



Carrier comfortpro apu owners manual

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I R Auxiliary Power Unit Operation & Service Manual for ComfortPro Auxiliary Power Unit Models PC6011, PC6012, PC6013, PC6014, PC6015, PC6018, PC GENX APU Only ComfortPro GENX 12K CCU with SHORE POWER Carrier GENX APU ONLY Carrier GENX APU ONLY Carrier GENX APU ComfortPro 12K BTU Standalone APU3 CONTENTS INTRODUCTION SAFETY Safety Alerts... c-iii Component Layout... c-v GENERAL ARRANGEMENT APU Dimensions... c-vi CCU Dimensions... c-vi Condenser Dimensions... c-vi 1.0 OPERATION OF MULTI FUNCTION D.C.P 1.1 PREPARATION Multi Function D.C.P Components How the ComfortPro Operates MANUAL OPERATIONS Starting the APU Turning the Heater ON/OFF Heating: Setting the Temperature Turning the A/C ON/OFF Setting the A/C Temperature Fan Operation AUTOMATIC OPERATIONS Password Protection Entering Password Setting the CCU Service Maintenance Schedule CCU Spring Tune Up TROUBLESHOOTING 3.0 MANUAL OPERATIONS 3.1 APU (Auxiliary Power Unit) GENERATOR DRIVER CONTROL PANEL CCU AIR CONDITIONING CCU Fan CCU Heat RECEPTACLE PANEL COMFORTPRO SERVICE MANUAL c-i4 3.0 TROUBLESHOOTING (Cont.) 3.8 TESTING PROCEDURES Testing AMP draw for components Testing Voltage and Hz readings ADDITIONAL INFORMATION Adjusting the 120 A/C Voltage Capacitor Troubleshooting Capacitor Troubleshooting 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 FOR INTEGRATED APU... A-9 DEFROST/HEAT & DCP SENSOR... A-11 INTEGRATED APU WIRING DIAGRAM (B)... A-12 INTEGRATED APU WIRING DIAGRAM (C)... A-13 STAND-ALONE APU WIRING DIAGRAM (30-S64-01A)... A-14 c-ii COMFORTPRO SERVICE MANUAL5 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 minor injury or death. CAUTION Hazards or unsafe practices that could result in minor injury or product or property damage. NOTICE Information technician must charge and test the CCU COMFORTPRO SERVICE MANUAL c-iii6 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 Electrical Toxic Substances Hot or Moving Parts Misuse 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. 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. 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. 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. The APU is designed to provide electrical 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. c-iv COMFORTPRO SERVICE MANUAL7 COMPONENT LAYOUT The main components of the ComfortPro are the Auxiliary Power Unit (APU), the Climate Control Unit (CCU) and the Driver Control Panel, including DCP, DCP2, etc. DRIVER CONTROL PANEL (DCP) BATTERY CHARGER SHORE POWER MANAGER CONDENSER 120 VAC RECEPTACLE PANEL 115V SHORE POWER PLUG Optional Shore Power CLIMATE CONTROL UNIT (CCU) BATTERY AUXILIARY POWER UNIT (APU) FUEL SUPPLY AND RETURN VEHICLE FUEL TANK COOLANT SUPPLY AND RETURN Figure C1: Main Components of the Carrier ComfortPro Integrated APU system and where they should best be installed on the truck. DRIVER CONTROL PANEL (DCP) CONDENSER 115 VAC RECEPTACLE PANEL CLIMATE CONTROL UNIT (CCU) BATTERY SURGE TANK FOR RADIATOR AUXILIARY POWER UNIT (APU) WITH RADIATOR IN REAR FUEL SUPPLY AND RETURN VEHICLE FUEL TANK OUTLET FOR BLOCK HEATER Figure C2: Main Components of the Carrier ComfortPro Stand Alone APU system and where they should best be installed on the truck COMFORTPRO SERVICE MANUAL c-v8 GENERAL ARRANGEMENT APU Dimensions (Measurements in inches) X = 1.9 STAND-ALONE APU X = 3.0 INTEGRATED APU X 28.5 REAR LEFT SIDE PREPARATION Multi-Function Driver Control Panel Components 1 When visible, the heating system is heating. 2 When visible, the A/C is cooling. 3 Indicates the state of the APU. APU 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. 8 Indicates that Temp Start mode is enabled. 9 T1 T2 Indicates that Te 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. OFF TRIP No power is being supplied to the outlet. Outlet breaker has tripped. RE- SET The breaker that tripped has reset automatically and the DCP needs to be reset COMFORTPRO SERVICE MANUAL 1-112 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 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 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. MENU ITEMS AND PASSWORD PROTECTION 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: ON/OFF: Allows the user to enable or disable the Comfort Monitor feature. 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. 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. 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). Specifically: The operator cannot activate / de-activate Comfort Monitor using the ON/OFF key (see below). The CM icon stays visible on the display. 