

# OPERATIONS AND SERVICE MANUAL

**Air Conditioning**

**22000, 23000, & 25000 SERIES**

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# TABLE OF CONTENTS

Paragraph	Page
<b>1 Description</b> .....	<b>1-1</b>
1.1 Introduction.....	1-1
1.2 Identifying your A/C Unit.....	1-1
1.2.1 Condensers .....	1-1
1.2.2 Evaporators .....	1-2
1.3 Identification Labels.....	1-3
1.4 System Types.....	1-4
1.5 System Components.....	1-4
<b>2 Operation</b> .....	<b>2-1</b>
2.1 Air Conditioning Basics .....	2-1
2.1.1 Orifice Tube System .....	2-1
2.1.2 TXV System .....	2-2
2.2 Operating Digital Controls .....	2-3
2.3 Operating Manual Controls .....	2-3
2.3.1 A/C only Switches.....	2-3
2.3.2 A/C & Temp Switches .....	2-3
<b>3 Troubleshooting</b> .....	<b>3-1</b>
3.1 Preliminary Checks .....	3-1
3.2 A/C System is not cooling properly .....	3-1
3.3 A/C System is running but air is warm .....	3-1
3.4 A/C System is producing bad odors .....	3-1
3.5 Compressor clutch will not engage .....	3-1
3.6 Controls operating incorrectly .....	3-1
3.7 Evaporator air flow (limited or none) .....	3-1
3.8 Heating .....	3-2
3.9 Noises and/or vibrations .....	3-2
3.10 Pressures too High/Low .....	3-2
3.11 Relay Board .....	3-3
<b>4 Service</b> .....	<b>4-1</b>
4.1 Preventative Maintenance Schedule .....	4-1
4.2 Hose Routing .....	4-2
4.3 Harness Routing .....	4-6
4.4 Accumulator Installation .....	4-7
4.5 Evaporator Installation .....	4-7
4.6 Relay Board Installation.....	4-8
4.7 CCOT Air Conditioning Protection System .....	4-8
4.8 Compressor Installation .....	4-9
4.9 Condenser Installation .....	4-10
4.10 Refrigerant Evacuation and Charging (R134a) .....	4-11
4.11 Cleaning an Open System .....	4-11
4.12 Torque Specifications .....	4-12
<b>5 Diagrams</b> .....	<b>5-1</b>
5.1 Basic A/C Setup .....	5-1
5.2 Plumbing Diagram - 30/40/53 Tie-In with Auxiliary Condenser .....	5-2
5.3 Wiring Diagram - Front/Rear 40 3SP Tie-In .....	5-3
5.4 Wiring Diagram - Front/Rear 40 3SP .....	5-4
5.5 Wiring Diagram - Front/Rear 53 3SP .....	5-5
5.6 Wiring Diagram - Front/Rear 86 3SP .....	5-6
5.7 Wiring Diagram - Front/Rear 86 3SP Single Blower .....	5-7
5.8 Wiring Diagram - Front/Rear 86 3SP Dual Blower .....	5-8
5.9 Evaporator Assembly – Basic Ceiling .....	5-9
5.10 Cover Assembly - Basic In-Wall .....	5-10

5.11	Condenser Assembly - Skirt mount .....	5-11
5.12	Wiring Schematic - CCOT Air Conditioning Protection System - Single Evaporator.....	5-12
5.13	Wiring Schematic - CCOT Air Conditioning Protection System - Dual Evaporator .....	5-13
5.14	Parallel Flow Condenser Assembly - 25057 Skirt mount.....	5-14
5.15	Rooftop Condenser Assembly – 25058 Dual Loop Condenser.....	5-15
5.16	3104257715B - Wiring Diagram - MDS.....	5-16
5.18	30200509A - 12" Digital Thermostat Relay Harness.....	5-18
<b>6</b>	<b>Warranty</b> .....	<b>6-1</b>
6.1	ACC Limited Warranty .....	6-1
6.2	Warranty Card and Information .....	6-1
6.3	ACC Warranty Authorization Process .....	6-2
6.4	Service centers .....	6-2
6.5	Warranty – Conditions of Warranty .....	6-3
6.6	Request for Warranty Authorization Form .....	6-4

## LIST OF ILLUSTRATIONS

FIGURE		PAGE
Figure 1-1	Skirt Mounted Condenser .....	1-1
Figure 1-2	Roof Mounted Condenser .....	1-1
Figure 1-3	In-Wall Evaporators .....	1-2
Figure 1-4	Single Blower Ceiling Evaporators .....	1-2
Figure 1-5	Dual Blower & Triple Blower Ceiling Evaporators .....	1-2
Figure 1-6	System Identification Label .....	1-3
Figure 1-7	Charge Label .....	1-3
Figure 1-8	Orifice Tube System .....	1-4
Figure 1-9	Expansion Valve System .....	1-5
Figure 2-1	Orifice Tube system .....	2-1
Figure 2-2	Thermal Expansion Valve System.....	2-2
Figure 2-3	Digital Control Board .....	2-3
Figure 2-4	Rooftop Digital Control Board (TC-96) .....	2-3
Figure 2-5	Manual Control Board with A/C only.....	2-3
Figure 2-6	A/C Button.....	2-3
Figure 2-7	Manual Control Board with Temp Knob.....	2-3
Figure 3-1	Relay Board.....	3-3
Figure 4-1	Proper Hose Routing and Clamps .....	4-2
Figure 4-2	Proper Hose Routing and Clamps .....	4-2
Figure 4-3	Example of Bad Hose Routing .....	4-2
Figure 4-4	Hose Routing and Grommets.....	4-2
Figure 4-5	Refrigeration Line Trap.....	4-2
Figure 4-6	Heat Shield.....	4-3
Figure 4-7	Excessive Hose Bends .....	4-3
Figure 4-8	Drain Hose .....	4-3
Figure 4-9	Kazoo Installation .....	4-3
Figure 4-10	Hose Routing Examples .....	4-4
Figure 4-11	ATCO Air-O-Crimp Hose fittings .....	4-5
Figure 4-12	Hose Crimp Examples .....	4-6
Figure 4-13	Hose Routing and Grommets .....	4-6
Figure 4-14	Wire Harness Routing and Grommets .....	4-6
Figure 4-15	Accumulator mounting .....	4-7
Figure 4-16	Rear Mount Evaporator Brackets .....	4-7

Figure 4-17	Side Mount Evaporator Brackets .....	4-7
Figure 4-18	Orifice Tube .....	4-7
Figure 4-19	Relay Board .....	4-8
Figure 4-20	Relay Board Electrical Panel Mounting .....	4-8
Figure 4-21	Relay Board Remote Mounting .....	4-8
Figure 4-22	CCOT Unit .....	4-8
Figure 4-23	CCOT Air Conditioning Protection .....	4-9
Figure 4-24	Compressor Mounting .....	4-9
Figure 4-25	Condenser Brackets .....	4-10
Figure 4-26	Condenser Bracket .....	4-10
Figure 4-27	System Evacuation .....	4-11
Figure 5-1	Basic A/C Setup.....	5-1
Figure 6-1	Warranty Card .....	6-1
Figure 6-2	System Information Label.....	6-1

## LIST OF TABLES

FIGURE		PAGE
Table 3-1	Evaporator Current Draw.....	3-4
Table 3-2	Condenser Current Draw.....	3-4
Table 3-3	Compressor Current Draw.....	3-4
Table 4-1	Preventative Maintenance Schedule.....	4-1
Table 4-2	Fitting Torque Specifications.....	4-12
Table 4-3	Metric Bolt Torque Specifications.....	4-12
Table 4-4	U.S. Bolt Torque Specifications.....	4-12
Table 4-5	Conductor Sizing Table .....	4-13
Table 4-6	Multiple Conductor Combinations .....	4-13
Table 4-7	R-134a Temperature vs. Pressure Chart .....	4-14
Table 6-6	Request for Warranty Authorization.....	6-4



# Section 1

## Description

### 1.1 Introduction

Thank you for choosing Valeo as your supplier of bus air conditioning products. The products supplied on your bus have been designed to bring you years of dependable operation. In order to maximize the performance of your air conditioning system a routine preventative maintenance program is recommended. (See section 4.1)

Should you have problems with your Valeo air conditioning system, you should contact Valeo, or your nearest Valeo service center for service and support.

The warranty period for your Valeo bus air conditioning system is 2 Year Unlimited/ 3 Year 75,000 Mile Warranty (See Section 6). Contact the Valeo Service/Warranty Department at 1-800-462-6322 or 574-264-2190 for details.

### 1.2 Identifying Your A/C Unit

All of Valeo's Condensers and Evaporators have a model and serial number tag located on the face of the unit.

1.2.1 Condensers have their labels placed on the fan side of the condenser between the fans on a dual fan setup or just offset from center on a single fan setup.

**FIGURE 1-1 – Skirt Mounted Condenser**



**FIGURE 1-2 – Roof Mounted Condenser**



1.2.2 Evaporators will typically have their tags on the front of the unit in between the center louvers.

FIGURE 1-3 – In-Wall Evaporators

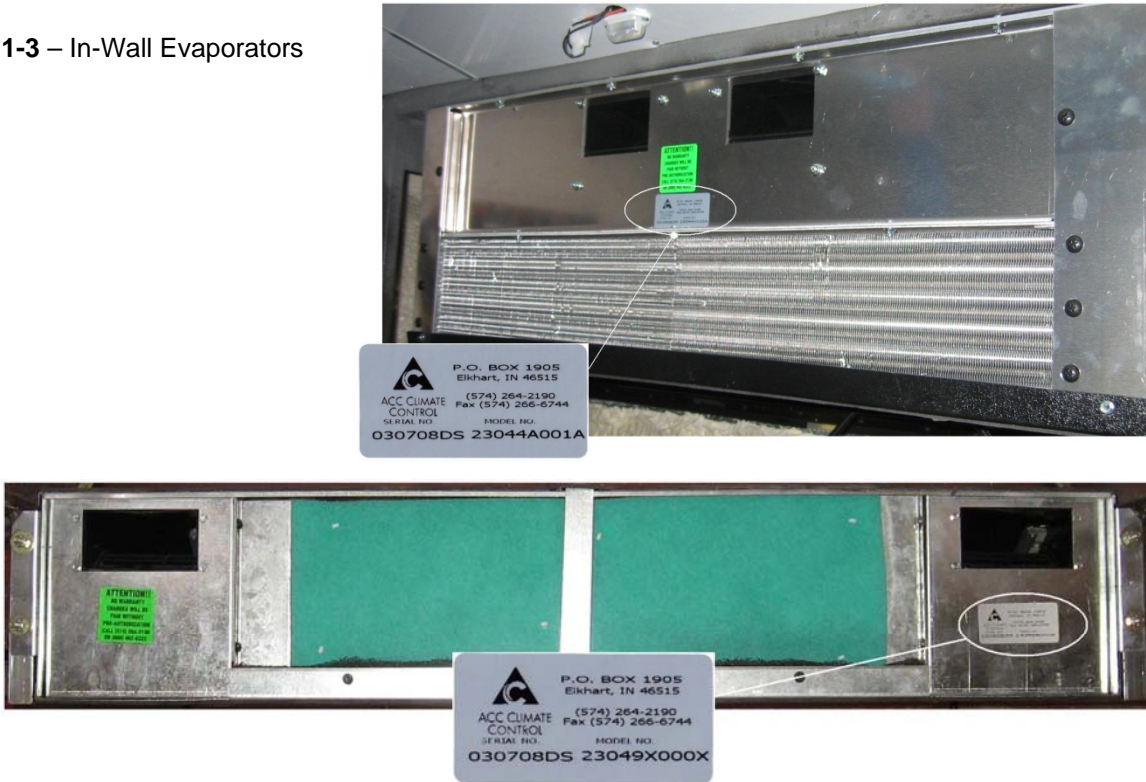


FIGURE 1-4 – Single Blower Ceiling Evaporators



FIGURE 1-5 – Dual Blower & Triple Blower Ceiling Evaporators



**1.3 Identification Labels**

The charge label will be located near the charge ports in the engine compartment. Newer systems may have the *System Identification Label* only or may have the *System Identification Label* in combination with the *Charge Label*.

The *System Identification Label* when properly filled out will include the following information:

Evaporator serial number(s)	Refrigerant type
Condenser serial number(s)	Charge amount
Compressor serial number(s)	Oil type
Mount kit number	Oil amount
Installer	Date

**FIGURE 1-6 – *System Identification Label***

*Caution: System to be Serviced by Qualified Personnel.*

**ACC CLIMATE CONTROL**

System Number: \_\_\_\_\_  
 Evaporator Model Number(s): \_\_\_\_\_  
 Condenser Model Number(s): \_\_\_\_\_  
 Compressor Serial Number(s): \_\_\_\_\_

Refrigerant: \_\_\_\_\_ Amount: \_\_\_\_\_  
 Lubricant: \_\_\_\_\_ Oil Amount: \_\_\_\_\_  
 Mount Kit Number: \_\_\_\_\_  
 Belt Part Number(s): \_\_\_\_\_  
 Installer: \_\_\_\_\_ Date: \_\_\_\_\_

*P.O. Box 1905, Elkhart, In. 46515 P(574)264-2190 F(574)266-6744*

The *Charge Label* includes limited charge information only. To locate the system information and model numbers if this is the only label found, you will need to locate the information on the system components themselves (see 1.2).

**FIGURE 1-7 – *Charge Label***

**AIR CONDITIONING SYSTEM**  
 Developed By

**ACC CLIMATE CONTROL**  
 ELKHART, IN 46514 \* 574-264-2190

<b>Refrigerant</b>	<b>Amount</b>
<b>Lubricant</b>	<b>Amount</b>

**CAUTION: SYSTEM TO BE SERVICED BY QUALIFIED PERSONNEL.**  
 REF. # 29000110A

## 1.4 System Types

**In-Wall System** – An ACC evaporator is installed in the front and/or rear wall of the vehicle. This evaporator installs between the inside and outside walls of the vehicle.

**Stand-Alone System** - All ACC components installed on a vehicle. These can be either single or dual compressor systems.

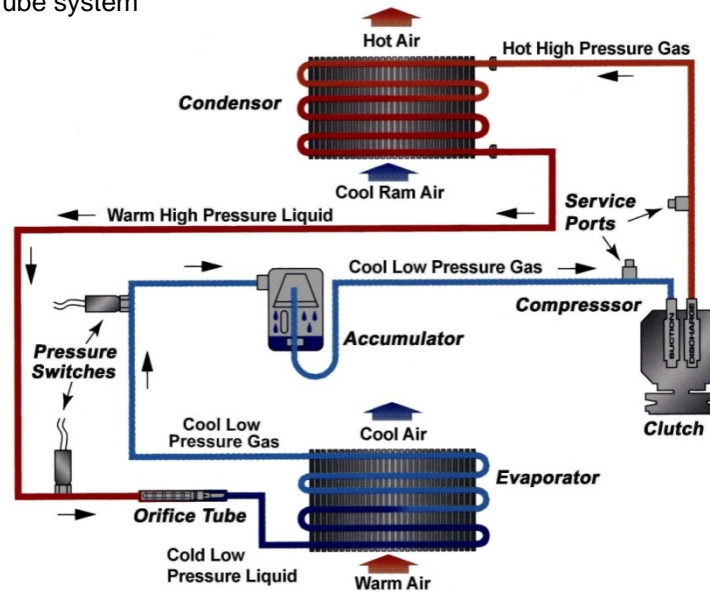
**Tie-In Systems** –

**Standard Tie-in** - An ACC evaporator is connected to an existing OEM system.

**Super Tie-In** – An ACC evaporator and condenser are tied into an existing OEM system.

## 1.5 System Components

Figure 1-8 - Orifice Tube system



**Accumulator** - Removes debris and moisture from the A/C system. Since the compressor will only pump gas the primary role of the accumulator is to keep any damaging liquid refrigerant isolated from the compressor.

**Compressor** - A high pressure pump which is belt driven via the electro-magnetic clutch. The compressor circulates refrigerant through the condenser and evaporator.

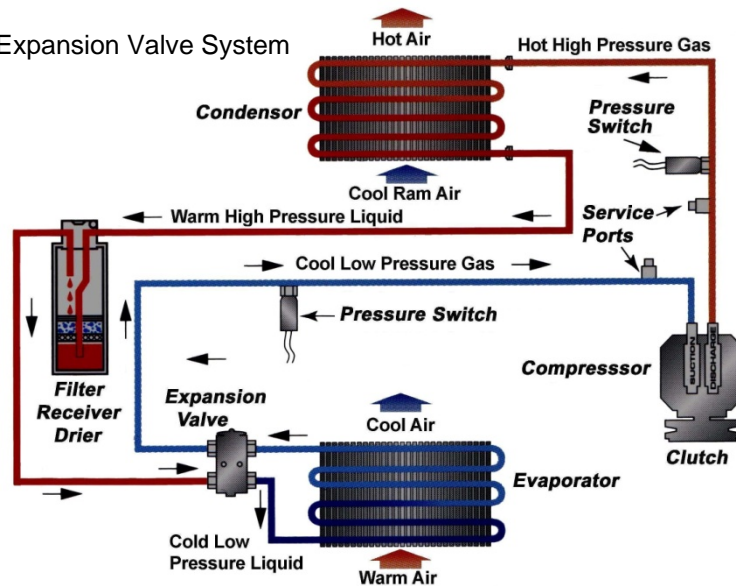
**Compressor Clutch** – The clutch is engaged through the compressor/condenser relay. Once engaged the compressor activates and circulates refrigerant throughout the system.

**Condenser** – The condenser is usually mounted in the skirt or on the roof of the vehicle. Its function is to remove heat from the entering refrigerant vapor changing it to a high-pressure, high-temperature liquid.

**Evaporator** – Located inside the vehicle, the evaporator's primary function is to remove unwanted heat from the air in the passenger compartment by boiling liquid refrigerant in the evaporator coil.

**Receiver Drier** – Used in TXV systems the receiver drier stores a small amount of liquid refrigerant as well as filters out moisture and particulates from the refrigerant.

