity of engine oil at low temperature Fuel leak due to loose injection pipe retaining nut Injection nozzle clogged/defective Injection pump defective Fuel lift pump defective Low cylinder compression Valve spring broken, valve stuck Excessive valve clearance Glow plugs malfunctioning Plugged air filter 	<ul style="list-style-type: none"> Check fuel stand pipe length Bleed air Drain fuel tank(s) and replace fuel filters Replace Clean/replace Replace Use the specified engine oil Tighten nut Clean/replace Replace Replace Repair/replace engine Repair/replace Adjust Check/replace Clean/replace 	<ul style="list-style-type: none"> A-8 A-8 3-16 A-8 A-2 Kubota Manual* Kubota Manual* Kubota Manual* Kubota Manual* Kubota Manual* Kubota Manual* Kubota Manual* Kubota Manual* Kubota Manual*

**Kubota Workshop Manual 97897-02400*

SYMPTOM	PROBABLE CAUSE	SOLUTION	REFERENCE
Engine does not start (starter does not work)	<ul style="list-style-type: none"> • Low battery voltage to the APU • Starter/solenoid defective • Poor positive cable connection • Poor ground cable connection 	<ul style="list-style-type: none"> • Check battery cables/charge battery • Repair/replace • Check/repair • Check/repair 	<ul style="list-style-type: none"> • A-13 • Kubota Manual*
Engine will not stop	<ul style="list-style-type: none"> • Starter solenoid jammed 	<ul style="list-style-type: none"> • Replace start solenoid or starter 	<ul style="list-style-type: none"> • Kubota Manual*
Engine runs rough	<ul style="list-style-type: none"> • Fuel filters clogged or dirty • Air filter plugged or dirty • Fuel leak due to loose injection pipe retaining nut • Injection nozzle clogged/defective • Injection pump defective • Uneven cylinder compression • Incorrect valve clearance • Fuel return line clogged/kinked • Governor defective 	<ul style="list-style-type: none"> • Replace • Clean/replace • Tighten nut • Clean/replace • Replace • Repair/replace engine • Adjust • Clean/replace • Repair/replace 	<ul style="list-style-type: none"> • A-8 • A-3 • Kubota Manual* • Kubota Manual* • Kubota Manual* • Kubota Manual* • Kubota Manual*
Smoking (white or blue exhaust)	<ul style="list-style-type: none"> • Excessive engine oil • Piston ring worn or stuck • Incorrect injector timing • Low cylinder compression • Coolant in combustion chamber 	<ul style="list-style-type: none"> • Reduce to specified level • Repair/replace engine • Repair • Repair/replace engine • Repair/replace engine 	<ul style="list-style-type: none"> • A-2 • Kubota Manual* • Kubota Manual* • Kubota Manual* • Kubota Manual*
Smoking (black or dark gray exhaust)	<ul style="list-style-type: none"> • Overloaded power draw • Low fuel grade • Fuel filters clogged • Air cleaner clogged 	<ul style="list-style-type: none"> • Reduce power consumption • Use specified fuel grade • Replace • Clean/replace 	<ul style="list-style-type: none"> • A-3 • A-3
Unable to bleed coolant	<ul style="list-style-type: none"> • Air lock • No coolant flow • Kinked coolant lines • Shut-off valves 'OFF' • Incorrect plumbing • Small fittings on truck engine • Low coolant level – Stand-Alone APU model only 	<ul style="list-style-type: none"> • Run Truck engine until 85°C (185°F) • Check for blockages using flow indicator • Straighten • Turn 'ON' • Re-plumb • Change to larger fittings (3/4") • Fill coolant to the proper level at the coolant surge tank 	<ul style="list-style-type: none"> • A-9
Excessive oil consumption	<ul style="list-style-type: none"> • Oil ring worn • Piston ring groove worn • Valve stem and guide worn • Crankshaft bearing and crank pin bearing worn • Air filter clogged 	<ul style="list-style-type: none"> • Replace • Replace the piston • Replace • Replace • Replace filter 	<ul style="list-style-type: none"> • Kubota Manual* • Kubota Manual* • Kubota Manual* • Kubota Manual* • A-3

*Kubota Workshop Manual 97897-02400

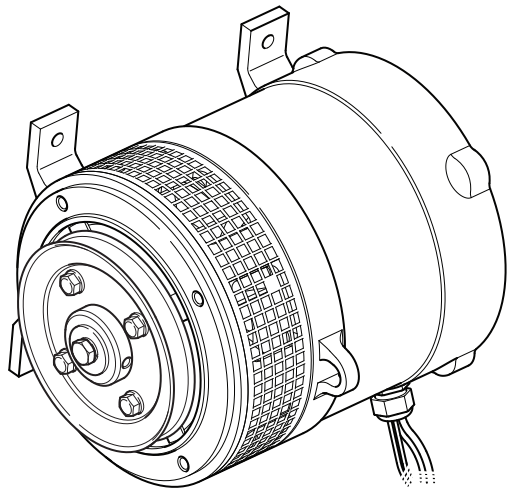
SYMPTOM	PROBABLE CAUSE	SOLUTION	REFERENCE
Oil level increases	<ul style="list-style-type: none"> • Diesel fuel getting to oil pan through governor lever • Fuel lift pump diaphragm defective 	<ul style="list-style-type: none"> • Replace O-ring in lower portion of governor lever • Replace 	<ul style="list-style-type: none"> • Kubota Manual* • Kubota Manual*
Low oil pressure	<ul style="list-style-type: none"> • Engine oil insufficient • Oil strainer clogged • Oil filter clogged • Relief valve stuck with dirt • Relief valve spring weakened or broken • Excessive oil clearance of crankshaft bearings • Excessive oil clearance of rocker arm boss • Oil passage clogged • Different type of oil • Oil pump defective 	<ul style="list-style-type: none"> • Replenish • Clean • Replace • Clean • Replace • Replace • Replace • Clean • Use the specified type • Repair/replace 	<ul style="list-style-type: none"> • A-2 • Kubota Manual* • Kubota Manual* • Kubota Manual* • Kubota Manual* • A-2 • Kubota Manual*
High oil pressure	<ul style="list-style-type: none"> • Different type of oil • Relief valve defective 	<ul style="list-style-type: none"> • Use the specified type • Replace 	<ul style="list-style-type: none"> • A-2
Engine overheated	<ul style="list-style-type: none"> • Engine oil insufficient • Fan belt broken or loose • Air lock • Coolant level insufficient • Coolant flow is restricted • Thermostat stuck • Water pump defective • Cooling fan defective • Plugged or blocked radiator 	<ul style="list-style-type: none"> • Replenish • Repair/replace • Check for air lock in Kubota engine and ensure there is coolant, purge if necessary • Add coolant, purge if necessary • Inspect for leaks • Repair Plumbing • Replace • Replace • Check electrical controls, fan relay, temperature sensor, wiring harnesses • Clean or replace as required 	<ul style="list-style-type: none"> • A-2 • A-2 • A-9 • A-9 • Kubota Manual* • Kubota Manual*
Overcharging of batteries	<ul style="list-style-type: none"> • Alternator malfunctioning • Poor positive/ground connections • Batteries defective 	<ul style="list-style-type: none"> • Replace • Repair • Load test or replace batteries 	<ul style="list-style-type: none"> • A-13
Dead batteries or undercharge	<ul style="list-style-type: none"> • Alternator malfunctioning • Poor alternator connection • DC load too high • Poor positive/ground connections • Alternator belt loose/worn 	<ul style="list-style-type: none"> • Replace • Check alternator connection • Reduce load • Check connections • Replace or tighten 	<ul style="list-style-type: none"> • A-13 • Kubota Manual*
APU suddenly stops ("Check APU" message on Driver Control Panel)	<ul style="list-style-type: none"> • Low oil pressure • Overheat • Alternator Feedback 	<ul style="list-style-type: none"> • See "Low oil pressure" • See "Engine overheated" • See "Alternator Troubleshooting" 	<ul style="list-style-type: none"> • A-6 • A-6 • 3-15, A-13