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. The operator has the ability to enter and exit manual mode COMFORTPRO SERVICE MANUAL13 FEATURE Comfort Monitor Cont. (page 1-9) DESCRIPTION SET TEMP: Allows the user to set the desired ambient temperature in the range from 18 C (64 F) to 30 C (86 F). COMFORT MONITOR OPERATION 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. Duration Timer The Comfort Monitor session 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. Duration Timer The Comfort Monitor session 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. Duration Timer The Comfort Monitor session 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. Duration Timer The Comfort Monitor session 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. Duration Timer The Comfort Monitor session 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. Duration Timer The Comfort Monitor session 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. Duration Timer The Comfort Monitor session 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. Duration Timer The Comfort Monitor session 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. Duration Timer The Comfort Monitor session duration timer set to a non-zero value in the menu, the APU ON/OFF key may be used to activate / de-activate / d Comfort Monitor mode is activated via the APU ON/OFF key. When the timer has elapsed, Comfort Monitor mode will deactivate. The driver should de-activate Comfort Monitor for a new session if desired by pressing the APU ON/OFF key. Note: The intent is that the driver should de-activate Comfort Monitor mode will deactivate. 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. 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. 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 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. 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 operates in Comfort Monitor mode if all automatic mode duration timers have expired but the Comfort Monitor duration timer has not expired. 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 COMFORTPRO SERVICE MANUAL 1-314 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 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 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 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 COMFORTPRO SERVICE MANUAL15 1.2 MANUAL OPERATIONS 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 APU flashes. When 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 up to five times or until the APU starts. If "CRANK LIMIT" appears, see Troubleshooting section APU PLEASE WAIT APU STARTING APU RESTARTING APU CRANK LIMIT OFF OFF Stopping the APU Press. The APU will stop. The display shows APU. Make sure to shut down HVAC before stopping APU! APU OFF 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 APU C HEAT LOW H 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 OFF. The heat will turn off when the desired temperature is reached APU C HEAT HIGH OFF H 3 Press to deactivate heating COMFORTPRO SERVICE MANUAL 1-516 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 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 APU C A/C LOW H 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 APU C A/C HIGH H 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 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 back when the heat or A/C goes off APU C APU C FAN LOW H FAN HIGH H COMFORTPRO SERVICE MANUAL17 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 attempt to start while servicing. All presets will remain once battery cable is reconnected 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 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 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 "is displayed with three blank squares, one for each digit in the password. The first digit flashes APU ENTER PASSWORD "is displayed with three blank squares, one for each digit in the password. The first digit flashes APU ENTER PASSWORD "is displayed, then press." 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. 7 Enter the new password again, then press to exit this function. OFF 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 APU OFF 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 APU OFF PASSWORD PROTECT" is displayed with three blank squares, one for each digit in the password. The first square flashes COMFORTPRO SERVICE MANUAL 1-718 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 t press. 2 Repeat for each digit in the password. 3 Press again after entering the last digit. NOTICE The clock does not automatically adjust for time zone changes; you must adjust it 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. 1 Press. 2 Press or until "CLOCK" is displayed, then press. If "ENTER PASSWORD" 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, am/pm-set (for 12-hour clock only), and day of the week APU APU CLOCK CLOCK: SET MODE 12 HOUR OFF 3 Press or to change the setting. 4 Press to move to the next setting. accepted, 5 When done, press to exit COMFORTPRO SERVICE MANUAL19 1.3.4 Comfort Monitor You can specify the 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 APU COMFORT MONITOR" is displayed, enter your password. If you do not know the password, then press APU COMFORT MONITOR 1 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 APU COMFORT MONITOR SET TEMP 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, enter your password. If you do not know the password, then you cannot set up this function (see page 1-7). 