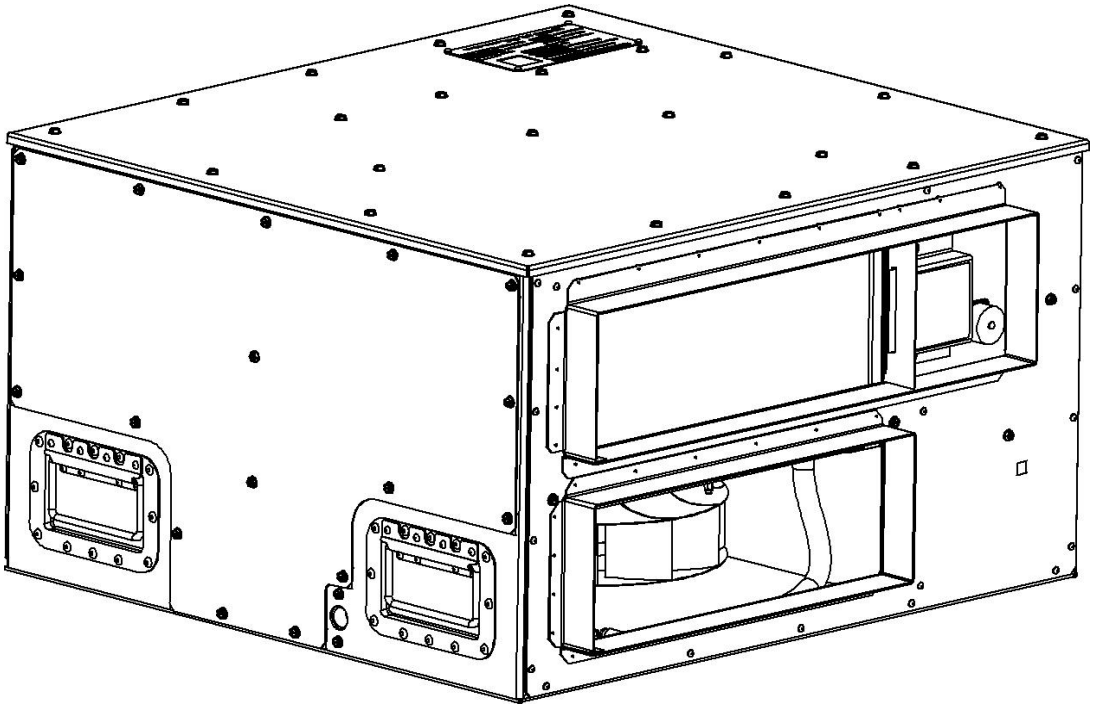
HDT™ NORDIC ECU

GENEVA ★ OHIO ★ USA

ENVIRONMENTAL CONTROL UNIT (ECU)
9,000 BTUH (9K) COOLING CAPACITY
5,200 BTUH HEATING CAPACITY (GSQ386ZABNWY0**)
6,810 BTUH HEATING CAPACITY (GSQ386ZABNWY0**-R)

MODEL NUMBER	GSQ386ZABNWY0** & GSQ386ZABNWY0**-R TWO CHARACTERS "**" OF THE MODEL NUMBER ARE USED FOR COLOR & OPTION KITS.
REMOTE, RACK MOUNT	254-00003 STANDARD & 254-00007 BULKHEAD
CAGE CODE	0WJE1
POWER (GSQ386ZABNWY0**)	115 VAC, 1 Phase, 50/60 Hz, 20 amp service
POWER (GSQ386ZABNWY0**-R)	115 VAC, 1 Phase, 50/60 Hz, 25 amp service
REFRIGERANT	R-407C
REFRIGERANT CHARGE	2 LBS (32 ounces)
WEIGHT	130 LBS



OPERATION and MAINTENANCE MANUAL
WITH REPAIR PARTS LIST
568-00009-R4, 12-December-2011

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EXPORT CONTROL

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Chapter 1 Introduction

Section 1.01 Forward

This Operations and Maintenance Manual applies to an Environmental Control Unit (ECU) designed for field deployment. This ECU is designed to provide years of trouble-free service if installed, operated, and maintained in accordance with this manual. This manual provides user instruction for the safe operation of the ECU. This manual also provides maintenance, trouble shooting, and repair information to be used *by trained technicians*. Damage to the unit from improper installation, operation, or maintenance is not covered by the warranty.

Section 1.02 Safety Summary

a. This ECU has been designed for safe and intuitive operation and maintenance. However, operators and service personnel must thoroughly read and understand the information presented in this manual. Improper use or servicing of this ECU can endanger personnel and damage the ECU.

b. Throughout this manual, statements of danger, warning and caution are noted. Danger and Warning statements are prefaced by the term:

DANGER! and WARNING!

Danger and Warning statements denote guidance that must be adhered to in order to avoid DEATH or SERIOUS INJURY.

c. Statements of caution are prefaced by the term:

ATTENTION!

Caution statements denote guidance that must be adhered to in order to avoid damaging the equipment, improper operation, and possible voiding of the warranty.

Section 1.03 Dangers and Warnings

The following dangers and warnings apply to all operating and service tasks that may be performed on this ECU. All personnel who use or service this equipment must fully understand and act in accordance with these warnings. They are listed in the sequential order they appear in this manual.

DANGER!
This ECU operates on high voltage. DEATH or SERIOUS INJURY can result if proper safety procedures are not observed. Always disconnect the ECU from its power source prior to servicing.

WARNING!
Connecting the ECU to a power source should only be done by qualified personnel.

WARNING!
This unit weighs 130 pounds. Injury can result if inadequate personnel or handling equipment is used for positioning, installation or transportation of the unit.

WARNING!
Make certain that the operation control switch is in the OFF position prior to turning the main circuit breaker ON

DANGER!
Refrigerant R-407C is used in this equipment. DEATH or SERIOUS INJURY may result if personnel fail to observe safety precautions. Great care must be exercised to prevent liquid refrigerant, or refrigerant gas discharged under high pressure, to come in contact with any part of the body. Extremely low temperature resulting from rapid expansion of liquid refrigerant, or refrigerant gas discharged from under high pressure, can cause sudden and irreversible tissue damage through freezing. All personnel must wear thermal protective gloves and a face shield or goggles when working in any situation where refrigerant contact with skin or eyes is possible. Application of excessive heat to any component in a charged system will cause extreme pressure that may result in a rupture, possibly explosive in nature. Exposure of certain CFC (chlorofluorocarbon) and HCFC (halogenated chlorofluorocarbon) refrigerants to extreme heat or very hot surface will cause a chemical reaction in the gas to form carbonyl chloride (phosgene), a highly poisonous and corrosive gas. Generally, in their natural states, CFC and HCFC refrigerants are colorless, odorless vapors with no toxic characteristics, are heavier than air and will disperse rapidly in a well ventilated area. However, in an unventilated area, these refrigerants present an asphyxiate danger by displacing oxygen in the area.

WARNING!
Disconnect the ECU from the power source and remove the power connector from the ECU prior to performing any service or maintenance tasks.

DANGER!
DEATH or SERIOUS INJURY may result if personnel fail to observe the following safety precautions

WARNING!
Use rubber gloves and safety glasses and ventilate the workspace. The oil from a burnout could cause serious skin irritation and possibly burns. In some cases, the fumes are toxic. Use extreme caution when sampling oil.

DANGER!
Troubleshooting must only be performed by qualified technicians. DEATH or SERIOUS INJURY can occur.

DANGER!
Many diagnostic tests require power to be present. Extreme care must be exercised to avoid DEATH or SERIOUS INJURY. High voltage is present in the electrical panel.

WARNING!
Fans and blowers are rotating parts that can cause severe injury. They may start without warning.
Always disconnect the ECU from its power source prior to servicing. Do not operate the ECU with panels removed.

WARNING!
Heating elements reach high temperatures. Severe burns are possible. Allow elements to cool before servicing.

Section 1.04 Cautions

The following cautions apply to all operating and service tasks that may be performed on this ECU. All personnel who use or service this equipment must fully understand and act in accordance with these cautions. Caution statements denote guidance that must be adhered to in order to avoid damaging the equipment, improper operation, and possible voiding of the warranty. They are listed in the sequential order they appear in this manual.

ATTENTION!
Unit must be operated with the correct voltage and frequency. Failure to do so may result in damage and operational failure of the unit.

ATTENTION!
When using compressed air to clean filters or coils, limit pressure to 35 PSI.

ATTENTION!
Do not attempt to make any adjustments or repairs without proper tools.

ATTENTION!
All repairs must be carried out in compliance with EPA Section No. 608 and applicable local air quality regulations.

ATTENTION!
When replacing a burned-out compressor, it is mandatory that the refrigeration system be thoroughly cleaned before operating the replacement compressor.

ATTENTION!

A refrigeration system should be evacuated whenever the system has been open in such a manner that there is a possibility that air and moisture could have entered the system. The evacuation process is intended to remove non-condensable gases and moisture from the portion of the system to be evacuated. The most important contaminant to be removed is moisture. To remove moisture from the system, it must first be boiled into vapor. Before water will boil at ordinary room temperature, for example, at 70°F the vacuum must be 29¼ inches of mercury at 30 inches of mercury barometric pressure. This means that the system must be within ¾ inches of mercury of absolute zero pressure. This low vacuum should be measured by using an absolute pressure gauge, such as an electronic gauge. For this reason, a good vacuum pump must be used to accomplish good dehydration.

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Chapter 2 General Information

Section 2.01 Equipment Descriptions

a. The ECU is a packaged system designed to operate in a portable field use application, providing conditioned air to a shelter.

b. The ECU is controlled with a remote rack mounted control unit.

c. The ECU operates using 115VAC, 1-phase, 50/60Hz power supplied by a generator or shore power via an auxiliary power plug located on the ECU. 20 amp service for models GSQ386ZABNWY0** & 25 amp service for models GSQ386ZABNWY0**-R.

d. The refrigeration system uses R-407C refrigerant and has a cooling capacity at 60 Hz of 9,000 BTU/Hr at 95° F ambient outside temperatures (95°F Ambient Dry Bulb (ADB) / 80°F Entering Dry Bulb (EDB) / 70°F Entering Wet Bulb (EWB)).

e. The heating system is furnished with a nominal heat of 5,200 BTU/Hr (GSQ386ZABNWY0**) or 6,810 BTU/Hr (GSQ386ZABNWY0**-R) which consists of resistive type heater in addition to the fan heat.

Section 2.02 Design Features

a. Operational

Capacity	9,000 BTU/Hr
Air Flow	370 CFM
Heating Capacity (GSQ386ZABNWY0**)	5,200 BTU/Hr, Nominal
Heating Capacity (GSQ386ZABNWY0**-R)	6,810 BTU/Hr, Nominal
Design Maximum Ambient Temperature	135^0 F
Minimum Ambient Cooling	to 45^0 F
Minimum Ambient Heating	to -25^0 F

Table 2.1

b. Physical Characteristics

Height	16.00”
Width	28.00”
Depth	26.00” (27.68” over duct flange)
Weight	130 Pounds

Table 2.2

Section 2.03 Special Features

a. SALT SPRAY PROTECTION

1. The cabinet is constructed of aluminum 5052-H32 alloy sheet; and painted in accordance with the specification.

2. All external hardware and all internal hardware is stainless steel, aluminum or have been protected against corrosion per the specification.

3. The evaporator coil is constructed from copper tubes and aluminum fins. The condenser coil is an aluminum micro-channel design.

4. The evaporator coil is coated with a protective coating. The condenser coil is treated with corrosion resistant clad materials.

b. MAINTENANCE FEATURES

1. **Sight Glass -** A sight glass with a moisture indicator is provided to detect any moisture in the refrigeration circuit and low refrigerant levels. This feature is located on the side of the ECU

2. **Service Valves -** Suction and discharge Schrader service valves have been provided to enable servicing of the ECU. These features are located on the side of the ECU.

c. SAFETY FEATURES

1. **Low/High Pressure Switches -** Low and high-pressure switches are provided. They are factory set for the application. The low pressure switch will disengage control power to the compressor contactor if suction pressure drops below a specific pressure. The high pressure switch will shut off the compressor if the discharge pressure rises above a specific pressure. These pressure switches are installed as safety devices and will help prevent compressor failure or other serious damage to the system components. If the ECU begins to cycle on high or low pressure, the unit should be removed from service and have the appropriate maintenance performed.

2. **Pressure Relief Valve -** The ECU is fitted with a relief valve that will discharge refrigerant should internal pressure exceed design parameters.

3. **Overtemp Safety Switch -** The ECU heater section is equipped with dual overtemp safety switches. If the temperature in the heater cabinet exceeds the set point of the switch (140^0 F), power to the heater elements will be interrupted.

Section 2.04 Major Components

a. **Electrical Compartment**
   1. All of the major electrical control components and the input power connection are mounted in a control compartment on the rear of the ECU.
   2. System controls are located on the remote control, which connects to the front of the ECU.
   3. The controls and electrical components are access by removing the rear, side and/or top covers.

b. **Evaporator Compartment**
   1. Contains the evaporator coil, expansion valve, blower, and some refrigeration components.
   2. Access to the compartment is gained by removing the side or top covers.

c. **Condenser compartment**
   1. Contains the condenser blower, compressor and service features.
   2. Access to the compartment is gained by removing the side or top covers.

d. **Filter** (not supplied)
   1. The ECU should have a air filter installed on the ductwork of the return air entering the system.

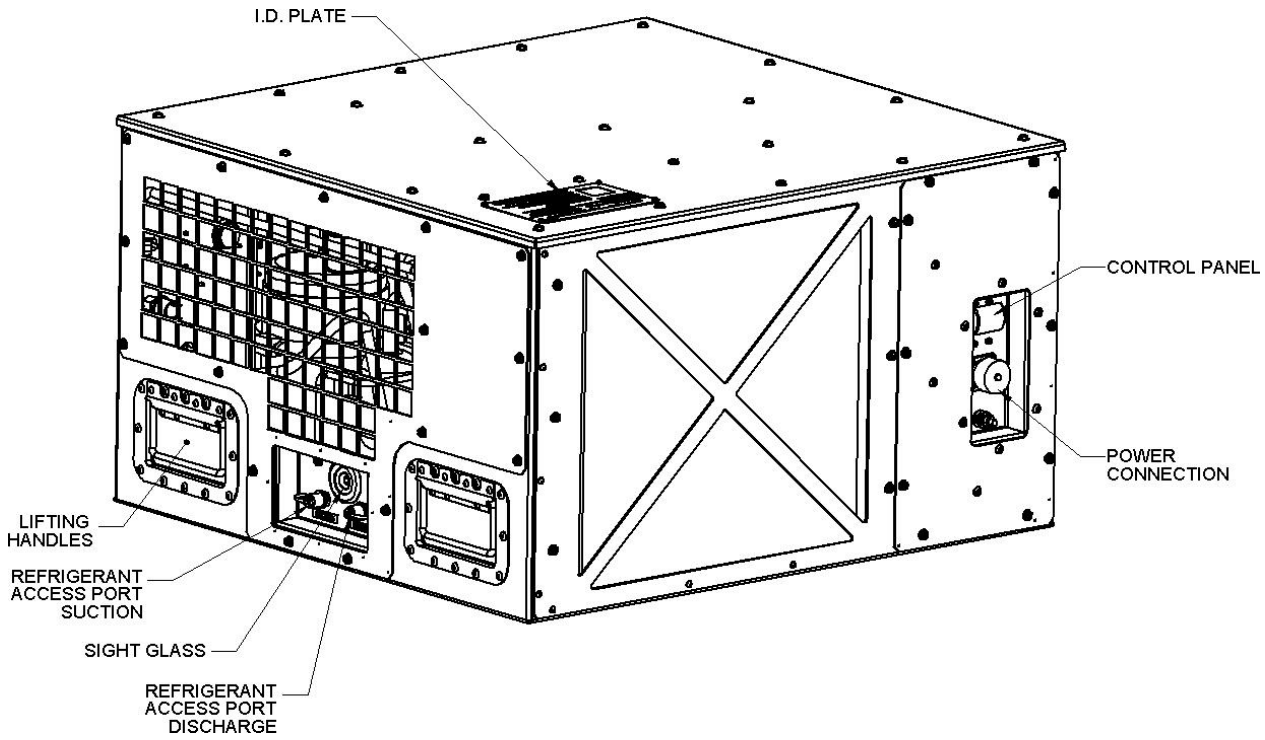

Figure 2.1

Section 2.05 Functional Components Description

COMPONENT	FUNCTION
FILTER DRIER	Filters impurities and absorbs moisture from liquid refrigerant.
SIGHT GLASS	Provides means to monitor system charge and operation.
HIGH PRESSURE SWITCH	High Pressure set to break on excess pressure 500 psig. (Auto Reset).
LOW PRESSURE SWITCH	Shuts down the AC when refrigeration system pressures falls below 35 psig (Auto Reset).
HEATER SAFETY SYSTEM	High Limit Trip Switch set to break on electric heater compartment temperature rising above 140°F.
DISCHARGE PRESSURE SERVICE VALVE	For adding refrigerant charge and to diagnose system pressures.
SUCTION PRESSURE SERVICE VALVE	For adding refrigerant charge and to diagnose system pressures.
RACK MOUNT REMOTE CONTROL	System Fan-On, Off, Auto-On. Remote control has functions for temperature control settings, switching and network monitoring.
THERMOSTAT CONTROL BOARD (TST)	Thermostat (Heat / Cool / Auto Select). - Prevents compressor from short cycling. - Allows the ECU to start and pressurize in low ambient conditions.
THERMOSTATIC EXPANSION VALVE (TXV)	TXV set to maintain superheat of 8 – 15°F.
COMPRESSOR	Rotary type.
EVAPORATOR COIL	The evaporator coil is constructed from copper tubes and aluminum fins and is E-coated with a protective coating.
CONDENSER COIL	The condenser coil is an aluminum micro-channel design and is treated with corrosion resistant clad materials.
FAN MOTOR (EVAPORATOR)	A single motor that drives the evaporator blower wheel.
FAN MOTOR (CONDENSER)	A single motor that drives the condenser blower wheel.

Table 2.3

Section 2.06 Identification

NOMENCLATURE	HDT Model Number	**
ENVIRONMENTAL CONTROL UNIT, 9K BTU, 5.2K BTU HEAT	GSQ386ZABNWY0**	Two characters "**" of the model number are used for color and option kits.
ENVIRONMENTAL CONTROL UNIT, 9K BTU, 6.8K BTU HEAT	GSQ386ZABNWY0**-R	

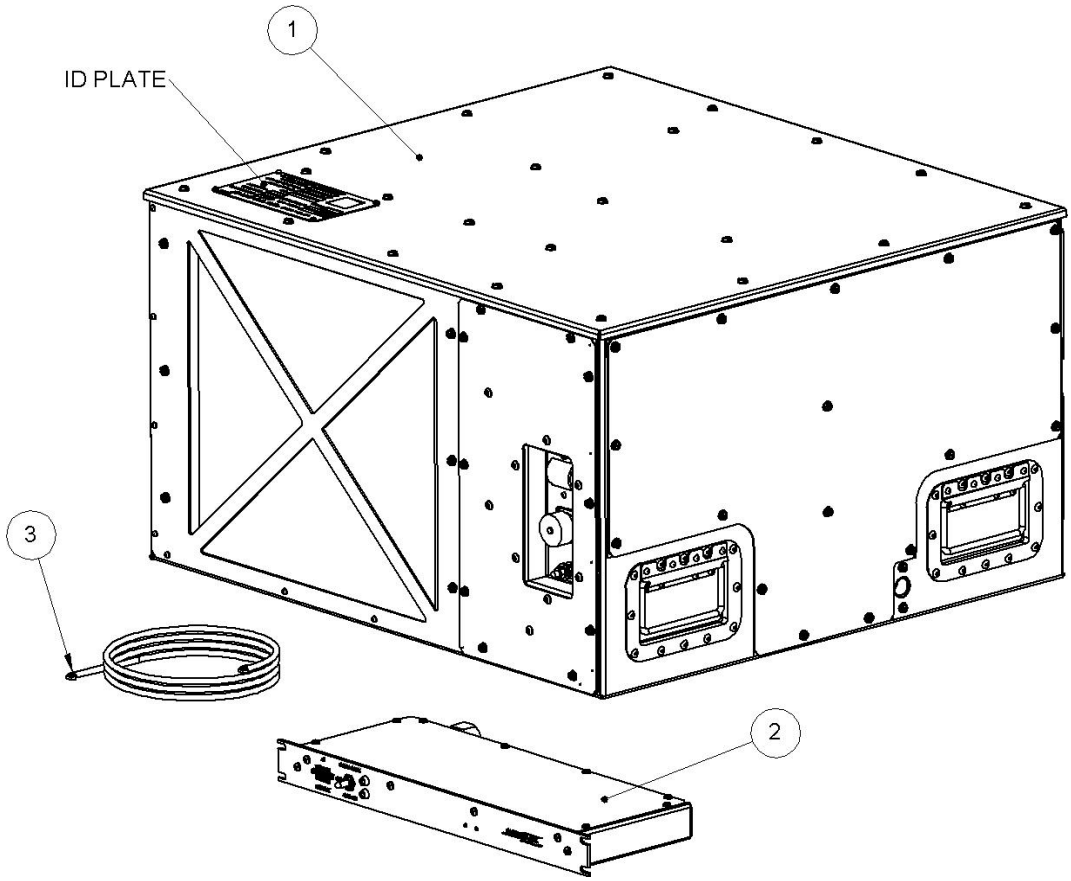

Figure 2.2

Parts List, ECU, Remote & sensor cable, Ref. Figure 2.2

Item	HDT Part #	DESCRIPTION	QTY
1	GSQ386ZABNWY0**	ENVIRONMENTAL CONTROL UNIT (ECU)	1
1	GSQ386ZABNWY0**-R	ENVIRONMENTAL CONTROL UNIT (ECU)	1
2	254-00003/254-00007	REMOTE CONTROL	1
3	019-00090	CABLE, CAT 5E CABLE	1

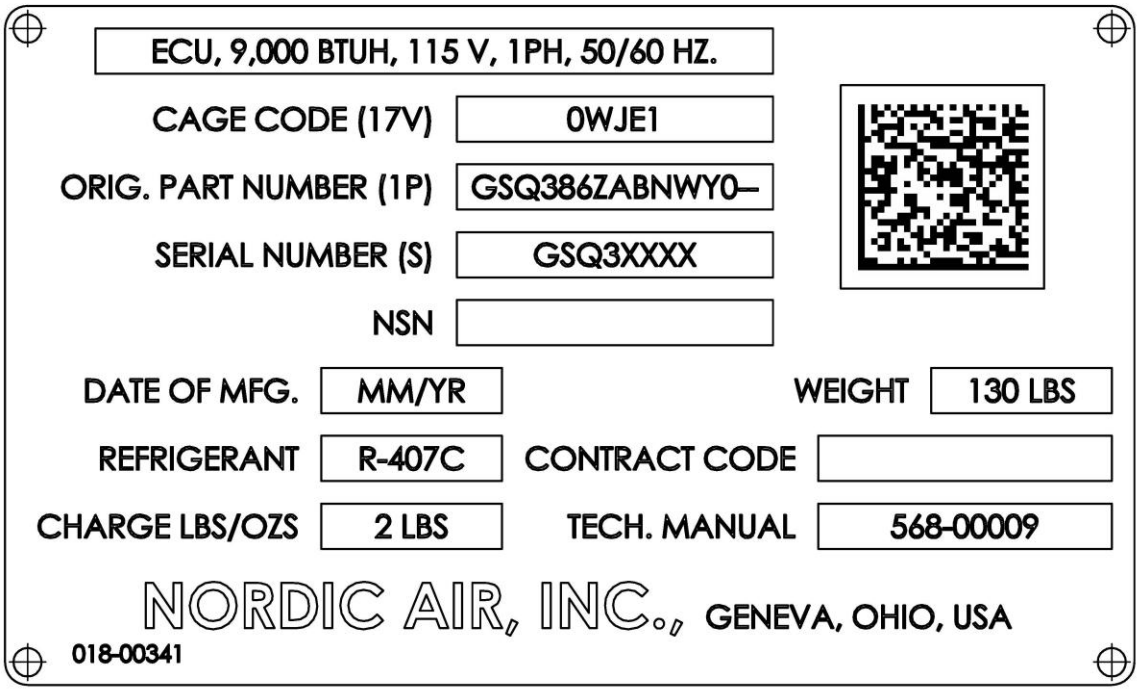

Figure 2.3 (sample data only)

Chapter 3 Functional Description

Section 3.01 Introduction

This chapter describes the operation of the refrigeration and heating sub-systems.

Section 3.02 Principles of Operation

a. The refrigeration system is a closed-loop circuit in which refrigerant is continuously circulated by the pressure differential created by the compressor.

b. The compressor maintains high side condensing pressure, and the thermostatic expansion valve separates the high-pressure side from the low-pressure side at the evaporator coil inlet.

c. The compressor is designed to increase refrigerant pressure to a level high enough for it to be cooled and condensed into liquid by the ambient air being drawn over the condenser coil.

d. The liquid refrigerant flows through the filter/drier, where moisture and other impurities are removed, then through the sight glass, a device for visual inspection of the refrigerant.

e. The liquid then flows through the thermostatic expansion valve, which meters the high-pressure liquid into the low-pressure refrigerant circuit. The thermostatic expansion valve is a pressure-reducing device metering high-pressure liquid refrigerant into the low-pressure evaporator coil in the amount required for the operating conditions.

f. As the liquid enters the low pressure side of the circuit, it flows through the evaporator coil, boils by absorbing the latent heat of vaporization at the low pressure, and evaporates into a low pressure, low temperature gas. Heat from the surrounding air is extracted through the finned tubing of the evaporator coil by the refrigerant.

g. The gas then returns to the compressor, where it is compressed and forced into the condenser coil, completing the cycle. The relationship of components involved in this process are illustrated in section 9.06 Refrigeration Schematic, on page 9-7.

Section 3.03 Operational Description

a. In Cool mode (Auto On with sensor calling for cooling):

1. Compressor, condenser fan and evaporator blower start.

2. The Compressor takes low pressure, low temperature gas and compresses it to a high temperature, high-pressure gas.

3. The refrigerant flows from the compressor to the condenser coil. The condenser fan forces outside ambient air out through the condenser coil. Heat is removed from the high temperature, high-pressure gas from the compressor by the flow of air over the condenser coil and is changed into a low temperature, high-pressure liquid.

4. The refrigerant filter/drier removes any moisture (water vapor) or impurities that may be carried by the liquid refrigerant.

5. The refrigerant then flows through the liquid sight glass. This device indicates the presence of moisture and state of refrigerant in the system.

6. The expansion valve senses the temperature and pressure of the refrigerant as it leaves the evaporator coil. By use of a sensing bulb and an internal equalizer the valve constantly adjusts the flow of liquid refrigerant to the evaporator coil.

7. As the liquid refrigerant leaves the expansion valve it enters the evaporator coil. Warm air being drawn across the fins and tubes of the coil causes the refrigerant to boil and change to a gas (vapor). The evaporator fan draws the warm air from the conditioned space through the evaporator coil. As the air from the conditioned space comes in contact with the evaporator coil, the air is cooled.

8. The refrigerant gas is then drawn back to the compressor and the cycle is repeated.

b. In Heat mode (Auto On with sensor calling for heating):

1. The evaporator blower starts and the heating elements are energized.

2. The evaporator blower circulates return air over the heating elements. Air warmed by the elements exits out the supply grille.