*Kubota Workshop Manual 97897-02400

SYMPTOM	PROBABLE CAUSE	SOLUTION	REFERENCE
APU suddenly stops (no message on Driver Control Panel display)	<ul style="list-style-type: none"> No fuel Air in the fuel system Water in fuel system Faulty communication between the APU Control Unit, CCU Control Board and/or the Driver Control Panel Fuel solenoid faulty Alternator belt loose or broken Alternator faulty Low battery voltage 	<ul style="list-style-type: none"> Check fuel stand pipe length/fuel level in tank Bleed air Drain fuel tank(s) and replace fuel filters Check APU control cable, and Driver Control Panel cable for shorts or opens/replace Replace Tighten/replace Repair/replace Check battery cables/charge battery 	<ul style="list-style-type: none"> A-8 A-8 A-3, A-8 3-16 Kubota Manual* 3-15
APU stops 15 seconds after starting sequence completes ("Check APU" message on Driver Control Panel display) <i>This will occur when the APU Control Unit sees a problem during or after startup</i>	<ul style="list-style-type: none"> Low oil pressure Overheat 	<ul style="list-style-type: none"> See "Low oil pressure" See "Engine overheated" 	<ul style="list-style-type: none"> 3- 4 3- 4
APU stops after start sequence completes. APU will only run with start button depressed (no message on Driver Control Panel display) <i>This will occur when the APU Control Unit does not see the Alternator feed back signal during or after start up.</i>	<ul style="list-style-type: none"> Alternator belt loose or broken Alternator Defective Poor connection between alternator and APU controller (brown wire) 	<ul style="list-style-type: none"> Tighten/replace Repair/replace Check connection / wire for breaks 	<ul style="list-style-type: none"> A-2 3-15
No "GLOWING" message on the Driver Control Panel, but APU will start and run normally	<ul style="list-style-type: none"> Faulty communication between the APU Control Unit, CCU Control Board and/or the Driver Control Panel 	<ul style="list-style-type: none"> Check APU control cable, and Driver Control Panel cable for shorts or opens/replace 	
No "GLOWING" message on the Driver Control Panel and APU will only run with ON button depressed	<ul style="list-style-type: none"> Faulty communication between the APU Control Unit, CCU Control Board and/or the Driver Control Panel 	<ul style="list-style-type: none"> Check APU control cable, and Driver Control Panel cable for shorts or opens/replace 	
APU only 'clicks' after glowing has finished and is attempting to start (ALT POWER light not on, ALT F/B light does not come on during glowing)	<ul style="list-style-type: none"> Faulty APU Controller 	<ul style="list-style-type: none"> Replace APU Controller 	
APU only 'clicks' after glowing has finished and is attempting to start (ALT F/B light on, APU controller does not come on during glowing)	<ul style="list-style-type: none"> Loose connection from APU controller to alternator, either at the APU controller end or at the Alternator end Faulty Alternator Faulty APU Harness 	<ul style="list-style-type: none"> Troubleshoot the Alternator 	<ul style="list-style-type: none"> 3-15

*Kubota Workshop Manual 97897-02400

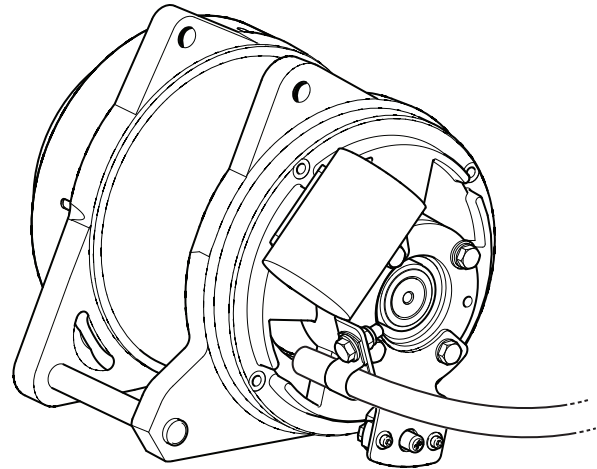
3.2 GENERATOR



Stand-Alone APU Generator

⚠ WARNING

Disconnect the batteries from the APU before performing any repairs.

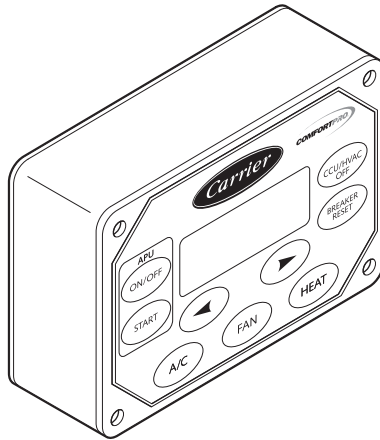


Integrated APU Generator

Each symptom is followed by a probable cause and suggested solution. To isolate the possible cause, proceed in a systematic manner to determine the faulty component. This guide does not cover all possible situations that may occur under all conditions of operation.

SYMPTOM	PROBABLE CAUSE	SOLUTION	REFERENCE
No voltage	<ul style="list-style-type: none"> • 35 Amp Breaker tripped • Generator Belt loose/broken 	<ul style="list-style-type: none"> • Determine reason and reset • Tighten/replace 	<ul style="list-style-type: none"> • A-5 • A-2
Low voltage (below 100 Volts)	<ul style="list-style-type: none"> • Generator belt loose/broken • Engine air filter dirty • Engine fuel system problem • Engine exhaust system problem • Engine speed low 	<ul style="list-style-type: none"> • Tighten/replace • Clean/replace filter • Change fuel filters • Clean/replace • Adjust 	<ul style="list-style-type: none"> • A-2 • A-3 • A-3 • 3- 13
Very low voltage (4-10 Volts AC)	<ul style="list-style-type: none"> • Wiring to capacitor • Capacitor defective 	<ul style="list-style-type: none"> • Repair/replace • Test and replace 	<ul style="list-style-type: none"> • 3- 13, 3- 14

3.3 DRIVER CONTROL PANEL



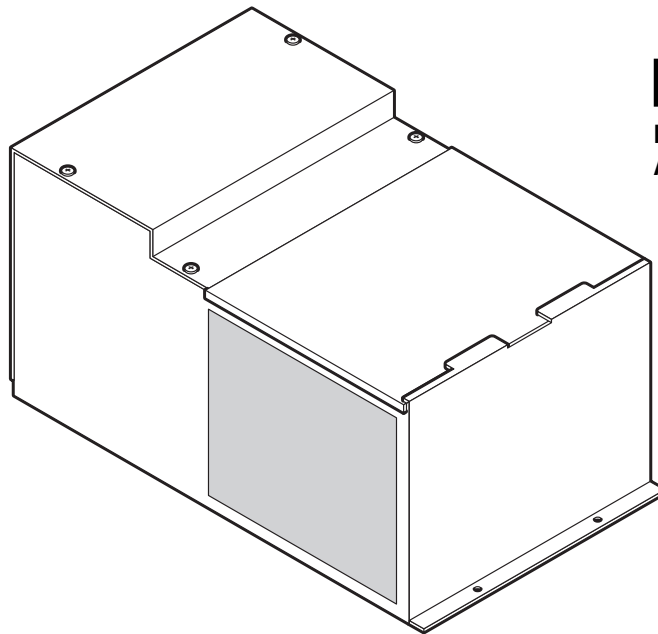
⚠ WARNING

Disconnect the batteries from the APU before performing any repairs.

Each symptom is followed by a probable cause and suggested solution. To isolate the possible cause, proceed in a systematic manner to determine the faulty component. This guide does not cover all possible situations that may occur under all conditions of operation.

SYMPTOM	PROBABLE CAUSE	SOLUTION	REFERENCE
APU starts and runs, but no CCU functions work and "OUTLET OFF" is displayed	<ul style="list-style-type: none"> No 120 Volt power to CCU Board Controls "locked up" 	<ul style="list-style-type: none"> See "Generator" section Re-boot by turning APU off and disconnecting battery power to APU for 30 seconds 	<ul style="list-style-type: none"> 3- 6
A/C will not turn on (no icon)	<ul style="list-style-type: none"> Temperature in sleeper is too cold Temperature is below Driver Control Panel set point 	<ul style="list-style-type: none"> Temperature must be above 18.5°C (65°F) (turn heat on to raise the sleeper temp) Set temperature to lower setting 	<ul style="list-style-type: none"> 1- 6, 1- 9 1- 6, 1- 9
Heat will not turn on (no icon)	<ul style="list-style-type: none"> Temperature in sleeper is too hot Temperature is above Driver Control Panel set point 	<ul style="list-style-type: none"> Temperature must be below 29.5°C (85°F) (turn A/C on to lower the sleeper temp) Set temperature to higher point 	<ul style="list-style-type: none"> 1- 6, 1- 9 1- 6, 1- 9
"HVAC BREAKER RESET" is displayed	<ul style="list-style-type: none"> 20 Amp CCU breaker tripped Generator belt loose 	<ul style="list-style-type: none"> Determine reason and press reset on the Driver Control Panel Tighten/replace 	<ul style="list-style-type: none"> A-2
"TRIP W/LIGHTNING BOLT ICON" is displayed	<ul style="list-style-type: none"> 20 Amp outlet breaker tripped Generator belt loose 	<ul style="list-style-type: none"> Determine reason and press reset on the Driver Control Panel Tighten/replace 	
"LOW VOLTAGE" is displayed	<ul style="list-style-type: none"> Generator 35 Amp breaker tripped Generator belt loose/broken Engine air filter dirty Engine fuel system problem Engine exhaust system problem Engine speed low 	<ul style="list-style-type: none"> Determine reason and reset Tighten/replace Clean/replace filter Change fuel filters Clean/replace Adjust 	<ul style="list-style-type: none"> 3-6, A-5 3-6 A-3 A-3 A-2

3.4 CCU AIR CONDITIONING



⚠ WARNING

Disconnect the batteries from the APU before performing any repairs.

Each symptom is followed by a probable cause and suggested solution. To isolate the possible cause, proceed in a systematic manner to determine the faulty component. This guide does not cover all possible situations that may occur under all conditions of operation.