**Figure 1-9 - Expansion Valve System**



**Freeze-up Thermostat** – (Optional on certain systems) The freeze-stat is wired in series with the pressure switches and clutch relay to stop the compressor in the event of ice build up on the evaporator coils. Coil icing is one indication that liquid refrigerant is getting back to the compressor.

Preset Thermostat / Freeze Protector: Off – 30.5°F      On – 44.5°F      (Non-adjustable)

**Orifice Tube** – A metering device located just ahead of the evaporator on the high-pressure side of that restricts the flow of refrigerant into the evaporator. A small hole (the orifice) allows only a certain amount of refrigerant to pass through the device. This creates a pressure drop that allows the refrigerant to evaporate inside the evaporator.

**Pressure Switches** – The High and Low pressure switches are wired in series with the clutch relay and the freeze-stat. The compressor is then stopped if either pressure switch is activated. The switches reset when the pressures return to normal the system will resume operating.

**High Pressure switch:** Normally closed  
Standard switch; Cut-out 370 psi (+/-5%); Cut-in 220 psi (+/-5%)

**Low Pressure Switch:** Normally open  
Standard switch; Cut-out 6 psi (+/-5%); Cut-in 34 psi (+/-5%)

**Refrigerant** - A compound used in a heat cycle that undergoes a phase change from a gas to a liquid and back. Refrigerant is used to move heat from the passenger compartment to the outside air. The refrigerant absorbs heat by evaporating at low pressure and temperatures and disperses heat by condensing at high pressures and temperatures.  
*Most ACC units use R134a.*

**Resistor** – Used to control the speeds of the blower motors.

**Thermostat** – A temperature device for regulating the operation of the system so that the temperature is maintained near a desired set point temperature. The thermostat does this by triggering the compressor clutch to engage or disengage.

**Thermal Expansion Valve** - Often abbreviated as TXV, a thermal expansion valve controls the rate at which liquid refrigerant can flow into an evaporator. This is accomplished by opening or closing the valve as temperature changes in the evaporator. A TX valve has the opposite effect of a compressor - it lowers the refrigerant temperature by reducing the pressure of the refrigerant.



## Section 2

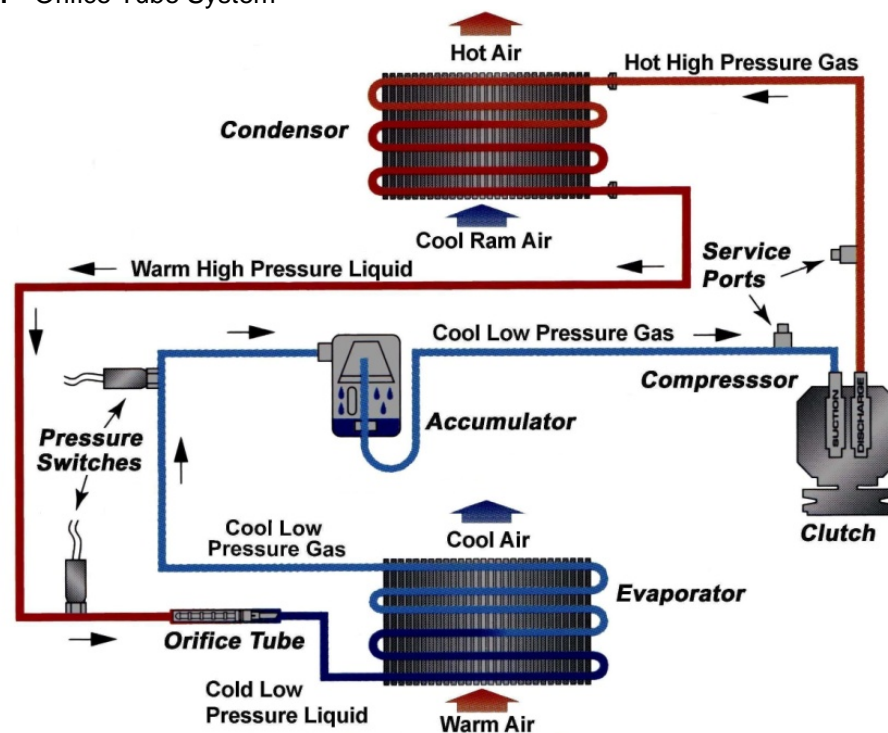
### Operation

#### 2.1 Air Conditioning Basics

##### 2.1.1 During operation of an Orifice Tube AC system;

- 1) Hot, high pressure de-superheated gas is discharged from the compressor.
- 2) The high pressure gas then goes through the condenser where the gas changes phase as air passes through the condenser fins. It first changes to a mixture of liquid and gas, then to a sub-cooled warm high pressure liquid.
- 3) The liquid then continues on to the Orifice tube where it is expanded becoming metered into the evaporator coil as a cold liquid.
- 4) In the evaporator, the mixture absorbs heat from the air passing through the fins of the coil, exhausting cold air through the duct system of the truck with the refrigerant becoming a low pressure superheated gas.
- 5) After the evaporator the low pressure gas then goes through an accumulator remove debris and moisture from a system. The primary role of the accumulator is to isolate the compressor from any damaging liquid refrigerant.
- 6) The material then continues back to the compressor as a low pressure superheated gas where the changes of state continue on.

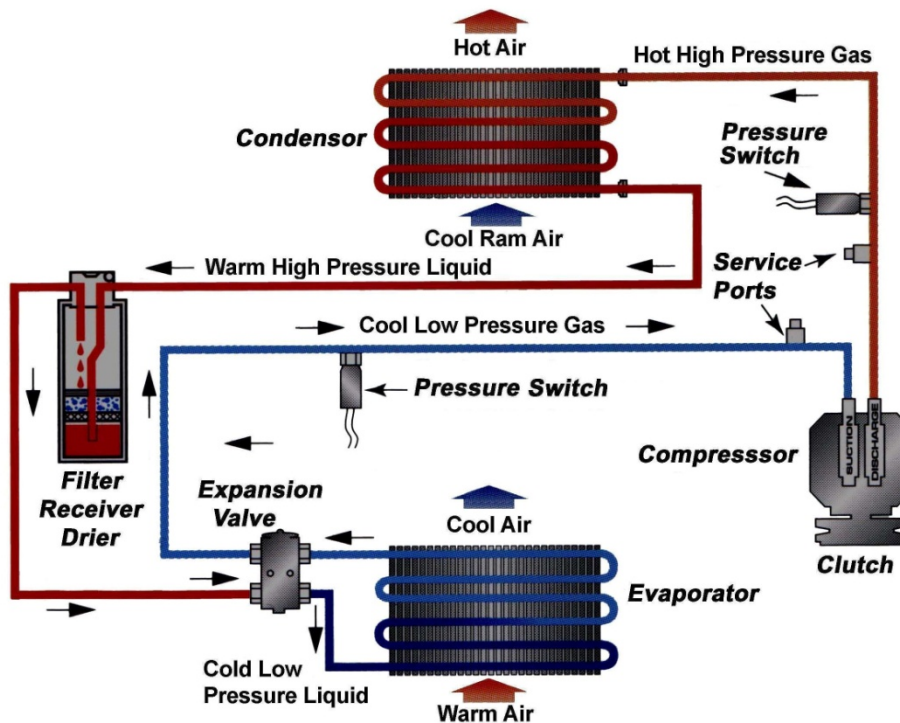
Figure 2-1 - Orifice Tube System



### 2.1.2 During operation of a TXV AC system;

- 1) Hot, high pressure de-superheated gas is discharged from the compressor.
- 2) The high pressure gas then goes through the condenser where the gas changes phase as air passes through the condenser fins. It first changes to a mixture of liquid and gas, then to a sub-cooled warm high pressure liquid.
- 3) The liquid then travels through the receiver drier before it continues on to the TXV where it is expanded becoming metered into the evaporator coil as a cold liquid. The flow to the evaporator is metered according to the temperature of the refrigerant out of the evaporator.
- 4) In the evaporator, the mixture absorbs heat from the air passing through the fins of the coil, exhausting cold air through the duct system of the truck with the refrigerant becoming a low pressure superheated gas.
- 5) After leaving the evaporator the low pressure superheated gas then goes back through the TXV and back to the compressor where the changes of state continue on.  
(Depending on the model of TXV the refrigerant leaving the evaporator may not return through the TXV. In this case the TXV will have a thermal probe to monitor the temperature of the refrigerant.)

Figure 2-2 - Thermal Expansion Valve System



## 2.2 Operating Digital Controls

### Digital Control Board (2.5" x 4")

- 1) Turn power on by pressing the *MODE* button. The *MODE* button cycles between *Heat*, *Cool*, and *Off*.
- 2) Select desired temperature by pressing the arrow buttons up or down.
- 3) System will automatically operate on high speed until set point is reached or fan speed is overridden manually.
- 4) Fans may be adjusted manually by pressing *FAN* button speed adjustor. The *FAN* Button cycles between *High*, *Med*, and *Low*
- 5) Once the set point is reached the system will shut off automatically. After a sufficient rise/fall in temperature the system will then turn on to the previous fan setting.

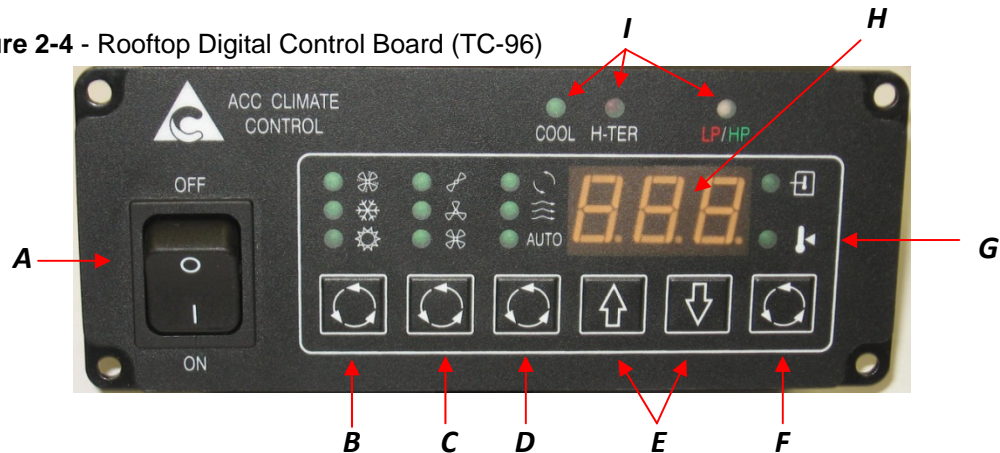
**Figure 2-3 - Digital Control Board**



### Rooftop Digital Controls (2.75" x 6.75") - TC-96

- A. System On / Off Switch.
- B. Select Button for system Heat / Cool / Fan functions.
- C. Select Button for Fan Speeds Low, Medium and High.
- D. Select Button for Recirculation / Fresh Air / Automatic.
- E. Select Buttons to Raise / Lower Temperature Settings.
- F. Push and Hold till light (G) flashes for Temperature Programming mode.
- G. Light indicating Temperature Programming mode.
- H. Temperature setting display.
- I. System operation mode lights.

**Figure 2-4 - Rooftop Digital Control Board (TC-96)**



## 2.3 Operating Manual Controls

**2.3.1** For systems with only an A/C switch the power is turned on by turning the *REAR A/C* switch from *OFF* to *Low*, *Med*, or *High*.

Fans are adjusted manually by turning the fan knob and selecting *Low*, *Med*, or *High*.

**Figure 2-5** - Manual Control Boards with A/C only



**Figure 2-6** - A/C Button

If system has an A/C button this button must be depressed in conjunction with the fans turned on for refrigerant to flow and system to cool.



**2.3.2** For systems with a manual A/C Fan speed switch and a Temperature knob.

- 1) Turn power on by turning the *REAR A/C* switch from *OFF* to *Low*, *Med*, or *High*.
- 2) Select desired temperature by turning the *TEMP* switch to the desired temperature range (red for heat or blue for cool).
- 3) Fans may be adjusted manually by turning the fan knob and selecting *HIGH*, *MED*, or *LOW*.
- 4) System will not operate unless the *REAR A/C* switch is turned from *OFF* to *Low*, *Med*, or *High* setting.

**Figure 2-7** - Manual Control Boards With Temp knob



## Section 3

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### Troubleshooting

#### **3.1 Preliminary Checks**

Check blower and air ducts for obstructions and proper operation. Check condenser and evaporator coils and clean if necessary. Check and clean or replace the evaporator filter if needed. Check compressor belt(s) for wear and proper tension.

#### **3.2 A/C System is not cooling properly.**

*Compressor will not run*

- Drive-belt loose or defective
- Clutch coil defective
- Clutch Malfunction
- Low refrigerant charge
- Compressor malfunction

*Electrical Malfunction*

- Circuit Breaker open
- Relay defective
- Mechanical thermostat malfunction

#### **3.3 A/C System is running but air is warm.**

*Compressor*

- Pressure switch malfunction will not allow clutch engagement
- Compressor clutch may need to be replaced

*Refrigeration system*

- System pressure may be too high or too low
- Thermostat may need to be replaced
- Condenser coil blockage or engine fan inoperable
- Condenser fan(s) are not operating
- Refrigerant flow may be restricted

#### **3.4 A/C System is producing bad odors**

- Check belts
- Check compressor clutch
- Resistor may be burned
- Check for mold in drain pan
- Check for leaking heater core

#### **3.5 Compressor clutch will not engage**

- Confirm thermostat is functioning
- Check for tripped low or high-pressure switches
- Check field coil voltage
- Pressure switch Failure

#### **3.6 Controls operating incorrectly**

- Blown fuse or tripped/bad circuit breaker
- Thermostat defective
- Fan speed switch defective
- Bad Relay

#### **3.7 Evaporator air flow (limited or none)**

No air flow through coil

- Filter dirty or blocked
- Coil dirty or blocked
- Coil frosted over

### **3.7 Evaporator air flow (limited or none) (cont...)**

Evaporator air flow restricted or blocked

- Filter dirty or blocked
- Ensure Evaporator cover is seated and sealed properly
- Coil icing up
- Fan loose, defective or broken
- Incorrect fan rotation, motor running in reverse
- Fan speed relay defective

### **3.8 Heating**

Poor Heating

- Low coolant level
- Coolant heat valve(s) malfunctioning or plugged
- Water pump malfunctioning
- Auxiliary heater malfunctioning

No Heating

- Coolant heat valve(s) malfunctioning or plugged

Constant heating

- Coolant heat valve(s) malfunctioning

### **3.9 Noises and/or vibrations**

*Compressor Noise*

- Compressor or compressor mount bolts loose
- Check belt for tension, wear, or cracks
- Clutch loose, rubbing, or defective
- Check for oil leaks
- Confirm oil level is per manufacturer specs
- Compressor may be damaged due to excessive moisture

*Condenser*

- Condenser assembly bolts loose/missing
- Fan blades broke or missing
- Fan assembly bolts loose/missing
- A/C hoses not secured

*Evaporator*

- Evaporator assembly bolts loose/missing
- Blower motor Inoperative or out of alignment
- Blower Assembly loose or broke

### **3.10 Pressures too High/Low**

Discharge pressure too high

- Refrigerant overcharged
- Condenser coil may be dirty
- Condenser fan motor(s) may have failed
- Skirt mounted condenser may be recirculating hot air from under bus

Discharge pressure too low

- Refrigerant charge may be low
- Compressor may be defective
- TXV may be stuck wide open

Suction Pressure too high

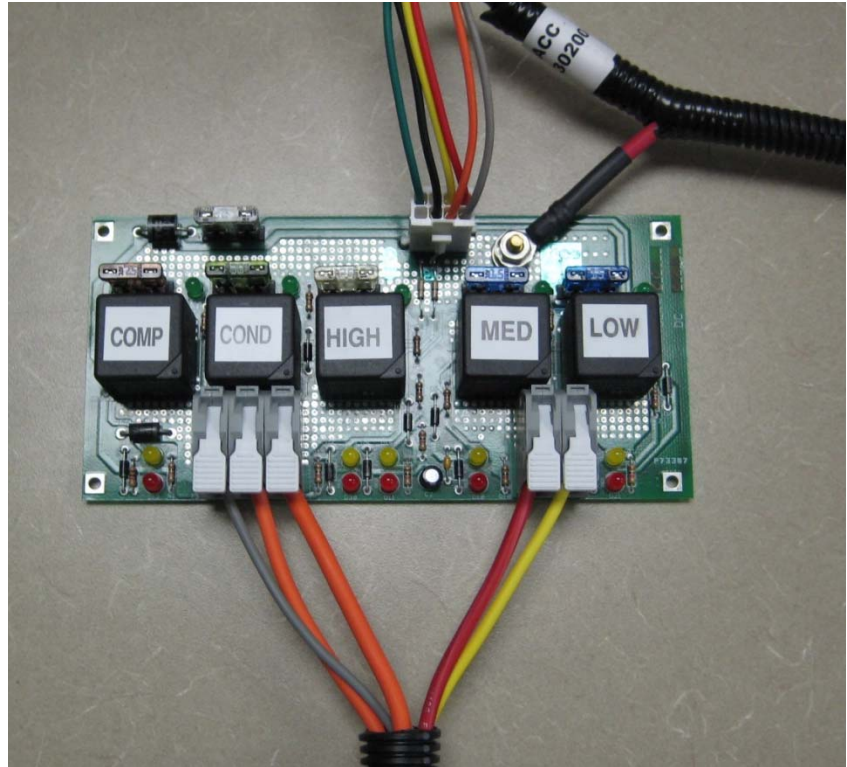
- Compressor may be defective
- TXV may be stuck wide open

Suction Pressure too low

- Air flow may be restricted
- Refrigerant charge may be low
- The TXV or orifice tube may be blocked

# Troubleshooting 5-Relay Board

## 3.11 Relay Board



**Figure 3-1** - 5 Relay Board for the Dual Blower Evaporator (12VDC board shown)

The ACC Climate Control relay board installed on the ACC bus evaporators features ground leg switching. The relay board is either installed during the manufacturing process, or supplied with the systems for remote installation. This means the use of low current to signal the various functions at the relay board and the elimination of a potential fire hazard under the dash or wherever the switch control is located.