3. Power to the elements will be interrupted if the over-temperature switch senses temperatures greater than 140°F.

c. In Fan mode:

1. The evaporator blower starts.

2. Air is circulated from the return grille, exiting the supply grille.

Chapter 4 Installation

Section 4.01 Unit Setup

a. The unit is to be installed up against a shelter wall with the supply and return duct flanges protruding into the conditioned space. These flanges can be connected to supply and return plenums as necessary. If the unit is installed through the side wall of a shelter the minimum opening size should be 16.25" high by 28.25" wide. The ECU should be supported from underneath on the outer side of the shelter. Four 3/8-16 threaded mounting holes are provided for securing the ECU. See figures 4.1 and 4.2.

b. The ECU should be set in a level location for best operation, and should not be on an incline of greater than 10° in any direction.

DANGER!
This ECU operates on high voltage. DEATH or SERIOUS INJURY can result if proper safety procedures are not observed. Always disconnect the ECU from its power source prior to servicing.

WARNING!
Connecting the ECU to a power source should only be done by qualified personnel.

WARNING!
This unit weighs 130 pounds. Injury can result if inadequate personnel or handling equipment is used for positioning, installation or transportation of the unit.

ATTENTION!
Unit must be operated with the correct voltage and frequency. Failure to do so may result in damage and operational failure of the unit.

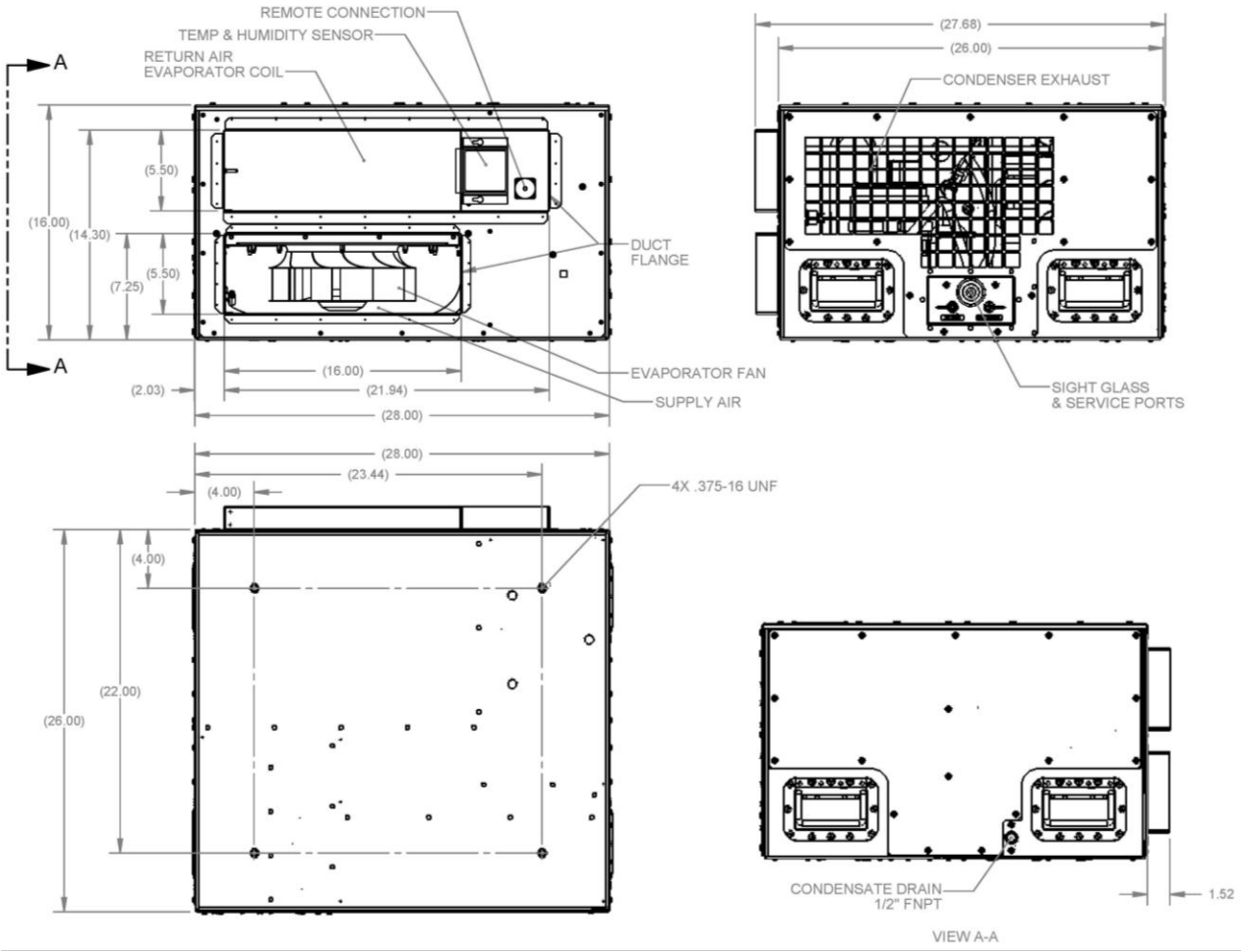

Figure 4.1

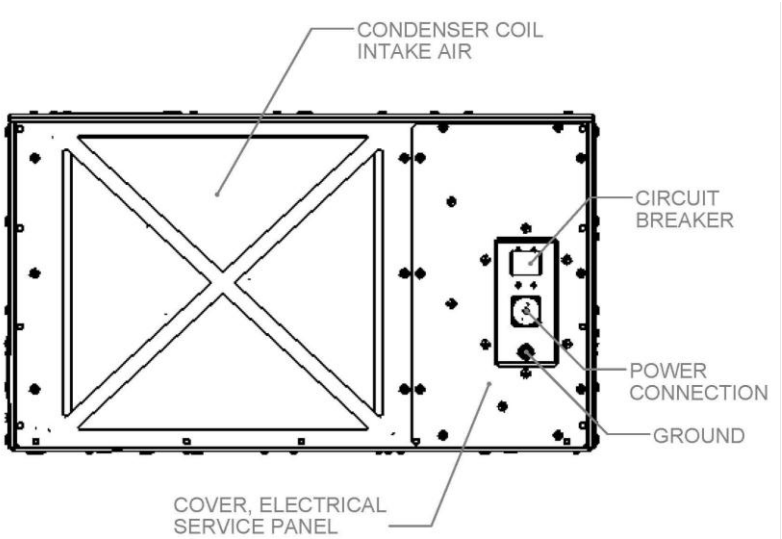

Figure 4.2

Section 4.02 Power Cable (108-00061 or 108-00047) Installation

a. These power cables are used on models GSQ386ZABNWY0**.

b. Put the main circuit breaker, found on the control panel, in the OFF position.

c. Attach the power cable connector to the power connector located on the back of the ECU, labeled J1. Ensure the connector is tightened securely. Only three of the five pins on this connector are utilized with Pin A = Black (L1), Pin D = Green (Ground) & Pin E = White (Neutral). See figure 4.3A.

d. Connect the opposite end to a 20 amp 115V, 50 or 60 Hz power source. Only three of the four pins of cable 108-00061's connector are utilized with Pin A = Black (L1), Pin B = White (Neutral) & Pin D = Green (Ground). See figure 4.3A.

e. A grounding wire can be connected to the ground stud GND located underneath the J1 connection on the rear of the ECU.

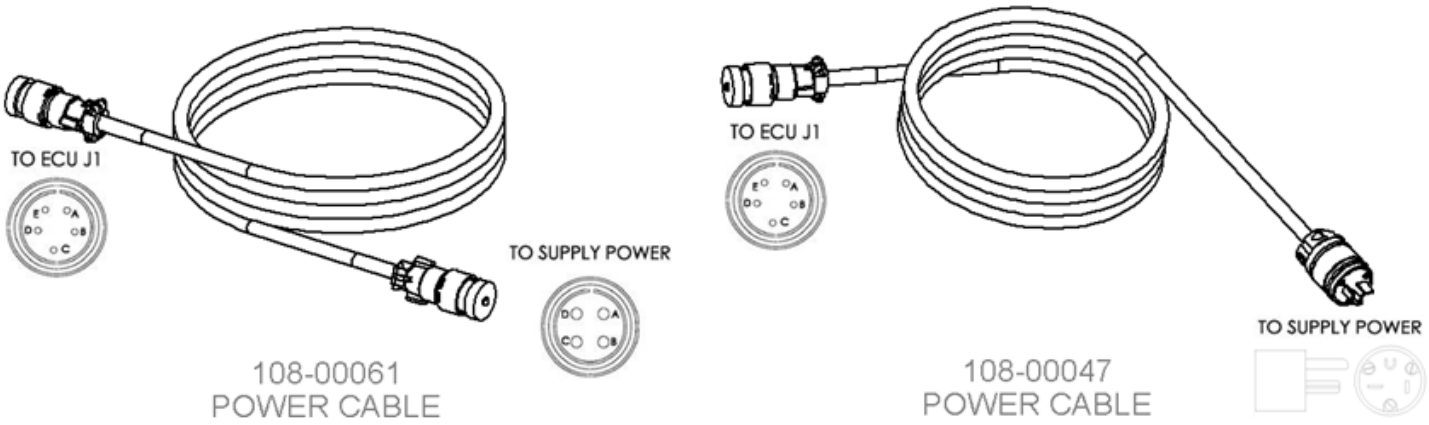

Figure 4.3A External Power Cable (108-00061 or 108-00047)

Section 4.03 Power Cable (108-00132) Installation

a. This power cable is used on models GSQ386ZABNWY0**-R.

b. Put the main circuit breaker, found on the control panel, in the OFF position.

c. Attach the power cable connector to the power connector located on the back of the ECU, labeled J1. Ensure the connector is tightened securely. This model only has three pins on the ECU connector with Pin A = Black (L1), Pin B = White (Neutral) & Pin C = Green (Ground) . See figure 4.3B.

d. Connect the opposite end to a 25 amp 115V, 50 or 60 Hz power source. Only three of the four pins of cable 108-00132's connector are utilized with Pin A = Black (L1), Pin B = White (Neutral) & Pin D = Green (Ground). See figure 4.3B.

e. A grounding wire can be connected to the ground stud GND located underneath the J1 connection on the rear of the ECU.

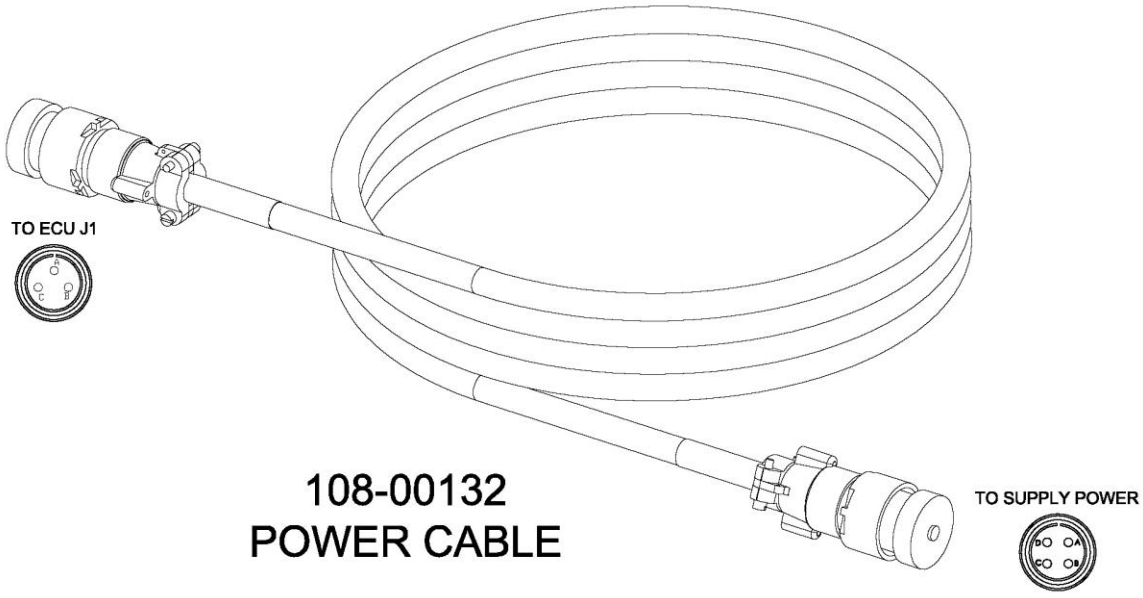

Figure 4.3B External Power Cable (108-00132)

Section 4.04 Remote Control Installation

a. Standard remote control 254-00003. See figures 4.4 thru 4.6.

1. The remote control should be mounted in the control rack of the installation.

2. The external cable of the remote control should be routed and connected to the front face of the ECU into connection J2. See figure 4.4.

3. There is a ground stud connection available on the rear of the remote.

4. The sensor CAT-5 cable (019-00090) should be connected to the back of the remote sensor input. This cable should be routed and connected to the front face of the ECU into connection RS1. See figure 4.6

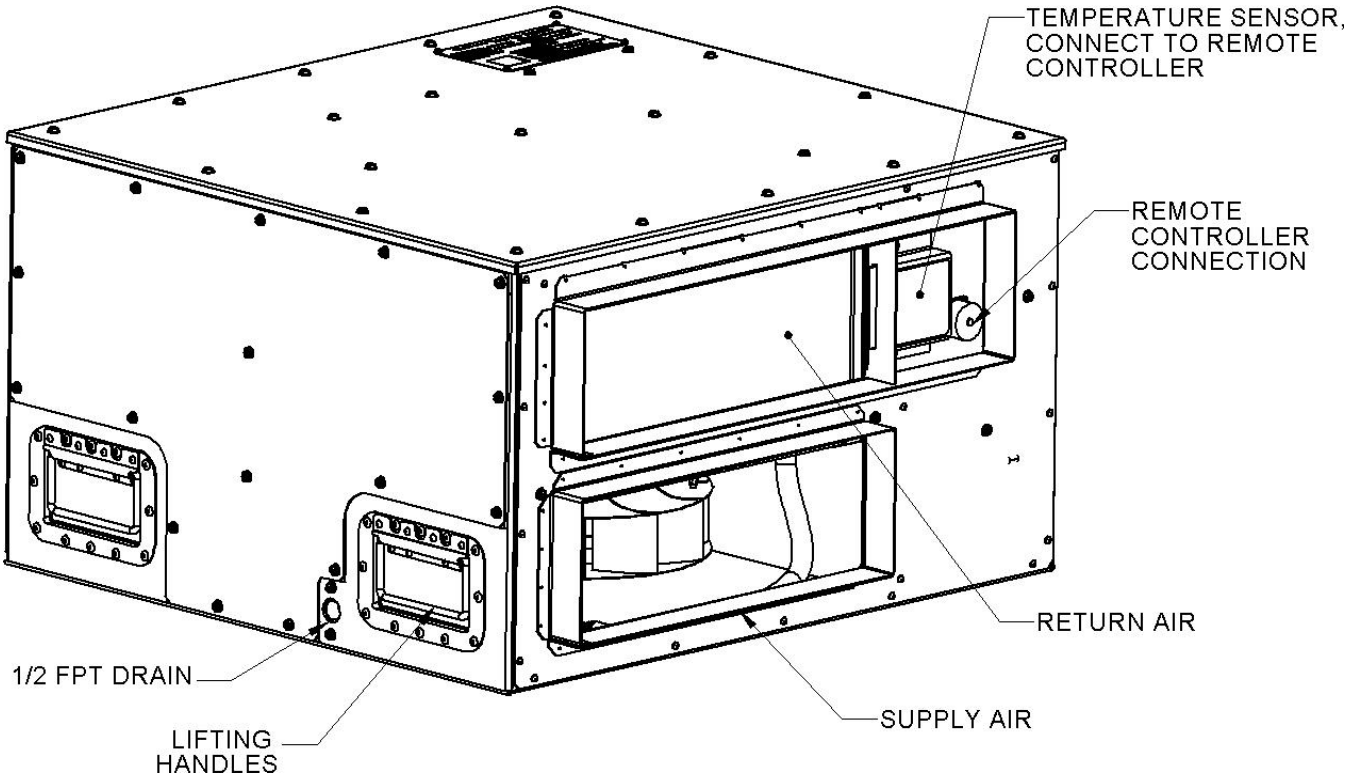

Figure 4.4

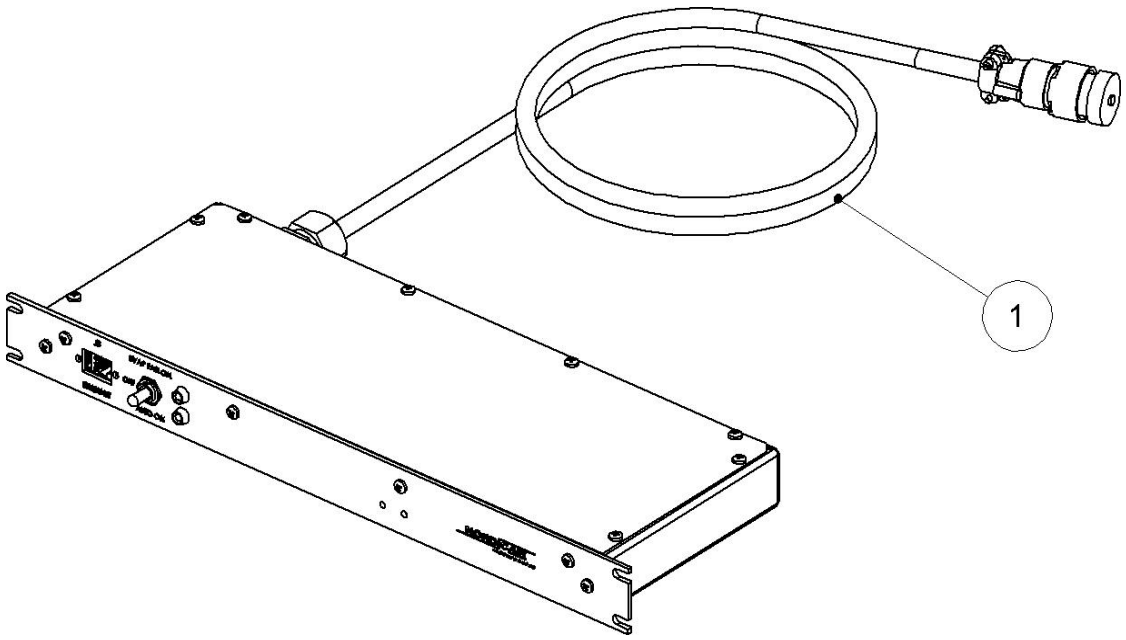

Figure 4.5 Standard Remote Control (254-00003)

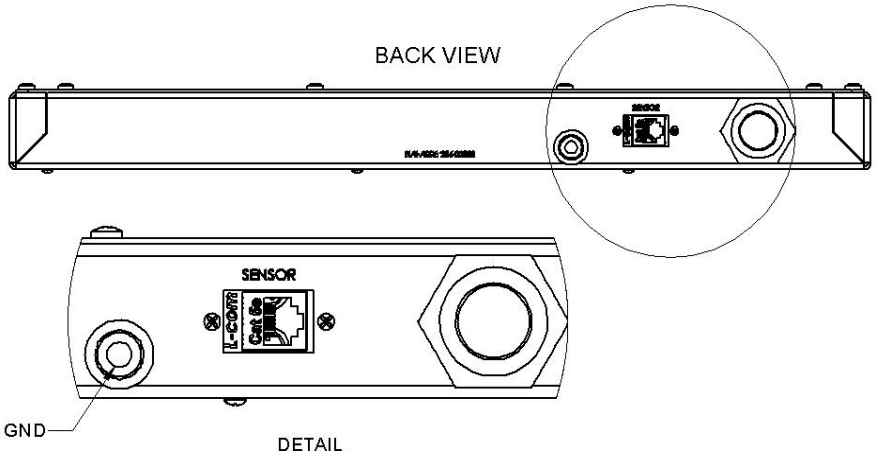

Figure 4.6 Remote Sensor Cable Connection

b. Bulkhead remote control 254-00007. See figures 4.6 and 4.7.

1. The remote control should be mounted in the control rack of the installation.

2. The external cable of the remote control, Item 1 in figure 4.7 (108-00084), should be routed and connected to the bulkhead connector Item 2 in figure 4.7 (not supplied) at the junction plate/box.

3. The remote cable extension, Item 3 in figure 4.7 (108-00085), should be routed and connected to the front face of the ECU into connection J2.

4. There is a ground stud connection available on the rear of the remote.

5. The sensor CAT-5 cable (019-00090) should be connected to the back of the remote sensor input. This cable should be routed and connected to the front face of the ECU into connection RS1. If there is a RJ45 thru connector at the junction plate/box, an additional CAT-5 cable is needed to connect to RS1.

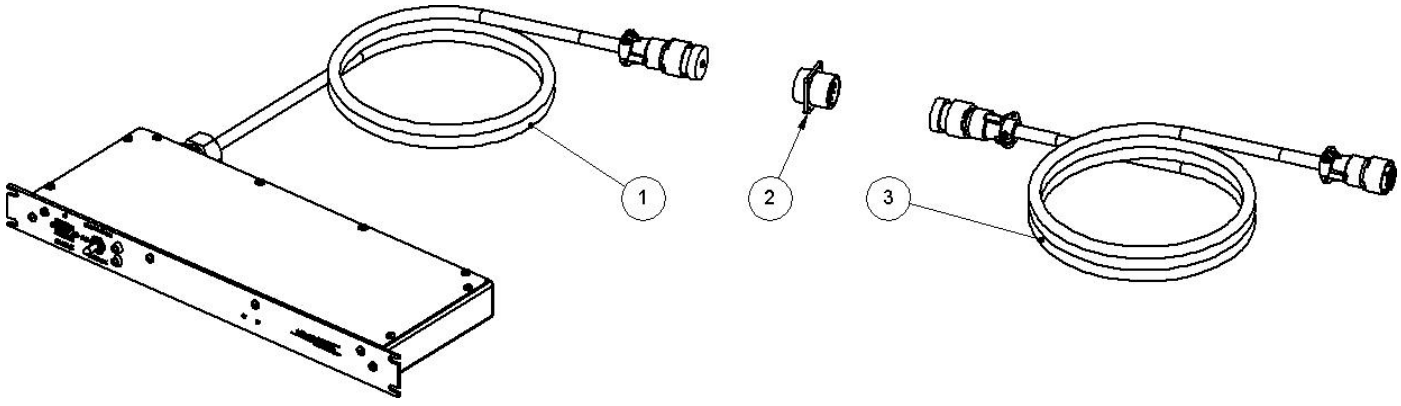

Figure 4.7 Bulkhead Remote Control (254-00007)

Section 4.05 Other Preparations

a. Ensure that the condensate drain, found on the side of the ECU is unobstructed. A hose with a ½" NPT fitting may be attached to the drain coupling to route the water to a desired discharge location.

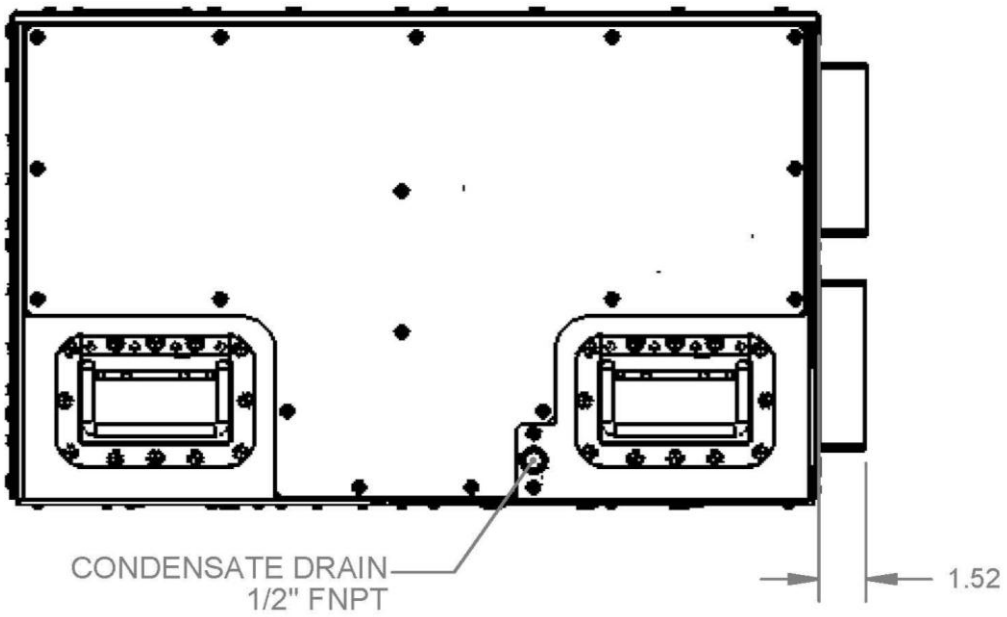

Figure 4.8 Condensate Drain location

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Chapter 5 Operators Instructions

Section 5.01 Operators Instructions

This chapter will provide operational instruction for the Environmental Control Unit (ECU) and Remote Controller. Review and understand these instructions before operating the unit.

