

AC Electrical System Tests Sign-Off Sheet

Printed Technician Name	Social Security Number
Address	Telephone Number
City	State
Zip Code	

STEP	Initials	Date
Hot Skin Test		
Did the candidate		
Prepare Documentation?		
Make sure shore line is plugged into 120VAC source?		
Set VOM to AC voltage scale?		
Place one probe on a bare metal surface of the RV (i.e., Door frame, Chassis)?		
Place the other probe to an earth ground source (i.e., water pipe)?		
Repeat the test at least twice changing the placement of the probe?		
If there is no voltage reading present the skin is not hot?		
Any voltage reading indicates an electrical short or reverse polarity?		
Accurately diagnose and repair problems if any exist?		
Document Results?		
Polarity Test		
Did the candidate		
Prepare Documentation?		
Perform the test using a ground monitor or circuit tester?		
Accurately diagnose and repair problems if any exist?		
Document Results?		
GFCI Test		
Did the candidate		
Prepare Documentation?		
Push the test button on the GFI outlet or breaker?		
Test any 120VAC receptacles within 5 feet of water and all outside receptacles?		
Use a GFCI Polarity Tester to check outlets that are GFCI protected but have no test button.		
Accurately diagnose and repair problems if any exist?		
Document Results?		

Air Conditioning Sign-Off Sheet

Printed Technician Name	Social Security Number
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STEP	Initials	Date
Install Or Verify The Accuracy Of An Air Conditioner's Installation		
<i>The candidate must describe and record these characteristics of an air conditioner.</i>		
Did the candidate		
Record the air conditioner model number?		
Record the air conditioner serial number?		
Record the type of air conditioner (ducted or non-ducted)?		
Indicate OEM or Aftermarket installation?		
Verify compatibility of the component parts (i.e., Rooftop unit, Ceiling plenum, Wall control)?		
<i>The candidate must confirm the proper installation of an air conditioner (including the ceiling plenum)</i>		
Did the candidate		
Verify the air conditioner is bolted down properly (Gasket compression approximately 50%)?		
Verify proper ceiling plenum installation including return and supply air separation?		
Verify installation wiring conforms to all applicable codes, proper wire gauge, breaker size, etc.?		
Verify adequacy of ducting, vents, and size of registers per installation instructions/service manual?		
Accurately diagnose and repair problems, if any exist, in accordance with the installation instructions?		
Evaluate Air Conditioner Performance		
Measure line voltage to the air conditioner		
Did the candidate		
Use a VOM to check incoming static voltage at the air conditioner voltage connection points?		
Start the air conditioner on high cool and check this voltage reading again after applying the load?		
Interpret the accuracy and validity of these voltage readings (should be between 103.5 & 126.5 VAC)?		
Correctly diagnose and repair problems, if any exist, in accordance with the service manual if voltage readings are not within the pre-described limits?		
<i>Measure the temperature difference across the evaporator (supply & return air temperatures)</i>		
Did the candidate		
Start the air conditioner in the high cool position?		
Allow the air conditioner to run for a minimum of 30 minutes?		
Open all discharge and supply air registers completely?		
Place a thermometer near the return air grille/louvers and measure the air temperature?		
Place a thermometer in the supply register/louver and measure the air temperature?		
Verify accuracy and validity of this calculation to the manufacturer specifications; 20 degrees difference nominal (See service manual)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

Certified Technician
Certified Appliance Specialist

Revised June 23, 2008

STEP	Initials	Date
<i>Measure the compressor amperage</i>		
Did the candidate		
Start the air conditioner in the high cool position?		
Allow the air conditioner to run for a minimum of 30 minutes?		
Measure the outdoor ambient temperature?		
Record the compressor rated load amperage (RLA) printed on the air conditioners rating plate?		
Use the information found in the service manual to calculate correct amperage based on RLA and outdoor temperature?		
Read the compressor amperage with an Ammeter?		
Confirm the measure compressor amperage and calculated amperages are approx. equal?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Subtract the supply air temperature from the return air temperature?		