To operate the Wago connectors, simply lift the lever; insert a stripped conductor; and lower the lever. The spring pressure assures that terminations are tight and maintenance-free, as well as resistant to vibration and temperature cycling.

The Light Emitting Diodes (LEDs) on the relay board provide an easy to use tool for checking power into and through the board, relays and switches. Their functions are as follows:

**Yellow** LEDs inform the technician that the individual relay (system function) is in operation. i.e. When fan is on Low, low LED will light. When Compressor (temp. switch) activates the Comp/Cond LED will light.

**Green** LEDs inform the technician that the Fuse is open on that individual relay function of the board. The green LEDs will normally be off until that function is selected and an open fuse is detected.

**Red** LEDs inform the technician that the system is in operation when the LEDs are lit.

All three Red Fan LEDs light when any one fan speed is selected.

The Red Comp and Cond LEDs will light when the temp switch is activated.

*(note: when troubleshooting, the Comp/Cond LED may take up to 5-10 seconds to completely turn off.)*

If only Red and Yellow of the selected Relay function is lit and blower is not operational check continuity from board to blower.

If all 3 Red Blower LEDs are lit but the blower is inoperative, check continuity from the blower to ground.

From this information, the technician can determine the next step or steps to be taken to correct a system problem, speeding up repair time and reducing vehicle down time.

**Table 3-1 Evaporator Current Draw**

Model		Voltage	Amp Draw
			High
22022	23022	13.5v	19 Amps
22023	23023	13.5v	30 Amps
22035	23035	13.5v	22 Amps
22036	23036	13.5v	30 + 15 Amps
--	23044	13.5v	22 Amps
--	23046	13.5v	22 Amps
22047	23047	13.5v	30 Amps
--	23048	13.5v	12 Amps
--	23049	13.5v	20 Amps
--	23050	13.5v	11 Amps
--	23051	13.5v	22 Amps
--	23052	13.5v	22 Amps

**Table 3-2 Condenser Current Draw**

Model	Voltage	Amp Draw
25031	13.5v	22 Amp
25032	13.5v	11 Amp
25033	13.5v	22 Amp
25034	13.5v	22 Amp
25035	13.5v	11 Amp
25039	13.5v	22 Amp
25042	13.5v	11 Amp
25045	13.5v	22 Amp
25046	13.5v	22 Amp
25047	13.5v	22 Amp

**Table 3-3 Compressor Current Draw**

Model	Voltage	Amp Draw
TM-16	13.5v	5 Amp Max
TM-21	13.5v	5 Amp Max
TM-31	13.5v	7 Amp Max
SD7	13.5v	5 Amp Max
SD	13.5v	5 Amp Max

# Section 4

## Service

### 4.1 Preventative Maintenance Schedule

System		Schedule
on	off	
<b>4.1.1 Daily Pre-trip Inspection and Maintenance</b>		
	X	Check condition and tension of drive belts. (refer to 4.X)
X		Check for sufficient air flow at evaporator air outlet. Inspect return air filter if air flow is less than normal.
X		Check set point temperature on digital thermostat to ensure proper cooling.
X		Confirm all evaporator and condenser fans are operating.
X		Check for water dripping from the evaporator or air ducts.
X		Check for unusual noises at the engine, evaporator, and condenser.
<b>4.1.2 Weekly Inspection</b>		
		Conduct Daily Pre-trip Inspection.
	X	Check air filter – clean or replace as needed.
	X	Check condenser and evaporator coils for cleanliness - clean if needed.
<b>4.1.3 Monthly Inspection</b>		
		Conduct Weekly Inspection.
X		Run system for 5 minutes.
	X	Clean or replace return air filter.
	X	Check compressor belt for wear and proper tension.
X		Confirm sufficient battery voltage.
	X	Inspect wiring harness and relay board to ensure electrical integrity. (See Section X.X)
<b>4.1.4 Quarterly Inspection</b>		
		Conduct Monthly Inspection.
	X	Inspect all components including evaporator and condenser motors.
	X	Check and clean Evaporator and Condenser Coil.
	X	Check securement and condition of hoses and harness.
X		Check for proper drainage of evaporator drain lines.
X		Check blower operation.
	X	Check all mounting hardware on evaporator, condenser and compressor, tighten as necessary. (4.xx)
<b>4.1.5 Semi-Annual Inspection</b>		
		Perform quarterly and monthly inspections.
X		Check system pressures.
	X	Open bus heater valves (winter).
	X	Close bus heater valves (spring).
	X	Remove or install optional winter guard kit.
<b>4.1.6 Annual Inspection</b>		
		Conduct Quarterly Inspection.
	X	Clean evaporator and drain pan.
		Perform manifold gauge check.
X		Check voltages at motors, replace if necessary.
	X	Check all hose connections tighten (see 4.xx) and/or secure as necessary.
	X	Check and tighten any connections at the electrical boards and at the battery. Clean if needed.
	X	Remove and Replace compressor belt.

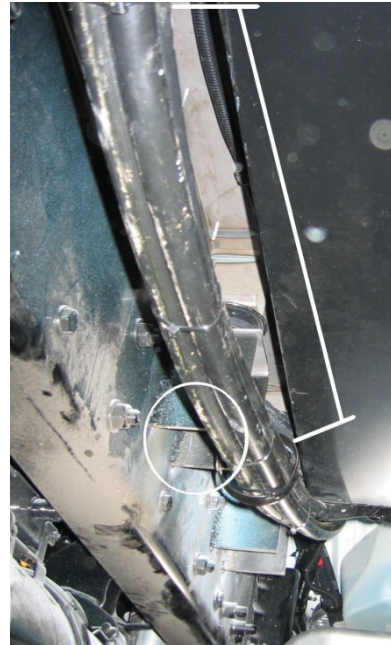
## 4.2 Hose Routing

- a. **Tape or cap hose ends before routing hoses.** For proper performance it is important to keep contamination out of the hoses.
- b. Avoid sharp edges. Use trim lock or protectant hose sleeves where necessary.

**Figure 4-1** – Proper Hose Routing and Clamps



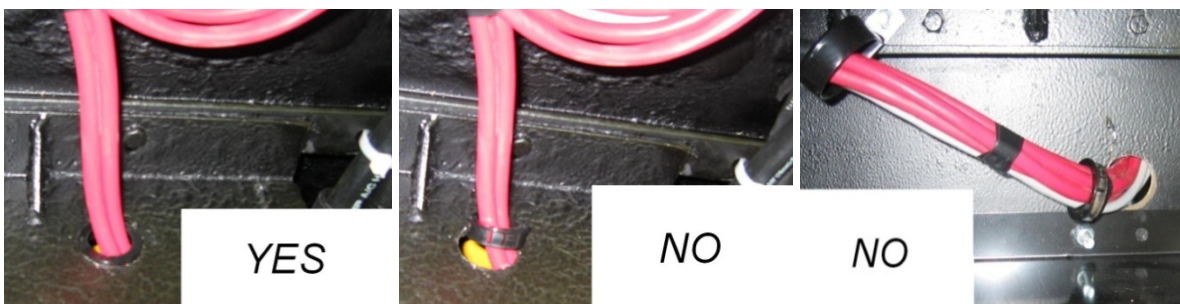
**Figure 4-2** – Proper Hose Routing and Clamps



**Figure 4-3** - Example of Bad Hose Routing. Hoses are routed up against sharp edges. Hoses are unsupported for too long of a distance and droop noticeably. Hose clamp is too big.

- c. Use grommets when passing through skin, body, floor, and other areas. When using grommets be sure that they are secure. If a grommet is loose and slips out of the passage the hoses and or wiring harness may be exposed to sharp edges causing eventual shorts or ruptures.

**Figure 4-4** – Hose Routing and Grommets



- d. Do not allow for “traps” in refrigeration hose. A trap is basically any sagging or dipping of the hose that will allow oil to pool in the hose and not be drawn through by the refrigerant.

Take special note that the hoses do not fall below the accumulator.

**Figure 4-5** - Refrigeration Line trap



- e. Insulate when near exhaust and other hot areas (turbos, engine area). Rule of thumb is keep hoses at least 6 inches away from any heat source(s).

**Figure 4-6 – Heat Shield**



- f. Avoid excessive bends in hose causing crimping and restrictions. As a rule of thumb the bend radius should not be less than 4-5 times the thickness of the diameter of the hose. For instance if you have a 1 inch *diameter* hose the bend *radius* should be no less than 4 to 5 inches.

**Figure 4-7 - Excessive Hose Bends**



- Avoid tight bends that create kinks.
- Avoid flattening hoses via wraps or hose clamps.



- g. Make sure drain hoses are at a proper slope angle for drainage.

**Figure 4-8 - Drain Hose**



The drain hose must be at a continuous downward slope. Any sagging of the tube or any uphill drain path will cause pooling of water and improper operation of the AC unit.

- h. Install “Kazoo” flaps on ends of drain hose.

Both Kazoo and hose clamp must be installed on the end of drain hose.

Improper installation or not installing Kazoo will result in poor or no draining. Water will then build up inside the drain pan and slosh while driving causing the unit to leak water.

**Figure 4-9 - Kazoo Installation**



*NO*

*YES*

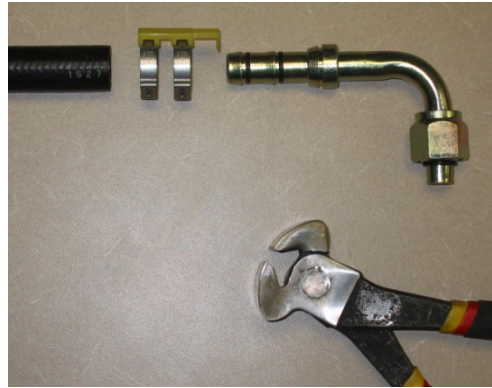
- i. Install Line stakes every 12-18" along hose routing. Be sure the line stakes are sized correctly for the size and quantity of hoses being secured. Loose line stakes cause hose vibration and undue wear. Tight line stakes pinch hoses cutting off the proper flow thus limiting performance. Use appropriately sized Zip Ties halfway between each line stake to keep hoses securely held together and in place. This applies both to hoses and wire harness routing.
- j. Be sure to secure hoses coming out of both the Condenser and Evaporator with line stakes no more than 12-18" from the fittings. (This is to prevent loosening of the fitting due to vibration and/or hose movement)

**Figure 4-10 - Hose Routing Examples**



**Figure 4-11 - ATCO Air-O-Crimp Hose fittings**

- A) Cut the hose to the correct length.  
Ensure that the cut is made square to the length of the hose.



- B) Place the clamp assembly onto the hose with the locator tab touching the end of the hose as shown.

- C) Assemble the fitting so that the hose and bead locator tab touch up against the bead on the fitting.

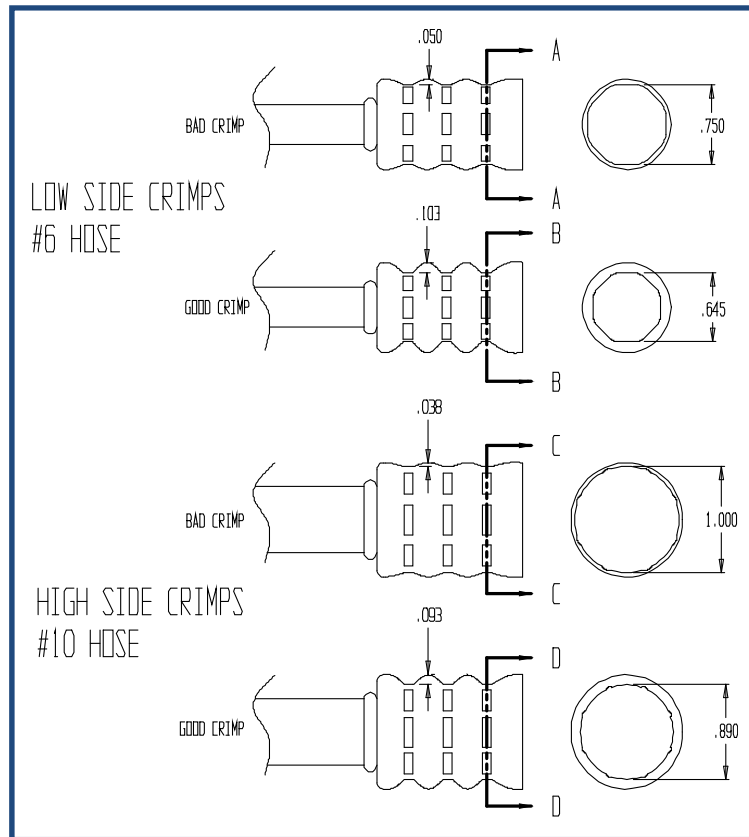


- D) Use crimp pliers to crimp each clamp separately.  
When clamping be sure you have metal to metal contact of the clamp ear. Once released there will be a slight amount of spring back.

**Failure to fully close the clamp may result in refrigerant leaks.**

***Do Not Use Oil on the AN type fittings***

**Figure 4-12 - Hose Crimp Examples**



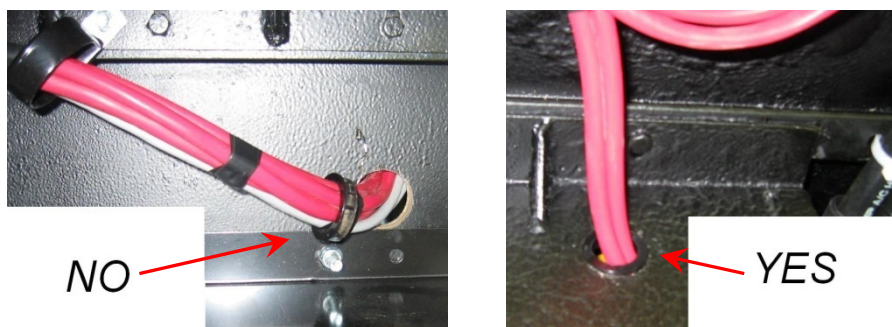
**4.3 Harness Routing**

- a. Avoid sharp edges!!  
When working around any OEM Harness be sure that the OEM harness is not forced against any sharp edges.
- b. Use grommets when passing through skin, body, floor, and other areas. When using grommets be sure that they are secure. If a grommet is loose and slips out of the passage the hoses and or wiring harness may be exposed to sharp edges causing eventual shorts or ruptures.

**Figure 4-13 – Hose Routing and Grommets**



**Figure 4-14 – Wire Harness Routing and Grommets**



#### 4.4 Accumulator Installation

- a. Accumulator – mount upright between evaporator outlet and compressor inlet.  
*Pay attention to the flow direction* during installation.  
Use colored tape to differentiate between units on a dual system application.

Figure 4-15 - Accumulator mounting



- i. The 'IN' marking on the accumulator is the *IN* from the evaporator.
- ii. The 'OUT' marking on the accumulator is the *OUT* towards the compressor.

#### 4.5 Evaporator Installation

- a. Use brackets supplied in the installation kit.
- b. Measure twice to confirm center line and proper location for brackets before mounting.
- c. Rivet or bolt the brackets to ceiling.  
Be sure to rivet through the cross bows.
- d. *DO NOT* attach to ceiling skin only.
- e. Line stake Hoses no more than 18" from fittings to prevent fittings loosening due to vibrations.  
Use Zip Ties accordingly.

Figure 4-16 - Rear Mount Evaporator Brackets



Figure 4-17 - Side Mount Evaporator Brackets



- f. Be sure to check for correct installation of the orifice tube.

Figure 4-18 - Orifice Tube



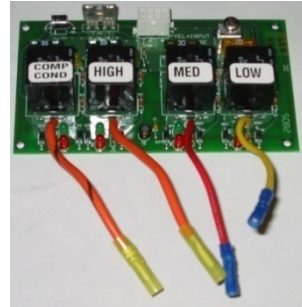
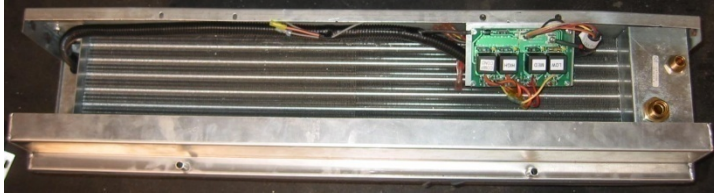
**\*\*ATTENTION\*\*ATTENTION\*\*  
PLEASE CHECK FOR ORIFICE TUBE**



## 4.6 Relay Board Installation

Many of our units come with the Relay board mounted right on the unit.

**Figure 4-19** – Relay Board

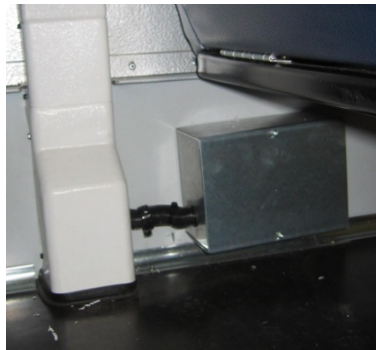


**Figure 4-20** – Relay Board Electrical Panel Mounting

In other cases the board comes separate for remote mounting of the relay board. For serviceability later on we recommend the board be mounted in a location that is protected yet easily accessible. Typically it is mounted near the Evaporator unit if the cover and space allows or in the electrical panel of the vehicle.

Be sure that there is sufficient space for the board and harness when mounting the board remotely to avoid crushing the wiring and/or shorting the circuit board.

**Figure 4-21** - Relay Board Remote Mounting



## 4.7 CCOT Air Conditioning Protection System

Cycling Clutch Orifice Tube (CCOT) Air Conditioning Protection System offers full air conditioning control, protection, and diagnostics. Its microprocessor-based intelligence offers year-round compressor lubrication and cooling fan coordination to prevent fan cycling at idle. The system also aids in preventive maintenance and troubleshooting with its easy-to-read diagnostic fault codes.

For installation instructions see the CCOT Air Conditioning Protection System manual.

Having this system installed on your new System vehicle will save you hundreds or even thousands of dollars in A/C maintenance, repair and downtime over your years of ownership.

### System Features

- Prevents rapid cycling under improper pressure conditions.
- Extends life of clutch, compressor and hoses.
- Prevents premature damage to clutch coil and plates.
- Reduces stress on starter motor and batteries.
- Installs quickly and easily with a few simple connections.