WARNING!
Make certain that the Mode switch on the Remote Controller is in the OFF position prior to turning the main circuit breaker ON

a. ECU Control Panel

Refer to Figure 5.1 for the arrangement and identification of the controls. The control panel contains the following switches and indicators:

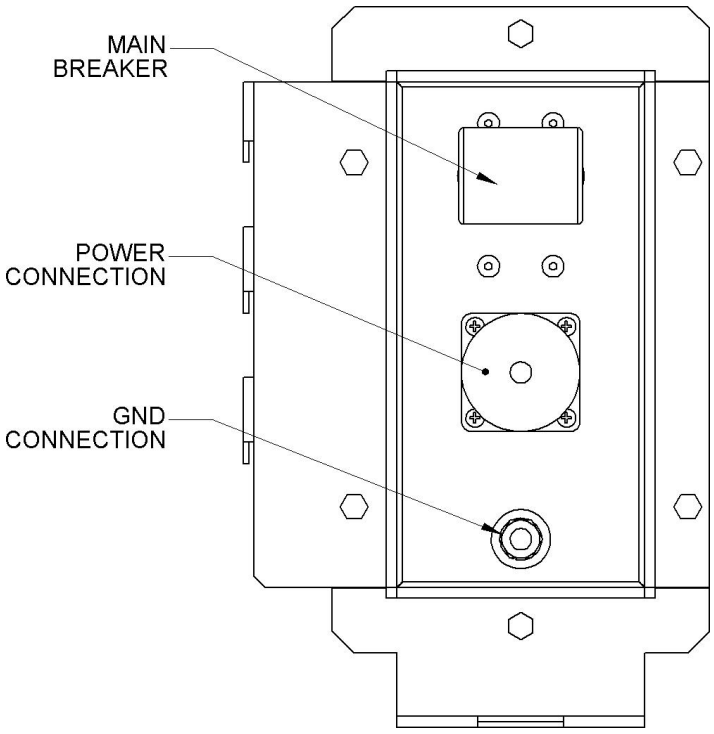

Figure 5.1

1. Main Circuit Breaker

a) The main circuit breaker should be in the OFF position during the unit setup to avoid the risk of damage to the unit.

b) The circuit breaker must then be set to the ON position to operate the ECU.

b. **Remote Control Panel**

Refer to figure 5.2 for the arrangement and identification of the controls. The control panel contains the following switches and indicators:

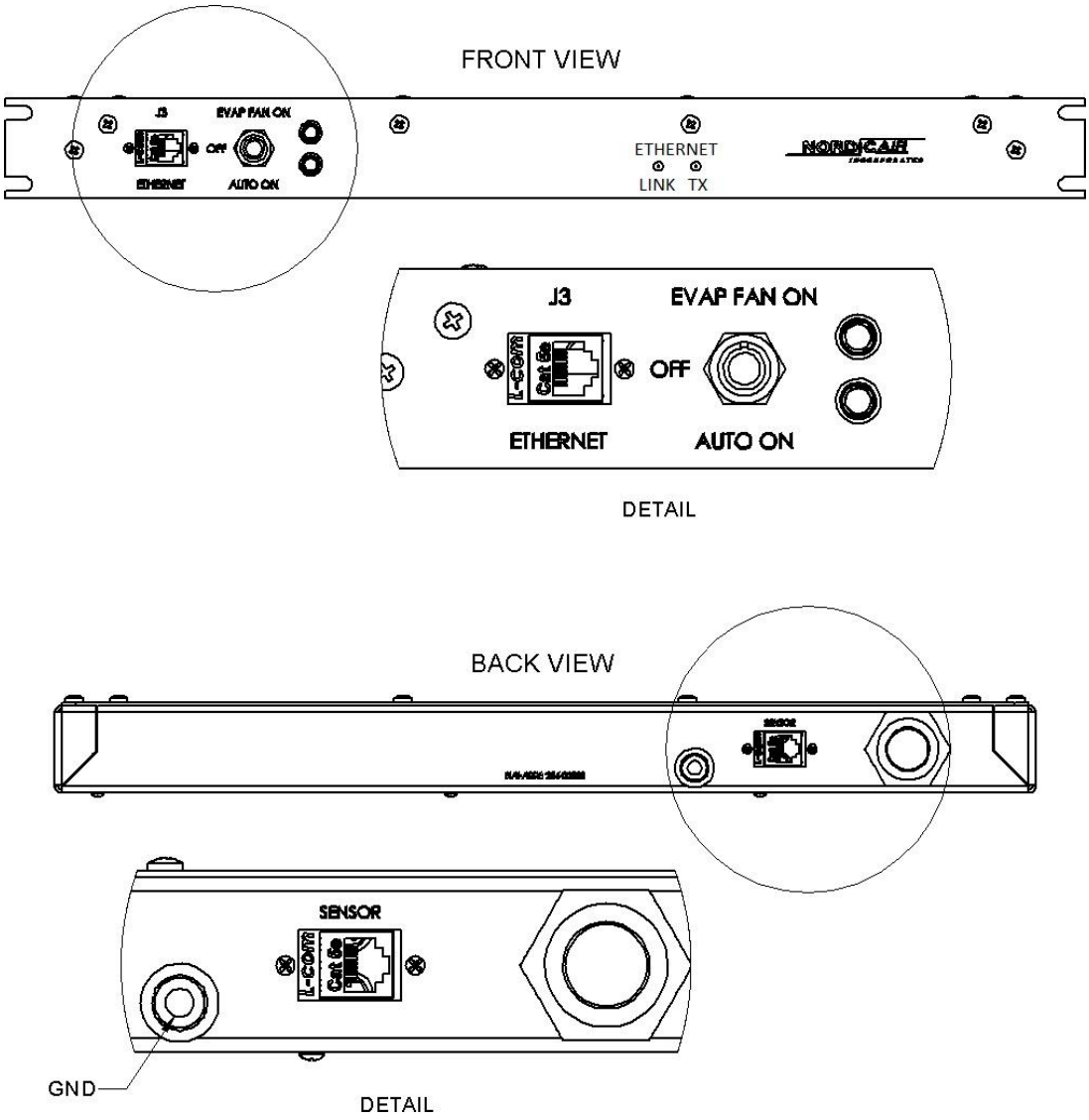

Figure 5.2

1. Mode Toggle Switch
   a) In "AUTO" mode, the heating and cooling will operate automatically. The heat will come on when the temperature drops below 63 degrees and will turn off when the temperature rises above 65 degrees. The compressor will come on when the temperature rises above 77 degrees and will turn

off when the temperature drops below 75 degrees. The compressor will remain energized for a minimum of one minute regardless of the temperature. Once the temperature has dropped below 75 degrees the compressor will de-energized for a minimum of 3 minutes regardless of the temperature.

b) In "Fan" mode, the fans will run continually for air circulation.
c) In "OFF" mode, no heating or cooling will take place.

c. Sequence of Operations

1. Verify that the Mode Toggle Switch on the remote controller is in the OFF position.

2. Verify that 115 VAC, 1 Phase, 50/60 HZ power to has been properly connected to the ECU. 20 amp service for models GSQ386ZABNWY0** & 25 amp service for models GSQ386ZABNWY0**-R.

3. Verify that the remote controller is connected to the ECU.

4. Verify that the remote controller is connected to the temperature sensor on the ECU.

5. Turn the Main Circuit Breaker to "ON".

6. Select mode option for ECU.
   a) The "AUTO" mode selects heating and cooling as required.
   b) The "FAN" mode circulates air without heating or cooling.
   c) In "OFF" mode, no heating or cooling will take place.

d. Shutdown Procedure

1. Turn the Mode Toggle Switch to OFF.

2. Verify the unit's fan stops.

e. Emergency Shutdown Procedure

1. Turn Main Circuit Breaker to OFF.

2. Interrupt incoming power by disconnecting the power cord from the power source.

3. Disconnect the power cable from the ECU.

f. Network Monitoring Feature

1. The remote controller has a network monitoring feature for offsite monitoring of the ECU's operation. This utilizes Simple Network Management Protocol (SNMP) v1 logic.
   a) Default IP Address: 192.168.0.1
   b) Default Password: password
   c) Read Community String: public
   d) Write Community String: private

2. Variables Used:
   a) CONTACT 1 closed - Cool mode enabled
   b) CONTACT 2 closed - Evaporator Fan is powered
   c) CONTACT 3 closed - Heat mode enabled
   d) EXT TEMP - return air temperature (°C default)

3. There is an Ethernet connection to the left of the mode switch on the front of the remote controller. This port is utilized in connecting the remote to the installation's network in order to utilize this functionality. When connected and powered up, the Ethernet LINK amber LED will light, the TX green LED will light during activity. See figure 5.3.

4. Please contract HDT if a copy of the Management Information Base (MIB) is needed or for further information on this feature.

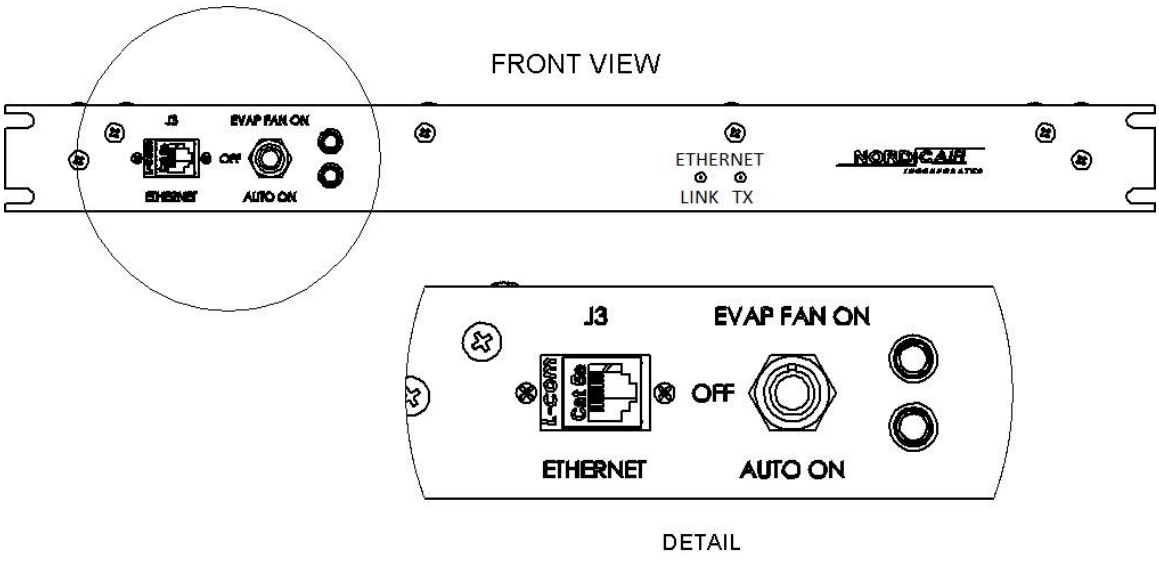

Figure 5.3

Chapter 6 Maintenance and Repair

Section 6.01 Maintenance Instructions

a. Preventive Maintenance Checks and Services are essential to ensure that the unit is ready for operation at all times. They correct defects and deficiencies before they can cause serious damage or complete failure of the equipment. Any effective preventive maintenance program must begin with instruction to all operators to report all unusual conditions noted during daily checks or actual operation to the appropriate maintenance personnel.

b. A system should be established to record all problems, defects, and deficiencies noted by operators and discovered during maintenance inspections together with the corrective actions taken.

c. A schedule for preventive maintenance inspection and service should be established immediately after installation of the unit. A quarterly interval is recommended for normal operating conditions. Any component requiring preventive maintenance at an interval more than quarterly is specifically identified in Preventive Maintenance Checks and Services Table, Table 6.1. When operating under unusual conditions, such as an extremely dusty, dirty, or sandy environment, it may be necessary to reduce the interval to monthly or less depending on the severity of the environmental conditions.

d. Stand-by, non-operating units should be rotated on a last in, last out basis. Any unit not operating for one (1) year should be tested. A walk-by, visual inspection should be done monthly. Look for physical damage due to material handling and evidence of oil leakage around the unit. Any unit that shows evidence of physical damage or oil leakage must be tested.

e. The refrigerant compressor and its drive motor are hermetically sealed. The compressor crankcase has a lifetime supply of oil and is pressure lubricated by an internal oil pump. If compressor failure or motor burnout occurs, the compressor must be replaced. Refer to the Recommended Spare Parts list for the correct replacement part. The blower motor has double shielded bearings that are permanently lubricated. These bearings are lubricated with a high-grade ball and roller grease of medium consistency and polyurethane base. If a situation occurs where the bearings need lubrication, the bearings must be removed and replaced or repacked with the above referenced lubricant or approved equivalent.

f. The Preventive Maintenance Checks and Services Table lists the preventive maintenance checks and services that should be performed at quarterly (or otherwise established) intervals. The Preventive Maintenance Checks and Services items in the table have been arranged in a logical sequence to provide for greater personnel efficiency and least amount of required maintenance downtime.

Section 6.02 Service Schedule

a. Preventative Maintenance Checks and Services

Component	PROCEDURES	SERVICE INTERVAL
Return Air Filter	• Remove, Clean, Inspect, and Service. • Discard/replace damaged or unserviceable filter. • NOTE: The return air filter is not supplied with the unit.	Monthly
Evaporator and Condenser Coils	• Check for secure mounting. Secure as needed. • Check for bent fins. Straighten with tongue depressor, coil comb, or plastic sheet. • Clean coils as needed.	Quarterly
Evaporator and Condenser Fan Motors	• Check for loose electrical connections. Secure as needed. • Check for loose mounting hardware. Secure as needed. • Check for accumulated dust/dirt. Clean as required.	Semi-Annually
Compressor	• Check for loose electrical connections. Secure as needed. • Check for loose mounting hardware. Secure as needed. • Check for accumulated dust/dirt. Clean as required.	Semi-Annually
Refrigeration Components	• Check for loose mounting. Tighten as needed. • Check tubing attachments. Repair as needed. • Inspect for bent or damaged equalizer tubing. Replace as needed. • Check expansion valve bulbs and tubing for damage. Replace as needed. • Check insulation. Repair as needed.	Semi-Annually
Condensate Drain Pan and Hoses	• Check evaporator compartment for evidence of moisture. • Blow out drain line if necessary. (a quart of clean water poured into the condensate pan provides a visual check of the drain line condition)	Semi-Annually
Refrigerant Charge	• Using the sight glass, inspect refrigerant while unit is running in COOL mode. • If low on charge, check for refrigerant leaks, recover refrigerant, repair leak, and recharge system.	Semi-Annually
Electrical Panel and Remote Control Wiring	• Inspect for damaged insulation, broken connection to lugs and indications of deterioration. Replace and repair as needed.	Semi-Annually

Table 6.1

Component	PROCEDURES	SERVICE INTERVAL
Brackets, Mounts, Hardware, etc.	• Examine for loose or missing attaching hardware or other obvious damage.	Semi-Annually
Outside Surfaces	• Check outside surfaces for accumulations of dust, dirt, or salt. Clean as required	Quarterly
Sight Glass	• Clean glass • Inspect condition of glass. Replace if cracked	Semi-Annually
Reassemble	• Install all components and panels removed during Preventive Maintenance Checks and Services. • Ensure all components and covers are in place and secure.	As Required

Table 6.1 (continued from previous page)

DANGER!
This ECU operates on high voltage. DEATH or SERIOUS INJURY can result if proper safety procedures are not observed. Always disconnect the ECU from its power source prior to servicing.

ATTENTION!
When using compressed air to clean filters or coils, limit pressure to 35 PSI.

b. Normal Operating Pressures

The following table 6.2 shows some pressure references. Note that these pressures should only be referenced as a guide as pressures are also affected by things like humidity, altitude, ECU coil cleanliness and refrigerant charge among others.

Temperatures	Pressure Range (Psig)			
Outdoor ambient	**50°F (10 C)**	**75°F (24 C)**	**100°F (38 C)**	**125°F (52 C)**
80°F(27 C) Return Air to Air Conditioner (Dry Bulb)	60-75 Suction 165-190 Discharge	60-75 Suction 215-250 Discharge	65-80 Suction 310-355 Discharge	65-80 Suction 410-425 Discharge
90°F(32 C) Return Air to Air Conditioner (Dry Bulb)	60-80 Suction 135-155 Discharge	65-85 Suction 215-225 Discharge	70-90 Suction 305-325 Discharge	75-95 Suction 420-435 Discharge

Table 6.2, Normal Operating Pressures

Section 6.03 Procedures

a. Air Filter Servicing (Not supplied with the ECU)

1. The air filter should be installed on the return air plenum.
2. Remove the filter from the plenum.
3. Using a water hose or compressed air, clean in the direction opposite of air flow
4. Allow the filter to dry.
5. Replace the filter into the plenum.

b. Evaporator Coil Cleaning

1. Remove the top cover.
2. Blow dirt from between fins with air nozzle pointing outward.
3. With damp rag, clean debris from filter compartment.
4. Replace the top cover.

c. Condenser Coil Cleaning

1. Remove the top cover from the condenser section.
2. Using compressed air and working from the inside of the ECU, blow debris from between the fins, pointing the air nozzle upward.
3. Replace the top cover.

Section 6.04 Field Repair

It may be necessary from time to time to perform field repairs on the refrigeration system. If field repairs are necessary, the following procedures apply.

WARNING!
Disconnect the ECU from the power source and remove the power connector from the ECU prior to performing any service or maintenance tasks.

ATTENTION!
Do not attempt to make any adjustments or repairs without proper tools.

ATTENTION!
All repairs must be carried out in compliance with EPA Section No. 608 and applicable local air quality regulations.

DANGER!

Refrigerant R-407C is used in this equipment. DEATH or SERIOUS INJURY may result if personnel fail to observe safety precautions. Great care must be exercised to prevent liquid refrigerant, or refrigerant gas discharged under high pressure, to come in contact with any part of the body. Extremely low temperature resulting from rapid expansion of liquid refrigerant, or refrigerant gas discharged from under high pressure, can cause sudden and irreversible tissue damage through freezing. All personnel must wear thermal protective gloves and a face shield or goggles when working in any situation where refrigerant contact with skin or eyes is possible. Application of excessive heat to any component in a charged system will cause extreme pressure that may result in a rupture, possibly explosive in nature. Exposure of certain CFC (chlorofluorocarbon) and HCFC (halogenated chlorofluorocarbon) refrigerants to extreme heat or very hot surface will cause a chemical reaction in the gas to form carbonyl chloride (phosgene), a highly poisonous and corrosive gas. Generally, in their natural states, CFC and HCFC refrigerants are colorless, odorless vapors with no toxic characteristics, are heavier than air and will disperse rapidly in a well ventilated area. However, in an unventilated area, these refrigerants present an asphyxiate danger by displacing oxygen in the area.

a. Leak Detection

1. In order to check a system for leaks, it is necessary that the system or portion of the system first be pressurized. This will naturally be true of a new system prior to evacuating and charging, or an old system, which has lost its charge.

2. If the system has been in operation and has lost its entire charge, it is desirable to pressurize the entire system to find the leak or leaks.

3. When the entire unit is to be pressurized, it is usually desirable to pressurize the system through both the suction and discharge service valves. In this manner, the pressure is supplied to both the high and low sides of the system.

4. Refrigeration systems are commonly pressurized with dry nitrogen or refrigerant for purposes of leak checking. Test pressures should be adjusted to 10 psig or higher (Max 150 psig). (Recover all refrigerant)

    a) The advantages of nitrogen are:
        1) Nitrogen is not ozone depleting.
        2) It is less expensive than refrigerant.

3) Nitrogen will leak approximately twice as fast as refrigerant from the same size hole at the same pressure.
4) The valve arrangement on a nitrogen bottle provides an excellent means of checking if a leak exists.
5) Nitrogen will not be absorbed by refrigerant oil, thereby causing a misleading pressure drop.
6) Test procedures are easier to obtain.

b) The advantages of refrigerant are:
1) Refrigerant leaks can be detected with a Halide or electronic leak detector.
2) Nitrogen cannot be detected unless it is used with a portion of refrigerant.
3) Refrigerant may be more readily available to a service technician.

5. Leak Testing a System Charged With Refrigerant Using an Electronic Leak Detector. An electronic leak detector is the preferred tool for leak checking. It is highly sensitive and measures the electronic resistance of gas samples.
a) Turn detector on and attach proper probe.
b) Pass probe along the lines going around the joints and connections. Be sure to check all points.
c) Presence of a leak will be indicated either by a buzzing or beeping sound.

6. Checking For Leaks With a Soap Solution.
a) Apply a solution of soapy water with a brush or sponge to the joints and connections in the refrigeration line(s).
b) A leak in the lines will cause bubbles to form.

b. Leak Repair

1. When a leak is located, properly reclaim the remaining refrigerant charge before attempting repairs. Adjacent piping must be thoroughly cleaned by removing all paint, dirt and oily film. Use a wire brush, sand cloth or sandpaper and wipe the area with clean, dry cloths. Protect nearby parts from heat damage by wrapping with water-soaked cloths.

2. For copper-to-copper (piping) repairs, use SILFOS Alloy. No flux is required with Silfos Alloy. Silver solder (Stay-Silv #45) and flux are to be used on copper-to-brass or copper-to-steel repairs. In an emergency, a 95%/5% tin/antimony solder may also be used with flux for repairs. When repairs are completed, remove all traces of flux. After any repair, check for leaks prior to system use.

DANGER!
DEATH or SERIOUS INJURY may result if personnel fail to observe the following safety precautions

c. Refrigeration System Component Replacement

1. The expansion valve, filter/drier, etc. can be readily replaced by any qualified refrigeration service technician following standard refrigeration procedures.

2. Refer to the wiring diagram and refrigeration schematic in Chapter 9 of this manual for the location of the system components and their relationship to each other. Refer to any adjustments and settings that may be required before or after installation.

3. To attach a manifold hose to Schrader valve:

   a) Remove cap from valve.

   b) Make sure gauge manifold valves are closed.

   c) If hose does not have an unseating pin, unseating coupler must be used.

   d) Make sure coupler is lined up straight with Schrader valve. Screw coupler on to valve.

   e) Open gauge manifold valve slightly and purge air from hose with refrigerant.

   f) Read the suction pressure on compound gauge and head pressure on pressure gauge.

   g) To remove, push end of coupler tight against end of Schrader valve and hold in place while quickly unscrewing coupler nut from Schrader valve.

   h) Remove coupler from Schrader valve.

4. Evacuate the system to less than 150 microns, using a good vacuum pump and an accurate high vacuum gauge. Operate the pump at less than 150 microns, for several hours and then allow the system to stand for several additional hours to be sure the vacuum is maintained. An alternative evacuation procedure can be found on the next page (Chapter 6, Section 6.04 c. 5.)

ATTENTION!

A refrigeration system should be evacuated whenever the system has been open in such a manner that there is a possibility that air and moisture could have entered the system. The evacuation process is intended to remove non-condensable gases and moisture from the portion of the system to be evacuated. The most important contaminant to be removed is moisture. To remove moisture from the system, it must first be boiled into vapor. Before water will boil at ordinary room temperature, for example, at 70°F the vacuum must be 29¼ inches of mercury at 30 inches of mercury barometric pressure. This means that the system must be within ¾ inches of mercury of absolute zero pressure. This low vacuum should be measured by using an absolute pressure gauge, such as an electronic gauge. For this reason, a good vacuum pump must be used to accomplish good dehydration.

5. An alternate method of removing moisture and non-condensables from the system is:

   a) Evacuate the system to 29 inches vacuum for ten minutes per ton of system.

   b) Break the vacuum with refrigerant to be used for final charging of system and vapor charge in system for a minimum of five minutes.

   c) Repeat Steps “a)” and “b)” two more times.

   d) Evacuate system to 29 inches vacuum for twenty minutes per ton. Charge system with the specified kind of quantity of refrigerant (charge into vacuum).

   e) Disconnect charging line at vacuum and connect to refrigerant supply. Crack valve and purge charging line at center on manifold. Then close valve.

   f) The system is now ready for the correct operating charge of refrigerant.

d. Compressor Replacement

1. The compressor is the most important component of the air conditioner. Numerous safety devices are provided to protect the compressor from contamination damage and burnout.

ATTENTION!
When replacing a burned-out compressor, it is mandatory that the refrigeration system be thoroughly cleaned before operating the replacement compressor.

2. When a compressor burnout occurs, acid is created as a result of refrigerant-oil mixture being exposed to the extreme high temperatures the motor burnout generates. The acid diffuses throughout the refrigeration system and must be removed before a new compressor is placed in service, or the acid will attack the windings of the new compressor motor. Any dirt, scale, air or water vapor also drastically shortens the operating life of the new compressor.

3. To replace the compressor, a qualified technician can observe the following procedure:

   a) Unsolder the suction and discharge lines from the compressor. Remove and retain the hardware that mounts the compressor to the ECU. Remove the compressor from the ECU.

   b) Test the refrigerant oil of the defective compressor for acid using an acid test kit. If the refrigerant oil is found to be acidic, replace the liquid line filter/drier and a suction line filter/drier. If the analysis of the oil shows no acidity, then the system can be cleaned by simply replacing the liquid line filter/drier.

   c) Install the new compressor using the hardware removed from the defective compressor. Re-solder the suction and discharge lines. Make all electrical connections to the compressor.

   d) Purge the system with dry nitrogen and perform a leak check. Refer to the leak detection section of this manual (Chapter 6, Section 6.04, a. & b.).

   e) Once the unit has passed the leak detection test, evacuate the refrigeration system to less than 150 microns of vacuum. (Chapter 6, Section 6.04 c. 4. or 5.)

   f) Break the vacuum with refrigerant, then charge and operate the unit.

   g) After installation and start-up are complete, the following tests should be performed on the replacement compressor and the information recorded.
      1) Suction pressure
      2) Discharge pressure
      3) Amp draw.

WARNING!
Use rubber gloves and safety glasses and ventilate the workspace. The oil from a burnout could cause serious skin irritation and possibly burns. In some cases, the fumes are toxic. Use extreme caution when sampling oil.

e. Compressor Burnout Decontamination Procedure

1. When a motor burnout occurs in the compressor, the resulting high temperature arc causes a portion of the refrigerant/oil mixture to break down into carbonaceous sludge, corrosive acid, and water. Contamination resulting from a burnout can result in repeat failures if the contaminants are allowed to reach and remain in the crankcase of the replacement compressor.

2. This situation can be prevented by following the proper clean-up procedures after a burnout. HDT recommends the filter-drier cleaning procedure. Basically this involves the use of approved filter-driers incorporating an adequate desiccant (not a filter only) in both the liquid and suction lines.

    a) In order to avoid losing refrigerant to the atmosphere, you must recover refrigerant using standard recovery procedures and equipment. At that point, remove the inoperative compressor and install the replacement.

    b) Since the normal color of refrigerant oil varies from oil to oil, take a sample of oil from the replacement compressor and seal in a small glass bottle for comparison purposes after the cleaning operation is complete. Suitable two ounce bottles are obtainable at any drug store.

    c) Install the recommended size filter-drier in the liquid line.

    d) Inspect all system controls such as expansion valves, solenoid valves, check valves, contactors, etc. replace the filter-drier previously installed in the system.

    e) Following the procedures previously recommended for leak detection and leak repair (Chapter 6, Section 6.04 a. & b.) charge through a filter-drier with the refrigerant that was removed and recovered adding additional refrigerant as necessary.

    f) Although some contaminants will be returned to the compressor during the pump down procedure, the compressor will not be harmed by the short period of operation required, and the contaminants will be removed as they are circulated through the system after the installation of the filter-drier.

g) Start the compressor and put the system in operation. As the contaminants in the system are filtered out, the pressure drop across the filter-drier will increase. Observe the pressure differential across the filter-drier for a minimum of four (4) hours, preferably by means of one gauge and a manifold to eliminate gauge error. If the pressure drop exceeds seven (7) pounds, replace the filter-drier and restart the system.

h) After the completion of Step "g)", allow the unit to operate for 48 hours. Check the odor (warning: smell cautiously, do not inhale) and compare the color of the oil with the sample taken in Step "b)". If an acid test is available, test for acid content. If the oil is discolored, has an acrid odor (do not inhale), is acidic, or if the moisture indicator indicates high moisture content in the system, change the filter-drier. The compressor oil can be changed if considered desirable. Allow the system to operate for an additional 48 hours, and recheck as before. Repeat until the oil remains clean, odor free and the color approaches that of the original sample.

i) Replace the liquid line filter-drier with one of the normally recommended size.

j) After the cleaning procedure is completed, recheck after approximately 50 hours of operation to insure that the system condition and operation is completely satisfactory.

f. Charging Procedures

If the system has been open to the atmosphere, it should be first evacuated (Chapter 6, Section 6.04 c. 4. or 5.), and then may be charged with this general procedure:

1. Attach a drum of proper, clean refrigerant to the center port of the charging manifold with one of the charging hoses.

2. Attach a second charging hose to the suction gauge (low-pressure) side of the gauge manifold.

3. Remove the cap from the suction line valve.

4. Loosely attach the suction gauge hose to the line valve. Open the valve on the refrigerant drum and the suction valve on the charging manifold slightly to purge the air from the manifold and hoses before tightening the fitting.

5. Attach the third hose to the high-pressure side of the manifold and the liquid line valve. Repeat Steps "3" and "4" above.

g. Charging the System by Weight

It is preferable to charge the system by refrigerant weight. If a proper scale is available, this procedure may be used to charge the ECU.