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 APU COMFORT MONITOR SET DURATION 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, enter your password, then you cannot set up this function (see page 1-7). this setting. Or press to cancel and retain the current duration. 7 Press to exit COMFORTPRO SERVICE MANUAL 1-920 1.3.5 Timer You can set up the ComfortPro so that the APU and CCU run automatically for a specified time on specif 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 day and time you want the APU to run for 5 hours. You must set up the timer as follows: APU is running. Turning TIMER On or Off 1 Press. 2 Press or until "TIMER 1" or "TIM 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 1" is displayed, then press TIMER 1 TI APU TI SET START 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 displayed. 5 Press to confirm this setting. The current start time is displayed. 5 Press to confirm this setting. The current start time is displayed. 5 Press to confirm this setting. The current start time is displayed. 5 Press to confirm this setting. Setting the DURATION 1 Press. 2 Press or until "TIMER 1" or "TIMER 1" or "TIMER 1" or "TIMER 1" or "TIMER 1" APU T1 SET DURATION 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 exit. OFF COMFORTPRO SERVICE MANUAL21 Setting the TEMPERATURE for the Timer NOTICE Factory Default Temperature Setting is 21 C (70 F). Range is 18 C (64 F) to 30 C (86 F). 1 Press. 2 Press or until "TIMER 1 or TIMER 1 or TIMER 1 APU T1 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 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 APU TEMP START ON OFF If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password is password. If you do not know the password is password. off the APU or manually starting the APU does not permanently cancel this setting. NOTICE Factory Default Temperature Setting 10 C (14 F). Range is -20 C (-4 F) to 5 C (41 F). Setting the START TEMPERATURE 1 Press. 2 Press or until "TEMP START" is displayed, then press APU TEMP START : SET TEMP -10C 14F OFF 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) COMFORTPRO SERVICE MANUAL 1-1122 3 Press to confirm this setting. The current start temperature is displayed. 5 Press or to display "SET TEMP". 4 Press to confirm this setting. 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 OFF 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 7 Press to exit APU TEMP START : DURATION 1.0 hrs to cancel and retain the current start temperature. OFF NOTICE Factory Default Run Time Setting is 8 hours. Range is 2 to 24 hours 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 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 COMFORTPRO SERVICE MANUAL23 Setting the DESIRED RUN TIME 1 Press. 2 Press or until "MAXIMUM RUN TIME" is displayed, then press APU MAXIMUM RUN TIME 5 APU MAXIMUM RUN TIME 5 APU MAXIMUM RUN TIME 5 APU MAXIMUM RUN TIME 1 Press. 2 Press or until "MAXIMUM RUN TIME" is displayed, then press APU MAXIMUM RUN TIME 5 A know the password, then you cannot set up this function (see page 1-7). 3 Press or to displayed. 5 Press to confirm this setting. Or press to confirm this setting. Or press to cancel and retain the current duration. 7 Press to exit 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 are used. Set the INITIAL VOLTAGE 1. Press. 2 Press or until "CALIBRATE" VOLTAGE" is displayed, then press APU OFF CALIBRATE VOLTAGE If "ENTER PASSWORD" is displayed, enter your password. If you do not know the password of the batteries. Press. 2 Press or until "BATTERY MONITOR" is displayed, then press APU BATTERY MONITOR ON OFF 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 COMFORTPRO SERVICE MANUAL 1-1324 The APU starts if the battery voltage goes below the level you specify here. NOTICE Factory Default Voltage Setting is 11.8V. Range is 1 has been below the specified level for 10 minutes. Setting the Voltage Level 1 Press. 2 Press or until "BATTERY MONITOR" 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". MENU 4 Press to confirm this setting. The current voltage level is displayed and flashes. 5 Press to cancel and retain the current voltage. 