DUO-THERM COMFORT CONTROL CENTER SYSTEMS

This program will address the most common system problems associated with the **Duo-Therm Comfort Control Center** supplied by The Dometic Corporation. Our intent is to provide you with a guideline of checks to make, should you encounter one of the following symptoms.

SYMPTOM	CAUSE	REFER TO	PAGE
COMFORT CONTROL CENTER SECTION:			
1. Turn to "ON" - No display.	Reset DC Volts Cable Assembly Fuse AC Power Module Board Comfort Control Center	1G/M 3G 4G/2 4G/7 4G/6 4G	105 127 128 133 130 127
2. Turn to "ON" - Has display, improper operation.	Operation Reset Configuration Wiring AC Power Module Board Comfort Control Center	1G 1G/M 2G 4B 4G/6 4G	100 105 106 26 130 127
 Multiple Units: One unit operates and improper operation on other unit(s). 	Operation Reset Configuration Wiring AC Power Module Board Comfort Control Center	1G 1G/M 2G 4B 4G/6 4G	100 105 106 26 130 127
ROOF MOUNTED AIR CONDITIONER SECTION			
1. Unit does not run: No fan, no compressor.	Configuration Operation AC Voltage DC Voltage Breaker Fuse Cable Assembly Comfort Control Center AC Power Module Board	2G 1G 1B 3G 3B 4G/7 4G/2 4G 4G/6	106 100 26 127 26 133 128 127 130
 Fan operates: Compressor will not come on (does not "hum") 	Operation Cable Assembly Cold Control Compressor AC Power Module Board Comfort Control Center	1G 4G/2 7C 5C 4G/6 4G	100 128 37 36 130 127
3. Fan Operates: Compressor tries to start, cycles "OFF" and "Hums" again, or blows circuit breaker.	AC Voltage PTCR Start or Run Capacitor Cold Control Overload Protector Compressor	1B 4C 2C/3C 7C 6C 5C	26 36 35/36 37 37 36

SYM	РТОМ	CAUSE	REFER TO	PAGE
(Roc	f Mounted Air Conditioner Sec. continued)			
11.	Air distribution box unit: Insufficient cooling with reduced air output.	Air Flow Obstruction Blower Wheel	10C 12C/E	38 44
12.	Duct in ceiling unit: Insufficient cooling with reduced air output.	Air Flow Obstruction Air Distribution System	10C 11C	38 38
13.	Excessive cooling.	Remote sensor AC Power Module Board Comfort Control Center	4G/5 4G/6 4G	129 130 127
14.	Noisy Operation.	Loose Parts Fan Blades Hitting Tubing Vibration	12C/C 12C/E 12C/D	44 44 44
ROC	F MOUNTED HEAT PUMP SECTION:			
1.	Unit does not run: No fan, no compressor.	Configuration Operation AC Voltage DC Voltage Breaker Fuse Cable Assembly Comfort Control Center AC Power Module Board	2G 1G 1B 3G 3B 4G/7 4G/2 4G 4G/6	106 100 26 127 26 133 128 127 130
2.	Fan operates: Compressor will not come on (does not "hum".	Operation Cable Assembly Compressor AC Power Module Board Comfort Control Center	1G 4G/2 5C 4G/6 4G	100 128 36 130 127
3.	Fan operates: Compressor tries to start, cycles "OFF" and "hums" again, or blows circuit.	AC Voltage PTCR Start or Run capacitor Overload Protector Compressor	1B 4C 2C/3C 6C 5C	26 36 35/36 37 36
4.	Fan operates: compressor runs for a short time, cycles "OFF", cycles back "ON".	Short Cycle Air Flow Obstruction Air Distribution System Compressor Refrigerant System	9C 10C 11C 5C 13C	38 38 36 45