1. Connect the manifold as instructed.

2. Place the refrigerant drum on a scale and determine exact weight of refrigerant and cylinder or use a Charging cylinder. Refer to Data Plate for proper refrigerant and charge.

3. With manifold suction valve closed and manifold discharge valve open, open refrigerant cylinder valve and allow pressure in system to balance with pressure of cylinder.

4. When there is approximately a full charge, close the discharge manifold valve and let the system stabilize for about five minutes.

5. Start compressor by setting thermostat.

6. When the correct weight of refrigerant has been added to the unit, close refrigerant cylinder valve and allow unit to run for 30 minutes. Check the head pressure and sight glass and adjust charge if needed.

7. Front seat gauge manifold valves, disconnect charging and gauge hoses and replace all valve caps.

Chapter 7 Troubleshooting

Section 7.01 General

The following table provides a service technician with a basic guide to troubleshoot common problems with the ECU. While this table is not intended to be all-encompassing, it does list the more common problems that may be encountered along with the possible causes and the suggested remedies.

DANGER!
Troubleshooting must only be performed by qualified technicians.
DEATH or SERIOUS INJURY can occur.

Symptom	Possible Cause	Remady
ECU fails to start	Incorrect voltage	Correct voltage
	Power failure	Check power source, power input and circuit breaker. Check control cables and connections
	Remote Controller not functioning	Check control cables and connections
Compressor fails to start	Defective contactor	Repair or replace. Check for overload
	Head pressure too high (high pressure switch open).	Check for condenser blockage Check fan motor contactor
	Loss of refrigerant (low pressure switch open)	Repair leak, recharge system
	Defective thermostat control board (TST)	Replace board
	Defective compressor	Replace compressor
Noisy compressor	Worn or failed compressor bearings (indicated by excessive knocking)	Replace compressor

Table 7.1

Symptom	Possible Cause	Remady
No condenser air flow	Internal motor overload tripped Defective condenser fan contactor	Determine cause and repair. Replace contactor
Head pressure too high	Low condenser air flow (indicated by excessively warm air leaving the condenser fan) Air or other non-condensable gas in system Over charge of refrigerant	Open air passages. Clean coil. Check condenser fan Reclaim system and recharge. Install new filter/drier Reclaim excess refrigerant from unit
Head pressure too low	Loss of refrigerant (indicated by bubbles in sight glass)	Repair leak and recharge system
Suction pressure too low	Expansion valve stuck in the open position (indicated by abnormally cold suction line). Low charge, flash gas in liquid line (indicated by bubbles in sight glass) Clogged filter/drier Obstructed expansion valve (indicated by loss of capacity) Loss of control fluid from expansion valve control head (indicated by bubbles in the sight glass)	Repair or replace valve. Repair leak and recharge system Replace filter/drier Replace valve Replace valve or control head
Heater fails to operate	Overload trip Defective over-temp switch Defective contactor	Determine cause and repair Replace switch Replace contactor

Table 7.1 (continued from previous page)

Section 7.02 Diagnostic Checks

a. Voltage Check

WARNING!
Disconnect the ECU from the power source and remove the power connector from the ECU prior to performing any service or maintenance tasks.

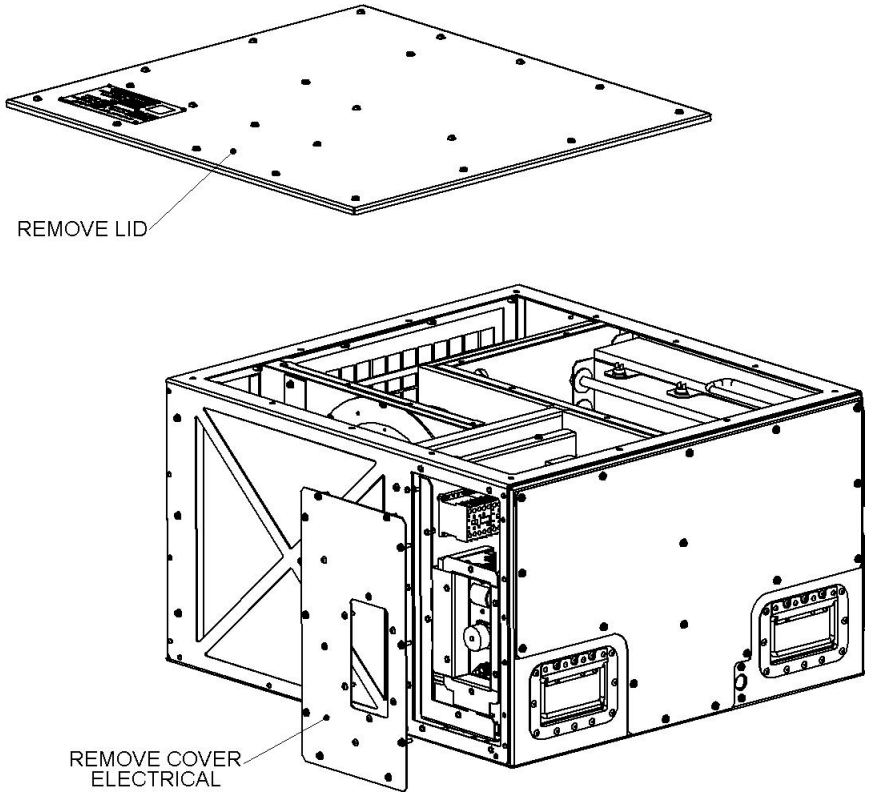

Figure 7.1

1. If there is a problem with a unit starting, or the compressor is cycling on its internal overload, the trouble may be due to improper electric service being supplied to the unit.

   a. With the disconnect switch on, turn the Mode toggle switch on the Remote Controller to the "OFF" position.

   b. Read the voltage at the disconnect from L1-N. This is called "idle" voltage.

c. Turn the Mode toggle switch on the Remote Controller to the "AUTO" position. With the compressor running, read the voltage at the disconnect from L1-N. This is called "running voltage".

2. If the voltage drops more than 20% between idle and running voltage then the motors in the unit will overheat. Some common causes of voltage drop include service transformers that are overloaded, service wiring that is too small, or too small a generator.

3. If the voltage is correct, then the frequency may not be correct. Running an ECU with improper voltage and/or frequency can cause compressor and motor damage.

b. Current Check

1. The nominal load amps for system components are tabulated on the wiring schematic. They are as follows (for 115V 60Hz):

Compressor (1M)	10.6 amps
Evaporator Fan Motor (2M)	1.9 amps
Condenser Fan Motor (3M)	2.8 amps
Heater Elements (HE1)	13.2 amps (GSQ386ZABNWY0**)
Heater Elements (HE1)	17.3 amps (GSQ386ZABNWY0**-R)

2. Operating current will vary from these nominal values based upon the operating conditions of the ECU. One can expect the typical operating amps to be as follows:

Compressor (1M) max load	11.8 amps
Compressor (1M) min load	7.1 amps
Evaporator Fan Motor (2M)	1.9 amps
Condenser Fan Motor (3M)	2.8 amps
Heater Elements (HE1) max	13.8 amps (GSQ386ZABNWY0**)
Heater Elements (HE1) max	18.0 amps (GSQ386ZABNWY0**-R)

3. The maximum power consumed by the ECU in cooling mode with indoor temperature of 110°F and outdoor temperature of 131F and clean coils is 1,870 watts. A dirty outdoor coil will increase the power consumed by the ECU. Cooler temperatures will decrease the power consumed by the ECU.

c. Electrical Component Diagnostics

1. To determine the possible failure of electrical components, the diagnostic tests in Table 7.3 can be used by a qualified technician. A legend of component abbreviations is provided in Table 7.2.

DANGER!
Many diagnostic tests require power to be present. Extreme care must be exercised to avoid DEATH or SERIOUS INJURY. High voltage is present in the electrical panel.

WARNING!
Fans and blowers are rotating parts that can cause severe injury. They may start without warning.
Always disconnect the ECU from its power source prior to servicing.
Do not operate the ECU with panels removed.

WARNING!
Heating elements reach high temperatures. Severe burns are possible. Allow elements to cool before servicing.

Electrical Component Legend

	LEGEND
CB1	CIRCUIT BREAKER-MAIN
1M	MOTOR-COMPRESSOR
1MS	CONTACTOR-COMPRESSOR
CAP1	START CAP-COMPRESSOR
KS1	COMPRESSOR HARD START
SF1	SOFT STARTER
2M	MOTOR-EVAP FAN
2MS	CONTACTOR-EVAP FAN
CS1	CURRENT SWITCH
CAP2	EVAP RUN CAP
3M	MOTOR-COND FAN
3MS	CONTACTOR- COND FAN
CAP3	RUN CAP-COMPRESSOR
PS1	DC POWER SUPPLY
HC1	HEATER CONTACTOR
HE1	HEAT ELEMENTS MAIN
HT1,2	TSTAT-HEATING HIGH LIMIT 1,2
TST	THERMOSTAT - COOL / HEAT
SS1	SWITCH- MODE SELECTION
PS1	PRES SWITCH-HIGH
PS2	PRES SWITCH-LOW
GND	GROUND LUG
RR1	REMOTE CONTROLLER
RS1	REMOTE TEMP & HUMIDITY SENSOR
RSC1	REMOTE SITE CONTROLLER
J2	REMOTE CONTROL RECEPTACLE
J1	MAIN POWER IN
PWR1	DC POWER SUPPLY

Table 7.2

Electrical Component Diagnostics

DC Power Supply (PWR1)	***Power must be connected.*** Test Power input (L & N), should be 120VAC. Test power output (+ and -), should read 24VDC.
Circuit Breaker (CB1)	***Power must be disconnected.*** In the OFF position terminals L1 to L1 & N to N should have no continuity. In the ON position terminals L1 to L1 & N to N should have continuity.
Input Power (J1)	Ohm out cable. Color code is Black/White/Green
All Motors Compressor Motor (1M)	Test each wire to ground for short, this applies to all motors Test wires 12 to 13 & 12 to 14 continuity should be present.
Fan Motor (2M)	Test wires 20 to 21 & 20 to 22 Continuity should be present.
Fan Motor (3M)	Test wires 30 to 31 & 30 to 32 Continuity should be present.
Contactors (1MS,2MS,3MS,HC1)	1.) Test 1 to 2, 3 to 4 & 5 to 6 continuity should not be present. 2.) A1 to A2 continuity should be present. *** To apply power ensure that tests 1 and 2 are correct.*** 3.) Connect power and check for amp draw. 4.) Ensure you have continuity from 1 to 2, 3 to 4 & 5 to 6.
Selector Switch (SS1) Located on the Remote Control Box For OFF, AUTO, and FAN modes	**OFF:** No continuity 1 to 1A or 1B & 2 to 2A or 2B. **FAN:** Continuity 1 to 1A & 2 to 2A. No continuity 1 to 1B & 2 to 2B. **AUTO:** Continuity 1 to 1B & 2 to 2B. No continuity 1 to 1A & 2 to 2A
HPC (PS1) LPC (PS2)	Test terminals 1 and 2, continuity should exist if system pressure is below 325 psi. Test terminals 1 and 2, continuity should exist if system pressure is greater than 35 psi.
Anti short cycle timer part of (TST)	***Must connect power.*** Turn unit on to cooling, then off. Turn unit back on to cooling. It should take 2 minutes for the compressor to restart.
Low ambient bypass timer part of (TST)	***Must Connect Power***. Output T12 will remain on for 2 minutes. (24 volt signal)
Heater Cutout HT1, HT2	Should have continuity from 1 to 2.

Table 7.3

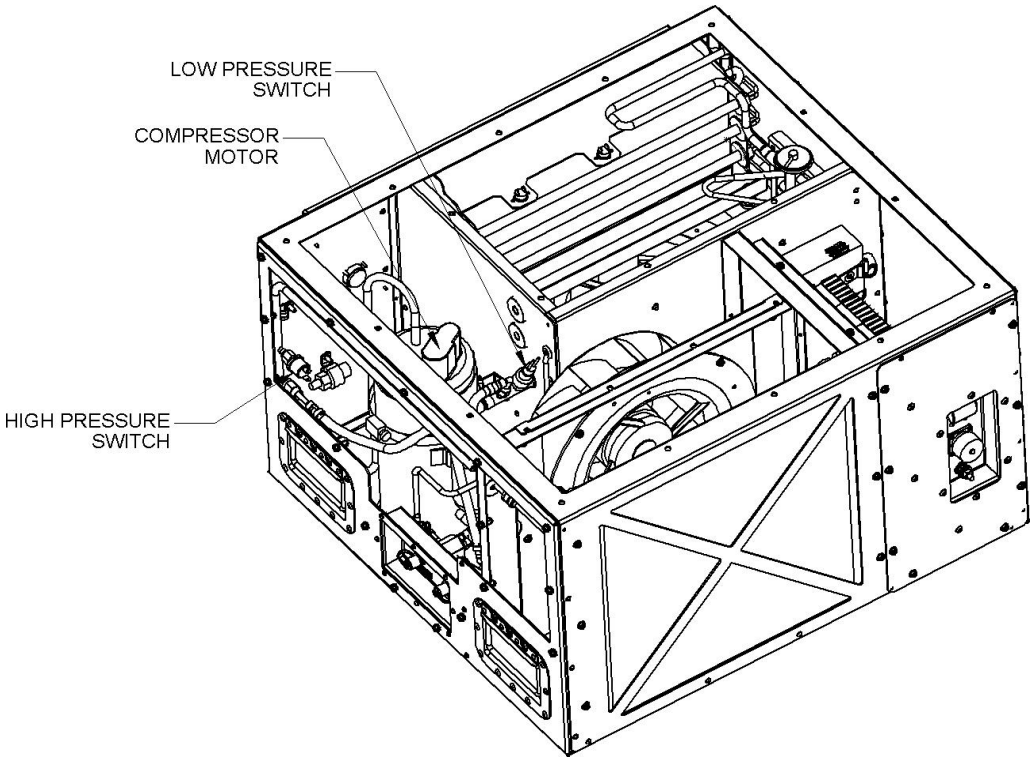

Figure 7.2

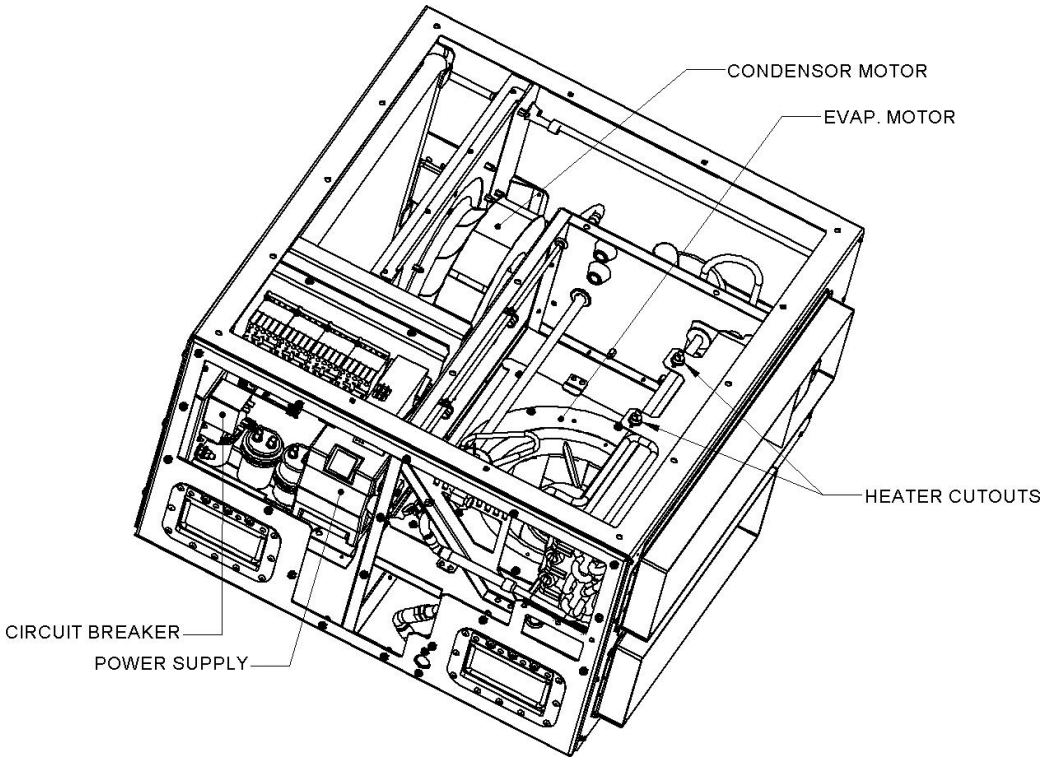

Figure 7.3

d. Compressor Check

1. The following diagnostic procedure should be used to evaluate whether a compressor is functioning properly.

    a. Verify proper voltage to the ECU.

    b. Verify proper indoor and outdoor fan/blower rotation direction.

    c. If the compressor will not run, the normal checks of motor winding continuity and short to ground should be made to determine if the inherent internal overload motor protector has opened or if an internal short to ground has developed.

    d. If the protector has opened, the compressor must be allowed to cool sufficiently to allow it to reset.

    e. With service gauges connected to suction and discharge pressure fittings, energize the compressor.

    f. If suction pressure falls below normal levels the system is either too low on charge or there is a flow blockage in the system (refrigerant or air).

    g. If suction pressure does not drop and discharge pressure does not rise to normal levels, the compressor is faulty.

Chapter 8 Specifications

Dimensions	L 26” (27.68" over duct flange) x W 28” x H 16” (L 660mm (703mm over flange) x W 711mm x H 406mm)
Weight	130 lbs (59 kg) Less: Electrical Power Cord
Storage Temperature	-60°F (-51°C) to +160°F (+71°C)
Operational Ambient Temperature Range	Heating: -25°F (-31°C) to +90°F (+33°C) Cooling: +50°F (+10°C) to +135°F (+57.2°C)
Incline Operation:	The ECU shall be capable of operation @ 10° incline in any horizontal direction.
Nominal Cooling Capacity:	9,000 BTUH Total, @ 95°FDB OAT. //Evaporator Air Inlet 80°FDB/70°FWB 7, 750 BTUH Total @ 131°FDB OAT. //Evaporator Air Inlet 90°FDB/75°FWB
Nominal Heating Capacity:	5,200 BTUH (model GSQ386ZABNWY0**) 6,810 BTUH (model GSQ386ZABNWY0**-R)
POWER	
Main Voltage	115/1/50-60VAC
Power Connection (GSQ386ZABNWY0**)	ECU MS3450W18-11P, CABLE MS3106E18-11S (5 Pin)
Power Connection (GSQ386ZABNWY0**-R)	ECU MS3102R20-19P, CABLE MS3106F20-19S (3 Pin)
Main Circuit Breaker	CB1- 20 Amp, 2 pole, Hydraulic Type (GSQ386ZABNWY0**) CB1- 25 Amp, 2 pole, Hydraulic Type (GSQ386ZABNWY0**-R)
8’ Power Cable (108-00047)	#12 AWG, 3 Conductor Cable with MALE, NEMA 5-20P, (GSQ386ZABNWY0**)
8’ Power Cable (108-00061)	#12 AWG, 3 Conductor Cable with MS3106F22-22P (4 Pin), (GSQ386ZABNWY0**)
8’ Power Cable (108-00132)	#8 AWG, 3 Conductor Cable with MS3106F22-22P (4 Pin), (GSQ386ZABNWY0**-R)
Control Voltage	24 VDC
CONDENSER	
Compressor	Rotary
Airflow	580 SCFM
Condenser Fan Motor	Single Speed: 110-130/1/50-60VAC, with Internal Thermal Overload Protection.
Pressure Relief Valve	550 PSI, Auto Reset.
High Pressure Switch	500 PSI CO, 350 PSI CI
Low Pressure Switch	35 PSI CO, 60 PSI CI
Filter Drier	5 inch^3, Solid core filter media.
Sight Glass	Moisture Indicator, Viewable from outside the ECU

Table 8.1

Refrigerant Access Ports	Suction & Discharge Access Valves: ¼ SAE Flare Connections with Schrader Valve and Cap, accessible from outside the ECU.
Condenser Coil	Aluminum Microchannel coil, Double Row with corrosion resistant cladding.
EVAPORATOR	
Airflow	330 CFM @ .25" ESP
TXV	Thermostatic Expansion Valve
Evaporator Coil	Aluminum Finned, 12 Fins per inch, 0.006" thick fin stock, enhanced copper tube 0.016" thick wall, Face Area 0.67ft^2. x 3 rows deep, E-Coating for corrosion protection.
Drain Pan	Drain Pan with Dual Drains to allow for condensate drainage and ECU operation @ 10° incline in any horizontal direction. 1/2" FPT Drain Connection is located on the side of the unit.
Heating Elements (GSQ386ZABNWY0**)	Elements 420W (+10%/-0) each, Qty. (3) 304 Stainless Steel Construction
Heating Elements (GSQ386ZABNWY0**-R)	Elements 570W (+10%/-0) each, Qty. (3) 304 Stainless Steel Construction
Heater High Limits	Qty. (2) Opens 140°F/ Closes 120°F Cut-in
CONTROLS	
Contactors	IEC Type
DC Power Supply	85-264/1/47-63 VAC Input, 24VDC Output 10A
Thermostat Control with built in Anti-Short Cycle and Low Pressure By-pass	Heating and Cooling Thermostat with remote sensing bulb located in the return air section of the evaporator. By-passes the low pressure switch for 2 minutes to allow the system to start in the Cooling Mode during low ambient conditions. 2 Minute on-delay/on-break timer to control compressor short cycling.
Mode Toggle Switch	Toggle Action Switch, OFF / FAN / AUTO –Modes

Table 8.1 (continued from previous page)

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Chapter 9 drawings are organized to span the binding.

Chapter 9 Reference Drawings

Section 9.01 ECU Electrical Schematic (502-00033)

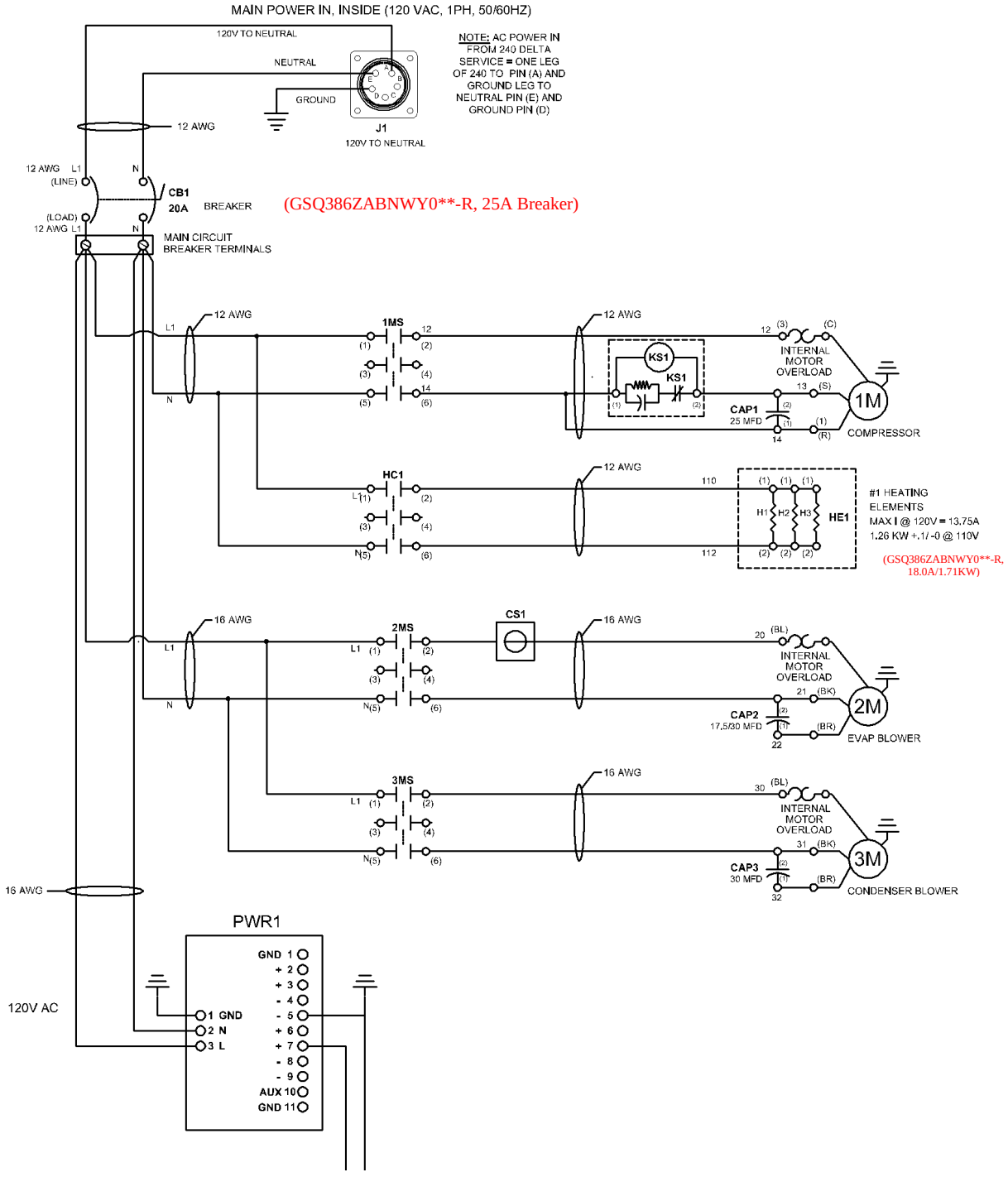


Figure 9.1.1 Main Electrical Schematic (Drawing continued on next page)