**Figure 4-22** - CCOT Unit



### System Features Continued...

- Provides rapid payback in maintenance cost savings.
- Prevents clutch damage from rapid cycling.
- Prevents clutch slippage from low voltage or over voltage.
- Improves A/C efficiency at idle.
- Eases troubleshooting with easy-to-interpret fault codes.
- Enhances preventive maintenance.
- Reduces expensive, unscheduled repairs.
- Detects A/C problems even when A/C is off.

**Testing the System** - To ensure that the system is working properly, please complete the following tests. If the module displays blink codes or the module is not functioning, consult the troubleshooting section of the CCOT Air Conditioning Protection System manual.

#### Test #1

1. Turn the vehicle ignition to the "On" position and be certain that the A/C controls are in the "Off" position. The green light on the control module should be illuminated.
2. After 15 seconds, the A/C compressor should engage.
3. After another 15 seconds, the A/C compressor clutch should disengage.
4. Turn the A/C switch on; listen for the clutch to engage.
5. Turn the A/C switch off; listen for the clutch to disengage.

#### Test #2

1. With ignition off, disconnect the low side pressure switch.
2. Turn on ignition. The red light on the module will blink four times within 15 seconds.
3. Reconnect the low side pressure switch.
4. Clear the error code by cycling ignition four times (one second on/one second off) and the green light will reappear.

If the control module has passed all of these tests, it has been successfully installed.

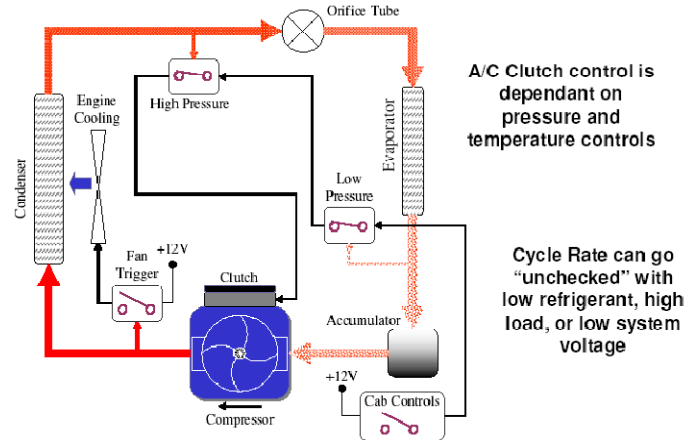
## 4.8 Compressor Installation

- a. Always follow instructions in the mounting kit.
- b. Use a straight edge to verify belt and pulley alignment.
- c. Make sure all bolts are properly tightened and torqued.
- d. Be careful where the Hoses and Compressor clutch wire are routed in the engine area.

**Figure 4-24 - Compressor Mounting**



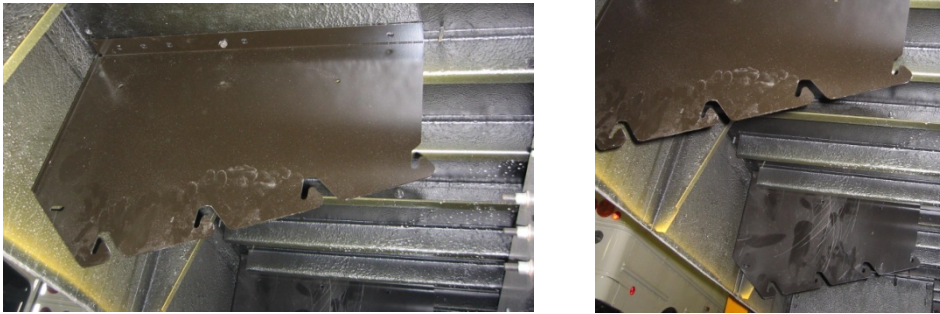
**Figure 4-23 – CCOT Air Conditioning Protection**



## 4.9 Condenser Installation

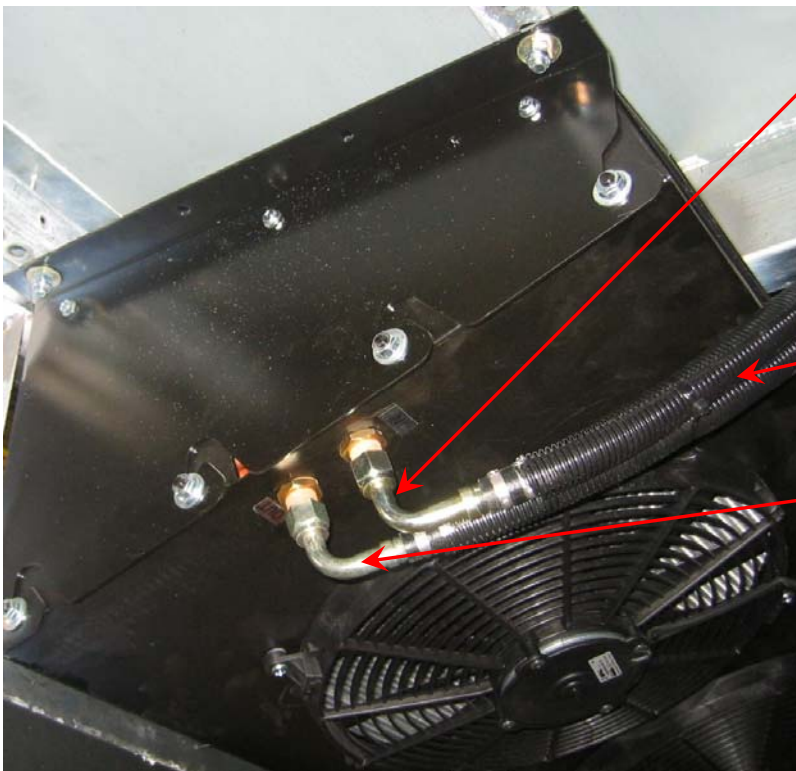
- a. Use brackets supplied in the installation kit.

**Figure 4-25 - Condenser Brackets**



- b. Avoid mounting behind rear wheel if at all possible.
- c. The “In” tube (Large hose) should be at the higher point on the condenser than the “Out” tube (small hose.)

**Figure 4-26 - Condenser Bracket**



**INLET** – Larger hose on *Top Fitting* on condenser. This hose runs to the discharge side of the compressor.

Hose is labeled  $\frac{1}{2}$ " (13mm). Outside diameter of hose is 0.795" (20mm).

Line Stake hoses within 18" of fittings to prevent fittings loosening due to vibrations. Use Zip Ties accordingly

**OUTLET** – Smaller hose to *Bottom Fitting* on condenser. This hose runs to the inlet of the evaporator. (Orifice Tube)

Hose is labeled  $\frac{13}{32}$ " (10mm). Outside Diameter of the hose is 0.670" (17mm).

- d. Avoid mounting near exhaust.
- e. Mount on driver's side (street side) of bus whenever possible.
- f. When installing the ground wire make sure of a positive ground by “scarring” the surface for the connection.

#### 4.10 Refrigerant Evacuation and Charging (R134a).

- a. Check for leaks with a vacuum or Nitrogen charge.
- c. Evacuate to 400 to 700 microns – should hold for 20 minutes.
- d. Use proper oil with proper oil charge.
- e. Amount of refrigerant charge will be dependent on the A/C system used and the required hose lengths.

Figure 4-27 - System Evacuation



***If not provided, please contact Valeo Thermal Commercial Vehicles North America, Inc. for current System Charge Chart***

#### 4.11 Cleaning an Open System

When the AC system is opened for service due to compressor failure issues:

- a. **Flush all components** in the system from both directions.
- b. **All components need to be flushed independently**, which means disconnecting all AC hoses.
- c. **Flushing from both directions** helps to make sure that any foreign materials in the hoses or coils can be dislodged and purged from the system.
- d. **Remove the expansion device**, flush and inspect for foreign materials trapped in the orifice. It is advisable to replace the expansion device to safe guard against re-using a part that may have an undetected blockage.
- e. **Replace the accumulator/drier**. This should be done anytime the system is opened for any length of time and always when a compressor is replaced.
- f. **Never re-use O-rings**. Always put oil (we recommend mineral oil) on the O-rings when installing fittings. Lubricating the O-rings helps eliminate the possibility of cutting them during installation and tightening of the fittings.
- g. **All fittings need to be properly torqued** to insure proper O-ring compression seating on the fitting pilot. (see Table 4.2 for Torque specs)

#### 4.12 Torque Specifications

All Heater Hose Clamps are to be torqued to 30 in.lb.

All refrigerant hose fittings must be torqued to the specifications listed in Table 4-2, 3 & 4.

**Table 4-2 Fitting Torque Specifications**

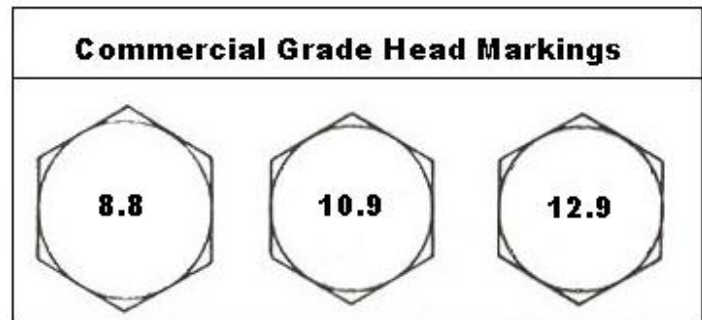
<b>Torque specifications for Non-Metric fittings</b>					
<b>Tubing Size</b>		<b>Thread</b>	<b>ft-lb</b>	<b>N-m</b>	
#6	0.375 in.	0.625	11-13	14.91-17.63	
#8	0.500 in.	0.750	15-20	20.34-27.12	
#10	0.625 in.	0.875	21-27	28.47-36.61	
#12	0.750 in.	1.063	28-33	37.96-44.74	

<b>Torque Specifications for Metric refrigerant fittings. ( for use with steel or aluminum fittings )</b>					
<b>Tubing Size</b>		<b>Steel To Aluminum</b>		<b>Steel to Steel</b>	
<b>Dia. (nom)</b>	<b>Thread</b>	<b>ft-lb</b>	<b>N-m</b>	<b>ft-lb</b>	<b>N-m</b>
0.375	M-16 x 1.5	5-7	7-10	30-35	40-48
0.375	M-18 x 1.5	11-18	15-24	30-35	40-48
0.500	M-20 x 1.5	15-26	20-35	30-35	40-48
0.625	M-22 x 1.5	21-35	28-47	30-35	40-48
0.625	M-24 x 2.0	24-38	32-52	30-35	40-48
0.750	M-27 x 2.0	28-42	38-57	30-35	40-48

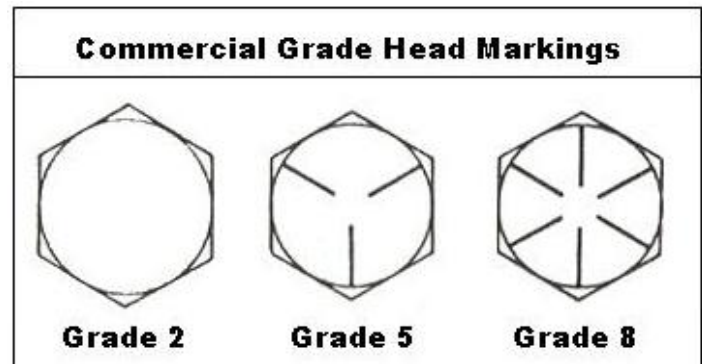
**Table 4-3 Metric Bolt Torque Specifications**

<b>Bolt Size Dia. mm</b>	<b>Torque ft.lb. Grade 8.8</b>	<b>Torque ft.lb. Grade 10.9</b>	<b>Torque ft.lb. Grade 12.9</b>
6	7	9	9
7	10	13	18
8	18	23	27
10	30	45	50
12	55	75	95
14	85	120	145
16	130	175	210



**Table 4-4 U.S. Bolt Torque Specifications**

<b>Bolt Size Dia. mm</b>	<b>Torque ft.lb. Grade 8.8</b>	<b>Torque ft.lb. Grade 10.9</b>	<b>Torque ft.lb. Grade 12.9</b>
¼-20	5	7	11
5/16-18	10	15	22
3/8-16	18	30	40
7/16-14	30	45	65
7/16-20	32	50	70
½-13	45	70	95
½-20	50	75	110
5/8-11	82	135	190
5/8-18	93	155	215



**Table 4-5 Conductor Sizing Table – Maximum 10% Voltage Drop at 12VDC**

12V System		Feet									
Amps	Watts	3	5	7	10	15	20	25	30	35	40
0 to 5	30	18	18	18	18	18	18	18	18	18	16
6	36	18	18	18	18	18	18	16	16	16	16
7	42	18	18	18	18	18	18	16	16	16	16
8	48	18	18	18	18	18	16	16	16	16	14
10	60	18	18	18	18	16	16	16	14	14	14
11	66	18	18	18	18	16	16	14	14	14	14
12	72	18	18	18	18	16	16	14	14	14	12
15	90	18	18	18	18	14	14	12	12	12	12
18	108	18	18	16	16	14	14	12	10	10	10
20	120	18	18	16	16	14	12	10	10	10	10
22	132	18	18	16	16	12	12	10	10	10	10
24	144	18	18	16	16	12	12	10	10	10	10
30	180	18	16	16	14	10	10	10	10	10	8
40	240	18	16	14	12	10	10	8	8	8	8
50	300	16	14	12	12	10	10	8	8	6	6
100	600	12	12	10	10	6	6	4	2	2	2
150	900	10	10	8	8	4	4	2	2	2	2

*Disclaimer:* While ACC has tried to ensure that the data contained in this table is accurate, ACC cannot guarantee its accuracy. Please confirm the power consumption and needed conductor sizes for your individual application.

**Table 4-6 Multiple Conductor Combinations**

Terminal Size	Allowable Conductor Combination
18 ga.	1-18 ga., 2-20 ga.
16 ga.	1-16 ga., 2-18 ga.
14 ga.	1-14 ga., 2-16 ga., 3-18 ga.
12 ga.	1-12 ga., 2-14 ga., 3-16 ga., 4 or 5-18 ga.
10 ga.	1-10 ga., 2-12 ga., 3-14 ga., 4 or 5-16 ga.

**Table 4-7 R-134a Temperature – Pressure Chart**

Temperature		Vacuum			Temperature		Vacuum		
F	C	Psig	Kg/cm <sub>2</sub>	Bar	F	C	Psig	Kg/cm <sub>2</sub>	Bar
-40	-40	14.6	37.08	0.49	30	2	26.1	1.84	1.80
-35	-37	12.3	31.25	0.42	32	1	27.8	1.95	1.92
-30	-34	9.7	24.64	0.33	34	0	29.6	2.08	2.04
-25	-32	6.7	17.0	0.23	36	1	31.3	2.20	2.16
-20	-29	3.5	8.89	0.12	38	2	33.2	2.33	2.29
-18	-28	2.1	5.33	0.07	40	3	35.1	2.47	2.42
-16	-27	0.6	1.52	0.02	45	4	40.1	2.82	2.76
-14	-26	0.4	0.03	0.03	50	7	45.5	3.20	3.14
-12	-24	1.2	0.08	0.08	55	10	51.2	3.69	3.53
-10	-23	2.0	0.14	0.14	60	13	57.4	4.04	3.96
-8	-22	2.9	0.20	0.20	65	16	64.1	4.51	4.42
-6	-21	3.7	0.26	0.26	70	18	71.1	5.00	4.90
-4	-20	4.6	0.32	0.32	75	21	78.7	5.53	5.43
-2	-19	5.6	0.39	0.39	80	24	86.7	6.10	5.98
0	-18	6.5	0.46	0.45	85	27	95.3	6.70	6.57
2	-17	7.6	0.53	0.52	90	29	104.3	7.33	7.19
4	-16	8.6	0.60	0.59	95	32	114.0	8.01	7.86
6	-14	9.7	0.68	0.67	100	35	124.2	8.73	8.56
8	-13	10.8	0.76	0.74	105	38	135.0	9.49	9.31
10	-12	12.0	0.84	0.83	110	41	146.4	10.29	10.09
12	-11	13.2	0.93	0.91	115	43	158.4	11.14	10.92
14	-10	14.5	1.02	1.00	120	46	171.2	12.04	11.80
16	-9	15.8	1.11	1.09	125	49	184.6	12.98	12.73
18	-8	17.1	1.20	1.18	130	52	198.7	13.97	13.70
20	-7	18.5	1.30	1.28	135	54	213.6	15.02	14.73
22	-6	19.9	1.40	1.37	140	57	229.2	16.11	15.80
24	-4	21.4	1.50	1.48	145	60	245.6	17.27	16.93
26	-3	22.9	1.61	1.58	150	63	262.9	18.48	18.13
28	-3	24.5	1.72	1.69	155	66	281.1	19.76	19.37

*If not provided, please contact Valeo Thermal Commercial  
Vehicles North America, Inc. for current System Charge Chart*

## Section 5

### Diagrams

Page Number	Diagram
5-2	Plumbing Diagram - 30/40/53 Tie-In with Auxiliary Condenser
5-3	Wiring Diagram - Front/Rear 40 3SP Tie-In
5-4	Wiring Diagram - Front/Rear 40 3SP
5-5	Wiring Diagram - Front/Rear 53 3SP
5-6	Wiring Diagram - Front/Rear 86 3SP
5-7	Wiring Diagram - Front/Rear 86 3SP Single Blower
5-8	Wiring Diagram - Front/Rear 86 3SP Dual Blower
5-9	Evaporator Assembly – Basic Ceiling
5-10	Cover Assembly - Basic In-Wall
5-11	Condenser Assembly - Skirt mount
5-12	Wiring Schematic - CCOT Air Conditioning Protection System - Single Evaporator
5-13	Wiring Schematic - CCOT Air Conditioning Protection System - Dual Evaporator
5-14	Parallel Flow Condenser Assembly - 25057 Skirt mount
5-15	Rooftop Condenser Assembly – 25058 Dual Loop Condenser
5-16	3104257715B - Wiring Diagram - MDS
5-18	30200509A - 12" Digital Thermostat Relay Harness