SYM	РТОМ	CAUSE	REFER TO	PAGE
(Roc	of Mounted Air Conditioner Sec. continued)			
5.	Compressor runs, no fan.	Wiring Run Capacitor AC Power Module Comfort Control Center	5B 2C 4G/6 4G	27 35 130 127
6.	Fan runs, but not on all speeds.	Wiring Motor Cable Assembly AC Power Module Board Comfort Control Center	5B 1C 4G/2 4G/6 4G	27 34 128 130 127
7.	Air distribution box unit: Inside coil freezes	Operation Air Flow Obstruction Low Charge Capillary Tube Blockage Reversing Valve	1G 10C 14C 14C 9F	100 38 47 47 95
8.	Duct in ceiling unit: Inside coil freezes.	Operation Air Flow Obstruction Air Distribution System Low Charge Capillary Tube Blockage Reversing Valve	1G 10C 11C 14C 14C 9F	100 38 38 47 47 95
9.	Air Distribution Box Unit: Insufficient cooling or heating, compressor runs constantly.	Air Flow Obstruction Heat Gain/Heat Loss Refrigerant System Compressor	10C 12C/B 13C 5C	38 44 45 36
10.	Duct in ceiling unit: Insufficient cooling or heater, compressor runs constantly.	Air Flow Obstruction Air Distribution System Heat Gain/Heat Loss Refrigerant System Compressor	10C 11C 12C/B 13C 5C	38 38 44 45 36
11.	Air distribution box unit: Insufficient cooling or heating with reduced air output.	Air Flow Obstruction Blower Wheel	10C 12C/E	38 44
12.	Duct in ceiling unit: Insufficient cooling or heating with reduced air output.	Air Flow Obstruction Air Distribution System Blower Wheel	10C 11C 12C/E	38 38 44
13.	Excessive cooling or heating.	Remote Sensor AC Power Module Comfort Control Center	4G/5 4G/6 4G	129 130 127

CAUSE	REFER TO	PAGE
Operation Ambient Sensor Reversing Valve Comfort Control Center	1G 4G/4 9F 4G	100 129 95 127
Loose Parts Fan Blades Hitting Tubing Vibration	12C/C 12C/E 12C/D	44 44 44
Configuration Operation AC Voltage DC Voltage Breaker Fuse Cable Assembly Comfort Control Center AC Power Module Board	2G 1G 1B 3G 3B 4G/7 4G/2 4G 4G/6	106 100 26 127 26 133 128 127 130
Operation Cable Assembly Compressor AC Power Module Board Comfort Control Center	1G 4G/2 5C 4G/6 4G	100 128 36 130 127
AC Voltage PTCR Start or Run Capacitor Overload Protector Compressor	1B 4C 2C/3C 6C 5C	26 36 35/36 37 36
Short Cycle Air Flow Obstruction Air Distribution System Overload Protector Compressor Refrigerant System	9C 10C 11C 6C 5C 13C	38 38 37 36 45
	CAUSE Operation Ambient Sensor Reversing Valve Comfort Control Center Loose Parts Fan Blades Hitting Tubing Vibration Configuration Operation AC Voltage Breaker Fuse Cable Assembly Comfort Control Center AC Power Module Board Operation Cable Assembly Compressor AC Power Module Board Comfort Control Center AC Voltage PTCR Start or Run Capacitor Overload Protector Compressor Short Cycle Air Flow Obstruction Air Distribution System Overload Protector Compressor Refrigerant System	CAUSEREFER TOOperation Ambient Sensor Reversing Valve Comfort Control Center1G 4G/4 9F 4GLoose Parts Fan Blades Hitting Tubing Vibration12C/C 12C/E 12C/DConfiguration Operation AC Voltage Breaker Fuse Comfort Control Center2G 4G/2 4G/2Configuration Operation AC Voltage Breaker AC Power Module Board2G 4G/2 4G/2Operation Compressor AC Power Module Board Comfort Control Center 4G1G 4G/2 4G/2AC Voltage Breaker Fuse Compressor AC Power Module Board Comfort Control Center 4G1G 4G/2 4G/2AC Voltage Compressor AC Power Module Board Comfort Control Center 4G1B 4G/2 4G/2AC Voltage Start or Run Capacitor Overload Protector Compressor SC1B 4G/3 4G/3 4G/3 5C 5CShort Cycle Air Flow Obstruction Air Distribution System Overload Protector Compressor 5C9C 5C 5C 5CShort Cycle Air Flow Obstruction Air Distribution System All C13C

SYMPTOM	CAUSE	REFER TO	PAGE
(Basement [Single Compressor] A/C Sec. Continued)			
5. Compressor runs, no fan.	Wiring	6B	28
	Run Capacitor	2C	35
	Motor	1C	34
	AC Power Module Board	4G/6	130
	Comfort Control Center	4G	127
6. Fan runs, but not on all speeds.	Wiring	6B	28
	Motor	1C	34
	Cable Assembly	4G/2	128
	AC Power Module Board	4G/6	130
	Comfort Control Center	4G	127
7. Evaporator freezes.	Operation	1G	100
	Air Flow Obstruction	10C	38
	Low Charge	14C	47
	Capillary Tube Blockage	14C	47
	Evaporator Blockage	14C	47
8. Insufficient cooling, compressor runs constantly.	Air Flow Obstruction	10C	38
	Air Distribution System	11C	38
	Heat Gain/Heat Loss	12C/B	44
	Refrigerant System	13C	45
	Compressor	5C	36
9. Insufficient cooling with reduced air output.	Air Flow Obstruction	10C	38
	Blower Wheel	12C/E	44
	Air Distribution System	11C	38
10. Excessive cooling.	Remote Sensor	4G/5	129
	AC Power Module Board	4G/6	130
	Comfort Control Center	4G	127
11. Noisy operation.	Loose Parts	12C	44
	Fan Blades Hitting	12C/E	44
	Tubing Vibration	12C/D	44
BASEMENT (SINGLE COMPRESSOR) HEAT PUMP SECTION:			
1. Unit does not run; no fan, no compressor.	Configuration	2G	106
	Operation	1G	100
	AC Voltage	1B	26
	DC Voltage	3G	127
	Breaker	3B	26
	Fuse	4G/7	133
	Cable Assembly	4G/2	128
	Comfort Control Center	4G	127
	AC Power Module Board	4G/6	130