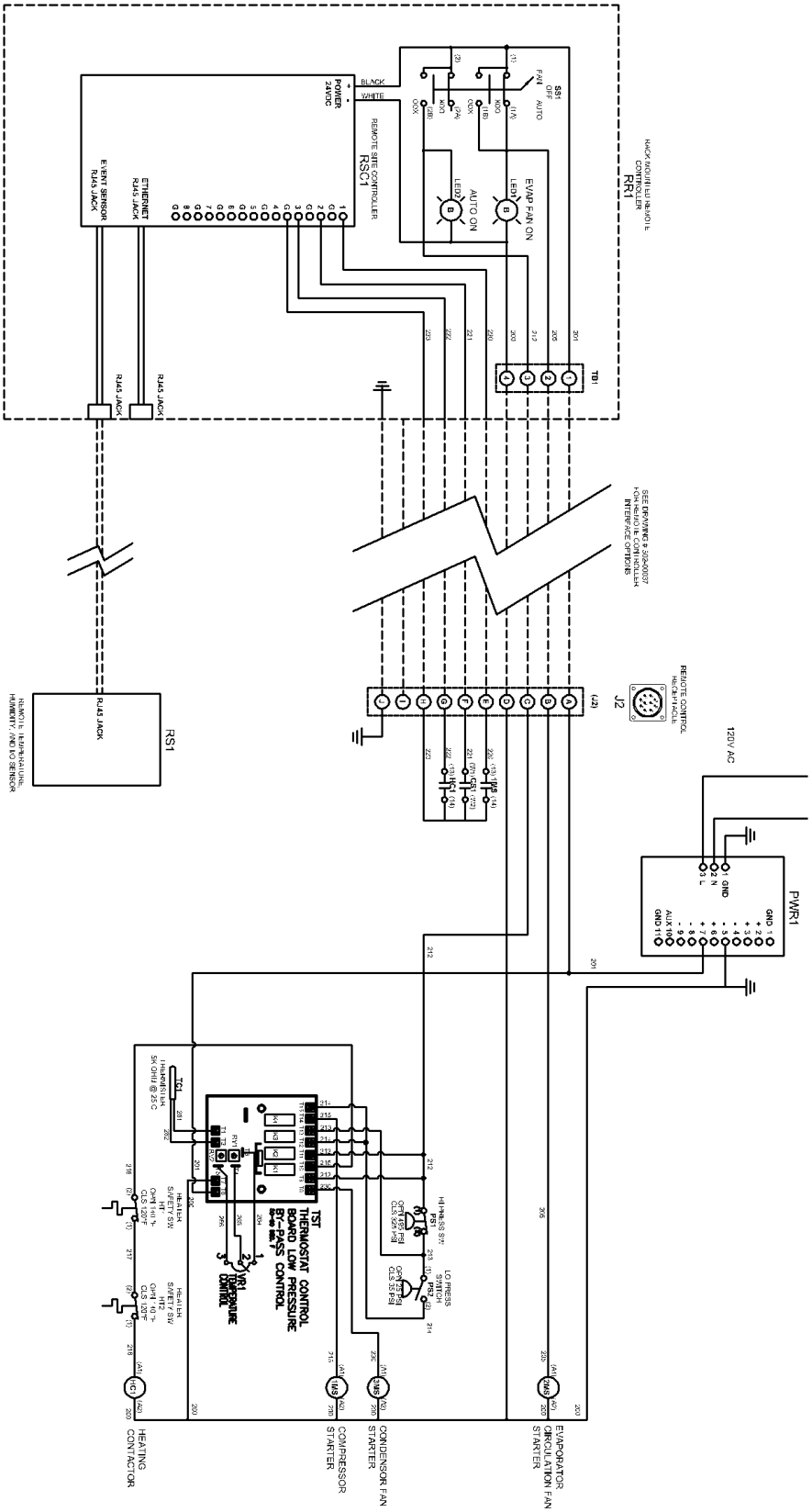


Figure 9.1.2 Main Electrical Schematic (Drawing continued from the previous page)

Section 9.02 Remote Control Schematic (502-00037)

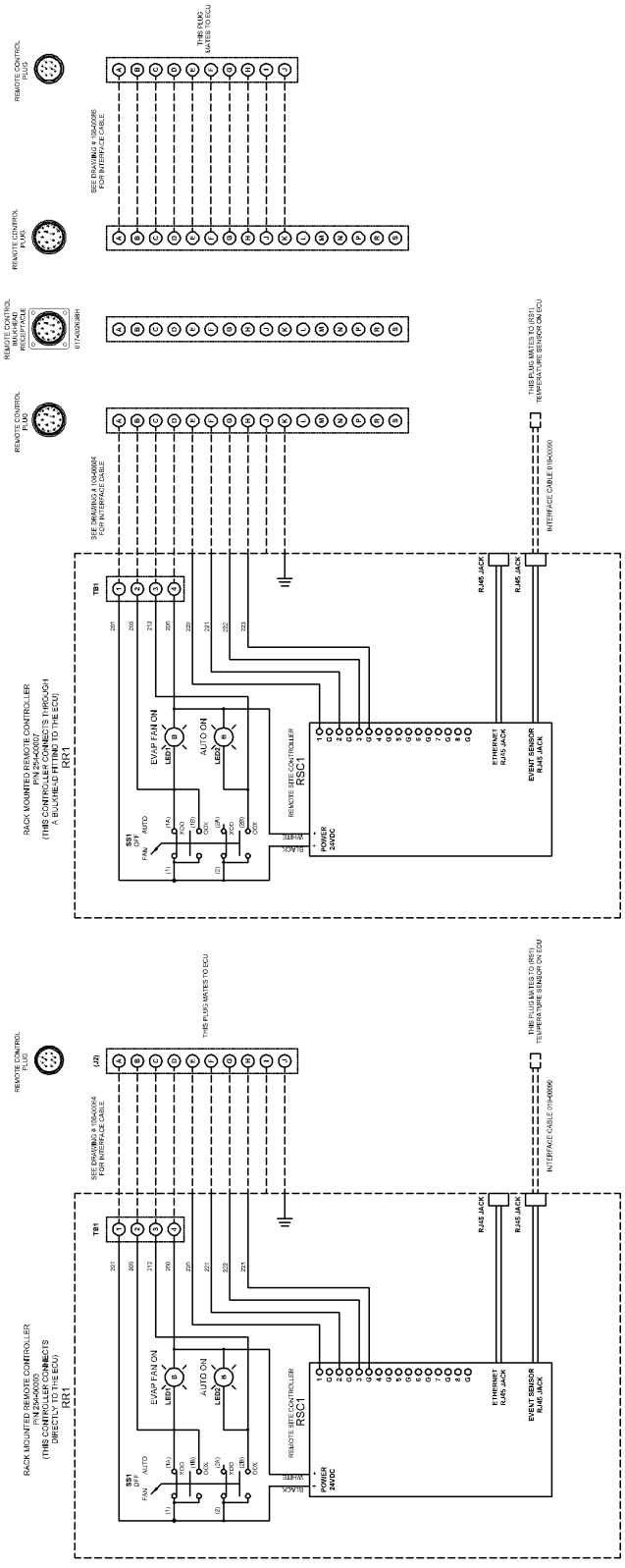


Figure 9.2 Schematic Remote Control Box

Section 9.03 ECU Wiring Diagram (514-00022)

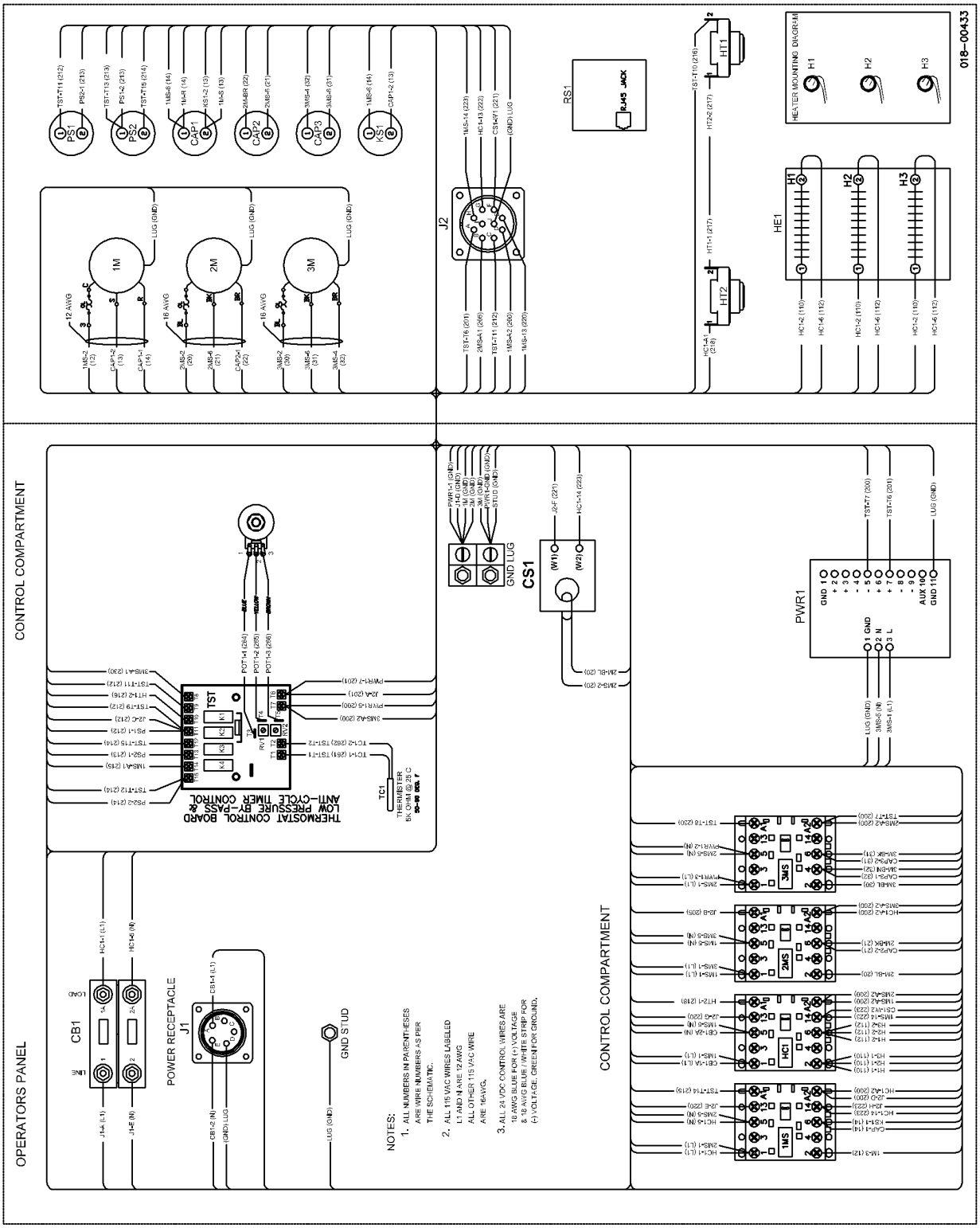


Figure 9.3 ECU Wiring Diagram

Section 9.04 54-00003, Remote Wiring Diagram (514-00024)

For standard remote model P/N 254-00003.

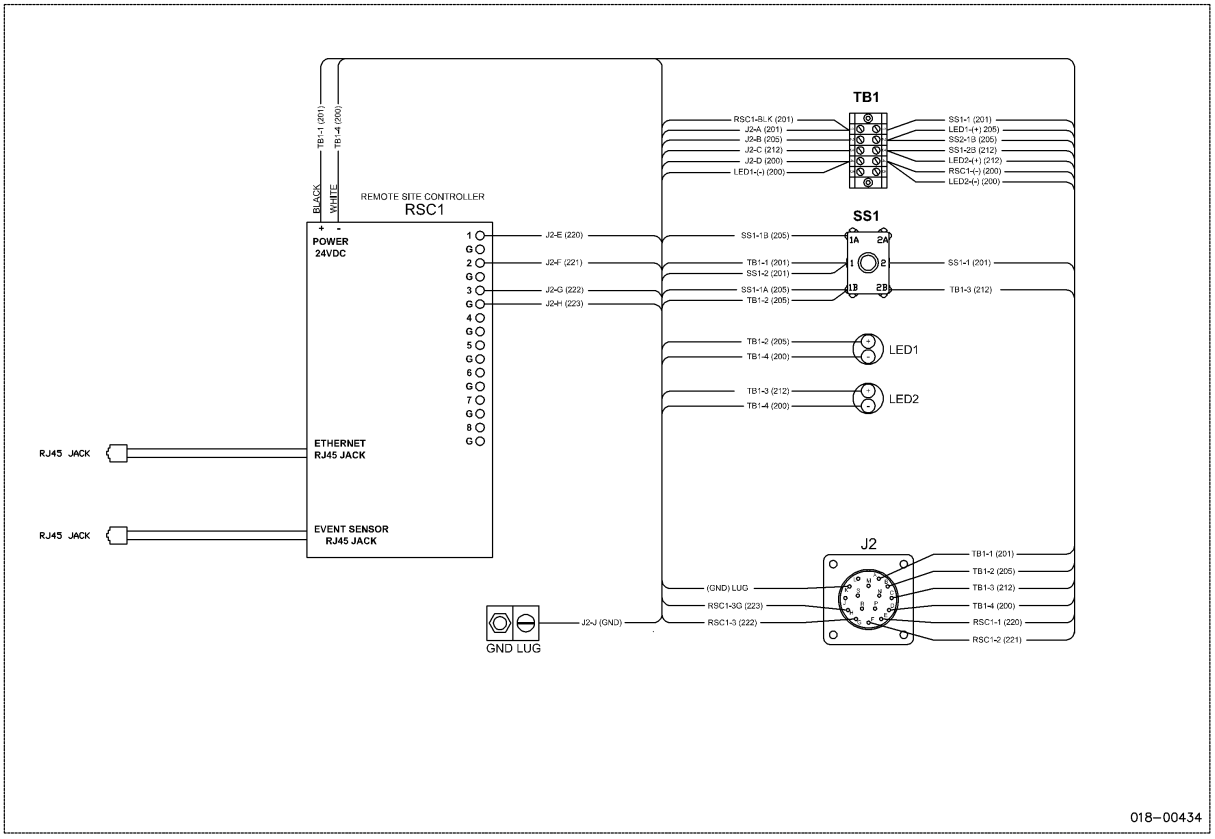


Figure 9.4 Remote Wiring Diagram for 254-00003 (Standard)

Section 9.05 254-00007, Remote Wiring Diagram (514-00029)

For optional bulkhead remote model P/N 254-00007.
This remote has multiple cable lengths in order to be wired thru a bulkhead junction box.

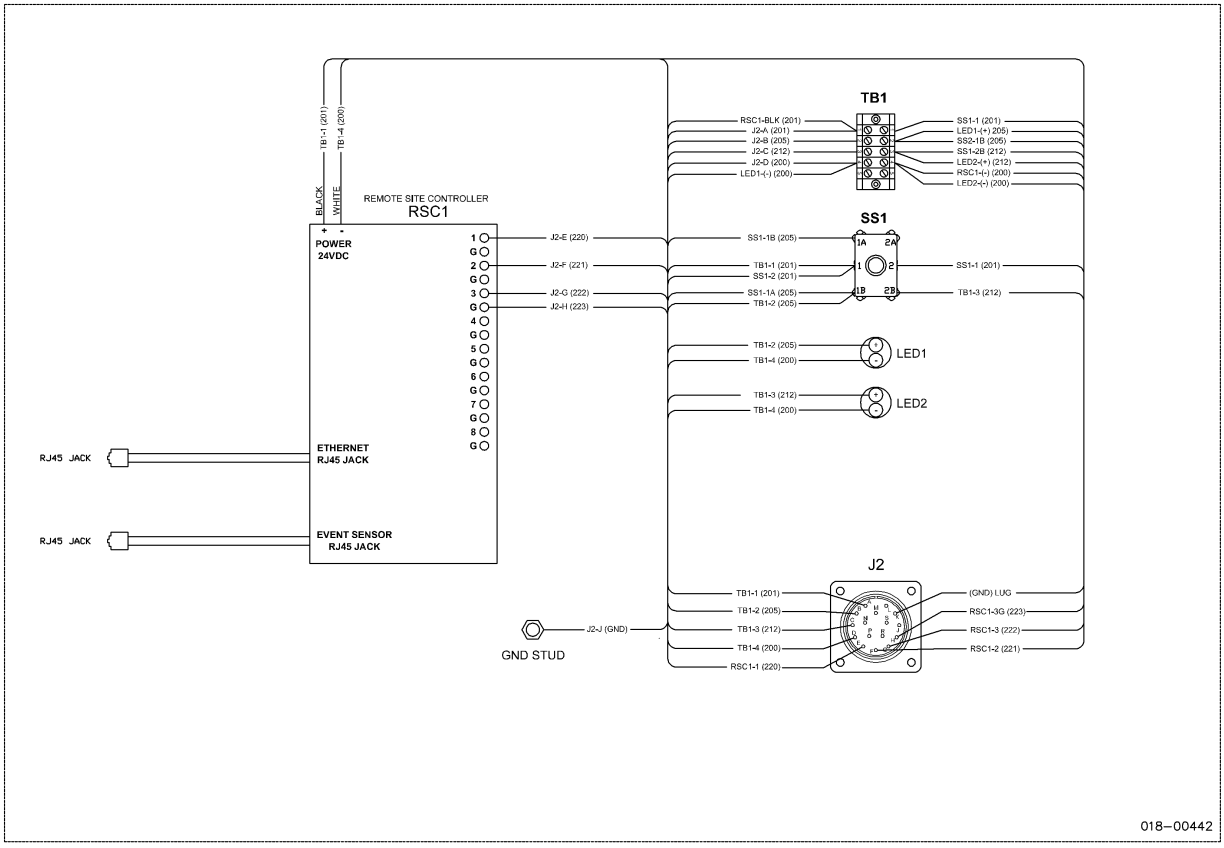


Figure 9.5 Remote Wiring Diagram for 254-00007 (Bulkhead)

Section 9.06 Refrigeration Schematic (520-00072)

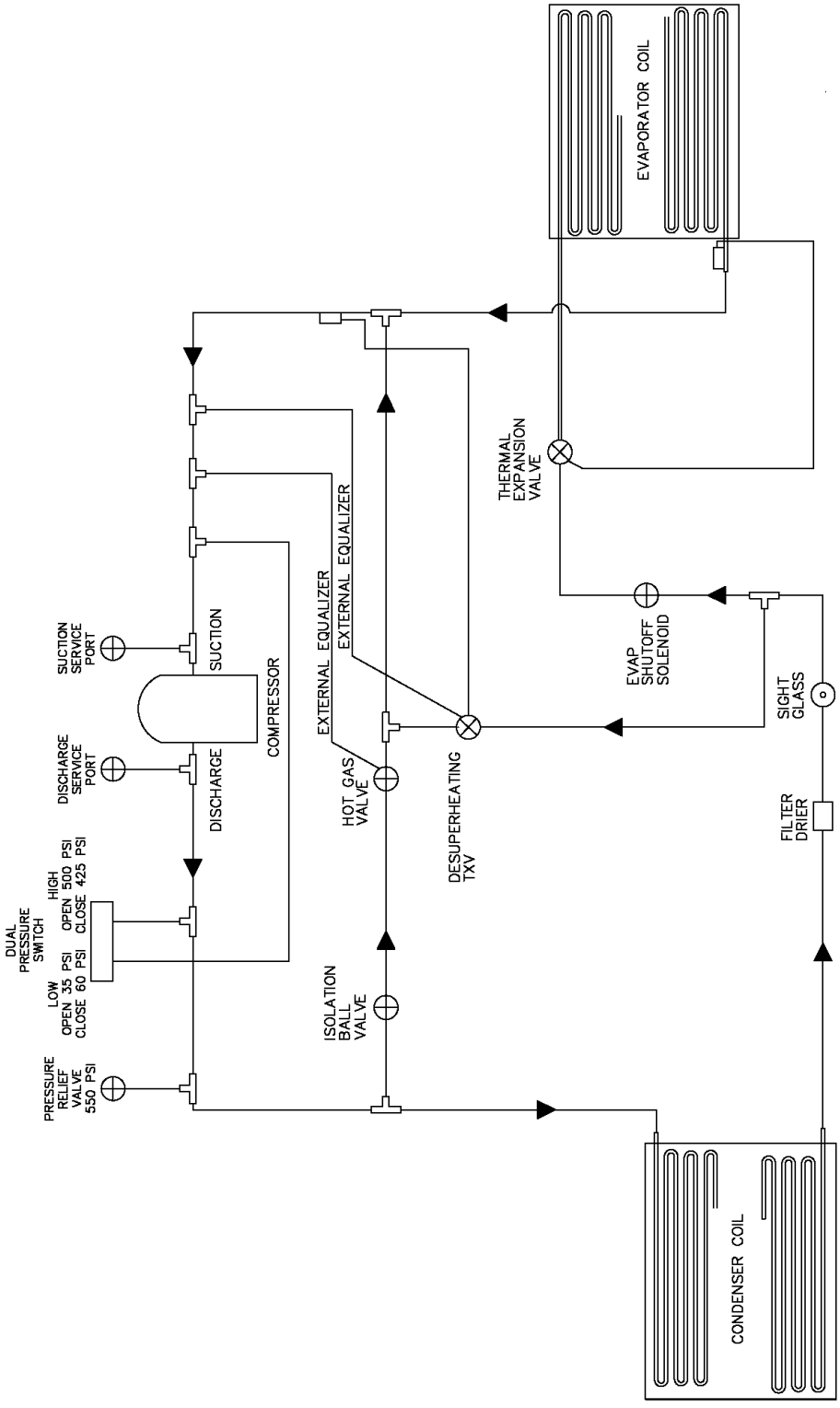


Figure 9.6 Refrigeration Schematic

Chapter 10 Parts List and Assembly Drawings

Below is the listing of parts sorted by HDT EP, Inc. (HDT) part number. Following these tables are assembly diagrams that will assist in identifying parts.

NOTE: Parts that have a suffix of "-PM" are finished Matte Sand, per FED-STD-595 COLOR 34094. If you have a unit which is Forest Green, per FED-STD-595 COLOR 34094, substitute the suffix "-P1" for the listed "-PM" suffix. All of the painted parts listed are for a matte sand unit.

Parts List, GSQ386ZABNWY0 & GSQ386ZABNWY0**-R,**
Sorted by HDT EP, Inc. (HDT) Part Number

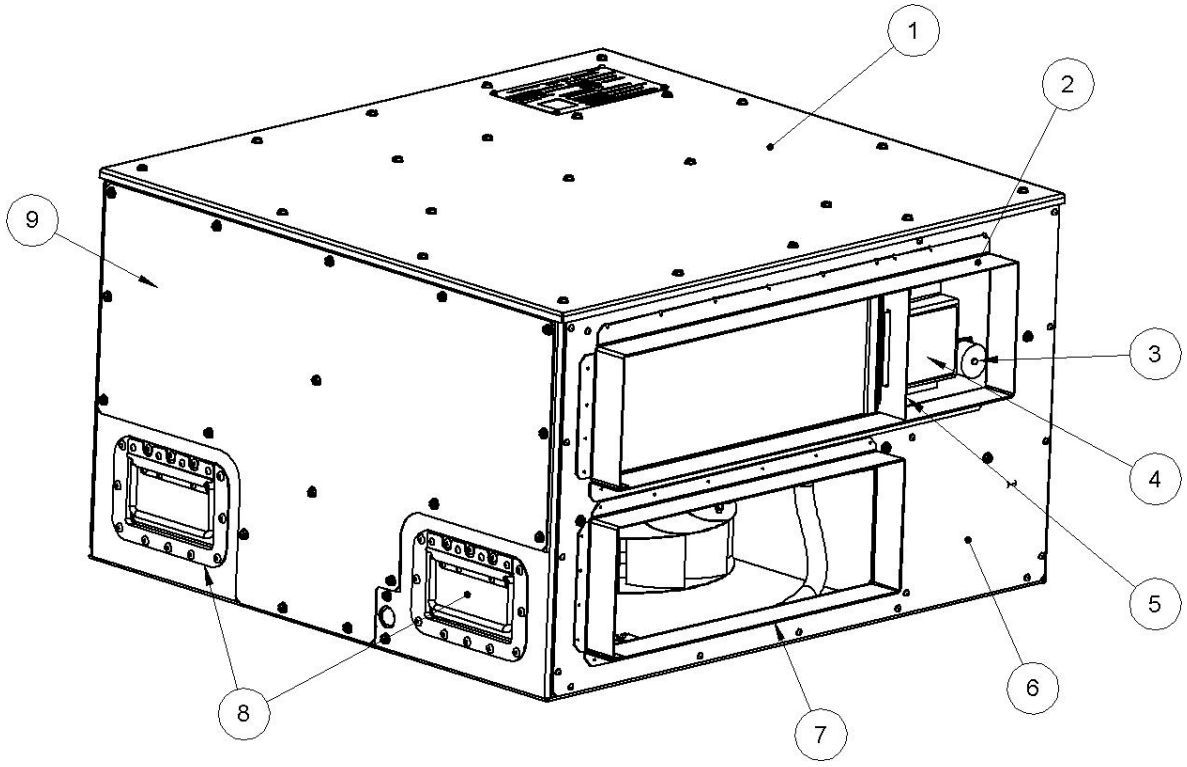
HDT Part #	DESCRIPTION	QTY
010-00141	HEATER ELEMENT- 420W (GSQ386ZABNWY0**)	3
010-00206	HEATER ELEMENT- 570W (GSQ386ZABNWY0**-R)	3
011-00132	T-STAT- SNAP DISC	2
011-00149	SWITCH- LOW PRESSURE	1
011-00222	TOGGLE SWITCH 3 POS	1
011-00223	SWITCH HIGH PRESSURE	1
011-00224	LED GREEN	2
013-00179S	SUPPRESSOR	4
013-00235	KICKSTART	1
013-00377, See Note*	CAPACITOR 30MF (Used with Condenser & Original Evaporator Blower)	1
013-00378	CAPACITOR 25MF	1
013-00389, See Note*	CAPACITOR 17.5MF (Used with New Evaporator Blower)	1
Note*	013-00389 REPLACES 1 OF 2, 013-00377 PER UNIT MODIFICATION BEGINS WITH UNIT S.N. GSQ30228 013-00377 IS USED WITH BLOWER 071-00092 013-00389 IS USED WITH BLOWER 071-00104	-
013-00895	CONTACTOR	4
014-00069	24VDC POWER SUPPLY	1
014-00069-1	POWER SUPPLY MOUNTING BRACKET	1
015-00066	CURRENT SENSING SW	1
015-00077	THERMISTER PROBE	1
015-00117	TEMPERATURE CONTROL	1
015-00119	REMOTE SITE CONTROLLER	1
015-00120	HUMIDITY & TEMP TRANSMITTER	1
016-00368-LD	CIRCUIT BREAKER- 20 AMP (LONG DELAY), (GSQ386ZABNWY0**)	1
016-00552	CIRCUIT BREAKER- 25 AMP (LONG DELAY), (GSQ386ZABNWY0**-R)	1
017-00037	GROUND LUG	1
017-00102C	CLAMP	1
017-00102PM	PLUG RECEPTACLE	1
017-00102RF	RECEPTACLE	1
017-00113N	NUT	1

HDT Part #	DESCRIPTION	QTY
017-00130C	CAP,PROTECTIVE (GSQ386ZABNWY0**)	2
017-00130C	CAP,PROTECTIVE (GSQ386ZABNWY0**-R)	1
017-00130G	GASKET-RECP (GSQ386ZABNWY0**)	2
017-00130G	GASKET-RECP (GSQ386ZABNWY0**-R)	1
017-00130R	RECEPTACLE (GSQ386ZABNWY0**)	1
017-00134CP	CAP, PROTECTIVE	2
017-00134P	PLUG, MS3106E18-11S (5-PIN FEMALE SOCKET)	1
017-00146	CABLE TIE	5
017-00149	TERMINAL BLOCK	1
017-00162	CORD GRIP	1
017-00243C	CAP,PROTECTIVE (GSQ386ZABNWY0**-R)	1
017-00243G	GASKET-RECP (GSQ386ZABNWY0**-R)	1
017-00243R	RECEPTACLE (GSQ386ZABNWY0**-R)	1
017-00253CP	CAP, PROTECTIVE	1
017-00253P	PLUG	1
017-00257	JACK RJ45	2
018-00187	FILM-DANGER	1
018-00291	TAG-SUCTION	1
018-00292	TAG-DISCHARGE	1
018-00341	PLATE-ID	1
019-00059	CORD	10.5 Ft
019-00072	CORD- 12/3 SJEW	20.0 Ft
019-00087	CIRCUIT BREAKER BOOT	1
019-00090	CAT5E CABLE 10FT	1
019-00091-BFW	WASHER FLAT ¼”	12
019-00091-BLW	WASHER LOCK ¼”	8
019-00091-BN	NUT ¼-20	8
019-00091-BS	STUD ¼-20	2
019-00094	CAT5E CABLE	12 In
021-00038	FILTER DRIER	1
021-00039	SIGHTGLASS-1/4”	1
022-00132	VALVE-TXV	1
023-00007	VALVE- SCHRADER, 1/4” ID, 3/8 OD	1
023-00023	VALVE- SCHRADER, 1/8” ID, 3/16 OD	5
023-00055	VALVE-RELIEF 550 PSI	1
024-00344	COMPRESSOR	1
025-00296E	COIL- EVAP	1
025-00297	COIL- COND	1
030-00093	ADAPTOR- FEMALE SWIVEL	1
030-00113	NIPPLE- GALV PIPE 1-1/4” x 4”	1
030-00262	FITTING- BULKHEAD	2
030-00263	CAP, 1/4 SAE	2
030-00288	BARBED TEE	1
031-00007	ELBOW- 5/8” 90 DEG FxC SHORT	2
031-00039	ELBOW-5/8” 90 DEG FxF SHORT	1
031-00044	TEE- 3/8" CxCxC	1
031-00105	ELBOW- 1/2” 45 DEG FxC SHORT	1