7 Press to exit. OFF COMFORTPRO SERVICE MANUAL25 CLIMATE CONTROL UNIT (CCU) 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 R-134A. refrigerants be recovered before any system can be opened for service. Recovery of refrigerant is done using a certified recovery unit. Before a refrigerant is done using a certified recovery unit. Before a refrigerant is done using a certified recovery unit. to remove excess charge from an overcharged system 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 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 by selecting High A/C (APU Running). measured by the scale. CONDENSER NOTICE The air conditioning system has a 5 minute delay timer (minimum time between cycles is 5 minutes). RED HIGH LOW BLUE CCU NOTICE Total System Capacity is 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. SCALE OZ Figure 2-1: Connecting hoses to CCU to Condenser COMFORTPRO SERVICE MANUAL 2-126 2.2 SERVIC 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 Change fuel filters Change Integrated APU Generator belt Change Stand-Alone APU Generator belt regardless of condition every 3000 hours Adjust valve lash Clean inside enclosure Clean radiator fins Check fuel hoses and clamps for abrasion and damage. Change as necessary 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. Check injection nozzle opening pressure Check air conditioning performance (HVAC) Check heater performance (HVAC) Ch maintenance: Condenser. Air ducting and outlets. Evaporator and temperature sensor. Refrigerant lines connections and routing. Harness Connections and routing. Harness Connections and routing. leakage and/or contaminated fins that may restrict air flow. 2 Check air ducting and outlets for: Damage and/or restrictions. 3 Check the evaporator for: Intake filter cleanliness, clean if required. Damage 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 kohm F, 100 kohm TEMPERATURE (F) 5 Check the Refrigerant lines and connections for: Abrasion and wear points. Connection wet spots that may indicate refrigerant leakage COMFORTPRO SERVICE MANUAL 2-328 6 Check the refrigerant charge level: 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 5-9 AMPS 9-12 AMP AMP Note: A/C - High Measure at 120 volt teck cable FAN ONLY AMP READING FAN LOW FAN HGH AMP AMP If both suction and discharge pressure is lower 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 Check the CCU drain: For damage and that it operates correctly COMFORTPRO SERVICE MANUAL29 3.0 TROUBLESHOOTING WARNING Before undertaking ANY repair to the APU, CCU or component of the CONDITIONING CCU FAN CCU HEAT RECEPTACLE PANEL ADDITIONAL INFORMATION COMFORTPRO SERVICE MANUAL 3-130 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 No fuel Check fuel stand pipe length A-8 (starter works) Air in the fuel system Bleed air A-8 Water in fuel system Drain fuel tank(s) and replace fuel filters Fuel solenoid faulty. No continuity Replace 8-16 from Red to Black wires or from White to Black wires Fuel filters filters fuel filters fuel filters fuel filters Fuel leak due to loose injection Tighten nut Kubota Manual* pipe retaining nut Injection nozzle clogged/defective Replace Kubota Manual* Injection pump defective Replace Kubota Manual* Fuel lift pump defective Replace Kubota Manual* Injection pump defective Replace Kubota Manual* Fuel lift pump defective Replace Kubota Manual* Injection pump defective Replace Kubota Manual* Fuel lift pump defective Replace Kubota Manual* Manual* Excessive valve clearance Adjust Kubota Manual* Glow plugs malfunctioning Check/replace Kubota Manual* Plugged air filter Clean/replace Kubota Manual* Plugged air filter Clean/replace Kubota Manual* Clean/replace Kubota Manual* Plugged air filter Clean/replace Kubota Manual* Clean/replace Kubota Manual* Plugged air filter Clean/replace Kubota Manual* Plugg battery cables/charge battery A-13 (starter does not work) Starter/solenoid defective Repair/replace Kubota Manual* Poor positive cable connection Check/repair Engine runs rough Fuel filters clogged or dirty Replace A-8 Air filter plugged or dirty Clean/replace A-3 Fuel leak due to loose injection Tighten nut Kubota Manual* Incorrect valve clearance Adjust Kubota Manual* Fuel return line clogged/kinked Clean/replace Smoking (white or Excessive engine oil Reduce to specified level A-2 blue exhaust) Piston ring worn or stuck Repair/replace engine Kubota Manual* Incorrect injector timing Repair Kubota Manual* Low cylinder compression Repair/replace engine Kubota Manual* Coolant in combustion chamber Repair/replace A-3 Air cleaner clogged Replace A-3 Unable to bleed coolant Air lock Run Truck engine until 85 C (185 F) A-9 No coolant flow Check for blockages using flow indicator Kinked coolant lines Straighten Shut-off valves 'OFF' Turn 'ON' Incorrect plumbing Re-plumb Small fittings on truck engine Change to larger fittings (3/4") Low coolant to the proper level at APU model only the coolant surge tank Excessive oil Oil ring worn Replace Kubota Manual* Consumption Piston ring groove worn Replace the piston Kubota Manual* Valve stem and guide worn Replace Kubota Manual* Valve stem and guide worn Replace Kubota Manual* Valve stem and guide worn Replace Kubota Manual* Compose worn Replace Kubota Manual* Valve stem and guide w MANUAL 3-332 SYMPTOM PROBABLE CAUSE SOLUTION REFERENCE Oil level increases Diesel fuel getting to oil pan Replace O-ring in lower portion Kubota Manual* through governor lever of governor lever fuel lift pump diaphragm defective Replace Kubota Manual* through governor lever fuel lift pump diaphragm defective Replace Network (Section 2019) and the section of the se Clean Kubota Manual* Oil filter clogged Replace Kubota