Troubleshooting Air Conditioner Key Electrical Components Sign-Off Sheet

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STEP	Initials	Date
Note: Due to product differences the candidate must consult the service manual for individual component specifications,		
procedures, and sequence of operation		
<i>Air Conditioner Compressor</i>		
Did the candidate		
Correctly measure compressor amperage?		
Correctly measure resistance of the compressor motor windings?		
Remove all electrical power from the air conditioner; remove all wires from the compressor; check terminals C&R, C&S, R&S?		
Measure running voltage at the proper location on the compressor?		
Accurately diagnose compressor problems, if any exist, in accordance with the service manual?		
<i>Air Conditioner Fan Motor</i>		
Did the candidate		
Correctly measure fan motor amperage?		
Correctly measure resistance of the fan motor windings?		
Remove all electrical power from the air conditioner; remove all wires from the fan motor; check motor windings for short, open or ground (see service manual)?		
Measure running voltage at the proper location on the fan motor?		
Accurately diagnose and repair fan motor problems, if any exist, in accordance with the service manual?		
<i>Air Conditioner Capacitor(s)</i>		
Did the candidate		
Properly discharge the capacitor(s) per the service manual?		
Properly test the capacitor(s) per the service manual?		
Accurately diagnose and repair capacitor problems, if any exist, in accordance with the service manual?		
Select either manual thermostat or wall thermostat		
<i>Manual Thermostat</i>		
Did the candidate		
Remove all electrical power from the air conditioner; remove all wires from the thermostat; check the thermostat with an Ohmmeter?		
Accurately diagnose and repair the thermostat problems, if any exist, in accordance with the service manual?		
<i>Manual Selector Switch</i>		
Did the candidate		
Remove electrical power from the air conditioner; remove wires from the switch; check the selector switch with an Ohmmeter?		
<i>Wall Thermostat</i>		
Did the candidate		
Measure low voltage power into the wall thermostat?		
Measure low voltage power out of the wall thermostat?		
Accurately diagnose and repair thermostat problems, if any exist, in accordance with the service manual?		

STEP	Initials	Date
<i>Upper Control Box Assembly</i>		
Did the candidate		
Measure low voltage power from the wall thermostat to the control box?		
Measure high voltage power (120VAC) out of the upper control box assembly to the rooftop air conditioner?		
Accurately diagnose and repair control box assembly problems, if any exist, in accordance with the service manual?		
Accurately diagnose and repair selector switch problems, if any exist, in accordance with the service manual?		

Batteries, Inverters and Converters Sign-Off Sheet

Printed Technician Name	Social Security Number
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STEP	Initials	Date
Draw a Diagram of Batteries in a Parallel Circuit		
Draw a Diagram of Batteries in a Series Circuit		
Perform a Battery Load Test		
Did the candidate		
Wear appropriate protective clothing?		
Disconnect batteries from coach?		
Hookup battery load tester according manufacturer specifications?		
Perform Battery Maintenance		
Did the candidate		
Wear appropriate protective clothing?		
Clean terminals?		
Clean cable clamps?		
Clean battery tops?		
Check and add battery fluid level on non-maintenance free batteries?		
Check Inverter		
Did the candidate		
Remove shore power and shut off generator?		
Check battery? It should be fully charged. If it is not, charge battery		
Turn the inverter on?		
Measure DC voltage input at the inverter? Nominal voltage should be 12 VDC		
Measure AC voltage output at the inverter? Nominal voltage should be 120 VAC		
Accurately diagnose and repair problems if any exist?		
Check Converter		
Did the candidate		
Measure AC voltage into the converter? Nominal voltage should be 90-135 VAC or 120 VAC with a RMS meter.		
Measure DC voltage output? Loaded and unloaded. Nominal voltage should be within manufacturer's specifications.		
Test the converter's battery charger at the converter?		
Turn off all 12 volt loads?		
Disconnect battery cable at the converter?		
Set the VOM on VDC scale?		
Connect positive probe to the converter charge lug?		
Connect the negative probe to converter ground lug?		
Measure voltage. If voltage is less than 13 VDC or more than 14.2 VDC a problem may exist?		
Accurately diagnose and repair problems if any exist?		

Furnace Sign-Off Sheet

Printed Technician Name	Social Security Number
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STEP	Initials	Date
Install or Verify the Accuracy of a Furnace's Installation		
<i>The candidate must describe and record these characteristics of a furnace.</i>		
Did the candidate		
Record the furnace model number?		
Record the furnace serial number?		
Record the type of furnace system?		
Indicate OEM or Aftermarket installation?		
<i>The candidate must confirm the proper installation of a furnace.</i>		
Did the candidate		
Verify proper ducting?		
Verify proper return air?		
Verify proper gas pressure at furnace?		
Verify proper propane connections and conduct a leak test ?		
Document leak test results?		
Verify proper DC/AC voltage at furnace?		
Verify proper exhaust vent system?		
Verify proper seals at door, vents etc.?		
Accurately diagnose and repair installation problems, if any exist, in accordance with the installation manual?		
Evaluate Furnace Performance		
Measure line voltage at the furnace		
Did the candidate		
Check incoming voltage at the wire connections on side of furnace? Nominal voltage should be 10.5-13.5 VDC under unloaded condition.		
Turn furnace on?		
Verify ignition?		
Check voltage at the wire connections on side of furnace? Nominal voltage should be 10.5-13.5 VDC under loaded condition.		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Measure propane pressure at furnace		
Did the candidate		
Turn propane off at container?		
Install manometer at pressure test port?		
Turn propane on at container?		
Check for proper gas pressure (see service manual)?		
Document measurement results?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