HDT Part #	DESCRIPTION	QTY
031-00106	ELBOW- 1/2” 90 DEG FxC SHORT	1
031-00108	ADAPTER- 5/8 Cx3/8 FIP	1
031-00132	ELBOW- 1/4" 90 DEG FxC SHORT RAD	2
031-00152	ADAPTER-DROP- 1/2 Cx1/2 FPT	1
031-00177	ELBOW- 1/2” 90 DEG CxC LONG	1
031-00211	REDUCER-FxC, 3/8x 1/4	1
031-00212	ELBOW- 1/4” 90 DEG FxC LONG	1
034-04000	HOSE- #4	23.75 In
034-04001	CAGE- #4	4
034-04002	CLIP- #4	4
034-04003	FITTING, STRAIGHT- #4	1
034-04004	FITTING, 90 DEG- #4	2
034-04005	FITTING, 45 DEG- #4	1
053-00012-PM	HANDLE, RECESSED	4
056-00002	CLAMP- GEAR 3/4"	1
056-00003	CLAMP- HOSE, 4-1/2" - 6-1/2" (GSQ386ZABNWY0**)	1
056-00015	CLAMP- HOSE 1/2" - 1-1/16"	6
056-00060	CLAMP-LOOP- 0.38 DIA.	5
056-00062	CLAMP-LOOP- 0.625 DIA.	1
056-00063	CLAMP-LOOP- 0.75 DIA	1
056-00073	CLAMP-LOOP, 1.75 DIA	3
056-00074	CLAMP-LOOP, 2.00 DIA	1
056-00083-BAND	CLAMP- BAND, 4.78 - 5.09" (GSQ386ZABNWY0**-R)	1
059-00051	STUD 3/8-16 x 1.5	3
059-00279-025	SPACER STANDOFFS 1/4"	6
060-00008	GROMMET- 5/8 ID	1
060-00038	GROMMET- 3/8 ID	1
060-00047	GROMMET- 1 ID	2
060-00049	GROMMET- 1/8 ID	1
060-00057	GROMMET- 1/2 ID	2
060-00060	GROMMET- 1 1/8 ID	1
060-00067	GROMMET-RED SILICON 0.91"	2
060-00068	GROMMET-RED SILICON 1.14"	6
060-00073	GROMMET- 1/4 ID	1
067-00004	REFRIGERANT- R-407C	32 Oz
071-00092, See Note**	BLOWER- MOTORIZED (Condenser & Original Evaporator Blower)	1
071-00104, See Note**	BLOWER- MOTORIZED (New Evaporator Blower)	1
Note**	071-00104 REPLACES 1 OF 2, 071-00092 PER UNIT MODIFICATION BEGINS WITH UNIT S.N. GSQ30228	-
100-00857-B	COMPRESSOR STANDOFF	3
108-00061	CABLE ASSY-POWER-CABLE-MAIN (GSQ386ZABNWY0**)	1
108-00062	CABLE ASSY-POWER-MAIN INTERNAL (GSQ386ZABNWY0**)	1
108-00063	CABLE ASSEMBLY-CONTROL INTERNAL	1
108-00075	CABLE ASSY- INTERNAL ETHERNET	2
108-00130	CABLE ASSY-POWER-MAIN INTERNAL (GSQ386ZABNWY0**-R)	1
108-00132	CABLE ASSY-POWER-CABLE-MAIN (GSQ386ZABNWY0**-R)	1
230-00033BJ-PM	BRACKET (GSQ386ZABNWY0**)	1

HDT Part #	DESCRIPTION	QTY
230-00033BP	BRACKET, STAINLESS STEEL (GSQ386ZABNWY0**-R)	1
230-00037BA-PM	FRAME - LOWER	1
230-00037BB-PM	FRAME - UPPER	1
230-00037BC-PM	COVER - TOP	1
230-00037BD-PM	COVER - LEFT	1
230-00037BE-PM	COVER - RIGHT	1
230-00037BF-PM	COVER - ELECTRICAL ACCESS	1
230-00037BG-PM	ELECTRICAL PANEL	1
230-00037BH-PM	OPERATOR PANEL, (GSQ386ZABNWY0**)	1
230-00037BJ-PM	SUPPORT - TXV	1
230-00037BN-PM	POTENTIOMETER MOUNTING BRACKET	1
230-00037CH-PM	BRACKET - FILTER/DRYER	1
230-00037DA-PM	BULKHEAD - EVAP - ELEC	1
230-00037DB-PM	BULKHEAD - EVAP - COND	1
230-00037DC-PM	BULKHEAD - EVAP	1
230-00037DD-PM See Note***	MOUNTING PLATE - BLOWER (Used with Condenser & Original Evaporator Blower)	1
230-00037DF-PM	PLENUM - RETURN AIR	1
230-00037DG-PM	BRACKET - SENSOR	1
230-00037DJ-PM	PLENUM - SUPPLY AIR	1
230-00037DK-PM	SPACER - COND BULKHEAD	1
230-00037DL-PM	RETAINER - COND BULKHEAD	1
230-00037DM-PM	TEST PORT RECESS	1
230-00037DN-PM	BULKHEAD - CONDENSER	1
230-00037DR-PM	CHANNEL-ELEC	2
230-00037DS-PM	RETAINER CLIP	4
230-00037DT-PM See Note***	MOUNTING PLATE – BLOWER (GSQ386ZABNWY0**) (Used with New Evaporator Blower)	1
Note***	230-00037DT REPLACES 1 OF 2, 230-00037DD PER UNIT MODIFICATION BEGINS WITH UNIT S.N. GSQ30228 230-00037DD IS USED WITH BLOWER 071-00092 230-00037DT IS USED WITH BLOWER 071-00104	-
230-00037DT-S	MOUNTING PLATE – BLOWER, SS (GSQ386ZABNWY0**-R)	1
230-00037FE-PM	DRAIN PAN WELDED	1
230-00037FB-PM	BRACKET	1
230-00037JE-PM	COIL FRAME TOP-BOTTOM	2
230-00037JF-PM	COIL FRAME-RIGHT	1
230-00037JG-PM	COIL FRAME-LEFT	1
230-00037JH-PM	BULKHEAD - COND - ELEC	1
230-00037JJ-PM	RETAINER - COND FRAME	1
230-0BA37BH-PM	OPERATOR PANEL, (GSQ386ZABNWY0**-R)	1
254-00003A-PB	BOX CONTROL	1
254-00003B-PB	COVER BOX	1
254-00003C-PB	FRONT PANEL	1

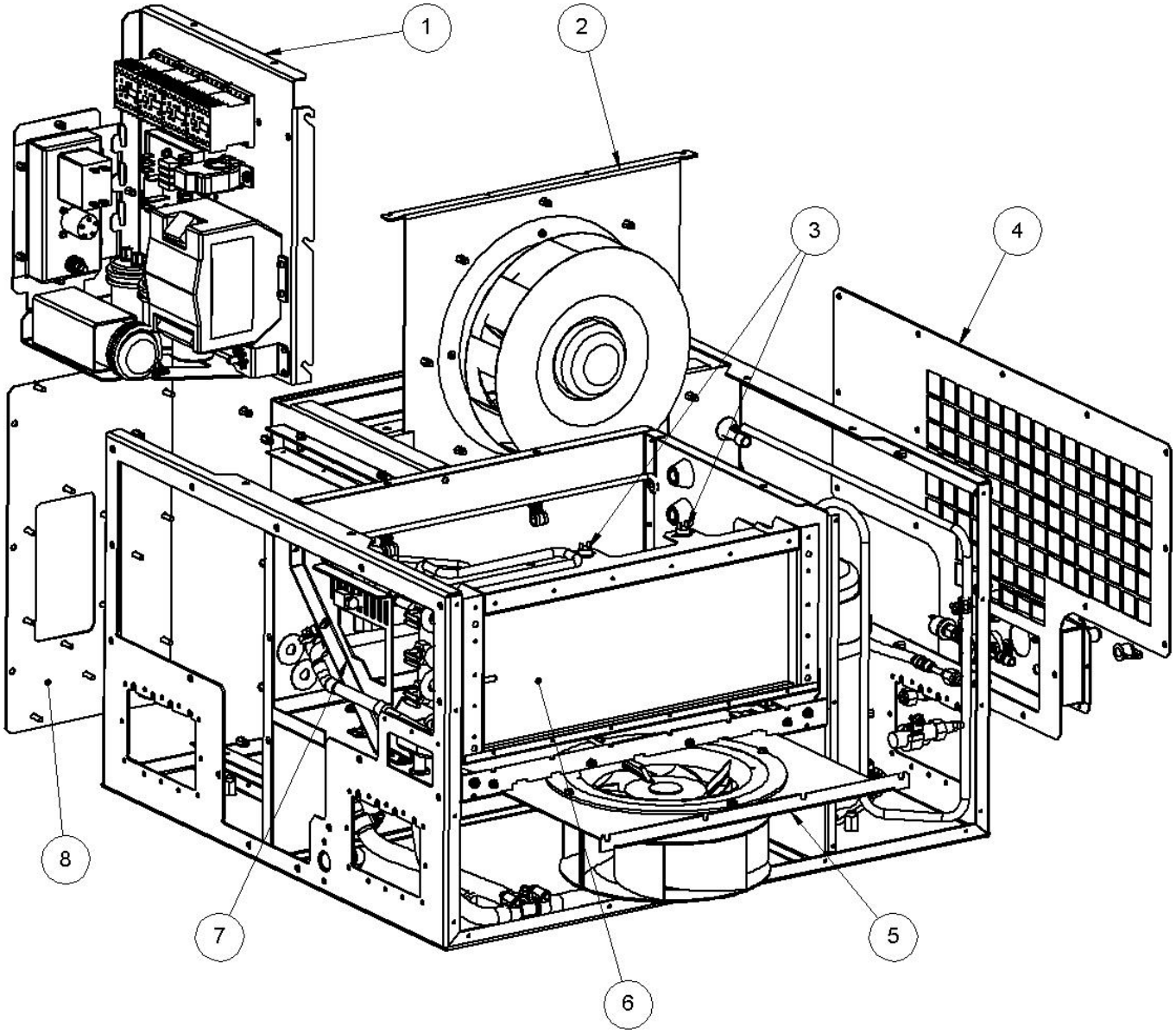
Figure 10.1.1, Main Assembly (230-00037-AM), 1 of 6



Parts List, Main Assembly (230-00037-AM), 1 of 6, Ref. Figure 10.1.1

Item	HDT Part #	DESCRIPTION	QTY
1	230-00037BC-PM	COVER-TOP	1
2	230-00037DF-PM	PLENUM-RETURN AIR	1
3	108-00063	CABLE ASSY-CONTROL	1
4	015-00120	HUMIDITY & TEMP TRANSMITTER	1
5	230-00037DG-PM	BRACKET - SENSOR	1
6	230-00037BB-PM	FRAME - UPPER	1
7	230-00037DJ-PM	PLENUM-SUPPLY AIR	1
8	053-00012-PM	HANDLE	4
9	230-00037BD-PM	COVER - LEFT	1

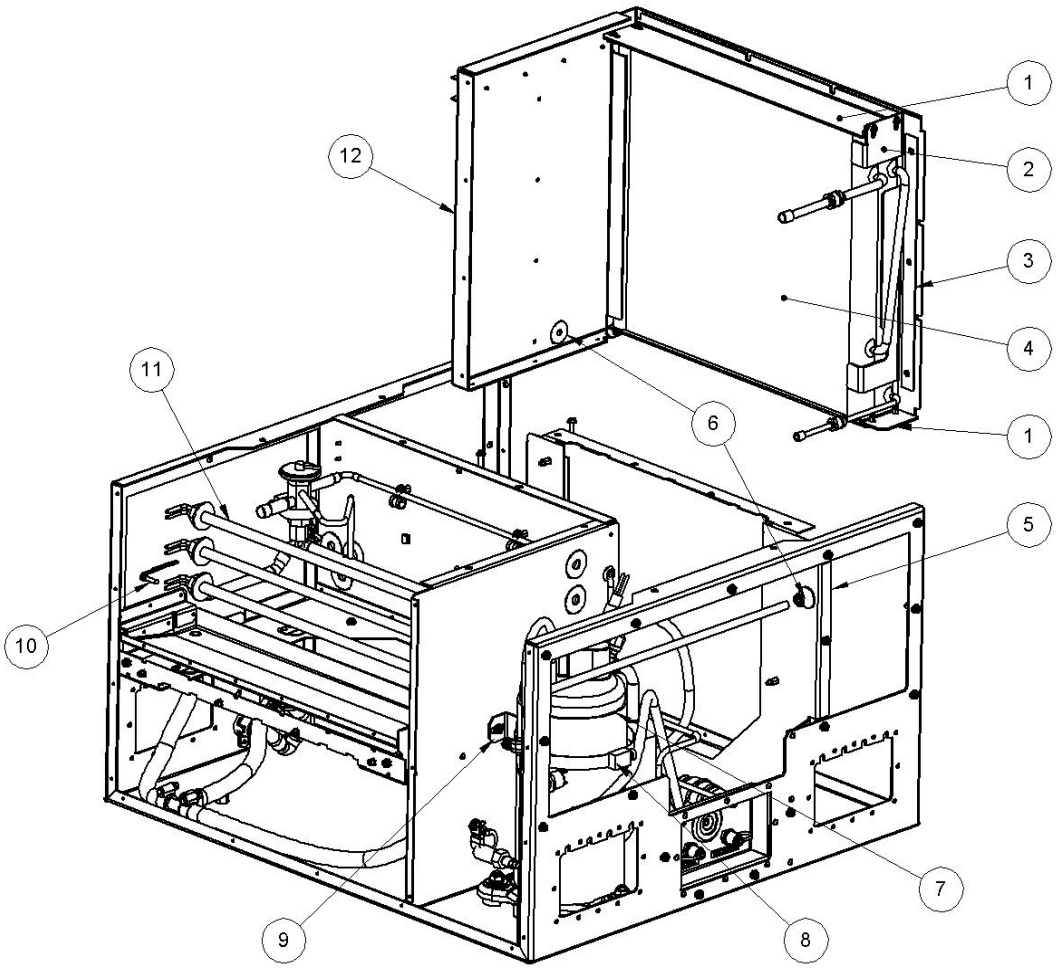
Figure 10.1.2, Main Assembly (230-00037-AM), 2 of 6



Parts List, Main Assembly (230-00037-AM), 2 of 6, Ref. Figure 10.1.2

Item	HDT Part #	DESCRIPTION	QTY
1	230-00037-AE	ASSY, ELECTRICAL	1
2	230-00037-A2	ASSY, BLOWER MOTOR, COND.	2
3	011-00132	T-STAT- SNAP DISC	2
4	230-00037BE-PM	COVER - RIGHT	1
5	230-00037-A13	ASSY, BLOWER MOTOR, EVAP (GSQ386ZABNWY0**)	1
5	230-00037-A13-SS	ASSY, BLOWER MOTOR, EVAP (GSQ386ZABNWY0**-R)	1
6	025-00296E	COIL- EVAP	1
7	230-00037BJ-PM	SUPPORT - TXV	1
8	230-00037BF-PM	COVER - ELECTRICAL ACCESS	1

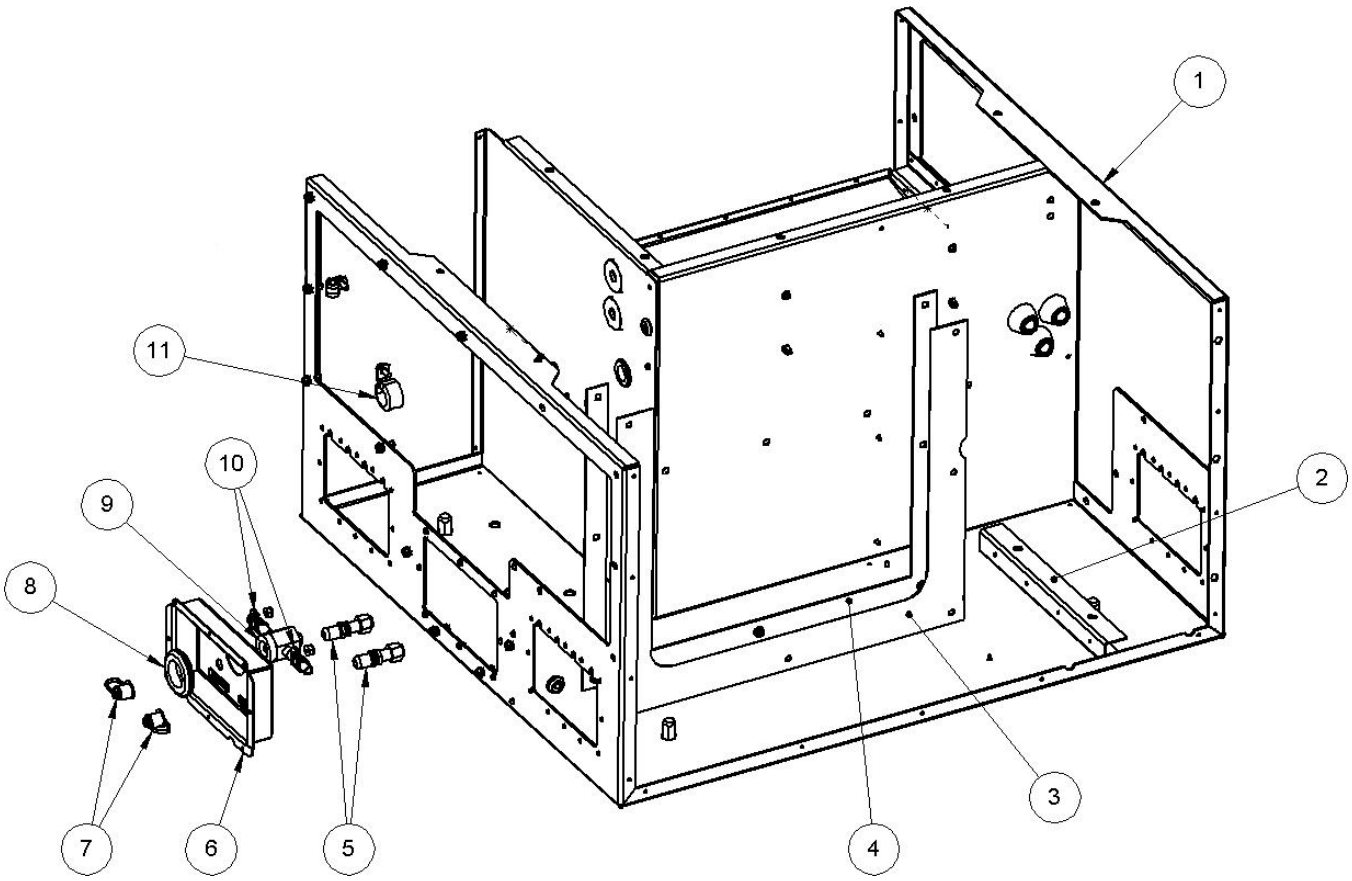
Figure 10.1.3, Main Assembly (230-00037-AM), 3 of 6



Parts List, Main Assembly (230-00037-AM), 3 of 6, Ref. Figure 10.1.3

Item	HDT Part #	DESCRIPTION	QTY
1	230-00037JE-PM	COIL FRAME TOP-BOTTOM	1
2	230-00037JF-PM	COIL FRAME-RIGHT	1
3	230-00037JJ-PM	RETAINER - COND FRAME	1
4	025-00297	COIL- COND	1
5	230-00037DN-PM	BULKHEAD - CONDENSER	2
6	060-00067	GROMMET-RED SILICON 0.91"	2
7	230-00037-AP	ASSY, PLUMBING	1
8	056-00003	CLAMP- HOSE, 4-1/2" - 6-1/2" (GSQ386ZABNWY0**)	1
8	056-00083-BAND	CLAMP- BAND, 4.78 - 5.09" (GSQ386ZABNWY0**-R)	1
9	230-00033BJ-PM	BRACKET (GSQ386ZABNWY0**)	1
9	230-00033BP	BRACKET, STAINLESS STEEL (GSQ386ZABNWY0**-R)	1
10	015-00077	THERMISTER PROBE	1
11	010-00141	HEATER ELEMENT- 420W (GSQ386ZABNWY0**)	3
11	010-00206	HEATER ELEMENT- 570W (GSQ386ZABNWY0**-R)	3
12	230-00037JH-PM	BULKHEAD - COND	1

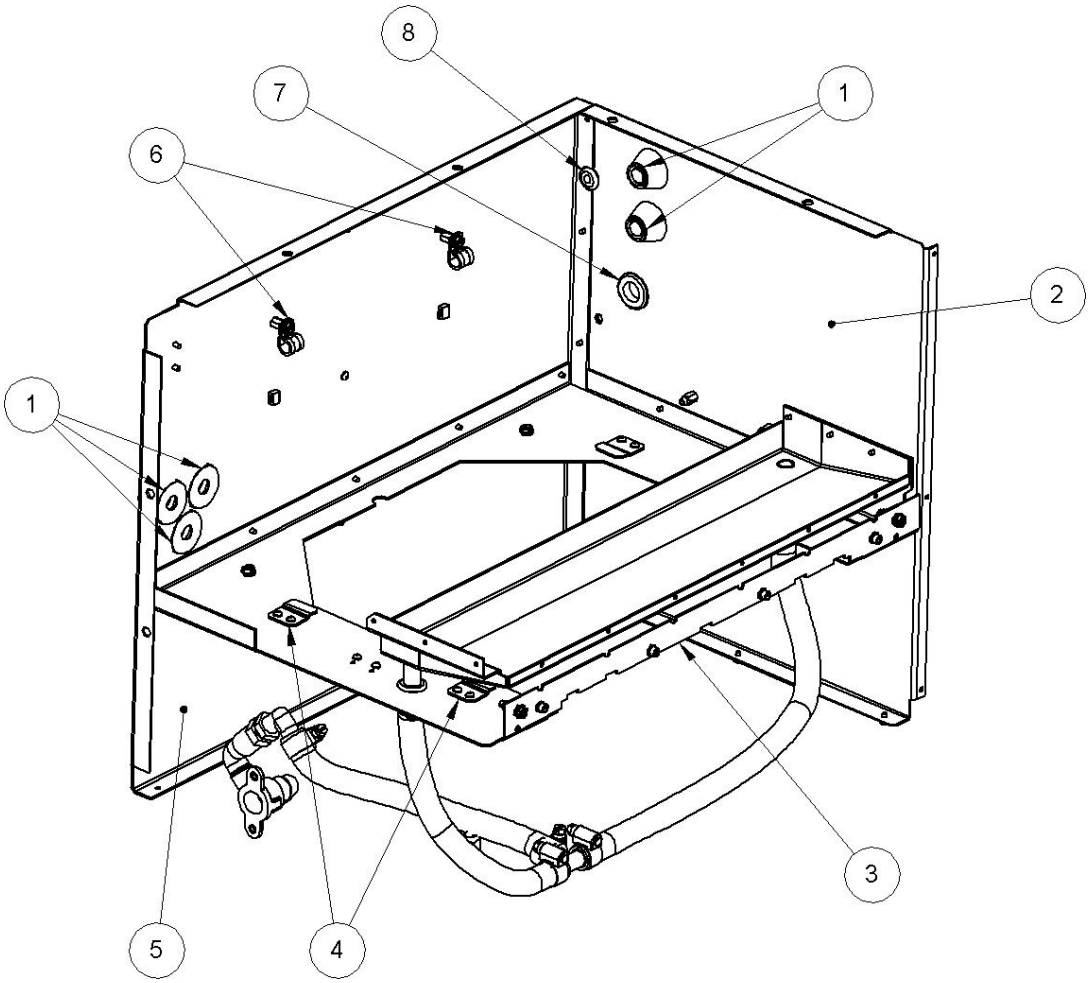
Figure 10.1.4, Main Assembly (230-00037-AM), 4 of 6



Parts List, Main Assembly (230-00037-AM), 4 of 6, Ref. Figure 10.1.4

Item	HDT Part #	DESCRIPTION	QTY
1	230-00037BA-PM	FRAME - LOWER	1
2	230-00037DR-PM	CHANNEL-ELEC. PANEL	1
3	230-00037DL-PM	RETAINER - COND BULKHEAD	1
4	230-00037DK-PM	SPACER - COND BULKHEAD	1
5	030-00262	FITTING- BULKHEAD-1/4SAE FLARE	2
6	230-00037DM-PM	TEST PORT RECESS	1
7	030-00263	CAP, 1/4 SAE PLASTIC W/STRAP	2
8	060-00060	GROMMET- 1 1/8 ID	1
9	021-00039	SIGHTGLASS- 1/4" SWEAT	1
10	056-00060	CLAMP-LOOP- 0.38” DIA	2
11	056-00063	CLAMP-LOOP- 0.75 DIA	1