Manual* crankshaft bearings Excessive oil clearance of Replace Kubota Manual* arm boss Oil passage clogged Clean Different type of oil Use the specified type A-2 Oil pump defective Repair/replace Kubota Manual* High oil pressure Different type of oil Use the specified type A-2 Relief valve defective Repair/replace A-2 Air lock in Kubota engine A-9 and ensure there is coolant, purge if necessary Coolant level insufficient Add coolant, purge if necessary A-9 Inspect for leaks Coolant flow is restricted Repair Plumbing Thermostat stuck Replace Kubota Manual* Water pump defective Replace Kubota Manual* Cooling fan defective Replace Kubota Manual* Clean or replace as required Overcharging of Alternator malfunctioning Replace A-13 batteries Poor positive/ground connections Repair Batteries or Alternator malfunctioning Replace A-13 batteries or Alternator malfunctioning Replace A-13 batteries or Alternator malfunctioning Replace A-13 batteries and Poor Poor alternator malfunctioning Replace A-13 batteries or Alternator malfunctioning Replace A-13 batteries and Poor Alternator malfunction DC load too high Reduce load Poor positive/ground connections Check connections Alternator belt loose/worn Replace or tighten Kubota Manual* APU suddenly stops Low oil pressure See "Engine overheated" A-6 on Driver Control Panel Alternator Feedback See "Alternator Troubleshooting" 3-15, A-13 Do not turn the Driver Control Panel off. Go to the APU and look at the APU Control Unit lights for the correct code. *Kubota Workshop Manual COMFORTPRO SERVICE MANUAL33 SYMPTOM PROBABLE CAUSE SOLUTION REFERENCE APU suddenly stops No fuel Check fuel stand pipe length/fuel level in tank A-8 (no message on Driver Air in the fuel system Bleed air A-8 Control Panel display) Water in fuel system Drain fuel tank(s) and replace A-3, A-8 fuel filters Faulty communication between the Check APU control Driver Control Panel or opens/replace Fuel solenoid faulty Replace 3-16 Alternator belt loose or broken Tighten/replace Kubota Manual* Alternator faulty Repair/replace 3-15 Low battery voltage Check battery cables/charge battery APU stops 15 seconds Low oil pressure See "Low oil pressure" 3-4 after starting sequence Overheat See "Engine overheated" 3-4 completes ("Check APU" message on Driver Control Panel display) This will occur when the APU Control Unit sees a problem during or after startup APU stops after start Alternator belt loose or broken Tighten/replace 3-15 APU will only run with Poor connection between alternator Check connection between alternator Defective Repair/replace 3-15 APU will only run with Poor connection between alternator belt loose or broken Tighten/replace 3-15 APU will only run with Poor connection between alternator belt loose or broken Tighten/replace 3-15 APU will only run with Poor connection between alternator belt loose or broken Tighten/replace 3-15 APU will only run with Poor connection between alternator belt loose or broken Tighten/replace 3-15 APU will only run with Poor connection between alternator belt loose or broken Tighten/replace 3-15 APU will only run with Poor connection between alternator belt loose or broken Tighten/replace 3-15 APU will only run with Poor connection between alternator bet wire) (no message on Driver Control Panel display) This will occur when the APU Control Unit, CCU Control Unit, CCU Control Unit, CCU Control Driver Control Panel cable for shorts Panel, but APU will start Board and/or the Driver Control APU control Oniver Control Driver Control Oniver Control APU control Oniver Control Oniver Control Oniver Control Oniver Control Panel or Opens/replace and run normally No "GLOWING" message Faulty communication between the Check APU control Oniver Control Panel or Opens/replace and run normally No "GLOWING" message Faulty communication between the Check APU control Oniver Control Oniv opens/replace run with ON button depressed APU only clicks after Faulty APU Controller Replace APU Controller does not come on during glowing) APU only clicks after glowing has finished and is attempting to start (ALT F/B light not on, ALT F/B light not on, ALT F/B light not on) come on during glowing) Loose connection from APU controller to alternator, either at the APU controller end or at the APU before Manual COMFORTPRO SERVICE MANUAL 3-534 3.2 GENERATOR WARNING Disconnect the batteries from the APU before performing any repairs. Stand-Alone APU Generator Integrated APU Generator Each symptom is followed by a probable 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 35 Amp Breaker tripped Determine reason and reset A-5 Generator Belt loose/broken Tighten/replace A-2 (below 100 Volts) Engine air filter dirty Clean/replace A-2 (below 100 Volts) Engine fuel system problem Change fuel filters A-3 Engine exhaust system problem Clean/replace Engine speed low Adjust 3-13 Very low voltage Wiring to capacitor Repair/replace (4-10 Volts AC) Capacitor defective Test and replace 3-13, COMFORTPRO SERVICE MANUAL

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