NOTE: The five minute timer is activated any time the compressor is turned off (by the thermostat, EVAP temp sensor or high pressure switch). It is used to let the pressure between the high and the low side equalize so that the compressor can start under a "no load" condition.

SYMPTOM	PROBABLE CAUSE	SOLUTION	REFERENCE
Does not produce cold air	<ul style="list-style-type: none"> Refrigerant leaked out Compressor not working Inlet filter clogged 	<ul style="list-style-type: none"> Check for leaks and repair Check voltage at compressor Clean filter 	<ul style="list-style-type: none"> 2-3 A-3
Produces cold air and gradually stops	<ul style="list-style-type: none"> Evaporator blocked with ice Low refrigerant charge Air Duct blocked 	<ul style="list-style-type: none"> Increase air flow, increase return air Check for leaks and repair Check and remove any blockage 	<ul style="list-style-type: none"> 2-1
Tripped high pressure switch	<ul style="list-style-type: none"> Condenser fan not working Condenser is dirty Poor air flow around condenser Refrigerant is over charged 	<ul style="list-style-type: none"> See "Condenser fan not working" Clean Check condenser location, relocate if necessary Reduce charge to 64–68 oz 	<ul style="list-style-type: none"> 3-9 2-1
Tripped on EVAP temp sensor	<ul style="list-style-type: none"> Evaporator blocked with ice Low refrigerant charge EVAP temp sensor faulty 	<ul style="list-style-type: none"> Increase air flow, increase return air Check for leaks and repair Verify sensor operation by using Temperature vs. Resistance Chart 	<ul style="list-style-type: none"> 2-1 2-3

SYMPTOM	PROBABLE CAUSE	SOLUTION	REFERENCE
Condenser fan not working	<ul style="list-style-type: none"> A/C is not on DC power fuse blown Wiring damaged Fan defective (seized) 	<ul style="list-style-type: none"> Set temperature to lower setting Determine reason and replace fuse Repair/replace Replace 	<ul style="list-style-type: none"> 1- 6, 1- 9 A-4
Compressor will not start (no hum)	<ul style="list-style-type: none"> High pressure switch open Evaporator frozen Five minute timer active Overload protector tripped Driver Control Panel not calling for A/C Compressor seized 	<ul style="list-style-type: none"> See "Tripped high pressure switch" See "Produces cold air and gradually stops" Wait five full minutes Let unit cool down, check for low refrigerant Set temperature to lower setting Replace compressor 	<ul style="list-style-type: none"> 3- 8 3- 8 2- 1
Compressor will not start (hums)	<ul style="list-style-type: none"> Low A/C Voltage to CCU Starting capacitor defective Potential relay is open Compressor motor winding open or shorted Internal mechanical trouble in compressor 	<ul style="list-style-type: none"> See "Generator" section Determine reason and replace Determine reason and correct, replace if necessary Replace compressor Replace compressor 	<ul style="list-style-type: none"> 3- 6
Compressor will not start (hums but trips on overload protection)	<ul style="list-style-type: none"> Low A/C Voltage to unit Potential relay is failing to open Run capacitor is defective Excessively high discharge pressure Compressor motor has a winding open or shorted Internal mechanical trouble in compressor (tight) 	<ul style="list-style-type: none"> See "Generator" section Determine reason and correct, replace if necessary Determine reason and replace Check high pressure switch, possible overcharge or insufficient cooling on condenser (fan) Replace compressor Replace compressor 	<ul style="list-style-type: none"> 3- 6
Compressor starts and runs, but short cycles on overload protector	<ul style="list-style-type: none"> Low voltage to unit Overload protector defective Run capacitor is defective Excessively high discharge pressure Compressor too hot – suction line hot Compressor motor has a winding shorted 	<ul style="list-style-type: none"> See "Generator" section Check current and replace protector Determine reason and replace Check condenser (fan) and for restriction in refrigeration lines Check refrigerant charge (check for leaks) and add if necessary Replace compressor 	<ul style="list-style-type: none"> 3- 6 2- 1
Air conditioner runs OK, but short cycles	<ul style="list-style-type: none"> Overload protector Driver Control Panel too close to ducts 	<ul style="list-style-type: none"> See "Compressor starts and runs, but short cycles on overload protector" Remount away from ducts 	<ul style="list-style-type: none"> 3- 9 1- 1

SYMPTOM	PROBABLE CAUSE	SOLUTION	REFERENCE
Air conditioner runs OK, but short cycles (cont.)	<ul style="list-style-type: none"> • Driver Control Panel temp sensor defective • High pressure cut out due to: <ul style="list-style-type: none"> a) Insufficient air flow b) Overcharge c) Air in system d) Defective switch • Low temp(de-ice) cut out due to: <ul style="list-style-type: none"> a) Insufficient air flow b) Faulty expansion valve c) Faulty de-ice sensor d) Undercharge 	<ul style="list-style-type: none"> • Replace Driver Control Panel • Check: <ul style="list-style-type: none"> a) Air flow through condenser (fan) b) Reduce charge to 64–68 oz. c) Purge air (vacuum system) d) Replace • Check: <ul style="list-style-type: none"> a) Air flow through evaporator (fan, filter, vents closed) b) Replace valve c) Verify sensor operation by using Temperature vs. Resistance Chart d) Fix leak and recharge (64–68 oz) 	<ul style="list-style-type: none"> • 2-1 • A-11
A/C operates long or continuously	<ul style="list-style-type: none"> • Shortage of refrigerant • Driver Control Panel temp sensor defective • Sleeper has an excessive heat load • Sleeper has poor insulation • Evaporator coil iced • Restriction in refrigerant system • Dirty condenser • CCU air filter dirty 	<ul style="list-style-type: none"> • Fix leak and recharge (64–68 oz) • Verify sensor operation by using Temperature vs. Resistance Chart • Cover windows, close sleeper curtains • Insulate sleeper • Faulty EVAP temp sensor, Verify sensor operation by using Temperature vs. Resistance Chart • Determine location and repair • Clean condenser • Clean or replace CCU filter 	<ul style="list-style-type: none"> • 2-1 • 2-1 • A-3
Start capacitor open, shorted, or blown	<ul style="list-style-type: none"> • Potential relay is not operating properly • Prolonged operation on start cycle due to: <ul style="list-style-type: none"> a) Low voltage to unit b) Starting load too high • Excessive short cycling 	<ul style="list-style-type: none"> • Replace • Check: <ul style="list-style-type: none"> a) Determine reason and correct (see "Low Voltage") b) Check: pressure equalization before compressor starts, (5 minute timer faulty) • Determine reason for short cycling and repair (see "Unit runs OK, but short cycles") 	
Potential relay defective or burned out	<ul style="list-style-type: none"> • Line voltage to low or to high • Excessive short cycling • Relay being influenced by a loose and vibrating mount 	<ul style="list-style-type: none"> • Determine reason and correct • Determine reason for short cycling and repair (see "Unit runs OK, but short cycles") • Remount rigidly 	
Suction line frosted or sweating	<ul style="list-style-type: none"> • Evaporator fan not running • Overcharge of refrigerant 	<ul style="list-style-type: none"> • Determine reason and correct • Reduce charge to 64–68 oz. 	<ul style="list-style-type: none"> • 3-11 • 2-1
Unit noisy	<ul style="list-style-type: none"> • Loose parts or mounting • Tubing rattle • Bent fan blade causing vibration • Fan motor bearings worn 	<ul style="list-style-type: none"> • Find and tighten • Move object that is touching the tubing to be free of contact • Replace blade • Replace motor 	

3.5 CCU FAN

⚠ WARNING

Disconnect the batteries from the APU before performing any repairs.

SYMPTOM	PROBABLE CAUSE	SOLUTION	REFERENCE
CCU fan not working	<ul style="list-style-type: none"> Fuse on CCU Board Wiring defective Capacitor defective 	<ul style="list-style-type: none"> Check/replace Repair/replace Test/replace 	<ul style="list-style-type: none"> A-4
CCU fan only works on high speed	<ul style="list-style-type: none"> Low speed resistor defective Resistor wiring defective CCU Board defective 	<ul style="list-style-type: none"> Check/replace heating element Repair/replace Test/replace 	<ul style="list-style-type: none"> A-2 A-2

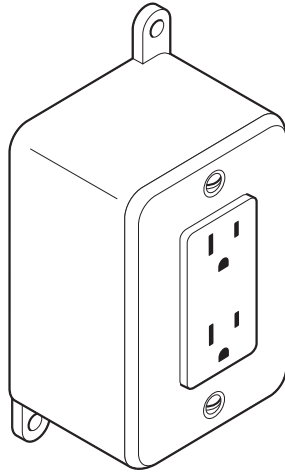
3.6 CCU HEAT

⚠ WARNING

Disconnect the batteries from the APU before performing any repairs.