STEP	Initials	Date
<i>Evaluate proper air flow</i>		
Did the candidate		
Open all discharge registers and any closeable registers(see installation and or service manual for requirements)?		
Verify air discharge by feel or using an air speed indicator?		
Verify that the discharge is warm?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
<i>Evaluate return air flow</i>		
Did the candidate		
Verify proper return air opening size (see installation and or installation manual)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

Troubleshooting Key Furnace Electrical Components Sign-Off Sheet

Printed Technician Name	Social Security Number
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STEP	Initials	Date
Troubleshoot Key Furnace Electrical Components		
Did the candidate verify sequence of operation per the service manual to evaluate the following components?		
Thermostat		
Did the candidate		
Verify proper height and location per installation and or service manual?		
Verify voltage to thermostat and voltage out of thermostat to furnace (see service manual)?		
On/Off Switch		
Did the candidate		
Remove power wires and check switch for continuity using an ohmmeter?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Circuit Breaker (If applicable)		
Did the candidate		
Measure DC voltage in and out of circuit breaker?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Time Delay Relay (if applicable)		
Did the candidate		
Confirm DC voltage at proper terminals (refer to service manual)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Blower Motor		
Did the candidate		
Confirm DC voltage to blower motor?		
Measure DC amperage at motor (see service manual)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Limit Switch		
Did the candidate		
Verify continuity or DC voltage through limit switch?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Sail Switch		
Did the candidate		
Verify continuity or DC voltage through sail switch?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

STEP	Initials	Date
<u>Either Fan Control Circuit Board</u>		
Verify proper DC voltage to circuit board (see manual)?		
Verify function of circuit board (see manual functions)?		
Spark		
DC voltage to gas valve		
Sense flame		
Energize relay to start fan		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
<u>Or Ignition Board</u>		
Did the candidate		
Verify proper DC voltage to ignition board (see manual)?		
Verify function of ignition board (see manual functions)?		
Spark		
DC voltage to gas valve		
Sense flame		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
<u>Gas Valve</u>		
Did the candidate		
Measure proper voltage at valve?		
Remove power wires and check coils for proper resistance 30-50 ohms?		
Check for proper gas flow exiting valve orphic (if ignition fails check by smell or use manometer)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
<u>Electrode</u>		
Did the candidate		
Check for proper gap (see manual)?		
Check for proper spark across electrode to ground?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Did the candidate		

Generator Sign-Off Sheet

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STEP	Initials	Date
Install or Verify the Accuracy of a Generator's Installation		
<i>The candidate must describe and record these characteristics of a generator set</i>		
Did the candidate		
Record the generator's make?		
Record the generator's model number?		
Record the generator's Serial number?		
Determine the generator's kilowatt (kW) rating?		
Determine the generator's maximum amperage output?		
Identify the generator's fuel type?		
The candidate must confirm the proper installation of a generator		
Did the candidate		
Verify generator mounting is level and will support the weight of the generator set?		
Verify the proper generator top, side, back and front clearances per the installation manual?		
Verify the generator compartment is sealed from the coach interior?		
Verify all AC and DC connections and routings comply with NEC codes?		
Verify fuel line and routings and fuel tank pickup comply with all applicable codes?		
Verify cooling air inlet and cooling air discharge is sized correctly per installation manual?		
Verify the engine exhaust pipes are properly installed per installation manual and comply with all applicable codes?		
Accurately diagnose and repair any installation problems in accordance with the installation instructions?		
Evaluate Generator Performance		
<i>Measure AC output voltage at no-load</i>		
Did the Candidate		
Use a voltmeter set on the AC scale to check output voltage at the junction box?		
Verify the voltage reading is correct per the service manual?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Measure AC output voltage at full rated load		
Did the Candidate		
Use a voltmeter set on the AC scale to check output voltage at the junction box?		
Use loadbank to properly apply maximum rated load on generator set per service manual? Indicate if loadbank is available.		
Verify the voltage reading is correct per the service manual?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Measure proper AC voltage frequency (engine RPM) at no-load		
Did the Candidate		