Figure 5-1 Basic A/C Setup

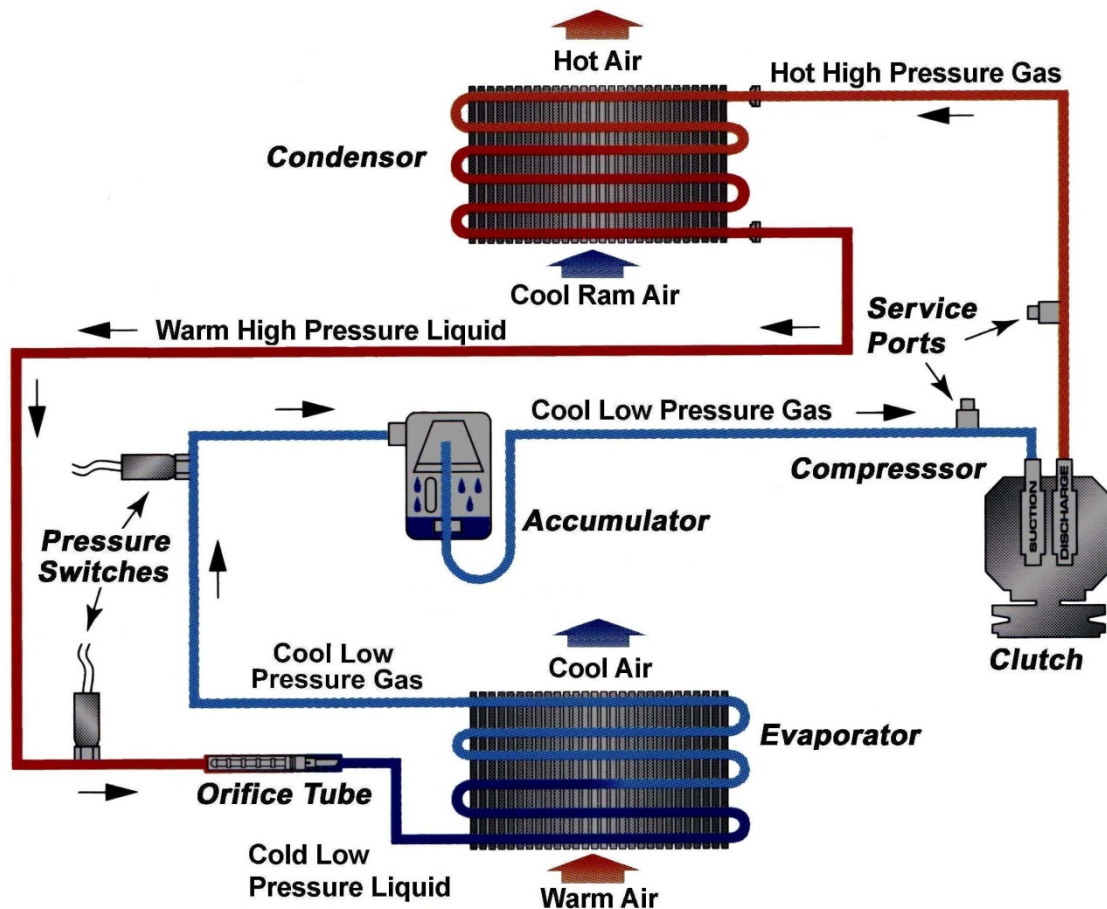
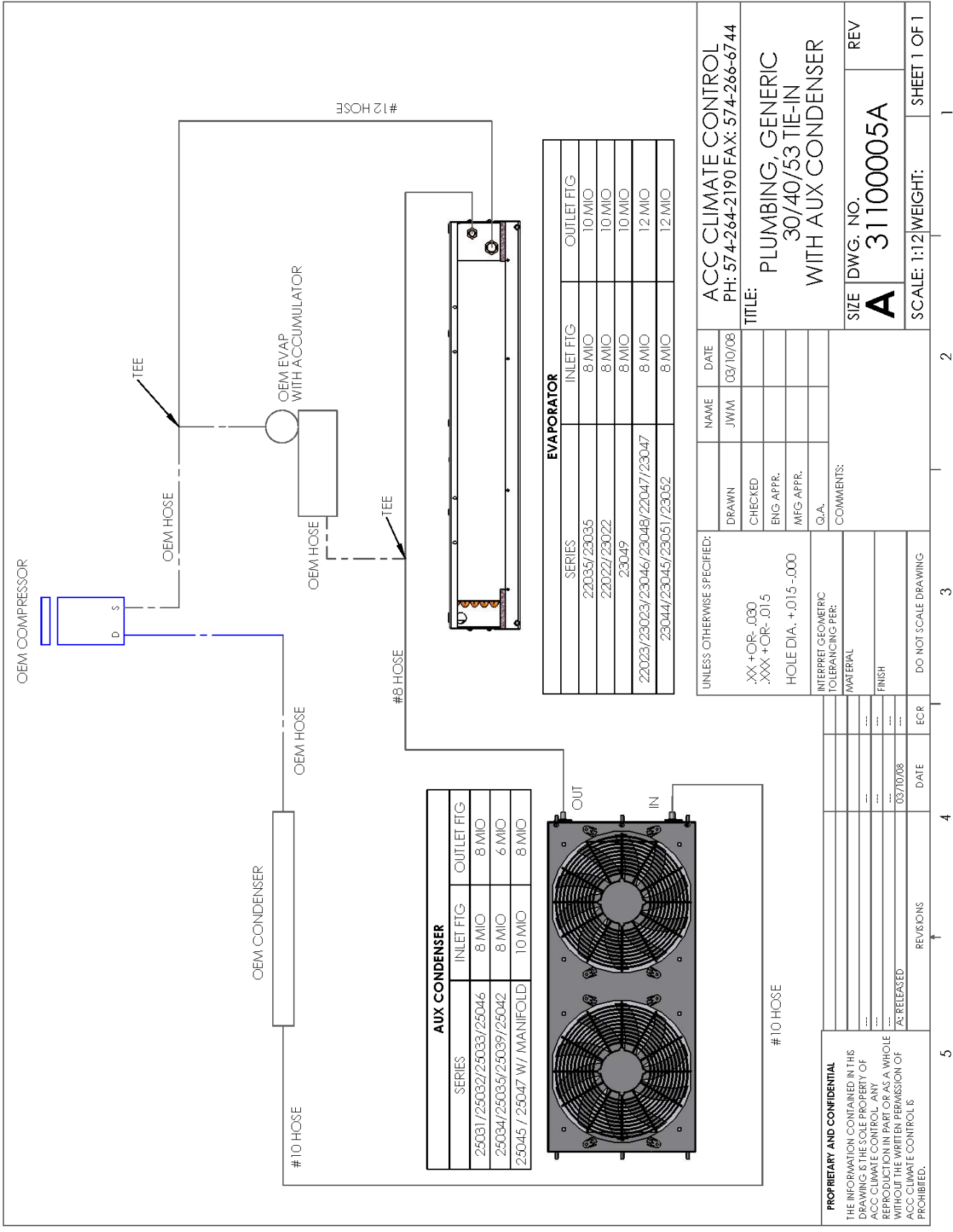


Figure 5-2 Plumbing Diagram - 30/40/53 Tie-In with Auxiliary Condenser



UNLESS OTHERWISE SPECIFIED:		DRAWN	NAME	DATE	ACC CLIMATE CONTROL PH: 574-264-2190 FAX: 574-266-6744 TITLE: PLUMBING, GENERIC 30/40/53 TIE-IN WITH AUX CONDENSER
.XX +OR- .030	CHECKED	JWM	03/10/08	REV	
.XXX +OR- .015	ENG APPR.			A	
HOLE DIA. +.015-.000	MFG APPR.			31100005A	
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.			SCALE: 1:12	
MATERIAL	COMMENTS:			WEIGHT:	SHEET 1 OF 1
FINISH					
DO NOT SCALE DRAWING					

**PROPRIETARY AND CONFIDENTIAL**  
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF ACC CLIMATE CONTROL. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF ACC CLIMATE CONTROL IS PROHIBITED.

REVISIONS	DATE	ECR
A: RELEASED	03/10/08	

Figure 5-3 Wiring Diagram - Front/Rear 40 3SP Tie-In

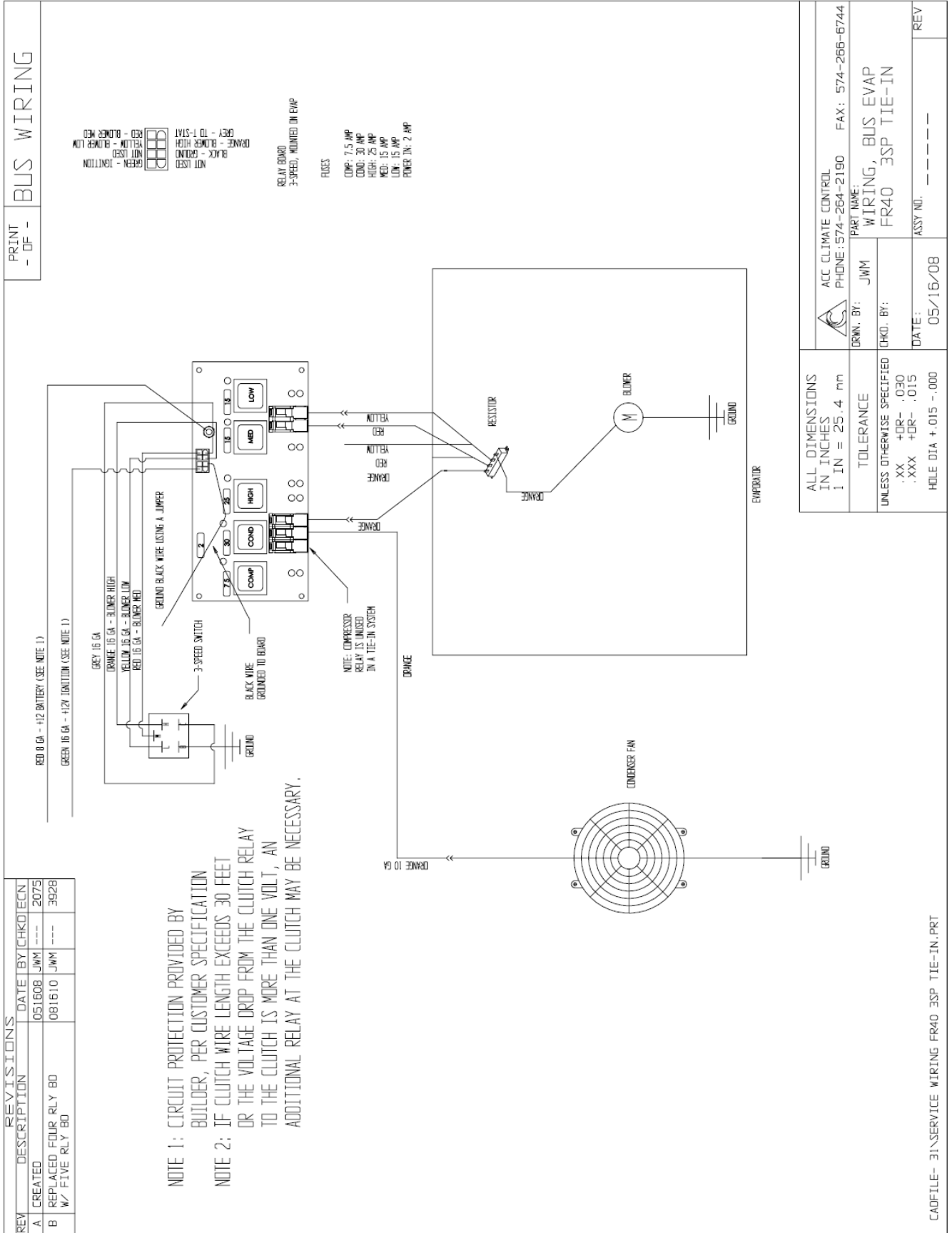


Figure 5-4 Wiring Diagram - Front/Rear 40 3SP

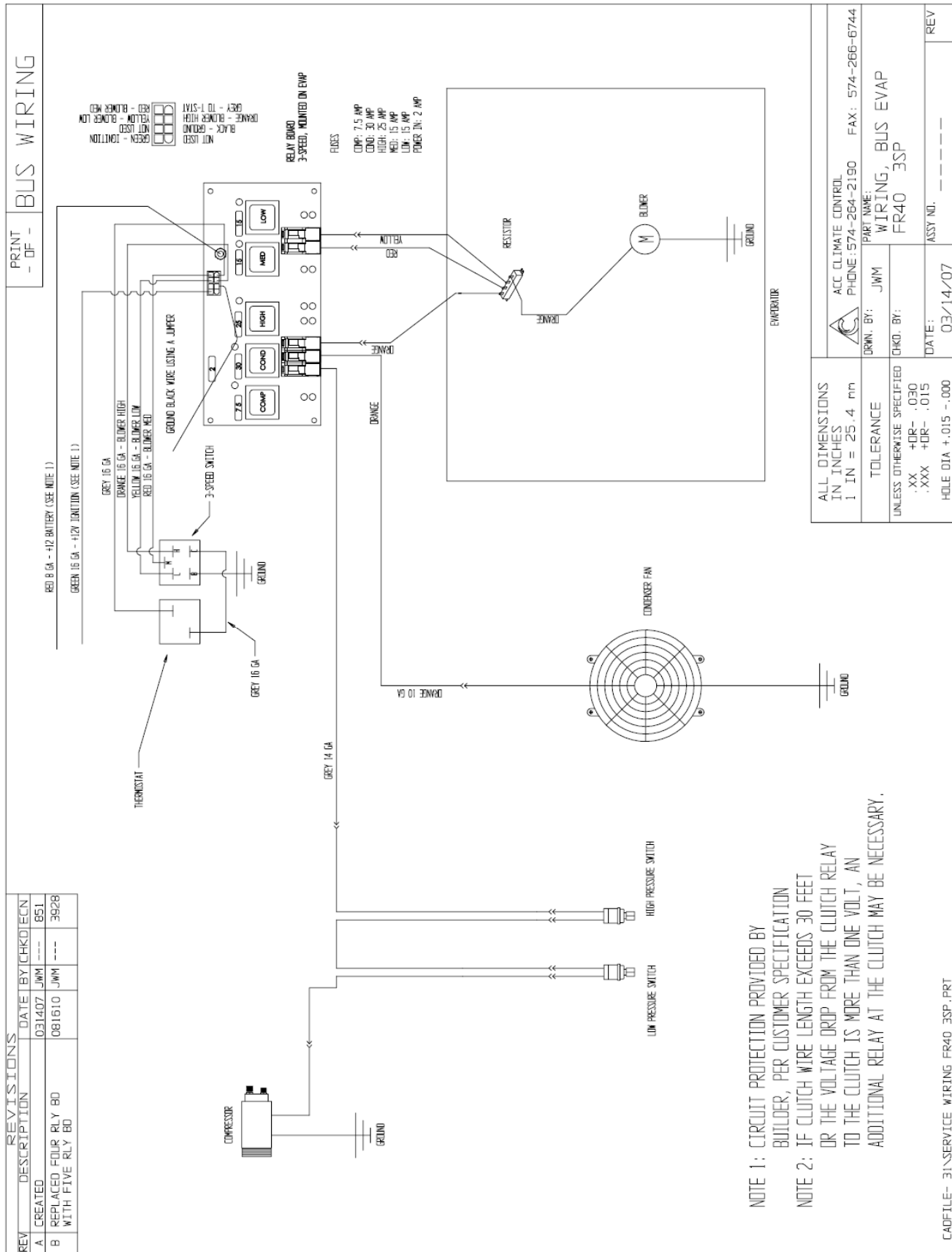
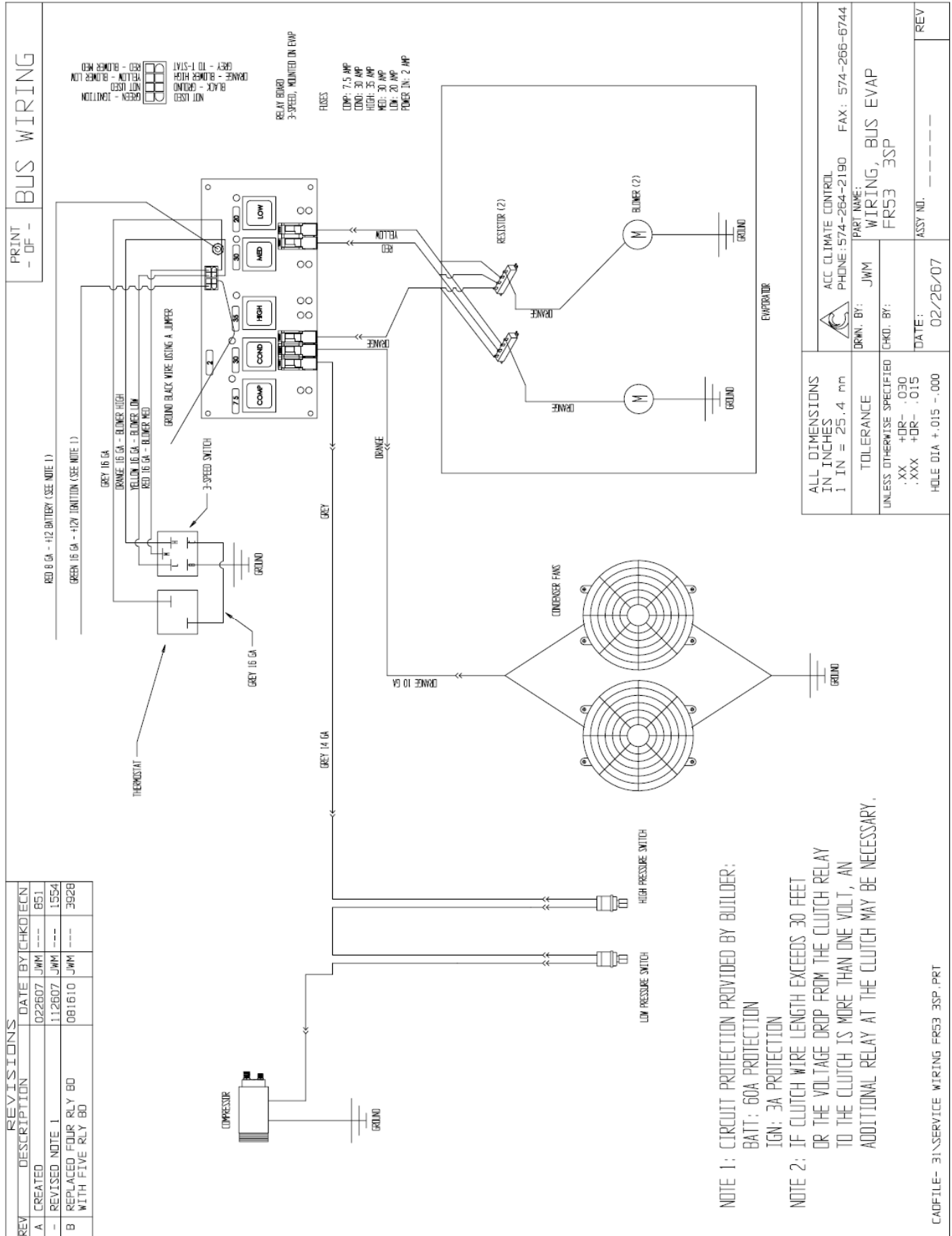