SYMPTOM	PROBABLE CAUSE	SOLUTION	REFERENCE
High Heat Mode does not produce warm air	<ul style="list-style-type: none"> Heat is not on (heat icon must be on) Thermo fuse blown CCU Board defective 	<ul style="list-style-type: none"> Turn temperature setting up Check/replace thermal fuse Replace 	<ul style="list-style-type: none"> 1- 6, 1- 9 A-2
Low Heat Mode does not produce warm air	<ul style="list-style-type: none"> Heat is not on (heat icon must be on) Thermo fuse blown CCU Board defective 	<ul style="list-style-type: none"> Turn temperature setting up Check/replace thermal fuse Replace 	<ul style="list-style-type: none"> 1- 6, 1- 9 A-2
Produces warm air and gradually stops	<ul style="list-style-type: none"> Set point has been reached High temperature cut out due to insufficient air flow 	<ul style="list-style-type: none"> Turn set point up Increase air flow/Increase return air 	<ul style="list-style-type: none"> 1- 6, 1- 9
High temperature sensor tripping	<ul style="list-style-type: none"> High temperature cut out due to insufficient air flow Temperature sensor wiring damaged Temperature sensor defective Ducting blocked 	<ul style="list-style-type: none"> Increase air flow, increase return air Repair/replace Verify sensor operation by using Temperature vs. Resistance Chart Check and remove any blockage 	<ul style="list-style-type: none"> A-11
Heat works OK, but short cycles	<ul style="list-style-type: none"> Driver Control Panel too close to duct Driver Control Panel temp sensor defective 	<ul style="list-style-type: none"> Remount away from ducts Verify sensor operation by using Temperature vs. Resistance Chart 	<ul style="list-style-type: none"> 1- 1
Heat operates long or continuously	<ul style="list-style-type: none"> Driver Control Panel temp sensor defective Sleeper has an excessive heat loss Sleeper has poor insulation CCU air filter dirty 	<ul style="list-style-type: none"> Verify sensor operation by using Temperature vs. Resistance Chart Cover windows, close sleeper curtains Insulate sleeper Clean/replace CCU filter 	<ul style="list-style-type: none"> A-11 A-3

3.7 RECEPTACLE PANEL



⚠ WARNING

Disconnect the batteries from the APU before performing any repairs.

Each symptom is followed by a probable cause and suggested solution. To isolate the possible cause, proceed in a systematic manner to determine the faulty component. This guide does not cover all possible situations that may occur under all conditions of operation.

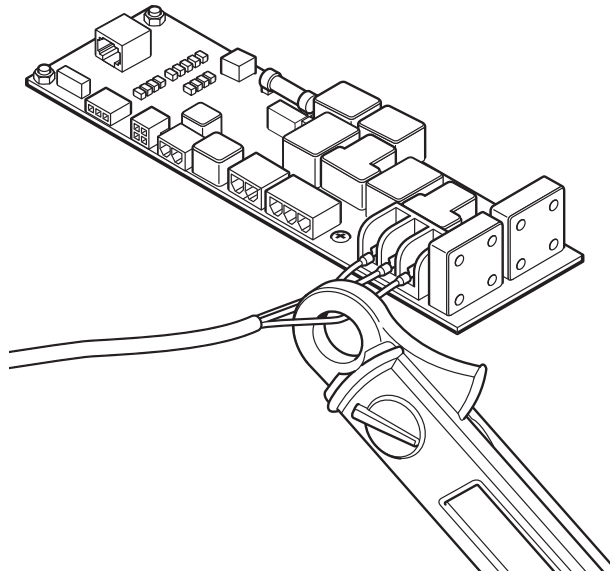
SYMPTOM	PROBABLE CAUSE	SOLUTION	REFERENCE
No 120 VAC power	<ul style="list-style-type: none">• High Heat Mode is selected• APU not running• 35 Amp breaker tripped at generator	<ul style="list-style-type: none">• Switch to 'Low Heat' position• Start APU• See "Generator" Section	<ul style="list-style-type: none">• 1- 6, 1- 9• 1- 6, 1- 9• 3-6

3.8 TESTING PROCEDURES

3.8.1 Testing AMP draw for components

When checking functions of individual components, place amp clamp over black (power) wire coming in from the generator to the CCU board. (As shown in below.)

When cross-referenced with the “AMP DRAW AND VOLTAGE CHART”, the components should show the same amp readings.

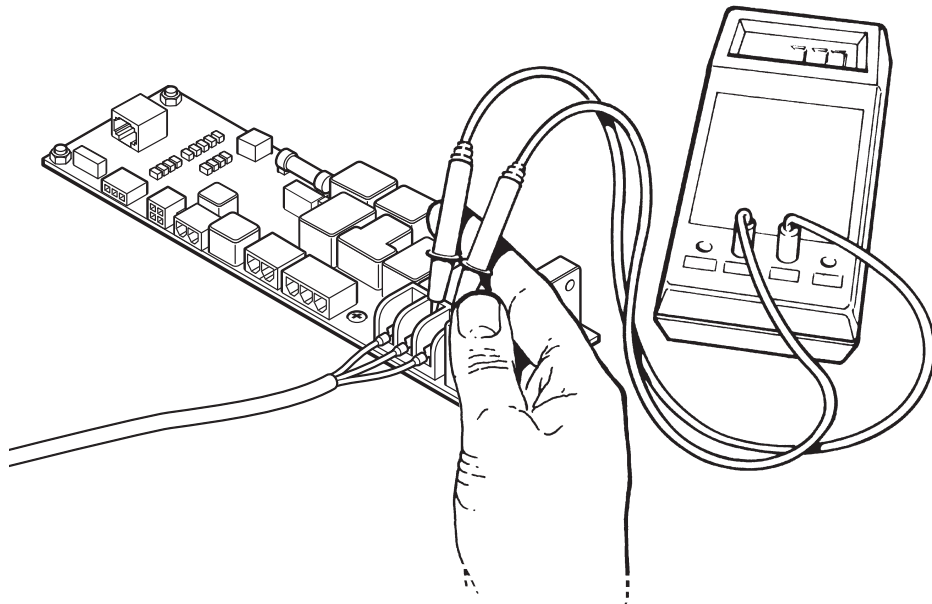


3.8.2 Testing Voltage and Hz readings:

When checking for 120 VAC at the CCU board, the probes are placed at the black wire terminal and the white wire terminal.

When APU is running there should always be between 110 – 130 VAC present.

When APU is running the Hz reading should always be 60 +/- 2.



3.9 ADDITIONAL INFORMATION

3.9.1 Adjusting the 120 AC Voltage

This does not need to be adjusted under normal operation. If you find low AC voltage, check the generator belt, air filter, fuel filters and exhaust system before adjusting.

- 1 With the APU running turn all 120-volt components off.
- 2 Measuring the voltage at the outlet panel adjust the engine speed until 120 (+/- 10) volts AC and 60 Hz +/- 2 Hz is read.

3.9.2 Capacitor Troubleshooting

- 1 Disconnect generator output from breaker.
- 2 With APU running, measure generator output voltage.
- 3 If voltage < 105 volts AC, try a **known good** capacitor and retest.

NOTE: Most multimeters will not test this capacitor reliably in either MF (capacitance) or Ω (resistance) modes. The above methods are the **ONLY** reliable means of testing the capacitor without a lab-grade capacitance meter.

3.9.3 Capacitor Theory

A single-phase motor can not be "fed" with just single-phase current (120 Volt AC), there must be some way to create an artificial second (or third) phase to smooth out the magnetic field. Capacitors are electrical components that help create and strengthen the artificial second phase in single-phase electric motors. They work much like a battery, storing and releasing a charge of electricity (AC Voltage) that is out of phase with the oscillating (AC) current that is fed into the motor.

If single-phase induction motors do not have a second phase (created by the capacitor) then it will not have an even magnetic field. This will cause the rotor to hesitate at those spots that are uneven. This hesitation will cause the rotor to spin slowly or even stop moving (compounding the problem), draw more current (Amp's), become noisy, and overheat.

The CCU Fan and the Compressor use a Run Capacitor. Run Capacitors are designed for continuous duty, and are energized the entire time the motor is running.

The Compressor motor needs a Start Capacitor in addition to the Run Capacitor. Start Capacitors are designed for momentary use. Start capacitors stay energized long enough to bring the motor to 75% of full speed (RPM) and are then taken out of the circuit by means of a Potential Relay.

3.9.4 Potential Relay Theory

In a Capacitor Start, Capacitor Run compressor the start capacitor is only designed for momentary use. The Potential Relay (NC) is used to connect and disconnect the start capacitor from the compressors start windings. Induced Voltage is generated in the start winding when of the compressor when it is running. The voltage induced in to the start winding is a function of the speed of the rotor and the magnetic field that is generated. When the compressor is first energized, the voltage in the start windings is less than the line voltage (120 VAC). As the compressor speed (RPM) increases, the voltage in the start windings increases significantly higher than the line voltage (up to 275 Volts) until full compressor speed (RPM) is reached.

The Potential Relay's coil is connected across the start windings, and is designed to respond to the increase of voltage as the compressor's speed increases. The normally closed Potential relay contacts are designed to open at a 75% of the full compressor speed (RPM). The Start Capacitor is connected to the relay contacts so when the relay opens (75% of the full compressor speed RPM) the start capacitor is disconnected from the system.