STEP	Initials	Date
Use a frequency meter to check output voltage frequency at the junction box?		
Verify the frequency reading is correct per the service manual?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Measure proper AC voltage frequency (engine RPM) at full load		
Did the Candidate		
Use a frequency meter to check output voltage frequency at the junction box?		
Use loadbank to properly apply max rated load on generator set per service manual? Indicate if loadbank is available.		
Verify the frequency reading is correct per the service manual?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Troubleshoot Key Generator Components by Sequence of Operation		
Start Solenoid		
Did the candidate measure DC voltage at the proper terminal per the service manual?		
Starter Motor		
Did the candidate measure DC voltage at the proper terminals per the service manual?		
Ignition System		
Did the candidate		
Use a spark tester to check if ignition is present?		
Visually inspect spark plug and reset plug to proper gap?		
Use ohmmeter to measure resistance of the primary and secondary winding of the ignition coil?		
Fuel System		
Did the candidate		
Verify fuel tank level is greater than 1/4?		
Use voltmeter set on the DC scale, measure voltage to the fuel pump per the service manual?		
Measure fuel pressure between the fuel pump and carburetor?		
Use voltmeter set on the DC scale, measure voltage to the fuel solenoid per the service manual?		
Generator System		
Did the candidate		
Measure field flash voltage using a voltmeter set on the DC scale. Measure voltage per the service manual?		
Check resistance of the rotor using an ohmmeter per the service manual?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

Water Heater Sign-Off Sheet

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STEP	Initials	Date
Install or Verify The Accuracy of a Water Heater's Installation		
<i>The candidate must describe and record these characteristics of a water heater.</i>		
Did the candidate		
Record the water heater model number?		
Record the water heater serial number?		
Verify type of control system?		
<i>The candidate must confirm the proper installation of a unit</i>		
Did the candidate		
Check the seal around the flange?		
Confirm the vent is clear and properly gapped from door screen (0 to 1/4" - see installation manual)?		
Confirm the gas line is properly sealed from interior of coach?		
Verify wiring complies with NEC code (if applicable)?		
Conduct a leak test on the propane connection to the water heater?		
Verify the water heater is properly supported?		
Accurately diagnose and repair problems, if any exist, in accordance with the installation instructions?		
Evaluate Water Heater Performance		
<i>Measure propane pressure at water heater</i>		
Did the candidate		
Turn propane off at the container?		
Install manometer on the provided pressure test port?		
Turn propane on at the container?		
Check for proper propane pressure (see service manual)?		
Document results?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
<i>Verify customer complaint</i>		
Did the candidate		
Visually inspect gas flame, burner tube, flu box, and wires?		
Troubleshoot Key Components		
Determine the proper pilot control type (pilot, DSI or electric)		
Pilot Control		
<i>Gas valve/ECO</i>		
Did the candidate remove the thermocouple and measure for continuity?		
<i>Pilot assembly</i>		
Did the candidate check the pilot for proper flame (see service manual)?		
<i>Thermocouple</i>		
Did the candidate measure millivolts in heated state (12 millivolts)?		
<i>Burner</i>		
Did the candidate check for blockage at the orifice?		

STEP	Initials	Date
DSI Control		
Switch		
Did the candidate		
Determine proper 12 VDC and ground to switch?		
Verify proper wiring (refer to service manual)?		
Thermostat		
Did the candidate test for voltage to thermostat or ECO?		
Circuit Board		
Did the candidate check for power to the circuit board from thermostat/ECO?		
Gas Valve		
Did the candidate		
Check for power coming from board/ECO?		
Disconnect power source and measure ohms on coils on valve (refer to service manual)?		
Electrode		
Did the candidate		
Check for proper gap (refer to service manual)?		
Check for spark at proper point on electrode?		
Visually inspect the electrode wire?		
Burner		
Did the candidate		
Inspect burner for proper flame and adjust as necessary (see service manual)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Electric Control		
Switch		
Did the candidate test for proper voltage to switch?		
ECO		
Did the candidate test for power from switch?		
Thermostat		
Did the candidate test for power from ECO?		
Heating Element		
Did the candidate		
Test for power from thermostat?		
Did the candidate disconnect power to heating element and perform an ohms test (see service manual)		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