Figure 5-5 Wiring Diagram - Front/Rear 53 3SP

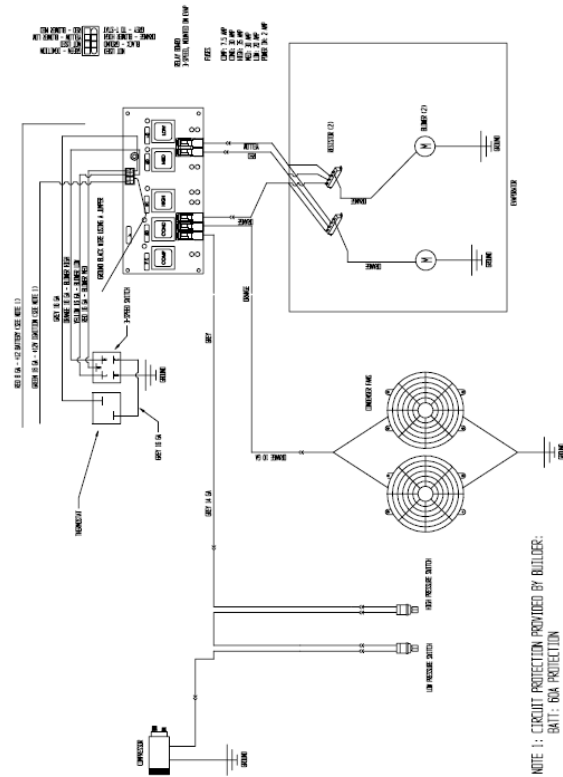
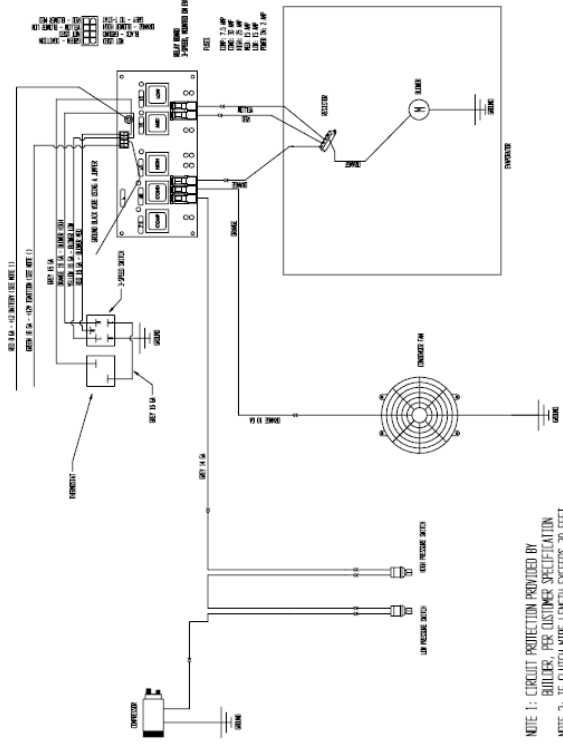


ALL DIMENSIONS IN INCHES 1 IN = 25.4 mm	ACC CLIMATE CONTROL PHONE: 574-264-2190 FAX: 574-266-6744
TOLERANCE UNLESS OTHERWISE SPECIFIED .XX +DR- .030 .XXX +DR- .015	DRAWN BY: JMM PART NAME: WIRING, BUS EVAP FR53 3SP
HOLE DIA +.015 -.000	DATE: 02/26/07
	ASSY NO: ---
	REV

Figure 5-6 Wiring Diagram - Front/Rear 86 3SP

PRINT - OF - BUS WIRING

REV	DESCRIPTION	DATE	BY	CHKD	ECN
A	CREATED	031607	JMM	---	851
B	REPLACED FOUR RLY B0 WITH FIVE RLY B0	081610	JMM	---	3928



ALL DIMENSIONS IN INCHES 1 IN = 25.4 mm	ACC CLIMATE CONTROL PHONE: 574-264-2190 FAX: 574-266-6744
TOLERANCE UNLESS OTHERWISE SPECIFIED .XX +DR-.030 .XXX +DR-.015 HOLE DIA +.015 -.000	DRWN. BY: JMM PART NAME: WIRING, BUS EVAP CHKD. BY: FR86 3SP DATE: 03/16/07 ASSY NO. ---

CADFILE- 31\SERVICE WIRING FR86 3SP.PRT



Figure 5-8 Wiring Diagram - Front/Rear 86 3SP Dual Blower

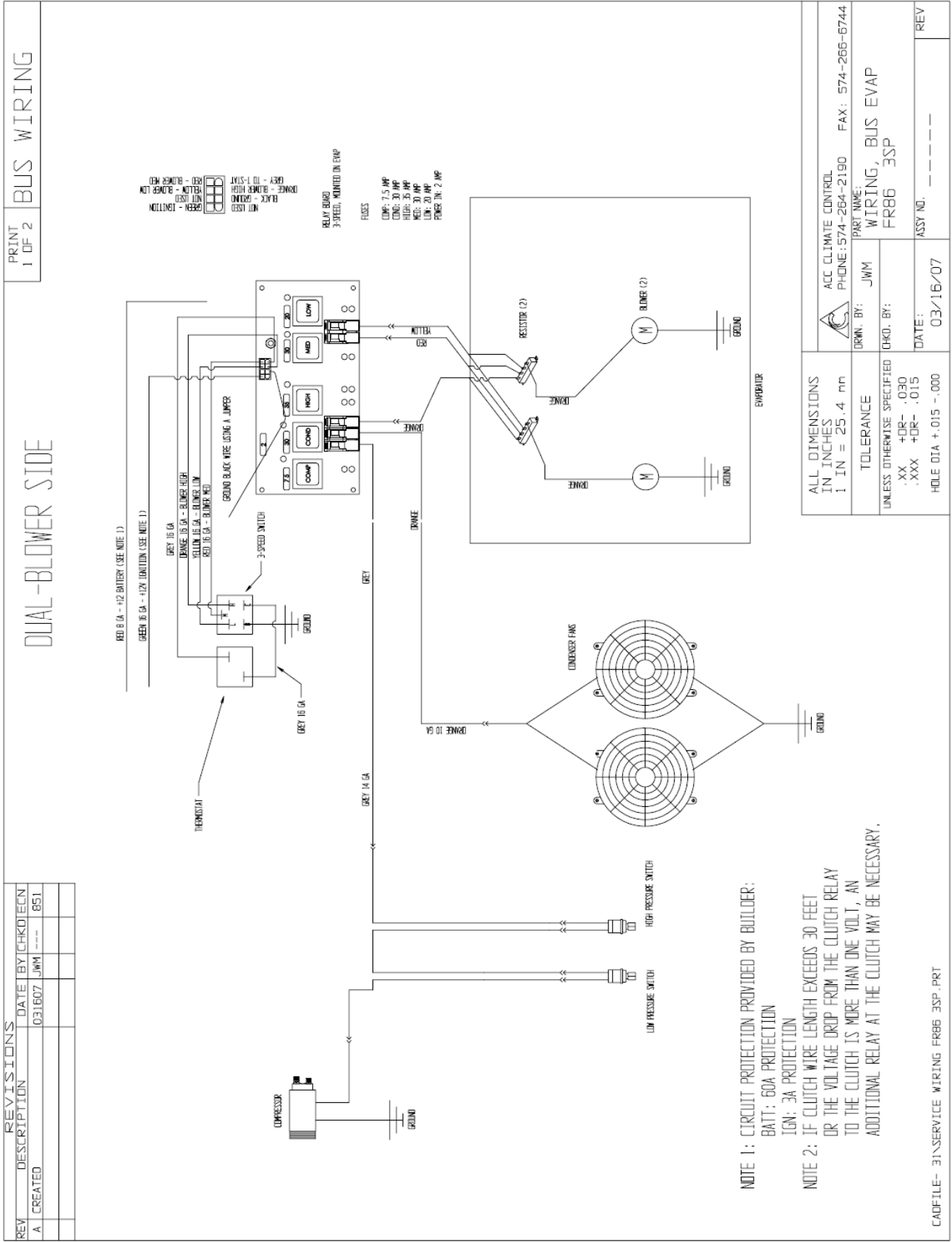


Figure 5-9 Evaporator Assembly - Basic Ceiling

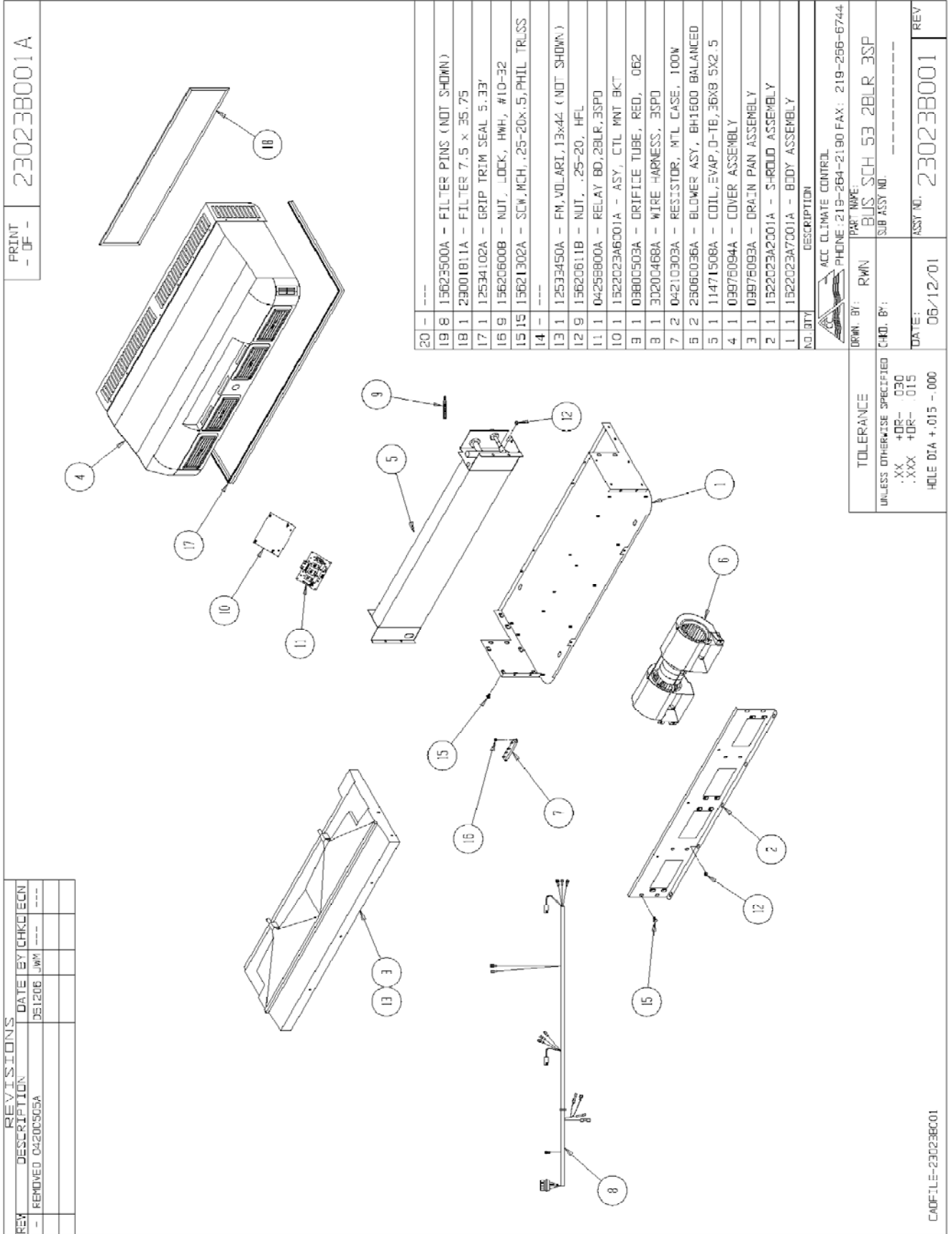


Figure 5-10 Cover Assembly - Basic In-Wall

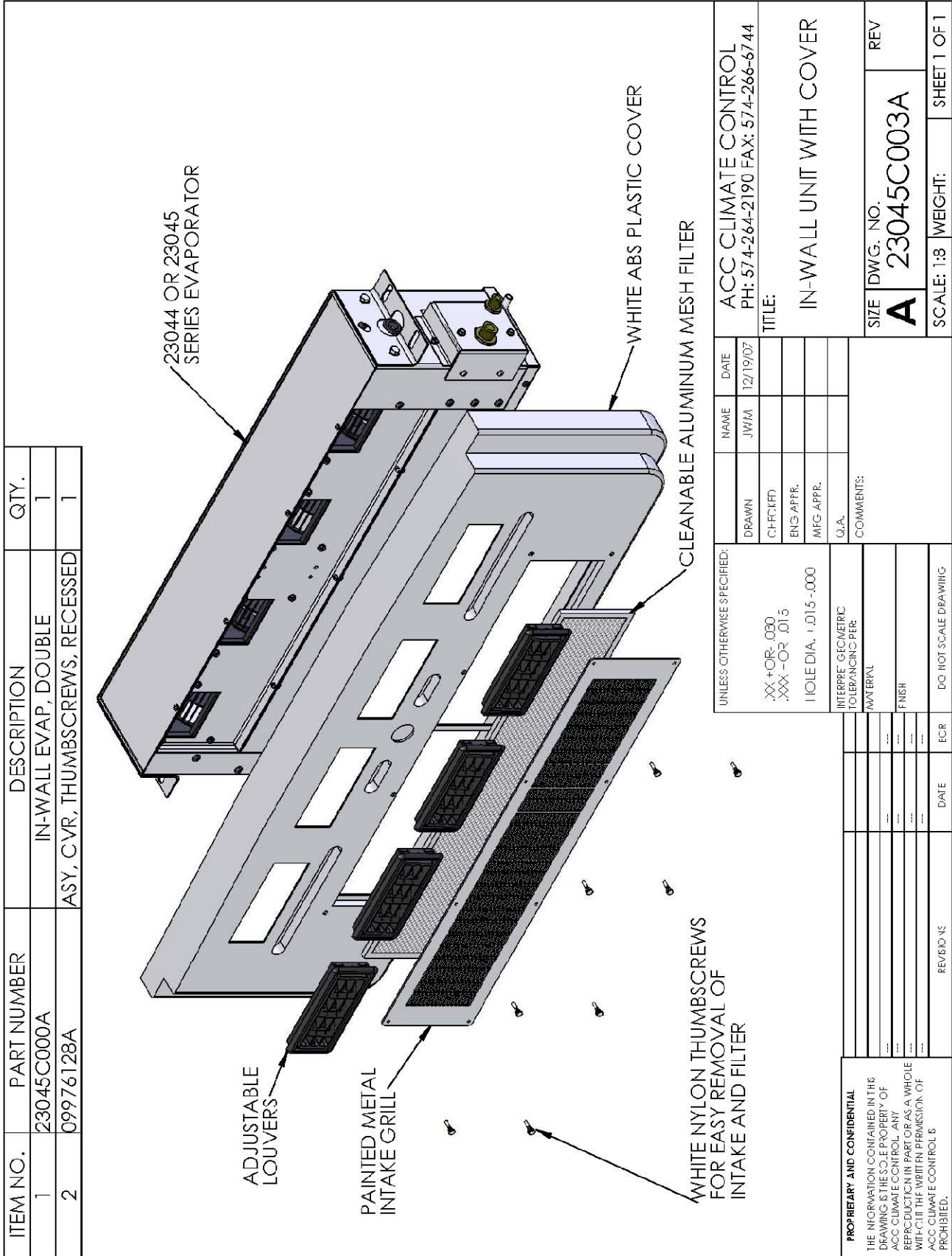
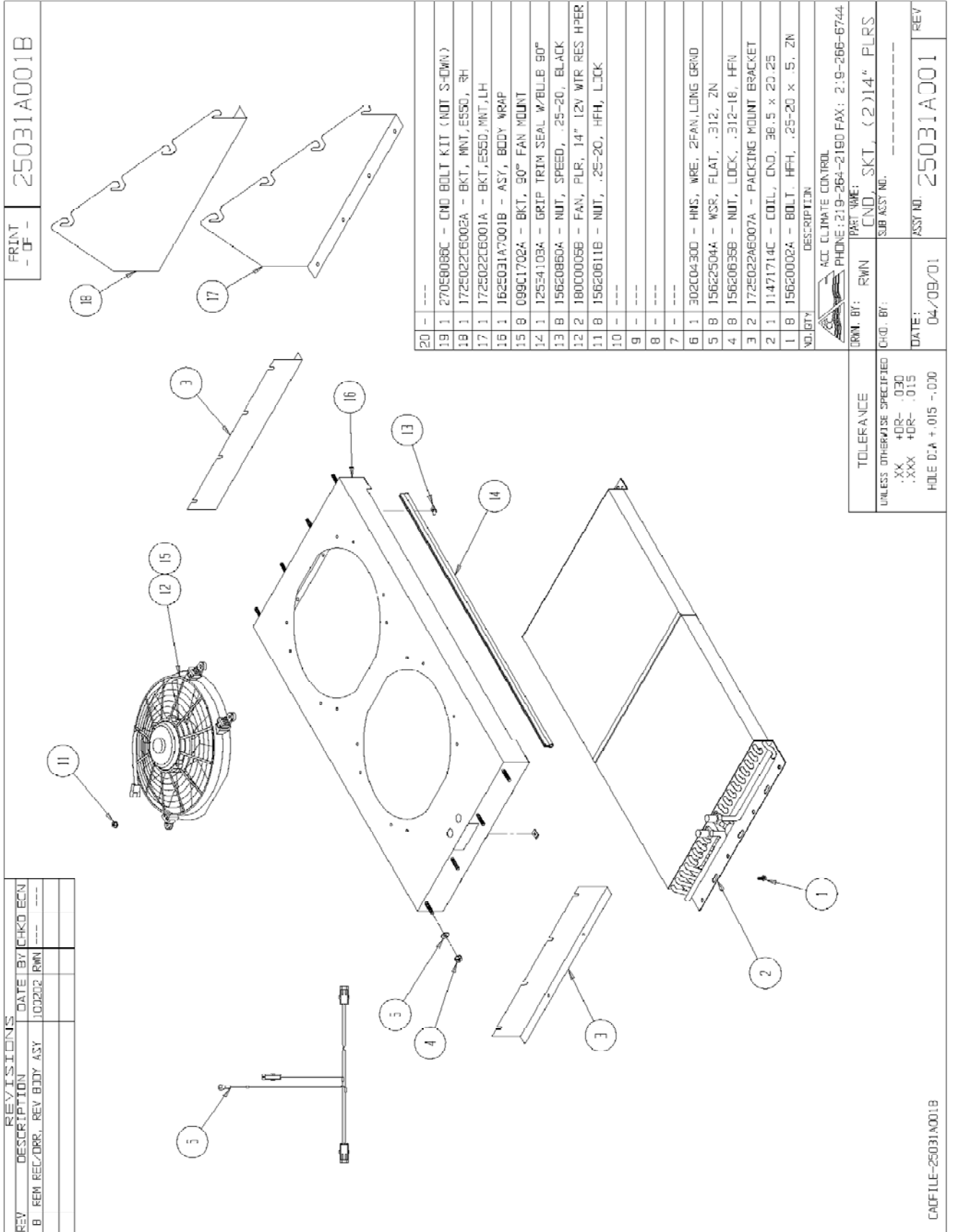