3.9.5 Alternator Troubleshooting

1 Unit switched OFF, harness connected

Check alternator feedback wire (brown) at the alternator for 5 volts.

If 5 volts are not found disconnect 'T' connector from alternator and retest. If 5 volts are found the alternator is faulty.

If 0 volt is found check alternator feedback wire (brown) for open, and power (B+) and ground (B-) to APU controller and repair as required. If no fault is found the APU controller is faulty.

2 Unit switched ON (glowing), harness connected

Check alternator field power wire (purple) for 12 volts. If 0 volt is found check alternator field power wire (purple) for open and power (B+) and ground (B-) to APU controller and repair as required. If no fault found the APU controller is faulty.

Check alternator feedback wire (brown) at alternator for 0 volt. If 5 volts are found the alternator is faulty.

3 Unit running, harness connected

Check alternator feedback wire (brown) at alternator for 5 volt. If 0 volts are found the alternator is faulty.

4 Unit running, then stops

Check alternator jumper harness (red) at alternator connection for 12.5-14.1 volts.

If 16-17 volts is found, check for alternator jumper (red) open and replace as required.

3.9.6 Fuel Solenoid Troubleshooting

If a faulty fuel solenoid is suspected (per diagnostic flow chart 62-11409) then use instructions below for troubleshooting.

Unplug the solenoid connector and check the resistance between the following terminals with a DVOM.

- White to Black = 0.3 – 0.7 Ohm
- Red to Black = 13 – 25 Ohm
- White to Red = Open (OL)

If the resistance is out of range then replace the fuel solenoid.

If the resistance measured is within range then check the fuel solenoid circuit in the APU controller for open or close.

If resistance is within range and there are no opens or shorts in the circuit in the APU controller, then replace the APU controller.

APPENDICES

CAPACITIES AND SPECIFICATIONS A-1

FUSE LOCATIONS A-4

CIRCUIT BREAKER LOCATIONS..... A-5

APU CONTROL UNIT A-6

CCU CONTROLLER A-7

FUEL SYSTEM PURGE PROCEDURE A-8

COOLANT PURGE PROCEDURE..... A-9

DEFROST/HEAT AND DCP SENSOR CHARTS A-11

ENGINE INTERLOCK DIAGRAMS A-12

APU WIRING DIAGRAMS A-13

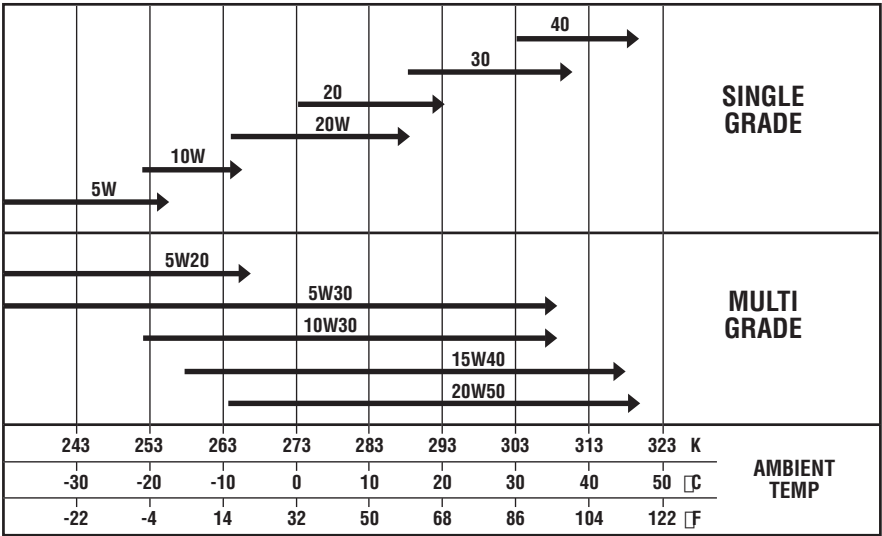
CAPACITIES AND SPECIFICATIONS

APU

Engine 13.9 hp Kubota, 2 cyl, 479cc (model Z482-B)

Engine Oil 3.5 US Qts (3.3L) with filter.

You can use any API service CI-4, CJ-4, CF-4, CG-4 or CH-4 oil and any ASE Viscosity (or weight) of Oil according to the chart.



Belt Tension Alternator 73 – 84 lbs (325 – 374 N).

Integrated APU Generator 100 – 112 lbs (445 – 500 N).

CCU

Air Conditioner 12,000 BTU/ hr hermetic compressor.
System capacity 50–55 oz of R-134A.
System Oil capacity . . 14 oz of PVE (Polyvinylether).
Compressor 6–10 Amps @ 120 Volts.
Condenser Fan 9-12 Amps .
Binary Pressure Switch . Normally closed between 26–335 psi.
Operating pressures . . Low side, 24–45 psi, High side, 110–250 psi.
Condenser Air inlet to outlet temperature difference should be no more than -1°C (30°F). Evaporator Air inlet to outlet temperature difference -8° to -4°C (18° to 25°F).

Maintenance Parts

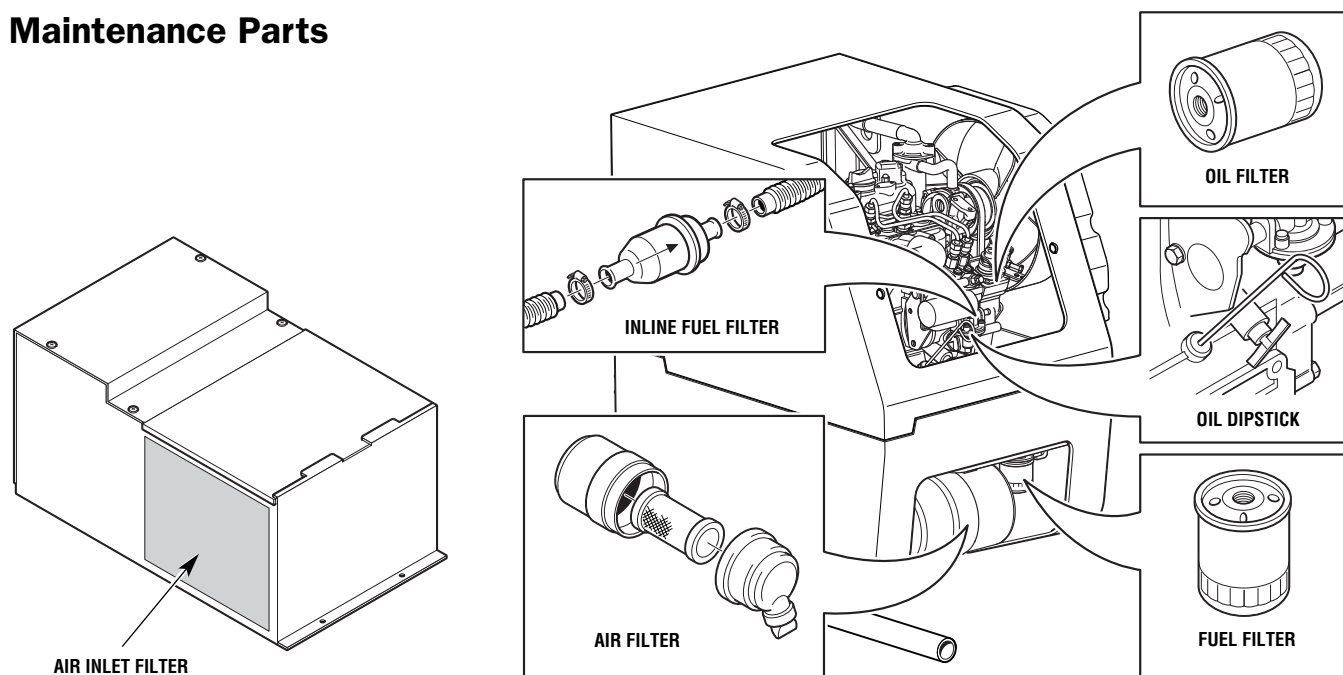


Figure A-1: Maintenance Components, CCU and Integrated APU.