Refrigerator Sign-Off Sheet

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STEP	Initials	Date
Install or Verify the Accuracy of a Refrigerator's Installation		
<i>The candidate must describe and record these characteristics of a refrigerator</i>		
Did the candidate		
Record the refrigerator model number?		
Record the refrigerator serial number?		
Verify the refrigerator's type of control system?		
<i>The candidate must confirm the proper installation of a refrigerator</i>		
Did the candidate		
Confirm proper side, top, and rear clearances ?		
Confirm proper venting per service or installation manual (i.e., bottom, upper, side, or roof vent)?		
Confirm the refrigerator compartment is properly sealed from interior of coach (see service or installation manual)?		
Verify wiring complies to NEC code?		
Verify proper propane connection to refrigerator (leak test)?		
Accurately diagnose and repair installation problems, if any exist, in accordance with the installation instructions?		
Evaluate Refrigerator Performance		
Measure propane pressure at refrigerator		
Did the candidate		
Turn the propane off at the container?		
Install a manometer at the provided pressure test port?		
Turn propane back on at the container?		
Measure for proper propane pressure (see service manual)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Measure incoming 12 VDC at refrigerator		
Did the candidate		
Measure incoming VDC at refrigerator DC terminal block (10.5-14.5 VDC per manufacturer's specification)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Measure 120 VAC at refrigerator		
Did the candidate		
Measure incoming VAC (108-132 VAC per manufacturer's specification) at the receptacle?		
Measure AC voltage at control board or selector switch?		
Verify the adequacy of the voltage readings?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
<i>Perform run test (12-24 hrs)</i>		

STEP	Initials	Date
Did the candidate		
Put a thermometer in 1 gallon of water and run the refrigerator for 12-24 hours (thermometer should read 40-43 ° F (4 – 6 ° C) or less)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

Refrigerator Troubleshooting Key Components Sign-Off Sheet

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STEP	Initials	Date
Troubleshoot Electrical Components		
Manual Control Refrigerator		
<i>Selector Switch</i>		
Did the candidate		
Turn off all AC power to the refrigerator?		
Disconnect wiring to the selector switch?		
Perform a continuity test on the selector switch per service manual?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
<i>Thermostat</i>		
Did the candidate		
Turn off all AC power to the refrigerator?		
Disconnect wiring to the thermostat?		
Perform a continuity test on the thermostat in accordance with the service manual?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
<i>Heating Element (120 VAC/12 VDC)</i>		
Did the candidate		
Turn off all AC and DC power to the refrigerator?		
Disconnect heating element wires?		
Conduct a resistance test to check for proper resistance per service manual or calculate proper resistance per ohm's law?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Electronic Control Refrigerator		
<i>verify model and type of electronic control system</i>		
Note: Due to the complexity of control systems see the individual service manual to diagnose the following components		
<i>Upper Control Board</i>		
Did the candidate check the upper control board (power in and power out)?		
<i>Lower Control Board</i>		
Did the candidate check the lower control board (power in and power to appropriate components)?		
<i>Heating Element (120 VAC/12 VDC)</i>		
Did the candidate		
Turn off all AC and DC power to the refrigerator?		
Disconnect all heating element wires?		
Conduct a resistance test to check for proper resistance per service manual or calculate proper resistance per ohm's law?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

STEP	Initials	Date
Propane Components		
Either Manual Control Refrigerator		
Safety Valve		
Did the candidate check the safety valve by testing it using a known good thermocouple?		
Piezo Igniter		
Did the candidate depress the Piezo igniter and check for resistance and spark?		
Thermocouple		
Did the candidate check the thermocouple using a known good safety valve or by measuring for millivolts (13-20 millivolts) in accordance with the service manual?		
Electrode		
Did the candidate visually inspect for cracks in wiring or the ceramic insulator?		
Or Electronic Control Refrigerator		
Gas Valve		
Did the candidate		
Disconnect wires to the gas valve and measure ohm's resistance (see service manual)?		
Verify propane pressure through the gas valve with a manometer installed at the test port and with the gas valve energized?		
Reigniter		
Did the candidate		
Measure 12 VDC at the reigniter (Minimum 9.5 VDC - see service manual)?		
Check ground to the reigniter?		
Electrode		
Did the candidate		
Check for cracks in wiring and ceramic covering?		
Verify the electrode has the proper spark gap (see service manual)?		
Thermocouple		
Did the candidate measure millivolts with refrigerator operating on propane (see service manual for specific readings)?		
Orifice		
Did the candidate verify proper orifice size (see service manual)?		
Did the candidate accurately diagnose and repair problems, if any exist, in accordance with the service manual?		