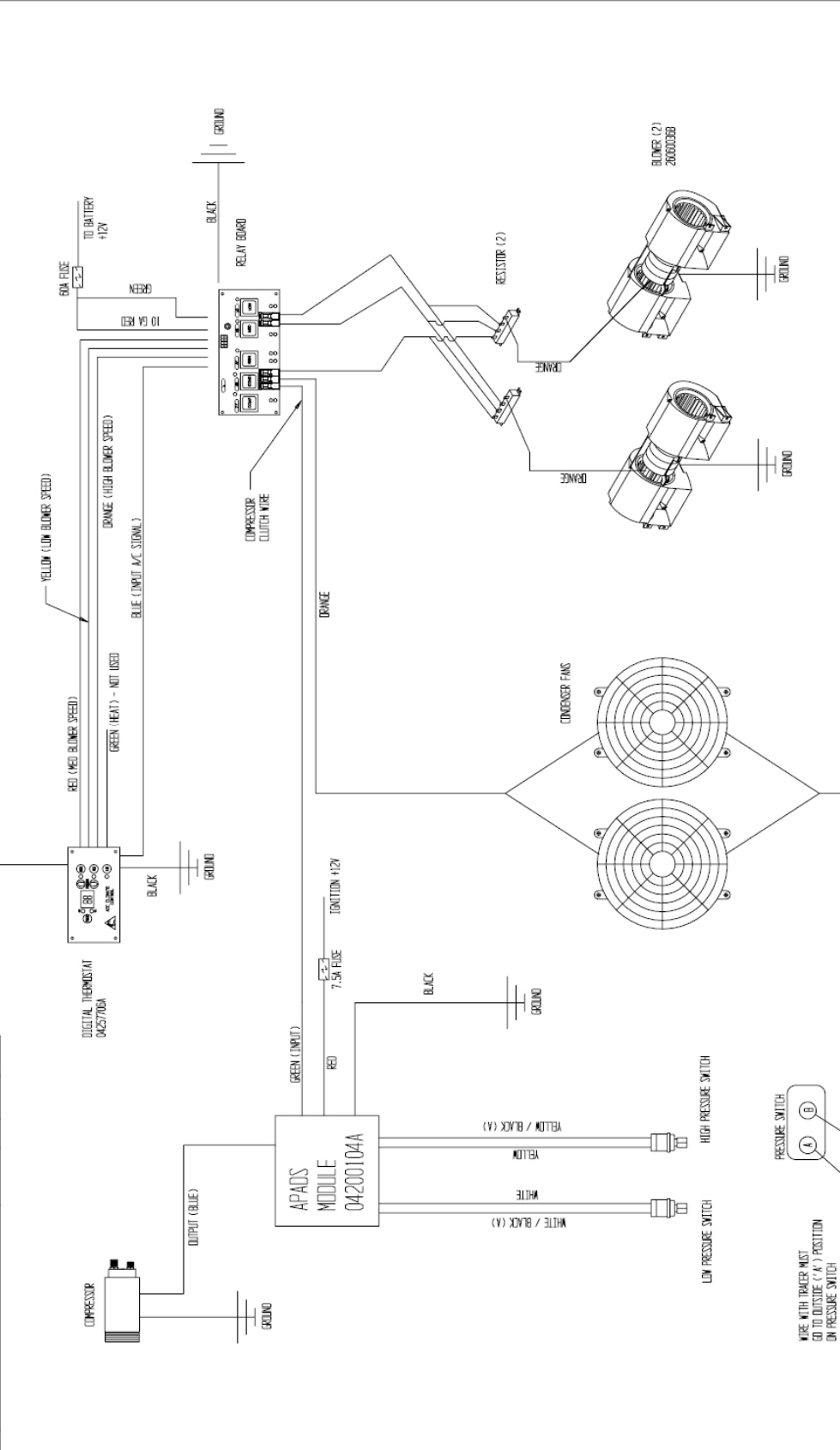
Figure 5-11 Condenser Assembly - Skirt mount



**Figure 5-12** Wiring Schematic - CCOT Air Conditioning Protection System - Single Evaporator

PRINT - OF - 3127058704A-2

REV	DESCRIPTION	DATE	BY	CHKD	ECN
-	REVISED BOARD GROUND	070706	JWM		
-	S-RLY. BD. WAS 4-RLY. BD	082010	JWM		3928



ALL DIMENSIONS IN INCHES 1 IN = 25.4 mm	ACC CLIMATE CONTROL PHONE: 574-264-2190 FAX: 574-266-6744
TOLERANCE UNLESS OTHERWISE SPECIFIED :XX +OR- .030 :XXX +OR- .015 HOLE DIA +.015 -.000	PART NAME: APADS WIRING SCHEMATIC SUB ASSY NO.:
DATE: 05/26/06	CHKD. BY:
ASSY NO. 27058704A	DRWN. BY: JWM
REV	

CADFILE- 31-33\31\3127058704A





Figure 5-15 25058 Condenser Assembly – Roof top mount

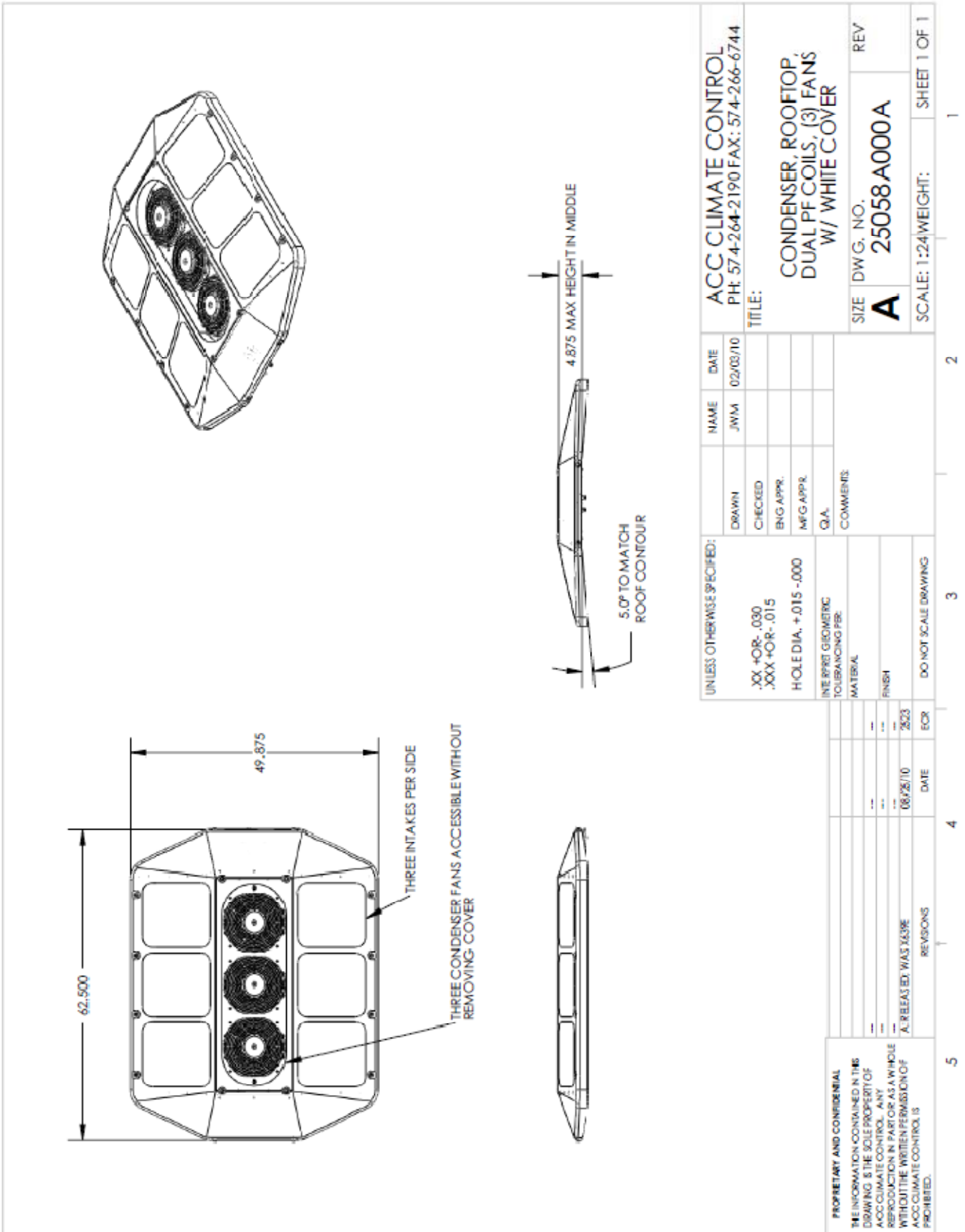
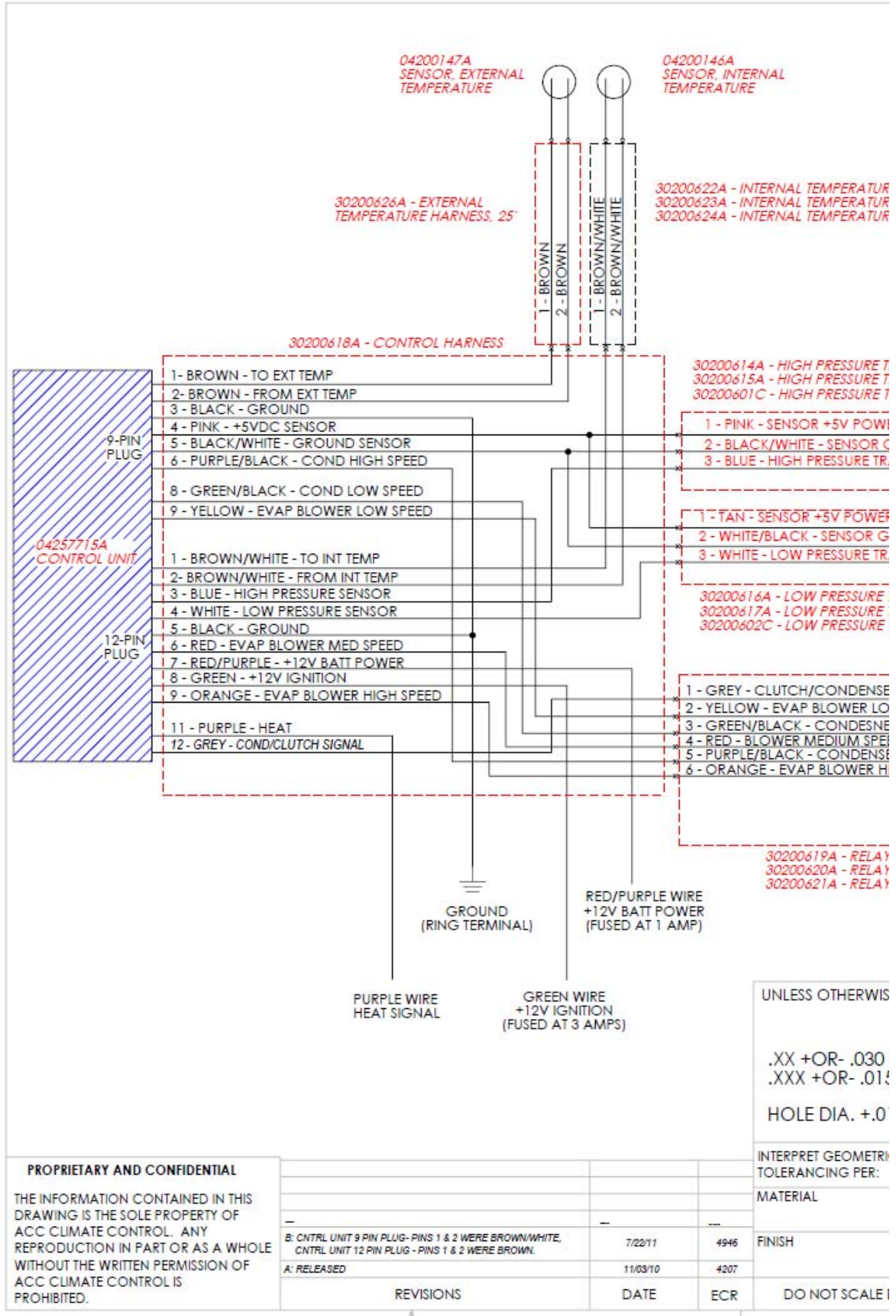


Figure 5-16 3104257715B – Wiring Diagram - MDS



UNLESS OTHERWISE SPECIFIED

.XX +OR- .030  
 .XXX +OR- .015  
 HOLE DIA. +.0

INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL

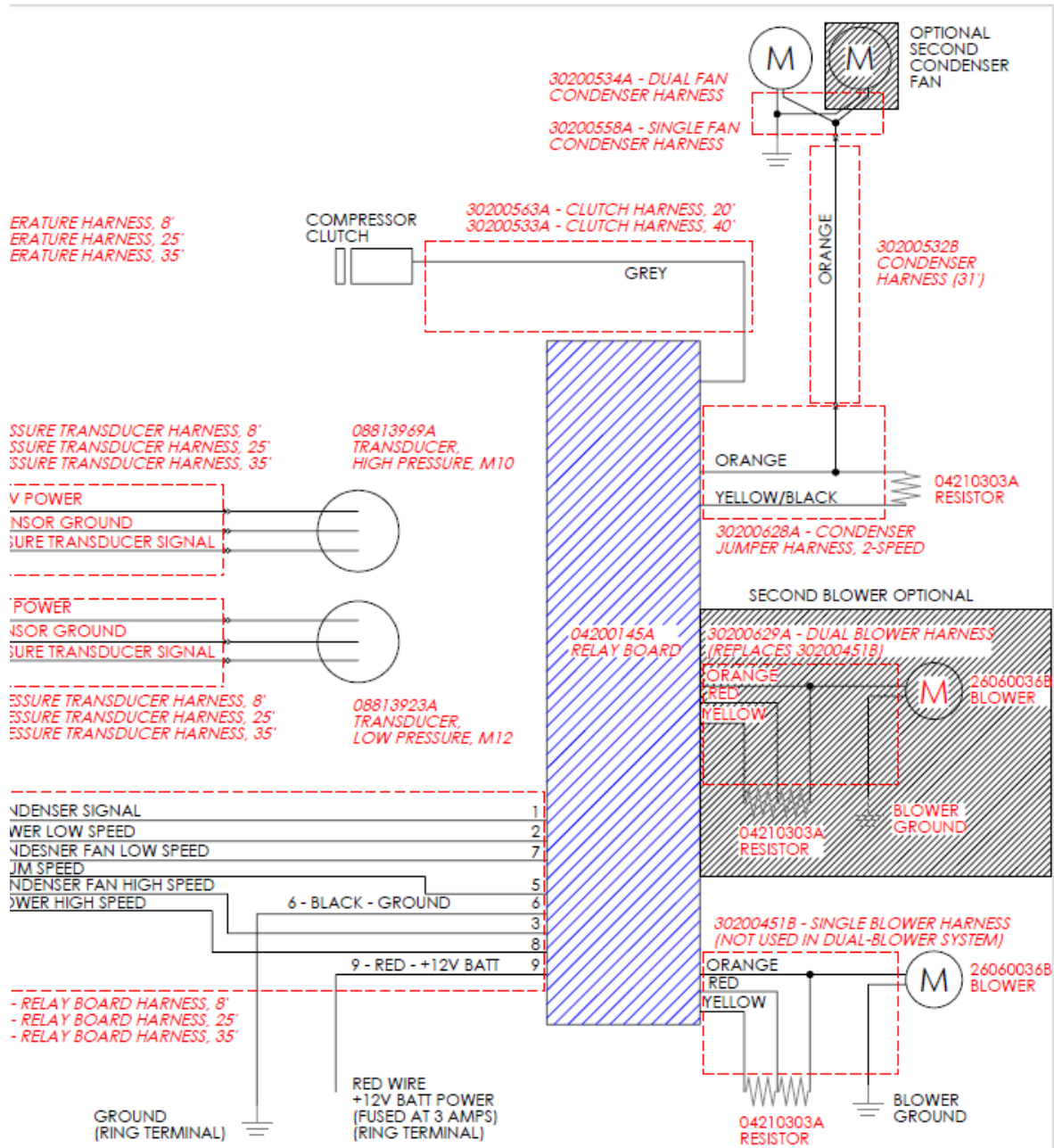
**PROPRIETARY AND CONFIDENTIAL**  
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REVISIONS	DATE	ECR
B: CNTRL UNIT 9 PIN PLUG - PINS 1 & 2 WERE BROWN/WHITE, CNTRL UNIT 12 PIN PLUG - PINS 1 & 2 WERE BROWN.	7/22/11	4946
A: RELEASED	11/03/10	4207