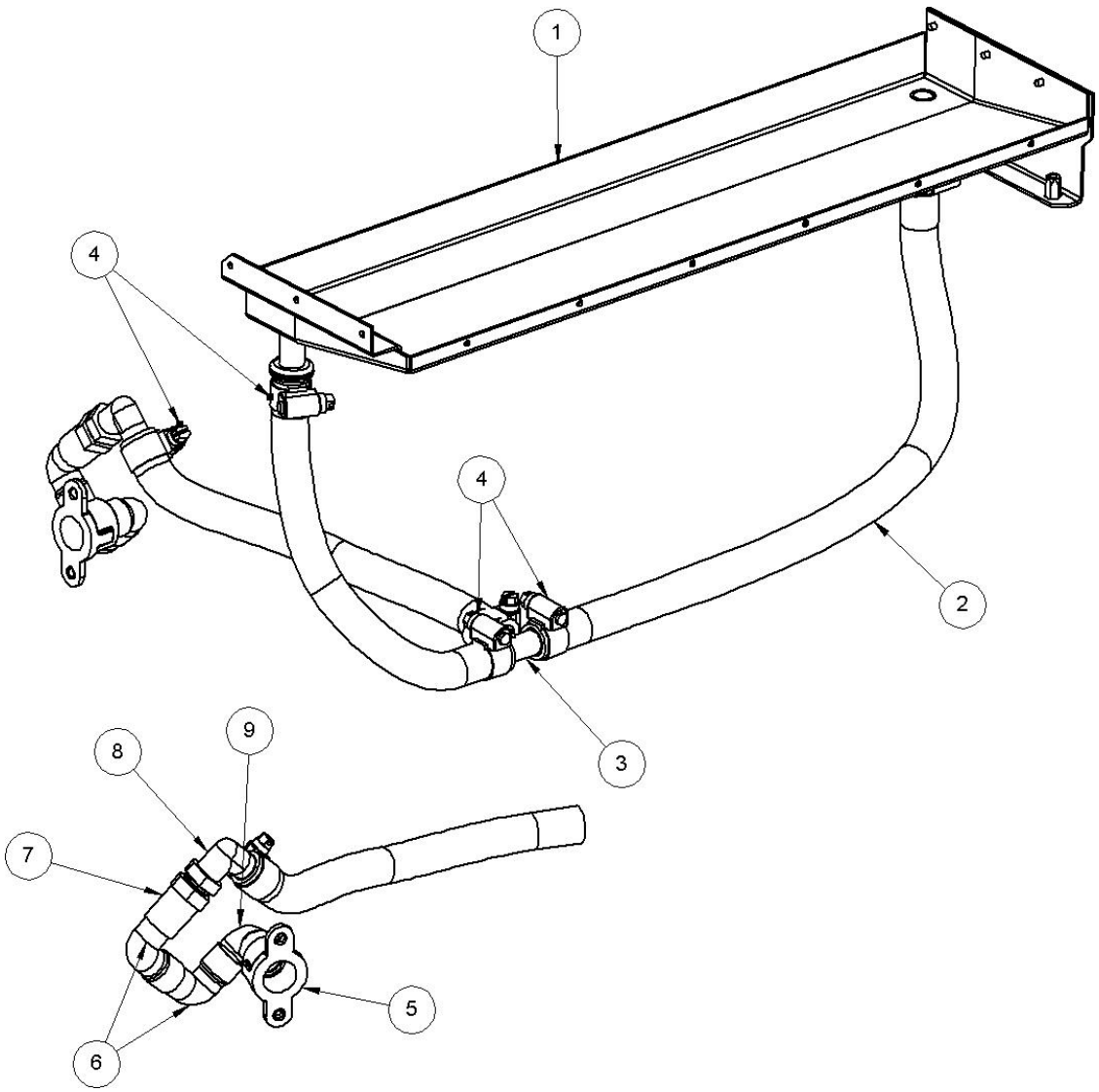
Figure 10.1.5, Main Assembly (230-00037-AM), 5 of 6



Parts List, Main Assembly (230-00037-AM), 5 of 6, Ref. Figure 10.1.5

Item	HDT Part #	DESCRIPTION	QTY
1	060-00068	GROMMET-RED SILICON 1.14"	5
2	230-00037DB-PM	BULKHEAD - EVAP - COND	1
3	230-00037DC-PM	BULKHEAD - EVAP	1
4	230-00037DS-PM	RETAINER CLIP	4
5	230-00037DA-PM	BULKHEAD - EVAP - ELEC	1
6	056-00060	CLAMP-LOOP- 0.38” DIA	2
7	060-00008	GROMMET- 5/8” ID	1
8	060-00073	GROMMET- 1/4” ID	1

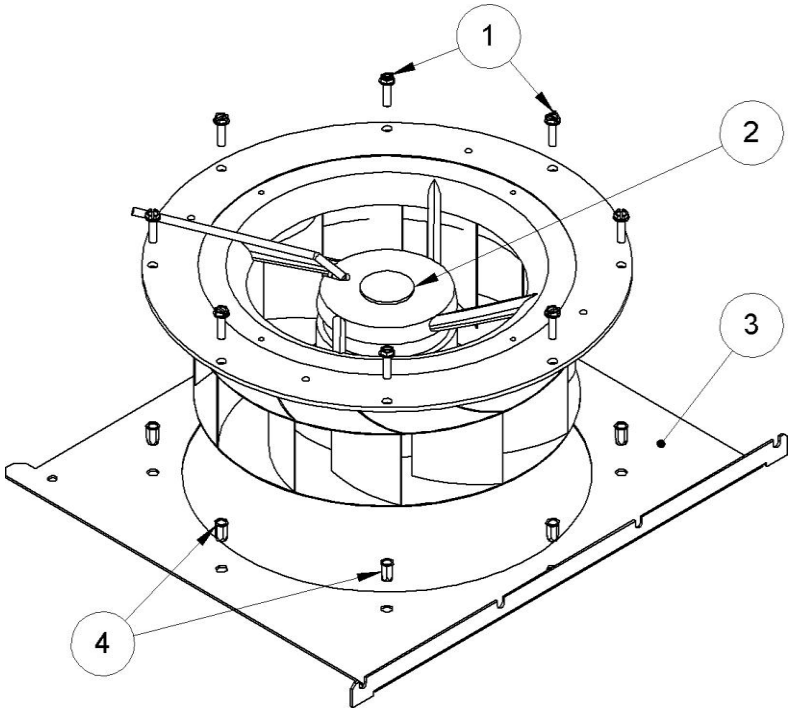
Figure 10.1.6, Drain Pan Assembly (230-00037-AM), 6 of 6



Parts List, Drain Pan Assembly (230-00037-AM), 6 of 6, Ref. Figure 10.1.6

Item	HDT Part #	DESCRIPTION	QTY
1	230-00037FE-PM	DRAIN PAN	1
2	FS-00498	TUBING-.500 ID .750 OD X 0.125 WALL	1
3	030-00288	BARBED TEE 1/2"x1/2"x1/2"	1
4	056-00015	CLAMP- HOSE 1/2" - 1-1/16"	6
5	031-00152	ADAPTER-DROP- 1/2 Cx1/2 FP	1
6	031-00007	ELBOW- 5/8" 90 DEG FxC SHORT RAD	2
7	031-00108	ADAPTER- 5/8 Cx3/8 FIP	1
8	030-00113	BARBED 90EL 1/2"x3/8"MPT	1
9	031-00039	ELBOW- 5/8" 90 DEG FxF SHORT RAD	1

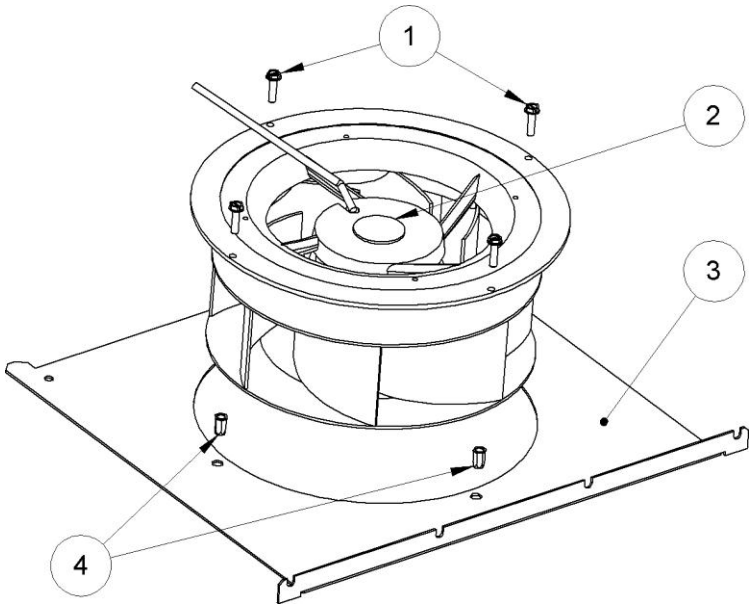
Figure 10.2, Blower Motor Condenser Assembly (230-00037-A2)



Parts List, Blower Motor Condenser Assembly (230-00037-A2), Ref. Figure 10.2

Item	HDT Part #	DESCRIPTION	QTY
1	FS-00383	SCREW- #10-24 x 3/4" SLOT HEX	8
2	071-00092	BLOWER- MOTORIZED	1
3	230-00037DD-PM	MOUNTING PLATE - BLOWER	1
4	FS-00341	RIVNUT-HEX 10-24	8

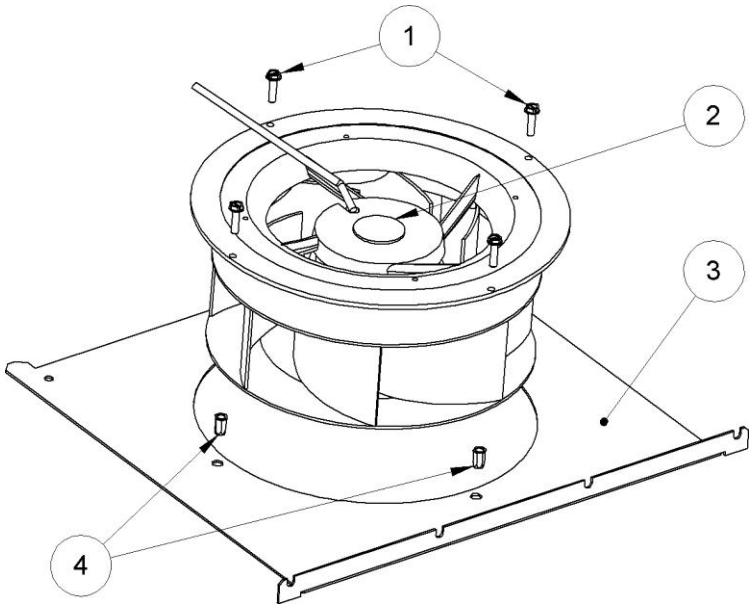
Figure 10.3A, Blower Motor Evaporator Assembly (230-00037-A13)
Model GSQ386ZABNWY0**



Parts List, Blower Motor Evaporator (230-00037-A13), Ref. Figure 10.3A
Model GSQ386ZABNWY0**

Item	HDT Part #	DESCRIPTION	QTY
1	FS-00383	SCREW- #10-24 x 3/4" SLOT HEX	4
2	071-00092 See Note**	BLOWER- MOTORIZED (**FOR SERIAL NUMBERS PRIOR TO GSQ30228)	1
2	071-00104 See Note**	BLOWER- MOTORIZED (**BEGINING WITH SERIAL NUMBER GSQ30228)	1
	Note**	071-00104 REPLACES 1 OF 2, 071-00092 PER UNIT MODIFICATION BEGINS WITH UNIT S.N. GSQ30228	-
3	230-00037DD-PM See Note***	MOUNTING PLATE - BLOWER (***FOR SERIAL NUMBERS PRIOR TO GSQ30228)	1
3	230-00037DT-PM See Note***	MOUNTING PLATE - BLOWER (***BEGINING WITH SERIAL NUMBER GSQ30228)	1
	Note***	230-00037DT REPLACES 1 OF 2, 230-00037DD PER UNIT MODIFICATION BEGINS WITH UNIT S.N. GSQ30228 230-00037DD IS USED WITH BLOWER 071-00092 230-00037DT IS USED WITH BLOWER 071-00104	-
4	FS-00341	RIVNUT-HEX 10-24	4

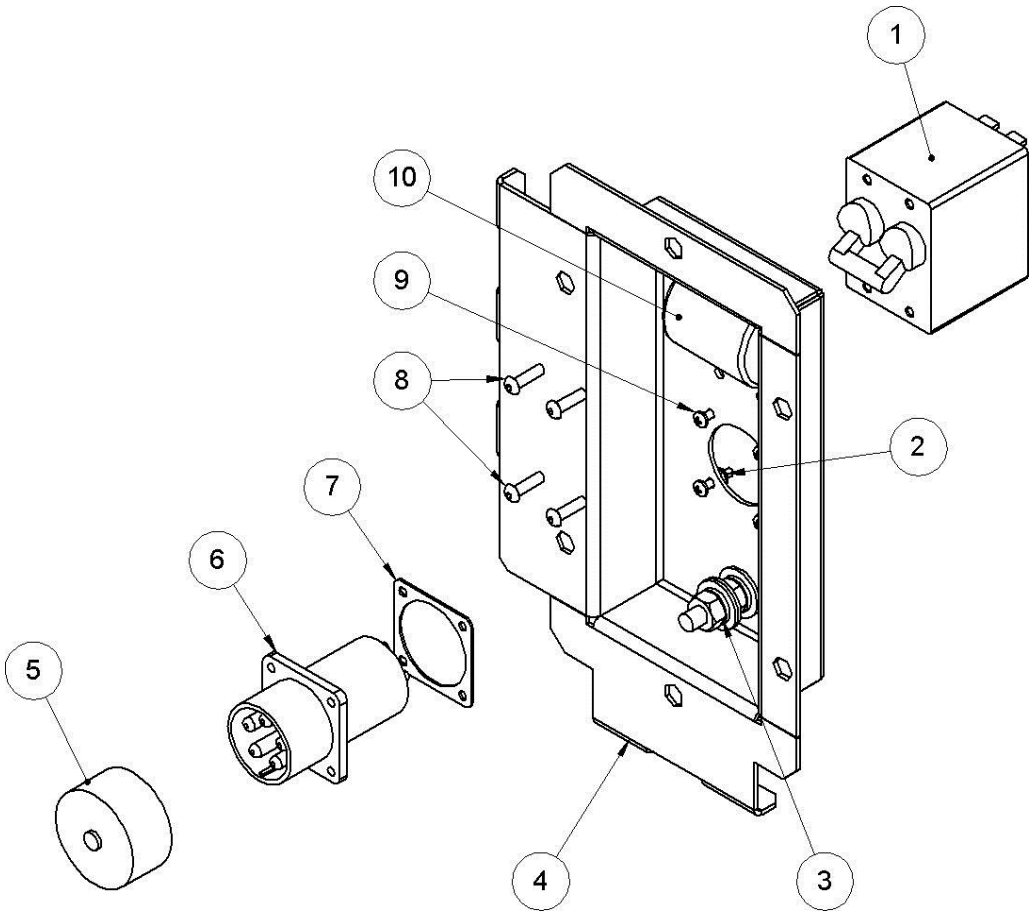
Figure 10.3A, Blower Motor Evaporator Assembly (230-00037-A13-SS)
Model GSQ386ZABNWY0-R**



Parts List, Blower Motor Evaporator (230-00037-A13-SS), Ref. Figure 10.3B
Model GSQ386ZABNWY0-R**

Item	HDT Part #	DESCRIPTION	QTY
1	FS-00383	SCREW- #10-24 x 3/4" SLOT HEX	4
2	071-00104	BLOWER- MOTORIZED	1
3	230-00037DT-S	MOUNTING PLATE – BLOWER, STAINLESS STEEL	1
4	FS-00341	RIVNUT-HEX 10-24	4

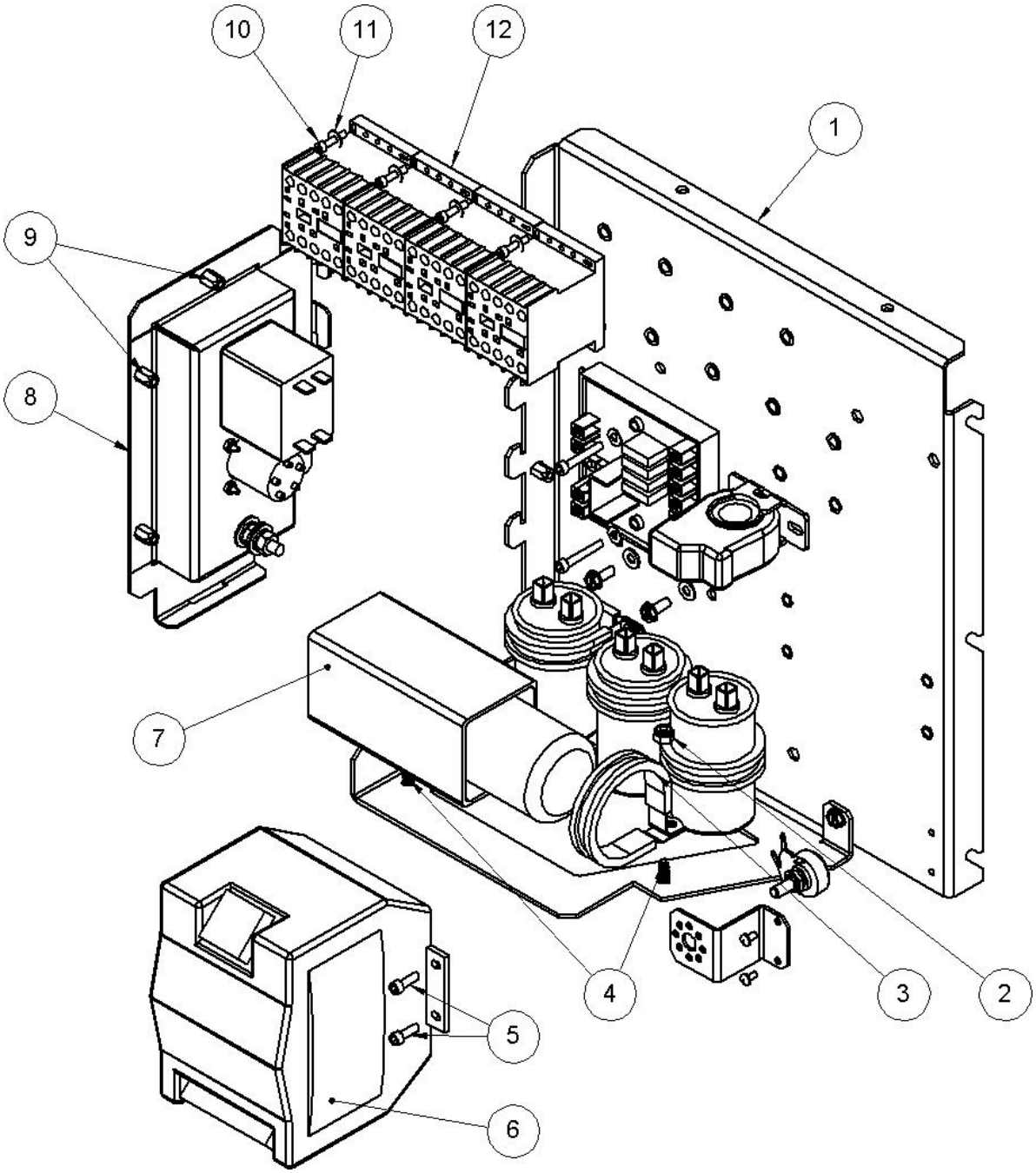
Figure 10.4, Control Panel Assembly (230-00037-A7)



Parts List, Control Panel Assembly (230-00037-A7), Ref. Figure 10.4

Item	HDT Part #	DESCRIPTION	QTY
1	016-00368-LD	CIRCUIT BREAKER (LONG DELAY), (GSQ386ZABNWY0**)	1
1	016-00552	CIRCUIT BREAKER (LONG DELAY), (GSQ386ZABNWY0**-R)	1
2	FS-00415	NYLOCK NUT, SS, 4-40	4
3	019-00091-B	ASSY, 1/4-20, BRONZE GROUND STUD	1
4	230-00037BH-PM	OPERATOR PANEL, (GSQ386ZABNWY0**)	1
4	230-0BA37BH-PM	OPERATOR PANEL, (GSQ386ZABNWY0**-R)	1
5	017-00130C	PROTECTIVE CAP RECEPTACLE, (GSQ386ZABNWY0**)	1
5	017-00243C	PROTECTIVE CAP RECEPTACLE, (GSQ386ZABNWY0**-R)	1
6	017-00130R	BOX MTG RECEPTACLE (108-00062), (GSQ386ZABNWY0**)	1
6	017-00243R	BOX MTG RECEPTACLE (108-00130), (GSQ386ZABNWY0**-R)	1
7	017-00130G	GASKET AMPHENOL, (GSQ386ZABNWY0**)	1
7	017-00243G	GASKET AMPHENOL, (GSQ386ZABNWY0**-R)	1
8	FS-00460	SCREW- #6-32 x 1/2" SOCKET HD CAP SCREW	4
9	4-40 x 500	SCREW- #4-40 x 1/2" PHIL	4
10	019-00087	BOOT - USE WITH 016-00368-LD OR 016-00552	1

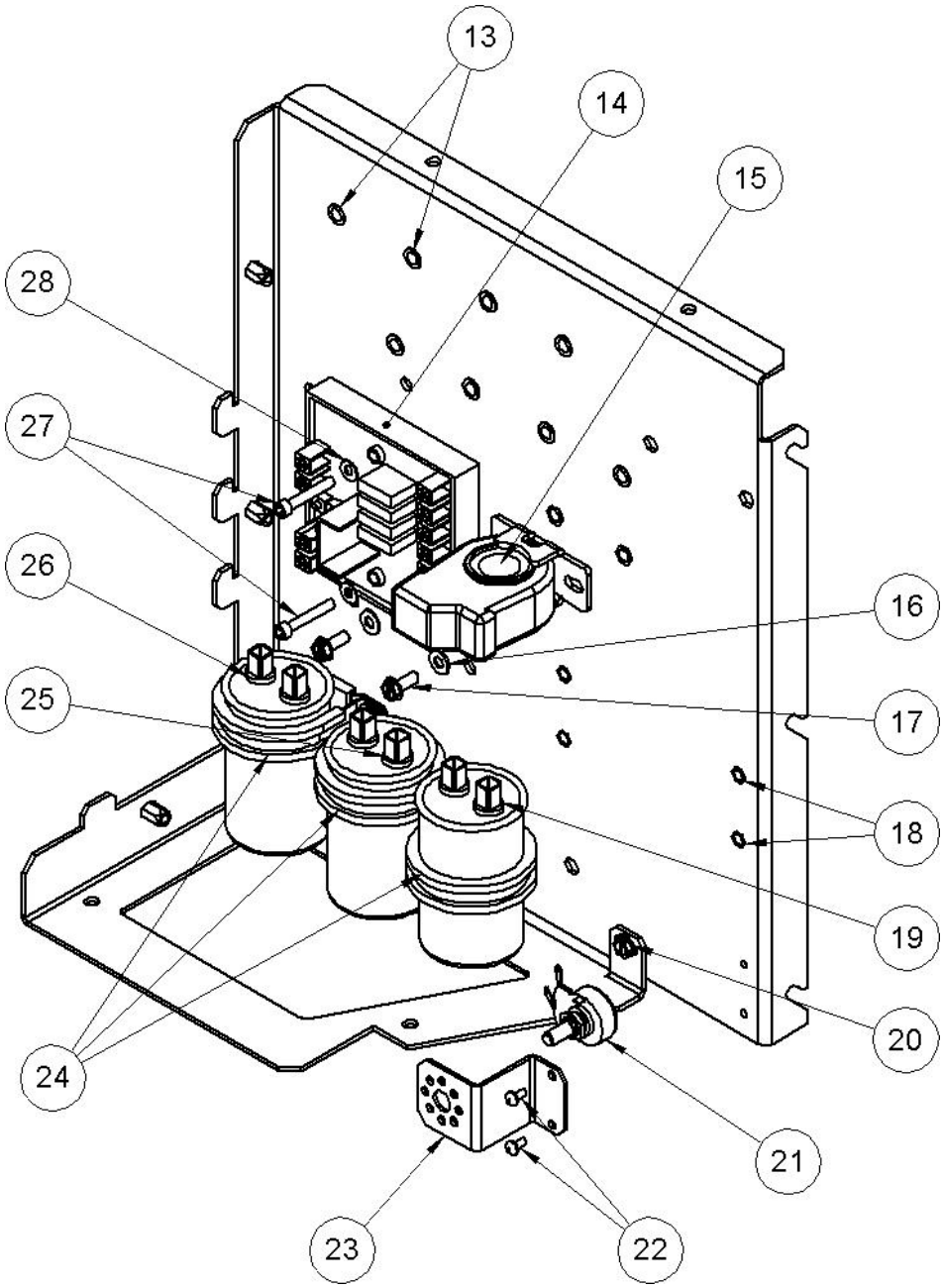
Figure 10.5.1, Electrical Panel Assembly (230-00037-AE), 1 of 2



Parts List, Electrical Panel Assembly (230-00037-AE), 1 of 2, Ref. Figure 10.5.1

Item	HDT Part #	DESCRIPTION	QTY
1	230-00037BG	ELECTRICAL PANEL	1
2	FS-00375	NYLOCK NUT, SS, 10-24	2
3	056-00074	CLAMP - LOOP - 2 DIA	1
4	FS-00016	10-24 X 5/8" SCREW	2
5	FS-00557	SCREW- #8-32 X 1/2" SOCKET CAP	4
6	014-00069	DC POWER SUPPLY	1
7	013-00235	HARDSTART 110/115/120V-1PH-60HZ	1
8	230-00037-A7	OPERATOR PANEL ASSEMBLY	1
9	FS-00341	RIVNUT-HEX 10-24	14
10	6-32 x .625	SCREW- #6-32 x 5/8" SOCKET HD CAP SCREW	8
11	1-W-6	FLATWASHER #6; 1-W-6	8
12	013-00895	CONTACTOR - 24V DC	4

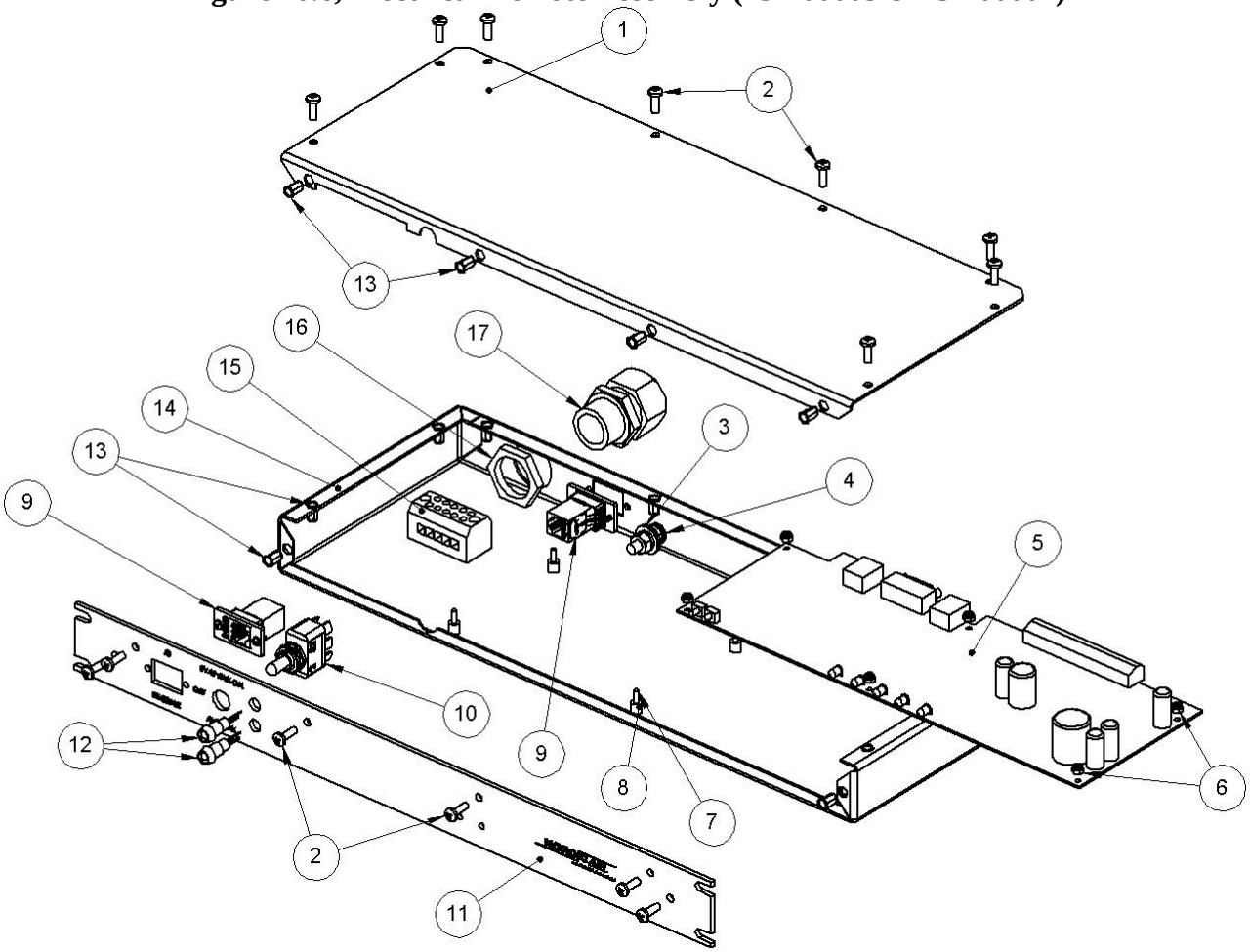
Figure 10.5.2, Electrical Panel Assembly (230-00037-AE), 2 of 2