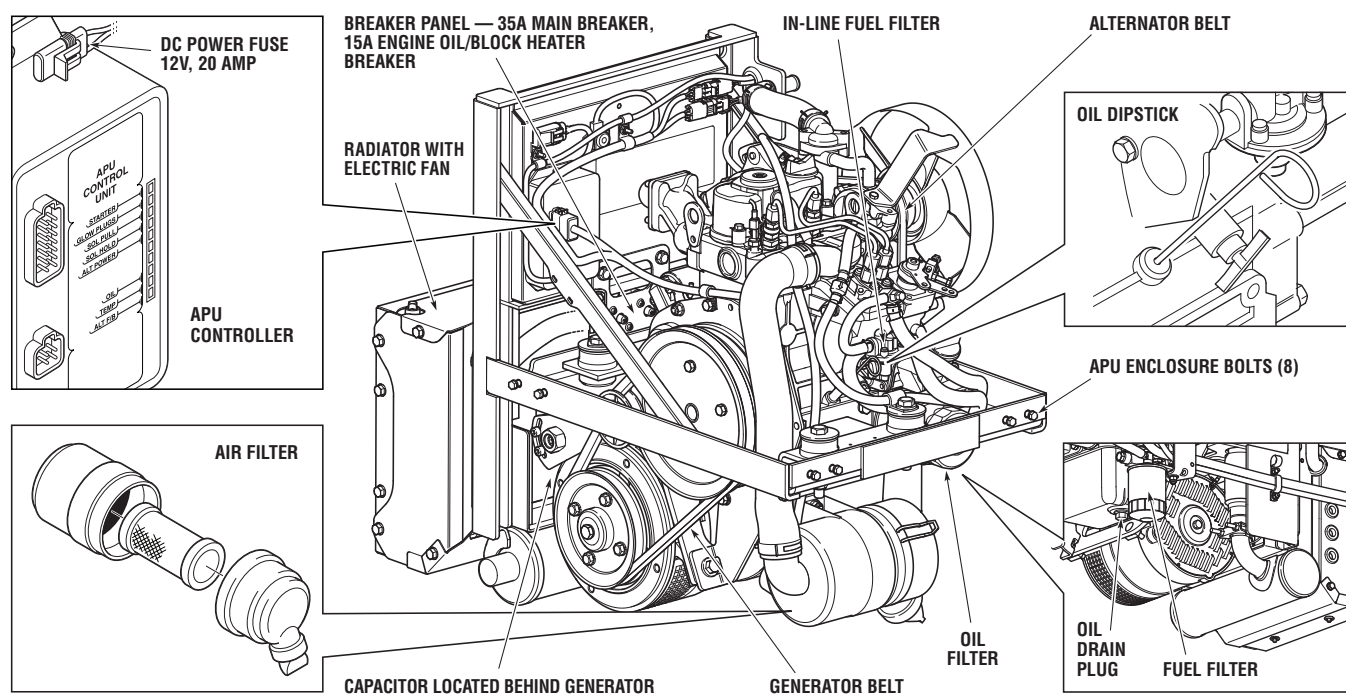


Figure A-2: Maintenance Components, Stand-Alone APU.