FINISH

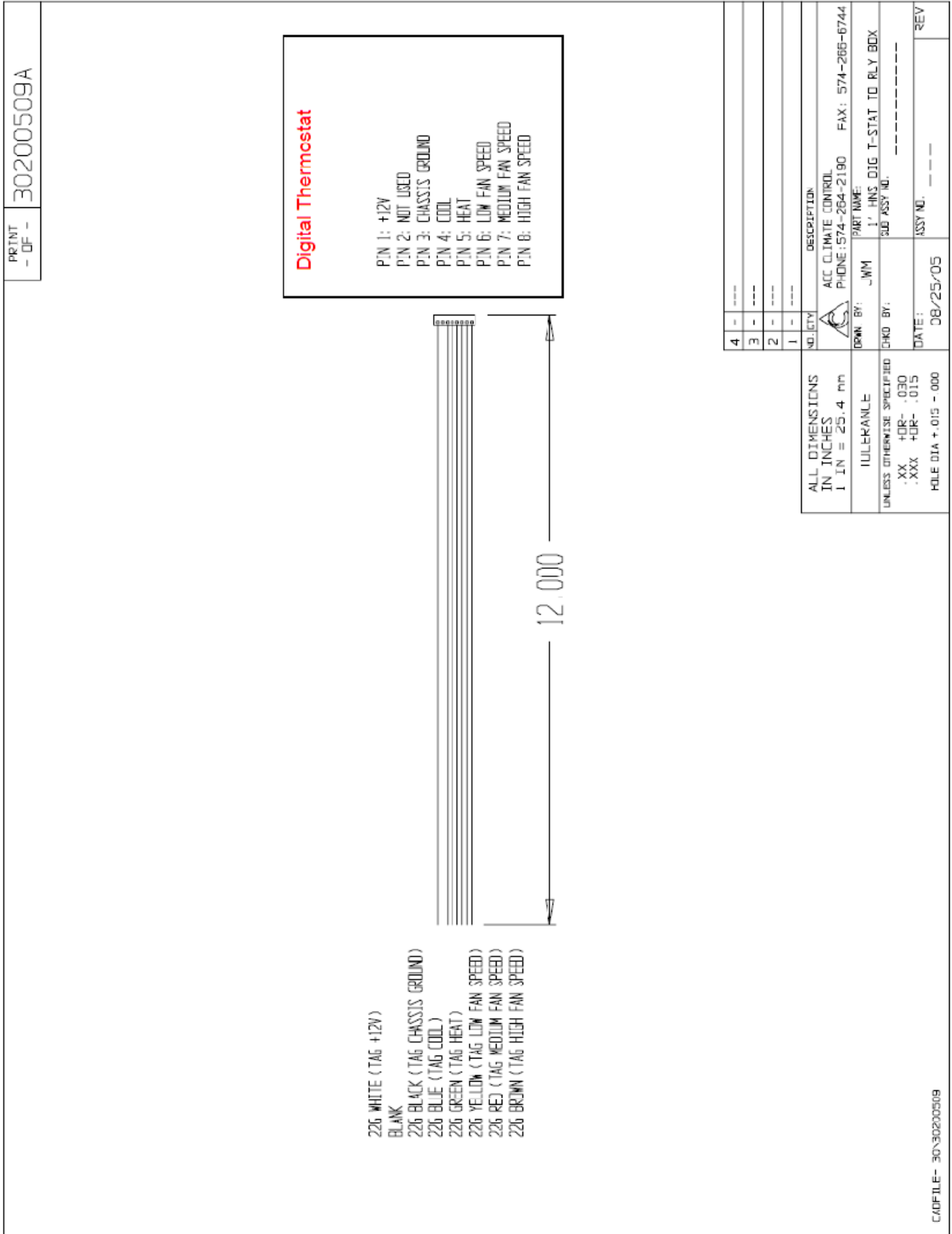
DO NOT SCALE

Figure 5-16 3104257715B – Wiring Diagram - MDS



OTHERWISE SPECIFIED:	NAME	DATE	ACC CLIMATE CONTROL PH: 574-264-2190 FAX: 574-266-6744	
DRAWN	JWM	11/03/10	TITLE: <b>WIRING DIAGRAM, 7715 CONTROLLED SYSTEM</b>	
CHECKED				
ENG APPR.			SIZE DWG. NO. REV <b>A 3104257715B</b>	
MFG APPR.				
Q.A.			SCALE: 1:10 WEIGHT: SHEET 1 OF 1	
COMMENTS:				
SCALE DRAWING				

Figure 5-18 30200509A - 12" Digital Thermostat Relay Harness



## Section 6

### Warranty

#### 6.1 *Valeo Limited Warranty*


The warranty period for your Valeo Thermal Commercial Vehicles North America, Inc bus air conditioning system is 2 Year Unlimited/3 Year 75,000 Mile Warranty (See pg.6-3). Contact the Valeo Service/Warranty Department at 1-800-462-6322 or 574-264-2190 for details. For any other applicable warranties please contact Valeo.

#### 6.2 *Warranty Card and information*

Information you will need when contacting Valeo for Warranty claims can be found on your Warranty Card and Charge Label. (Also see section 1.2)

**Figure 6-1 - Warranty Card**

**RETURN IN ENVELOPE TO:**



P.O. BOX 1905 • ELKHART, IN 46515  
 FACSIMILE (574) 266-6744 • TELEPHONE (574) 264-2190

EVAPORATOR 1 MODEL AND/OR SERIAL #	COMPRESSOR 1 MODEL AND/OR SERIAL #	ALTERNATOR MODEL AND/OR SERIAL #
EVAPORATOR 2 MODEL AND/OR SERIAL #	COMPRESSOR 2 MODEL AND/OR SERIAL #	COMPRESSOR MOUNT KIT #
EVAPORATOR 3 MODEL AND/OR SERIAL #	CONDENSOR 1 MODEL AND/OR SERIAL #	BELT #(S)
EVAPORATOR 4 MODEL AND/OR SERIAL #	CONDENSOR 2 MODEL AND/OR SERIAL #	MISC


PURCHASER/DEALER		INSTALLER	
NAME:		NAME: <b>ACC CLIMATE CONTROL</b> <input type="checkbox"/> GA	
ADDRESS:		ADDRESS: <b>P.O. BOX 1905</b>	
CITY:                    ST                    ZIP	CITY:                    ST                    ZIP	CITY: <b>ELKHART</b> <b>IN</b> <b>46515</b>	
PHONE:		PHONE: <b>574 264-2190</b>	
SIGNATURE OF PURCHASER/DEALER	DATE:	SIGNATURE OF INSTALLER:	DATE:

BODY INFORMATION			
MAKE/MODEL OF CHASSIS	ENGINE SIZE	OEM BODY #	V.I.N. #

Form # 31000450A                    WHITE - INSTALLER    YELLOW - OEM    PINK - PURCHASER/DEALER    GOLD - MAIL TO ACC                    DPI 23067

**Figure 6-2 - System Information Label – Located under the hood of the vehicle. (See section 1.3)**

*Caution: System to be Serviced by Qualified Personnel.*



**System Number:** \_\_\_\_\_

Evaporator Model Number(s): \_\_\_\_\_

Condenser Model Number(s): \_\_\_\_\_

Compressor Serial Number(s): \_\_\_\_\_

Refrigerant : \_\_\_\_\_ Amount: \_\_\_\_\_

Lubricant: \_\_\_\_\_ Oil Amount: \_\_\_\_\_

Mount Kit Number: \_\_\_\_\_

Belt Part Number(s): \_\_\_\_\_

**Installer:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**P.O. Box 1905, Elkhart, In. 46515 P(574)264-2190 F(574)266-6744**

### **6.3 Valeo Warranty Authorization Process**

The following process must be used for any claim to be considered valid:

- 1) Phone Valeo for a warranty authorization (WA) number before any work begins.
- 2) State the apparent problem in as much detail as possible. If there is a cooling problem, this must always include pressure readings observed, including ambient temperature and relative humidity levels.
- 3) Provide the following information (See pg.6-4):
  - a) The repair facility name, phone number and a contact name.
  - b) The builder or installer name of the affected product, along with the date in service, chassis type, mileage and unit/body identification number.
  - c) The Valeo model and serial number of the product.
  - d) The initial problem observed in as much detail as possible. If known, include your recommended course of action. We will then issue an initial authorization for certain procedures.
  - e) Your job number or repair order number, if necessary for referencing.
- 4) If replacement parts are needed to complete any repairs, contact Valeo and get an RGR# for those parts. Any parts must be replaced with original Valeo parts, not parts purchased elsewhere and the alleged defective parts returned to Valeo for examination and failure determination. Failure to use Valeo original parts may void the balance of the system warranty.
- 5) Get authorization to perform full repairs at Valeo authorized time standards.
- 6) Return any parts, and submit a detailed repair order showing all processes performed. Include the warranty authorization number (WA#) on the repair order.

Warranty claims will not be honored without pre-authorization. A warranty authorization number (WA#) must accompany any and all claims made for parts or labor for the claim to be considered valid by *Valeo Thermal Commercial Vehicles North America, Inc.* Any alleged defective parts must be returned to Valeo referencing our Returned Goods Report (RGR) number and the WA# for failure cause determination before any claims will be paid. If, upon receipt and failure cause analysis, the part is deemed defective, any authorized repair costs will be honored by Valeo, either in the form of a credit, or a check.

### **6.4 Service Centers**

Valeo can even schedule the work to be done for you at one of our Service Centers.  
Call us at 1-800-462-6322 for details.



## 6.5

### **2 Year Unlimited/3 Year 75,000 Mile Warranty**

Valeo Thermal Commercial Vehicles NA, Inc, hereinafter referred to as “Valeo”, warrants its products to the original purchaser, subject to normal use and service, for a period of 24 months w/unlimited mileage or 36 months 75000 miles and while in possession of the original owner.

Valeo agrees to repair or replace with a new or repaired part, any part of an Valeo unit which, after inspection has proven to fail because of a manufacturing defect, within the warranty period. Replacement of a defective part within the warranty period will include labor for replacement at factory established rates if performed at any authorized Service Center. Compensation at factory established rates for loss of refrigerant will be paid only when caused by a defective part and if the defective part itself was under warranty at the time of failure.

#### **CONDITIONS OF WARRANTY**

##### **1. HANDLING OF WARRANTY CLAIMS.**

- A. Should a failure occur to an ACC component under warranty, call ACC at (574) 264-2190 for authorization (**pre-authorization is required before work is performed**) and return the vehicle to the installer or dealer from whom the air conditioning was purchased. Present your copy of the warranty registration card. He will make the necessary repairs to the system or replacement parts as covered by the warranty.
- B. If it is not possible to return to the original dealer, take the vehicle to any convenient ACC dealer and present your Warranty Card. He will contact the factory for authorization for the necessary repairs. Should you be unable to locate an authorized ACC dealer, contact the factory and you will be assisted.

##### **2. EXCLUSIONS FROM WARRANTY**

THIS WARRANTY SHALL NOT APPLY TO:

- A. Any part or parts of products becoming defective as a result of negligence, accident, or other casualty.
- B. Owner's failure to provide normal maintenance such as lubrication of engine, tightening belts, cleaning coils, loss of refrigerant, drier replacement or improper voltage or electrical connections.
- C. Improper installation, repair, or alterations.
- D. Operation in a manner contrary to ACC's printed instructions.
- E. Any parts or products which have been repaired or altered outside of ACC's factory unless specific written authorization for such repair or alteration has been issued by ACC.

##### **3. CONDITIONS**

- A. ACC neither assumes nor authorizes any person to assume for it, any obligations or warranty other than stated herein.
- B. ACC reserved the right to make changes in design or improvements of its products or parts thereof without obligations to make or install such changes or improvements in or upon products covered in this warranty.
- C. Remedies available to the owner for breach of the A/C Factory Warranty are expressly limited to an action to recover the cost of repairs or replacement due hereunder.
- D. Repair or replacement of any part or parts of the products under this Warranty shall not extend this Warranty with respect to such repaired or replaced part or parts beyond the warranty period.
- E. ACC does not warrant the workmanship of the installer and will not bear any cost due to faulty or incorrect installation or shipping damage.
- F. ACC will not be liable for loss of time, labor, equipment, rental, or other expenses while products are out of service.
- G. ACC shall credit authorized dealers for labor for replacement or repair of defective parts discovered during the warranty period according to the published schedule of labor allowance in the Warranty Policy and Procedures Manual.
- H. This Warranty shall remain in effect during the warranty period when the equipment is properly installed, serviced and operated under normal conditions according to ACC's instructions.
- I. Items such as filters, belts, driers, lubricants, motor brushes, etc. are considered expendable and not covered under warranty.

**ACC DISCLAIMS ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF USE OF THE VEHICLE, LOSS OF TIME, INCONVENIENCE; EXPENSE FOR TRAVEL, LODGING, LOST INCOME OR REVENUE, TRANSPORTATION CHARGES OR LOSS OR DAMAGE OF PERSONAL PROPERTY.**

**SOME STATES DO NOT ALLOW EXCLUSIONS OR LIMITATIONS OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE EXCLUSIONS MAY NOT APPLY TO YOU.**

**THIS WARRANTY IS THE ONLY EXPRESSED WARRANTY BY ACC AND NO DEALER OR SERVICE FACILITY IS AUTHORIZED BY ACC TO MODIFY OR EXTEND IT. ANY IMPLIED WARRANTIES, INCLUDING WARRANTY OF FITNESS FOR PARTICULAR PURPOSE, OR WARRANTY OF MERCHANTABILITY, ARE EXPRESSLY LIMITED IN DURATION TO THE SAME PERIOD AS THE EXPRESSED WARRANTY. SOME STATES DO NOT ALLOW LIMITATIONS ON IMPLIED WARRANTIES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.**

**THIS WARRANTY IS NULL AND VOID UNLESS THE WARRANTY REGISTRATION CARD IS COMPLETED AND MAILED TO ACC WITHIN THIRTY DAYS OF THE DATE OF ORIGINAL RETAIL PURCHASE.**

**IN ADDITION TO THE ABOVE RIGHTS, THE PURCHASER HAS CERTAIN LEGAL REMEDIES PROVIDED BY THE MAGNUSON MOSS WARRANTY ACT, PUBLIC LAW 93-637. YOU MAY ALSO HAVE CERTAIN RIGHTS UNDER STATE LAW.**



6.6

REQUEST FOR WARRANTY AUTHORIZATION

Convertor Name: \_\_\_\_\_ DATE: \_\_\_\_\_  
 Requested By: \_\_\_\_\_  
 Dealer Contact: \_\_\_\_\_ Dept. \_\_\_\_\_  
 Dealer Name: \_\_\_\_\_ Dealer Phone: (\_\_\_\_) \_\_\_\_\_  
 Dealer Address: \_\_\_\_\_  
 City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
 Vehicle  
 Year: \_\_\_\_\_ Make: \_\_\_\_\_ Mileage: \_\_\_\_\_  
 Model: \_\_\_\_\_ VIN (Last 8): \_\_\_\_\_  
 In Service Date: \_\_\_\_\_ Customer Last Name: \_\_\_\_\_  
 Dealer RO#: \_\_\_\_\_ Dealer PO#: \_\_\_\_\_ (If Required)  
 (Provide if Possible) ACC Unit /Kit #: \_\_\_\_\_ ACC S/N : \_\_\_\_\_

Problem as stated by Dealer : \_\_\_\_\_

Parts Requested : \_\_\_\_\_

Description: _____	Qty. _____	@\$ _____	ea.	\$ _____	
Description: _____	Qty. _____	@\$ _____	ea.	\$ _____	
Description: _____	Qty. _____	@\$ _____	ea.	\$ _____	
Description: _____	Qty. _____	@\$ _____	ea.	\$ _____	
				Total Parts	\$ _____
Refrigerant Qty: _____	lbs _____	@\$ _____	/lb _____	Total Refrigerant	\$ _____
Total Labor Requested: _____	hrs _____	Labor Rate: \$ _____		Total Labor	\$ _____
				<b>TOTAL CLAIM:</b>	<b>\$ _____</b>

\*\*\*\*\*ACC CLIMATE CONTROL AUTHORIZATION RESPONSE\*\*\*\*\*

Refrigerant Authorized: _____	lbs _____	@\$ _____	/lb _____	Total Refrigerant	\$ _____
Parts Authorized: _____				Total Parts	\$ _____
Labor Time Authorized: _____	hrs _____	Labor Rate: \$ _____		Total Labor	\$ _____
<b>Claim Number:</b> _____				<b>TOTAL AUTHORIZED CLAIM:</b>	<b>\$ _____</b>
<b>Authorized By:</b> _____					

Comments: \_\_\_\_\_





SMART TECHNOLOGY  
FOR SMARTER MOBILITY

Valeo Thermal Commercial Vehicles North America, Inc.

22150 Challenger Drive

Elkhart, IN 46514

Toll Free: 800-462-6322

Office: 574-264-2190

[www.valeo-thermalbus.com/us\\_en](http://www.valeo-thermalbus.com/us_en)