Parts List, Electrical Panel Assembly (230-00037-AE), 2 of 2, Ref. Figure 10.5.2

Item	HDT Part #	DESCRIPTION	QTY
13	FS-00266H12	RIVNUT-HEX 6-32	8
14	015-00117	TEMPERATURE CONTROL BOARD	1
15	015-00066	CURRENT SENSING	1
16	FS-00712	FLATWASHER #10; 1-W-10	2
17	FS-00382	SCREW- #10-24 x 1/2" SLOT HEX	2
18	FS-00340	RIVNUT-HEX 8-32	6
19	013-00378	CAPACITOR, 25uf	1
20	FS-00381	SCREW- #10-24 x 5/8" SLOT HEX	3
21	015-00117-POT	POTENTIOMETER	1
22	FS-00015	RIVET- 1/8 SS , 0.187 GRIP	2
23	230-00037BN	POTENTIOMETER MOUNTING BRACKET	1
24	056-00073	CLAMP - LOOP - 1.125 DIA	3
25	013-00377 See Note*	CAPACITOR, 30uf, EVAPORATOR BLOWER (CAP2) (*FOR SERIAL NUMBERS PRIOR TO GSQ30228)	1
25	013-00389 See Note*	CAPACITOR, 17.5uf, EVAPORATOR BLOWER (CAP2) (*BEGINING WITH SERIAL NUMBER GSQ30228)	1
	Note*	013-00389 REPLACES 1 OF 2, 013-00377 PER UNIT MODIFICATION BEGINS WITH UNIT S.N. GSQ30228 013-00377 IS USED WITH BLOWER 071-00092 013-00389 IS USED WITH BLOWER 071-00104	-
26	013-00377	CAPACITOR, 30uf, EVAPORATOR BLOWER (CAP3)	1
27	8-32 X 1.000	SCREW- #8-32 X 1" SOCKET CAP	2
28	FS-00776	WASHER, S.S. FOR #8 FASTENER	2

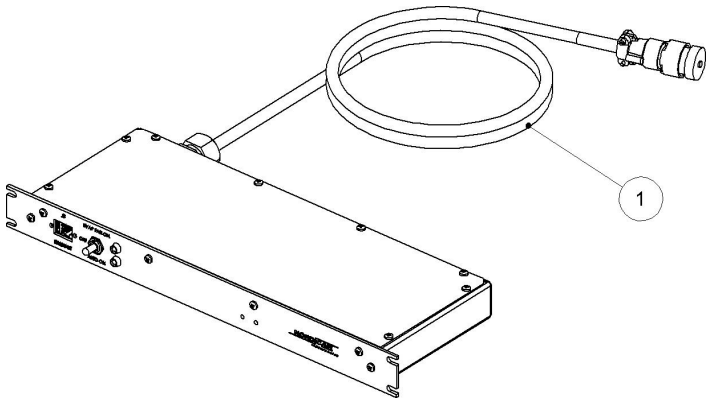
Figure 10.6, Electrical Remote Assembly (254-00003 & 254-00007)



Parts List, Electrical Remote Assembly (254-00003 & 254-00007), Ref. Figure 10.6

Item	HDT Part #	DESCRIPTION	QTY
1	254-00003B-PB	COVER BOX	1
2	FS-00042	SCREW- #8-32 x 1/2" PHIL	14
3	019-00091-B	ASSY, 1/4-20, BRONZE GROUND STUD	1
4	4-INT-25	STARWASHER 4-INT-25	1
5	015-00119	REMOTE SITE CONTROLLER	1
6	FS-00415	NYLOCK NUT, SS, 4-40	6
7	4-40 x 625	SCREW- #4-40 x .750"	6
8	059-00279-025	SPACER NYLON 1/4"	6
9	017-00261	LAN PLUG	2
10	011-00222	SWITCH - TOGGLE	1
11	254-00003C-PB	FRONT PANEL	1
12	011-00224	GREEN - LIGHT EMITTING DIODE	2
13	FS-00340	RIVNUT-HEX 8-32	14
14	254-00003A-PB	BOX CONTROL	1
15	017-00149	TERMINAL BLOCK	1
16	017-00113N	LOCKNUT 3/4" PLASTIC	1
17	017-00162	CORD GRIP 3/4" .45-.71	1

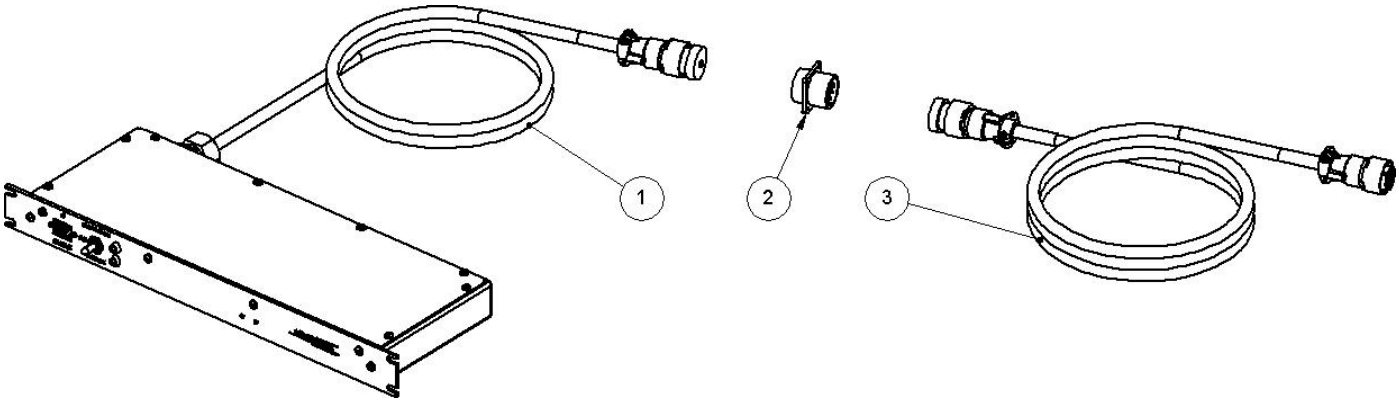
Figure 10.7.1, Electrical Remote Assembly (254-00003-10)



Parts List, Electrical Remote Assembly, (254-00003-10), Ref. Figure 10.7.1

Item	HDT Part #	DESCRIPTION	QTY
1	108-00064-10	CABLE ASSEMBLY-CONTROL, 10 FT LONG	1

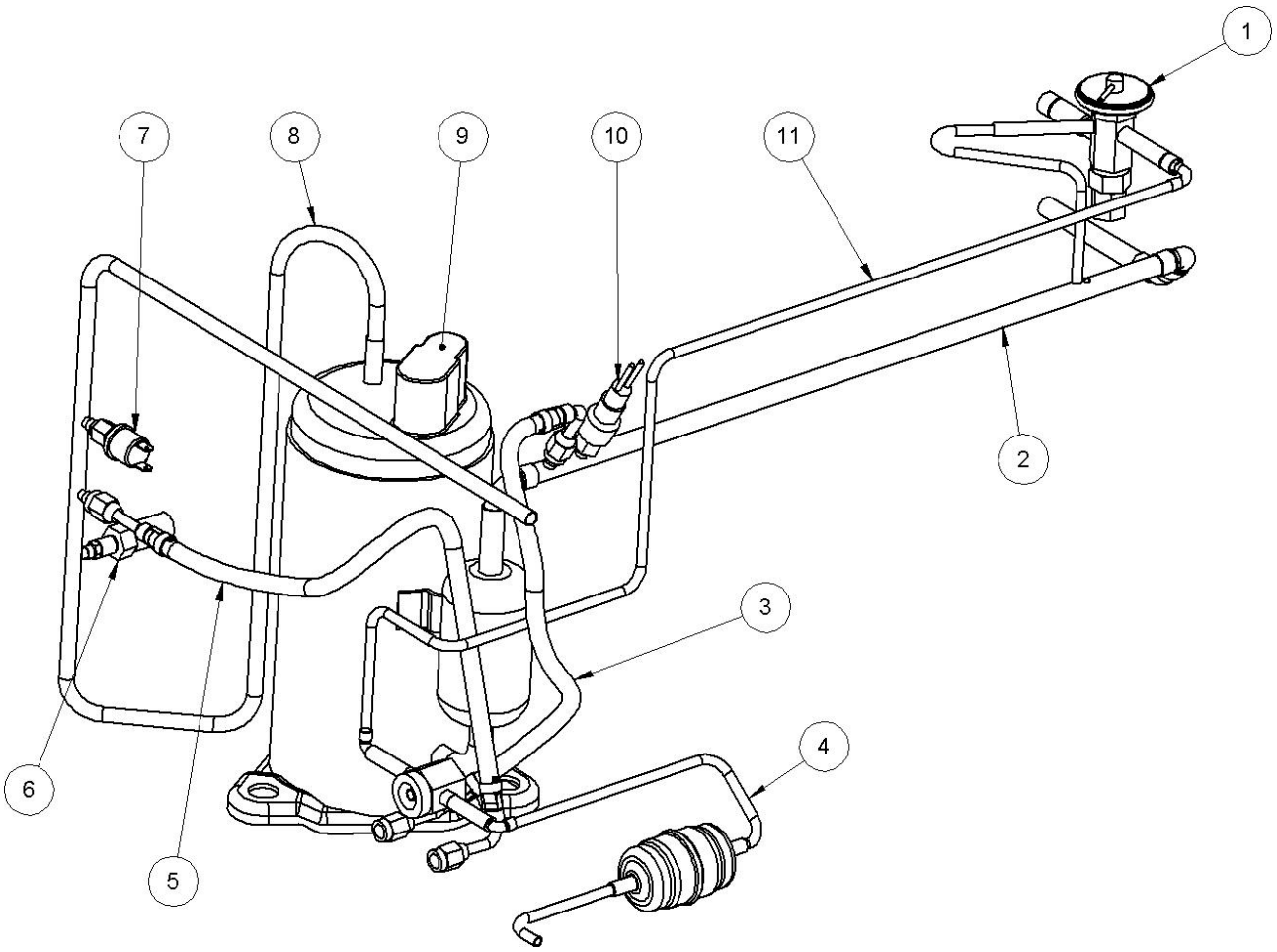
Figure 10.7.2, Electrical Remote Assembly (254-00007)



Parts List, Electrical Remote Assembly, (254-00007), Ref. Figure 10.7.2

Item	HDT Part #	DESCRIPTION	QTY
1	108-00084	CABLE ASSEMBLY-CONTROL, 4 FT LONG	1
2	Not Supplied	THRU BULKHEAD RECEPTACLE	REF
3	108-00085	CABLE ASSEMBLY-CONTROL, 5 FT LONG	1

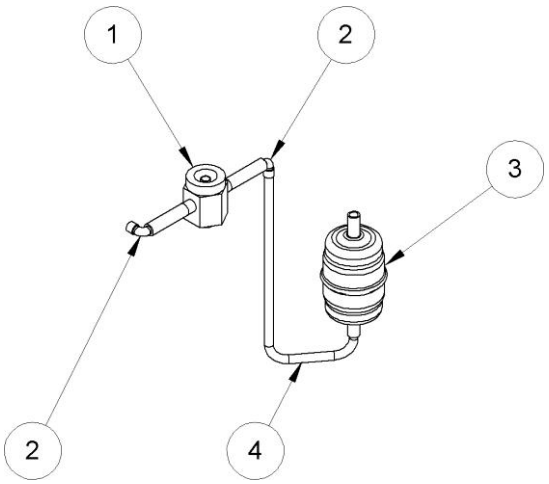
Figure 10.8, Plumbing Assembly (230-00037-AP)



Parts List, Plumbing Assembly, (230-00037-AP), Ref. Figure 10.8

Item	HDT Part #	DESCRIPTION	QTY
1	022-00132	VALVE-TXV	1
2	230-00037-APC	PLUMBING ASSY RUN C	1
3	230-00037-APE	SUCTION HOSE ASSEMBLY	1
4	230-00037-APA	PLUMBING ASSY RUN A	1
5	230-00037-APF	DISCHARGE HOSE ASSEMBLY	1
6	023-00055	PRESS RELIEF VALVE	1
7	011-00223	PRESSURE SWITCH - HIGH	1
8	230-00037-APD	PLUMBING ASSY RUN D	1
9	024-00344	COMPRESSOR	1
10	011-00149	PRESSURE SWITCH - LOW	1
11	230-00037-APB	PLUMBING ASSY RUN B	1
-	100-00857-B	COMPRESSOR STANDOFF (NOT SHOWN)	3

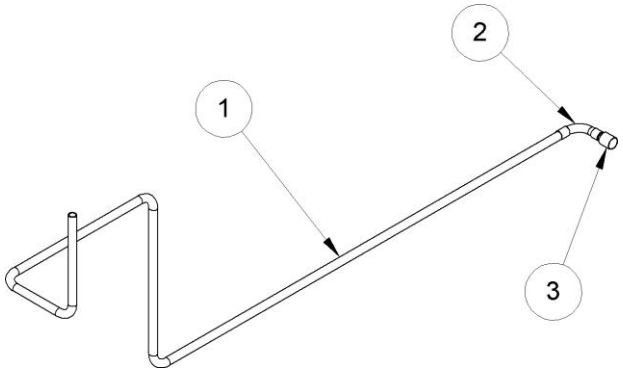
Figure 10.9, Plumbing Sub-Assembly "A", (230-00037-APA)



Parts List, Plumbing Sub-Assembly "A", (230-00037-APA), Ref. Figure 10.9

Item	HDT Part #	DESCRIPTION	QTY
1	021-00039	SIGHTGLASS	1
2	031-00132	STREET ELL SHORT RAD 31/4 F X C	2
3	021-00038	FILTER DRIER	1
4	ACR-2-SAT	1/4" OD X 9-1/2" LG COPPER TUBE	1

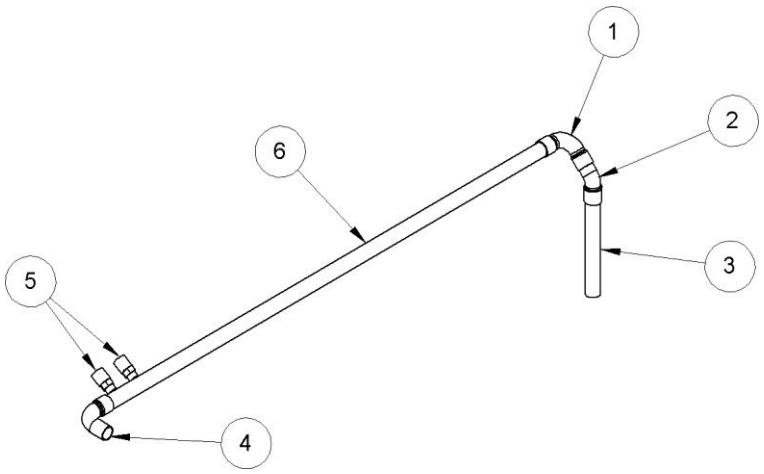
Figure 10.10, Plumbing Sub-Assembly "B", (230-00037-APB)



Parts List, Plumbing Sub-Assembly "B", (230-00037-APB), Ref. Figure 10.10

Item	HDT Part #	DESCRIPTION	QTY
1	ACR-3-SAT	1/4" OD X 35-5/8" LG COPPER TUBE	1
2	031-00212	90 DEG ELBOW, 1/4" FxC LR	1
3	031-00211	REDUCER 3/8" TO 1/4" FxC	1

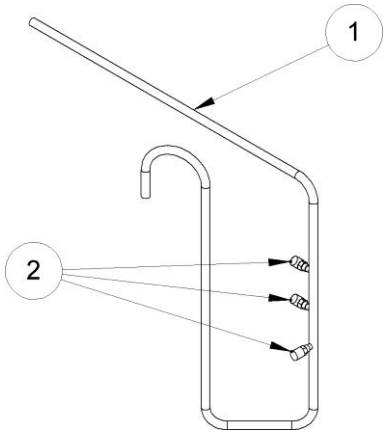
Figure 10.11, Plumbing Sub-Assembly "C", (230-00037-APC)



Parts List, Plumbing Sub-Assembly "C", (230-00037-APC), Ref. Figure 10.11

Item	HDT Part #	DESCRIPTION	QTY
1	031-00177	ELBOW - 1/2" 90 DEG CxC L.R.	1
2	031-00105	45 STREET ELL 1/2"OD FTG TO COPPER	1
3	ACR-6-SAT	1/2" OD X 4-1/2" LG COPPER TUBE	1
4	031-00106	ELBOW - 1/2" 90 DEG FxC L.R.	1
5	023-00023	VALVE-SCHRADER - STEPPED	2
6	ACR-7-SAT	1/2" OD X 20-21/32" LG COPPER TUBE	1

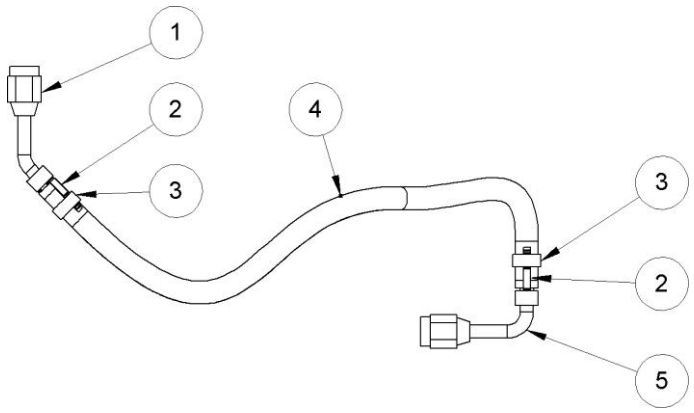
Figure 10.12, Plumbing Sub-Assembly "D", (230-00037-APD)



Parts List, Plumbing Sub-Assembly "D", (230-00037-APD), Ref. Figure 10.12

Item	HDT Part #	DESCRIPTION	QTY
1	ACR-5-SAT	3/8" OD X 49-1/2" LG COPPER TUBE	1
2	023-00023	VALVE-SCHRADER - STEPPED	3

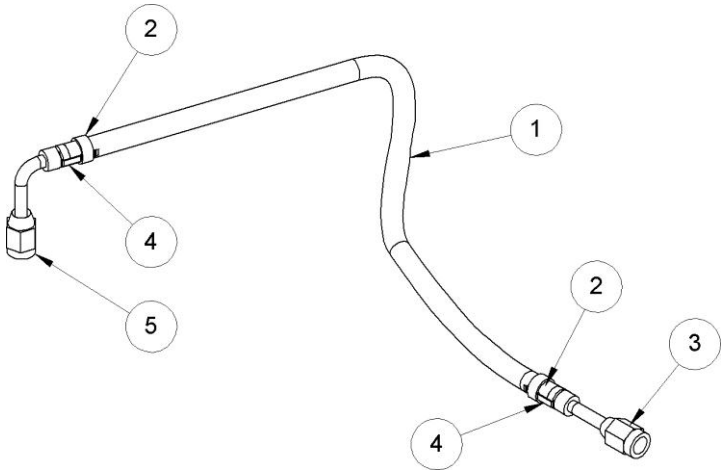
Figure 10.13, Plumbing Sub-Assembly "E", (230-00037-APE)



Parts List, Plumbing Sub-Assembly "E", (230-00037-APE), Ref. Figure 10.13

Item	HDT Part #	DESCRIPTION	QTY
1	034-04005	#4 45 DEG ELBOW EZ CLIP	1
2	034-04001	CAGE-#4	2
3	034-04002	CLIP-#4	2
4	034-04000	HOSE- #4	1
5	034-04004	#4 90 DEG ELBOW EZ CLIP	1

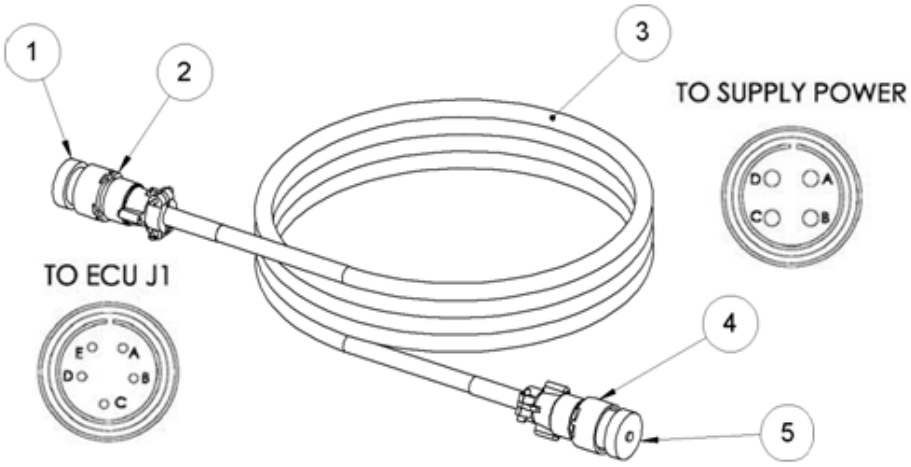
Figure 10.14, Plumbing Sub-Assembly "F", (230-00037-APF)



Parts List, Plumbing Sub-Assembly "F", (230-00037-APF), Ref. Figure 10.14

Item	HDT Part #	DESCRIPTION	QTY
1	034-04000	HOSE- #4	1
2	034-04002	CLIP-#4	2
3	034-04003	#4 STRAIGHT EZ CLIP FEMALE	1
4	034-04001	CAGE-#4	2
5	034-04004	#4 90 DEG ELBOW EZ CLIP	1

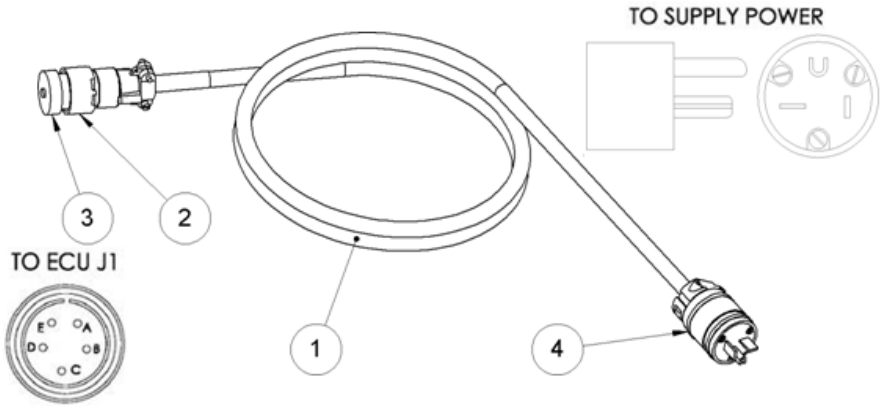
Figure 10.15, External Power Cable Assembly, (108-00061)
Used with model GSQ386ZABNWY0**



Parts List, External Power Cable Assembly, (108-00061), Ref. Figure 10.15

Item	HDT Part #	DESCRIPTION	QTY
1	017-00134CP	CAP,PROTECTIVE PLUG	1
2	017-00134P	PLUG, MS3106E18-11S (5-PIN FEMALE SOCKET), TO ECU	1
3	019-00072	CORD SOW #12-3,1431 UL RATED	8 ft
4	017-00253P	PLUG, MS3106F22-22P (4-PIN MALE PINS), TO POWER	1
5	017-00253CP	CAP,PROTECTIVE PLUG	1

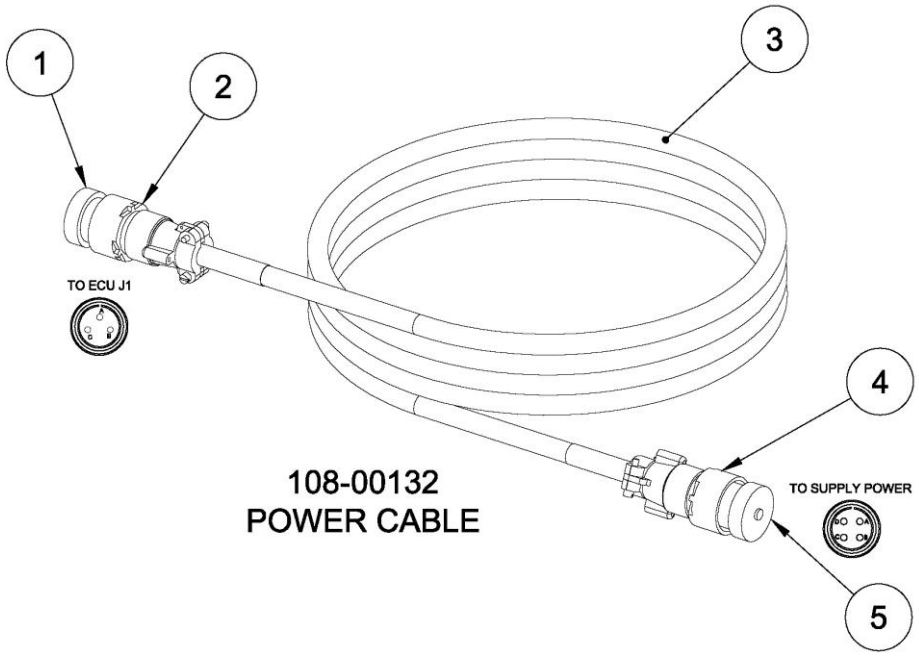
Figure 10.16, External Power Cable Assembly, (108-00047)
(Optional) Used with model GSQ386ZABNWY0**



Parts List, External Power Cable Assembly, (108-00047), Ref. Figure 10.16

Item	HDT Part #	DESCRIPTION	QTY
1	019-00072	CORD SOW #12-3,1431 UL RATED	10.5ft
2	017-00134P	PLUG, MS3106E18-11S (5-PIN FEMALE SOCKET), TO ECU	1
3	017-00124CP	CAP,PROTECTIVE PLUG	1
4	017-00184	120V AC PLUG NEMA 5-20, TO POWER	1

Figure 10.17, External Power Cable Assembly, (108-00132)
Used with model GSQ386ZABNWY0-R**



Parts List, External Power Cable Assembly, (108-00132), Ref. Figure 10.17

Item	HDT Part #	DESCRIPTION	QTY
1	017-00243PC	CAP,PROTECTIVE PLUG	1
2	017-00243P	PLUG, MS3106F20-19S (3-PIN FEMALE SOCKET), TO ECU	1
3	066-00028	CABLE, #8-3	8 ft
4	017-00253P	PLUG, MS3106F22-22P (4-PIN MALE PINS), TO POWER	1
5	017-00253CP	CAP,PROTECTIVE PLUG	1

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