FUSE LOCATIONS

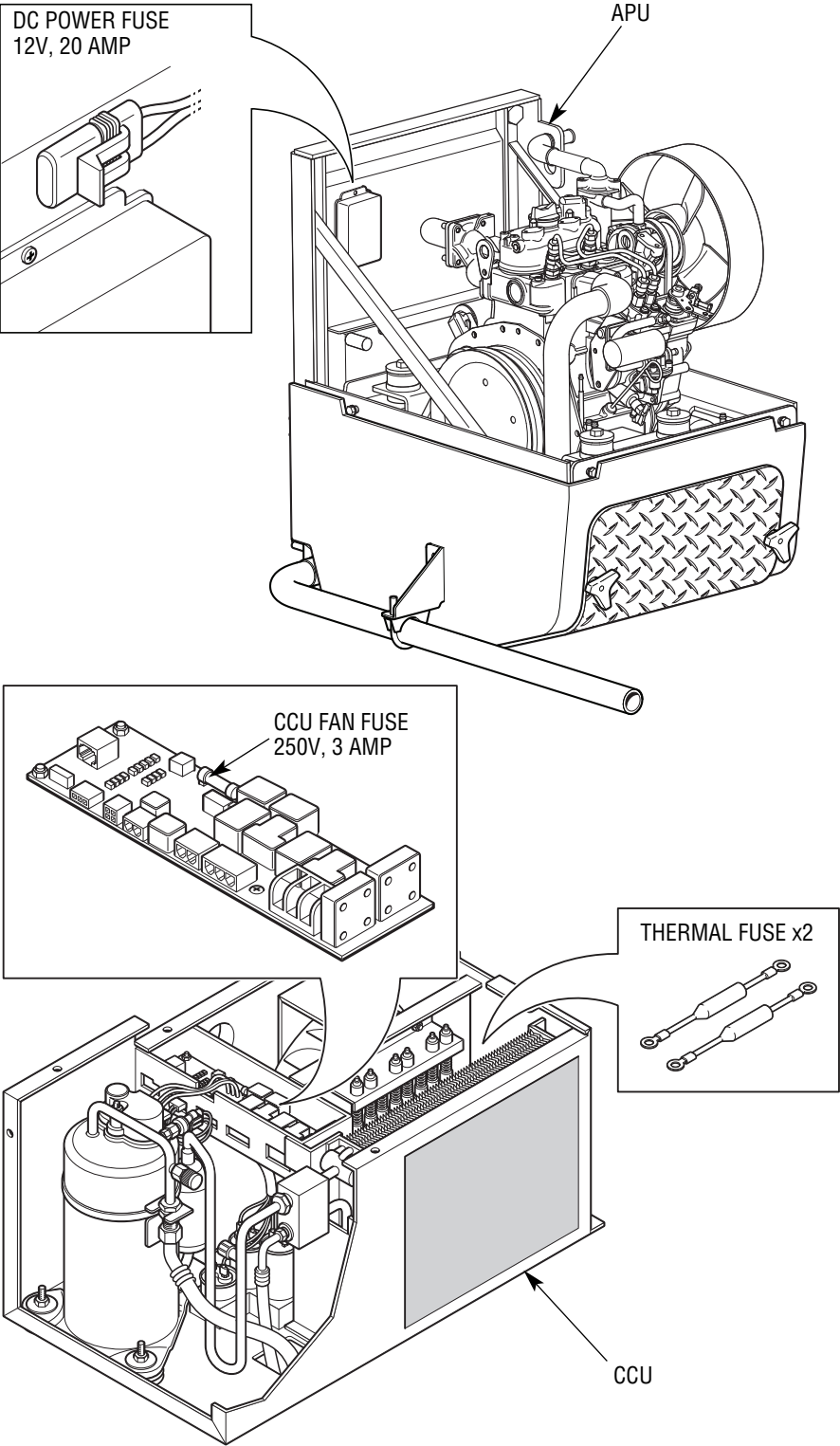


Figure A-3: Fuse Locations

CIRCUIT BREAKER LOCATIONS

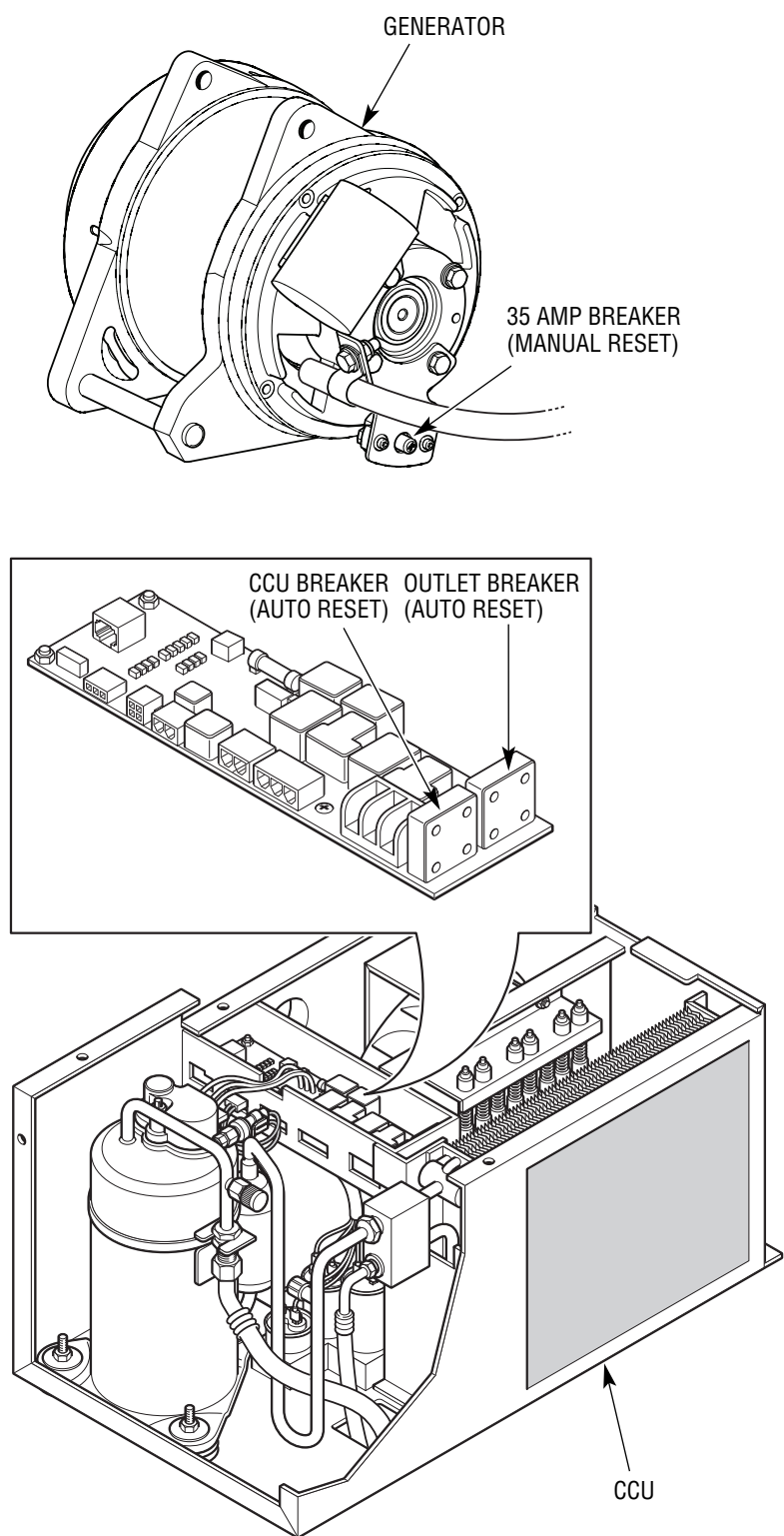


Figure A-4: Circuit Breaker Locations

APU CONTROL UNIT

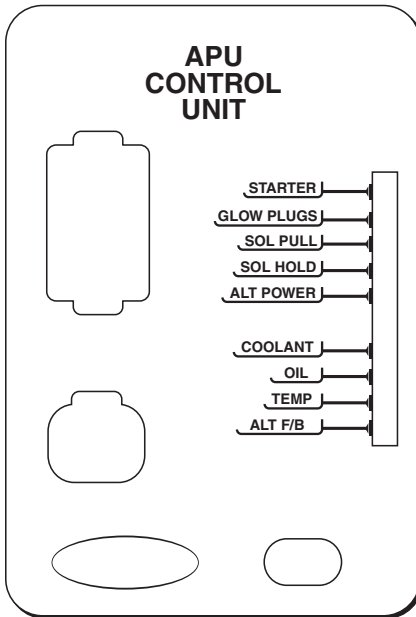


Figure A-5: APU Control Unit

Output Indicators

STARTER – This is the output (+) to the Starter solenoid.

GLOW PLUGS – This is the output (+) to the Glow Plugs.

SOL PULL – This is the output (+) to the Fuel Solenoid Pull windings (Only on during cranking for the first .5 seconds).

SOL HOLD – This is the output (+) to the Fuel Solenoid Hold windings.

ALT POWER – This is the output (+) to the Alternator field windings.

Input Indicators

COOLANT – Not Used.

OIL – This is the input (-) from the Oil Pressure Switch. You will see this light illuminated when the oil pressure is below 7 psi. This will shut the APU off when it is illuminated.

TEMP – This is the input (-) from the Overheat Switch. You will see this light illuminated when the coolant temperature is above the 'Over Temperature Limit'. This will shut the APU off when it is illuminated.

ALT F/B – This is the input (-) from the Alternator Charging light. When the APU is not running this light will be on. When the APU is running and the Alternator is charging this light will be out (or very dim). This will shut the APU off when the light is illuminated.

Oil Pressure & Coolant Temperature Switch Operation

ComfortPro APU Units serial number NXC 98206420 and later:

OIL PRESSURE SWITCH (NO) – Closed > 7 psi

COOLANT TEMPERATURE SWITCH (NC) – Open > 110°C (230°F)

ComfortPro APU Units serial number prior to NXC 98206420:

OIL PRESSURE SWITCH (NC) – Open > 7 psi

COOLANT TEMPERATURE SWITCH (NO) – Closed > 118.5°C (245°F)

CCU CONTROLLER

Inputs

AC – This is the input from the Driver Control Panel only when it is calling for Air conditioning. (Low or High A/C.)

HEAT – This is the input from the Driver Control Panel only when it is calling for Heat. (Low or High Heat.)

FAN LOW – This is the input from the Driver Control Panel only when it is calling for CCU Low Fan. (Used in Fan, A/C, and Heat modes.)

FAN HIGH – This is the input from the Driver Control Panel only when it is calling for CCU High Fan. (Used in Fan, A/C, and Heat modes.)

*Outputs

OUTLET – This is the output signal to the Power Outlet relay. It is On any time 120 VAC Power is available to the Outlet. If High Heat mode is selected the Outlet will be turned off.

LOW HEAT – This is the output signal to the Low Heat relay. It is On any time Low Heat is called for.

****COMPRESSOR** – This is the output signal to the A/C Compressor relay. It is On any Time the A/C is called for. (Low or High.)

****CONDENSER** – This is the output signal to the Condenser Fan relay. It is On any Time the A/C is called for. (Low or High.)

LOW FAN – This is the Output signal to the CCU Low Fan relay. It is On any time the CCU Low Fan is called for. (Used in Fan, A/C, and Heat mode.)

HIGH FAN – This is the Output signal to the CCU High Fan relay. It is On any time the CCU High Fan is called for. (Used in Fan, A/C, and Heat modes.)

HIGH HEAT – This is the output signal to the High Heat relay. It is On any time High Heat is called for. High Heat and Outlet can not be on at the same time.

Service Light

If Service Light is illuminated, reprogram or replacement of CCU board may be required.

***NOTE:** Outputs only indicate the signal to turn the component relay on. They do not indicate that the actual component itself is working.

****NOTE:** Air Conditioning is a sequence start. CCU fan will come on first, 0.5 seconds later the Condenser Fan will come on, and 0.5 seconds after the Condenser fan the A/C Compressor will come on.

NOTICE

Service Light will flash when CCU is OFF.

FUEL SYSTEM PURGE PROCEDURE

1. Start the APU with the APU Test Switch Module. If APU fails to start, crank in 15 second bursts until fuel system is purged of air and APU starts and runs smoothly.

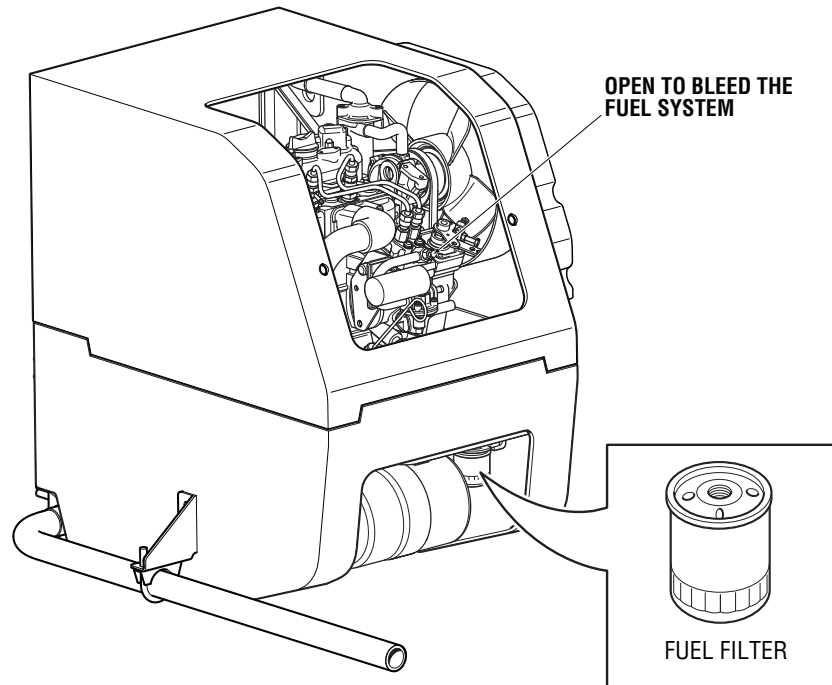


Figure A-6: Fuel Filter

COOLANT PURGE PROCEDURE FOR INTEGRATED APU

1. Ensure that the coolant supply valve to the APU (located at the truck engine) and the coolant return valve to the APU (also located at the truck engine) are open.
2. Release pressure from coolant system.
3. Remove the truck engine radiator cap.
4. Top up the coolant if necessary in the expansion tank.
5. Run the truck engine at fast idle until 85°C (185°F) is reached on truck temperature gauge. This **should** purge most of the air out of the APU.
6. Purging Air From the Coolant.
 - Place thermostat drain hose into bucket (see Figure A-7).
 - Open the thermostat bleed valve, using a wrench, and let any trapped air escape until a steady stream of coolant flows from the valve.
 - Close thermostat bleeder fitting.
 - Top up the coolant if necessary in the truck expansion tank.
 - Run the truck engine at fast idle for another 10 minutes to continue purging air.

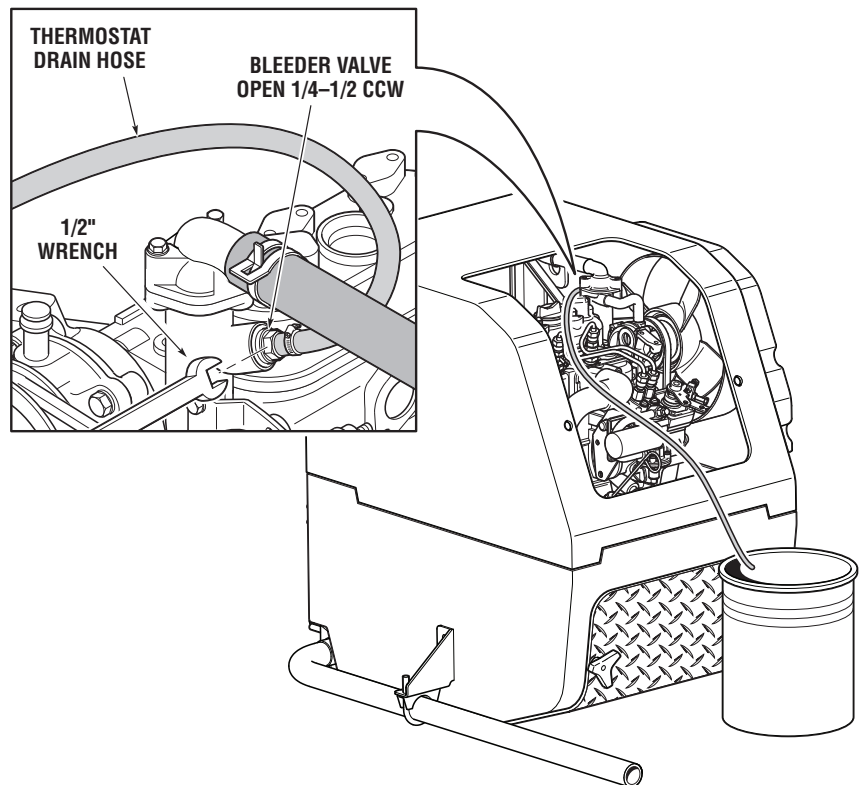


Figure A-7: Drain Hook-up

7. Start the APU by following the instructions on page 1-7 (Multi-Function Driver Control Panel).
8. With the APU and truck engines running, open the thermostat bleed valve and let any trapped air escape until a steady stream of coolant flows from the valve.
9. Shut the truck engine off.
10. Check the truck engine; ensure it is getting hot coolant from the APU. If it is not, the APU is not purged of all its air. Stop APU by following the instructions on page 1-7 (Multi-Function Driver Control Panel). Check for a restriction (i.e. valves/kinks etc.) and repeat steps 5 to 9.
11. Let APU run for at least 30 minutes. During this time keep checking for signs of coolant leaks, fuel leaks and overheating.
12. Top up the coolant if necessary in the truck expansion tank and replace the truck engine radiator cap.
13. Clean up any spilled coolant from inside APU and on the ground.

COOLANT FILL PROCEDURE FOR STAND-ALONE APU

1. With the surge tank mounted, remove the pressure cap.
2. Slowly fill the cooling system with the recommended coolant until the coolant level is mid level at the surge tank sight glass.
3. Start the APU engine and open the bleeder valve at the thermostat housing to allow air to escape.
4. Allow the engine to warm up to operating temperature while maintaining the proper coolant level in the surge tank.
5. Install the surge tank pressure cap and allow the engine to run. Check for leaks.

⚠ WARNING

Do not operate the engine without the enclosure cover in place. Failure to do so may result in injury.

System Air Bleed

1. Run the APU engine until 76.6°C (170°F) is reached.
2. Open the thermostat bleed valve, as shown, and let trapped air escape until a steady stream of coolant flows from the valve.
3. Close the thermostat bleeder fitting.
4. Top up the coolant in the surge tank if necessary and replace the surge tank pressure cap.
5. Clean up any spilled coolant from inside APU and on the ground.

DEFROST/HEAT & DCP SENSOR

Temperature vs. Resistance Chart

T(°C)	T(°F)	RESISTANCE Ω	
15	59	157.6	(k Ω)
16	61	150.4	(k Ω)
17	63	143.5	(k Ω)
18	64	137.1	(k Ω)
19	66	130.9	(k Ω)
20	68	125.1	(k Ω)
21	70	119.6	(k Ω)
22	72	114.3	(k Ω)
23	73	109.3	(k Ω)
24	75	104.5	(k Ω)
25	77	100.0	(k Ω)
26	79	95.7	(k Ω)
27	81	91.6	(k Ω)
28	82	87.7	(k Ω)
29	84	84.0	(k Ω)
30	86	80.5	(k Ω)
31	88	77.1	(k Ω)
32	90	73.9	(k Ω)
33	91	70.9	(k Ω)
34	93	68.0	(k Ω)
35	95	65.2	(k Ω)
36	97	62.5	(k Ω)
37	99	60.0	(k Ω)
38	100	57.6	(k Ω)
39	102	55.3	(k Ω)
40	104	53.1	(k Ω)
41	106	51.0	(k Ω)
42	108	49.0	(k Ω)
43	109	47.1	(k Ω)
44	111	45.3	(k Ω)
45	113	43.5	(k Ω)
46	115	41.9	(k Ω)
47	117	40.3	(k Ω)
48	118	38.7	(k Ω)
49	120	37.3	(k Ω)
50	122	35.9	(k Ω)

APU Units serial number prior to NXC 98206420.



VEHICLE SLEEPER

CLIMATE CONTROL UNIT (CCU)

30-864-50B

APU Units serial number NXC 98206420 and later.



30-864-50C

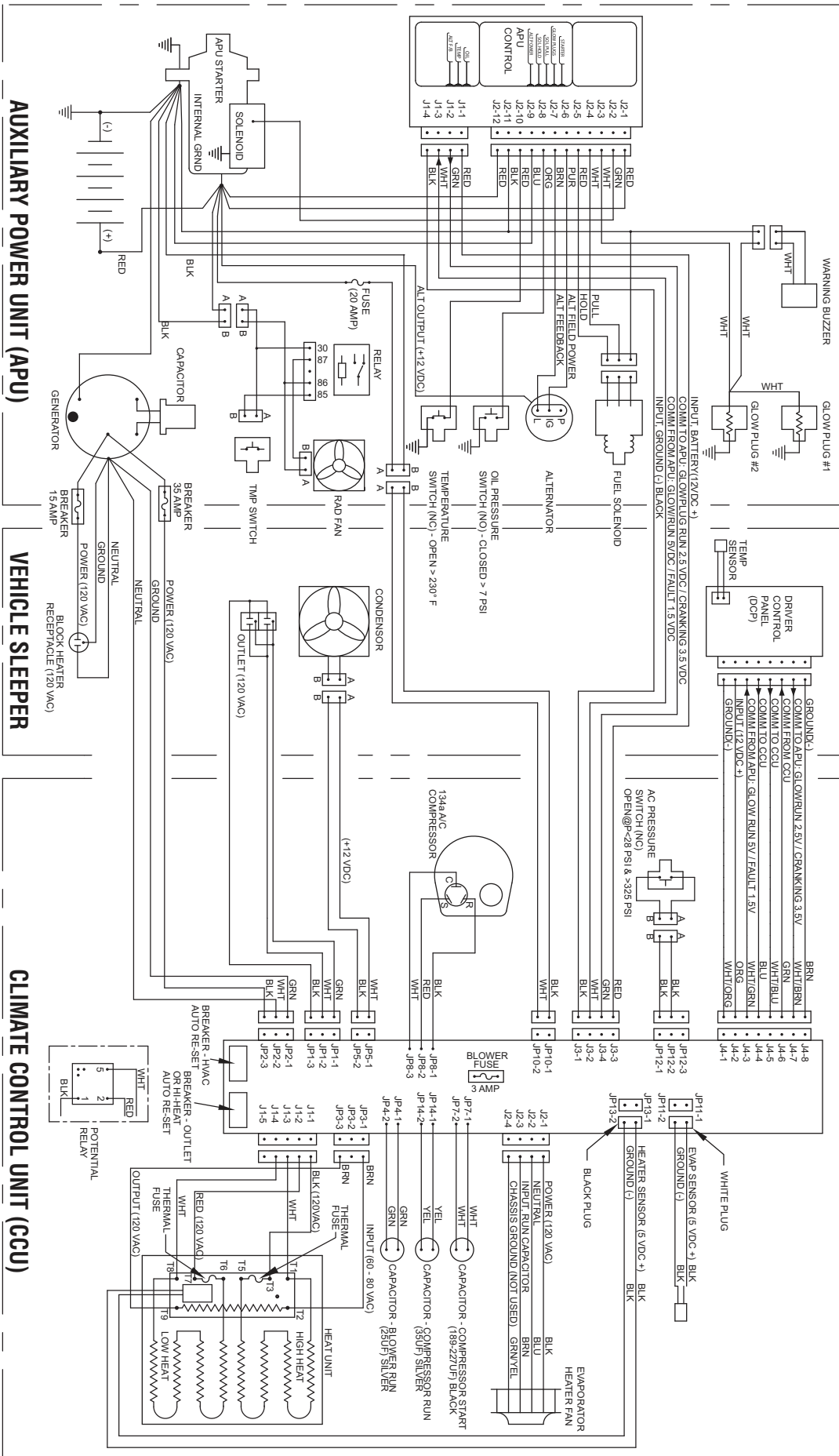
STAND-ALONE APU WIRING DIAGRAM (30-S64-01A)

PC6111 and PC6112 APU Units.

AUXILIARY POWER UNIT (APU)

VEHICLE SLEEPER

CLIMATE CONTROL UNIT (CCU)



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