SYN	ИРТОМ	CAUSE	REFER TO	PAGE
<u>(Ba</u>	asement [Single Compressor] H/P Sec. Continued)			
2.	Fan operates; compressor will not come on (does not "hum")	Operation Cable Assembly Compressor AC Power Module Board Comfort Control Center	1G 4G/2 5C 4G/6 4G	100 128 36 130 127
3.	Fan operates; compressor tries to start, cycles "OFF" and "hums" again, or blows circuit breaker.	AC Voltage PTCR Start or Run Capacitor Overload Protector Compressor	1B 4C 2C/3C 6C 5C	26 36 35/36 37 36
4.	Fan operates; compressor runs for a short while, cycles "OFF", cycles back "ON".	Short Cycle Air Flow Obstruction Air Distribution System Overload Protector Compressor Refrigerant System	9C 10C 11C 6C 5C 13C	38 38 38 37 36 45
5.	Compressor runs, no fan.	Wiring Run Capacitor Motor AC Power Module Board Comfort Control Center	7B 2C 1C 4G/6 4G	28 35 34 130 127
6.	Fan runs; but not on all speeds.	Wiring Motor Cable Assembly AC Power Module Board Comfort Control Center	7B 1C 4G/2 4G/6 4G	28 34 128 130 127
7.	Inside coil freezes.	Operation Air Flow Obstruction Air Distribution System Low Charge Capillary Tube Blockage Reversing Valve	1G 10C 11C 14C 14C 9F	100 38 38 47 47 95
8.	Insufficient cooling or heating; compressor runs constantly.	Air Flow Obstruction Air Distribution System Heat Gain/Heat Loss Refrigerant System Compressor	10C 11C 12C/B 13C 5C	38 38 44 45 36

SYMPTOM	CAUSE	REFER TO	PAGE
(Basement [Single Compressor] H/P Sec. Continued)			
 Insufficient cooling or heating with reduced air output. 	Air Flow Obstruction Air Distribution System Blower Wheel	10C 11C 12C/E	38 38 44
10. Excessive cooling or heating.	Remote Sensor AC Power Module Board Comfort Control Center	4G/5 4G/6 4G	129 130 127
 Unit operates in wrong mode (cool instead of heat pump or reversed) 	Operation Ambient Sensor Reversing Valve Comfort Control Center	1G 4G/4 9F 4G	100 129 95 127
12. Noisy operation.	Loose Parts Fan Blades Hitting Tubing Vibration	12C/C 12C/E 12C/D	44 44 44
BASEMENT (DUAL COMPRESSOR) AIR CONDITIONER SECTION:			
1. Unit does not run; no fan, no compressor.	Configuration Operation AC Voltage DC Voltage Breaker Fuse Cable Assembly Comfort Control Center AC Power Module Board	2G 1G 1B 3G 3B 4G/7 4G/2 4G 4G/6	106 100 26 127 26 133 128 127 130
 Fan operates; compressor will not come "ON" (does not "hum") 	Operation Cable Assembly Compressor AC Power Module Board Comfort Control Center	1G 4G/2 5C 4G/6 4G	100 128 36 130 127
3. Fan operates; compressor tries to start, cycles "OFF" and "hums" again, or blows circuit breaker.	AC Voltage PTCR Start or Run Capacitor Overload Protector Compressor	1B 4C 2C/3C 6C 5C	26 36 35/36 37 36

SYMPTOM	CAUSE	REFER TO	PAGE
(Basement [Dual Compressor] A/C Sec. Continued)			
 Fan operates; compressor runs for a short while, cycles "OFF", cycles back "ON" 	Short Cycle Air Flow Obstruction Air Distribution System Overload Protector Compressor Refrigerant System	9C 10C 11C 6C 5C 13C	38 38 38 37 36 45
5. Compressor runs, no fan.	Wiring	8B	29
	Run Capacitor	2C	35
	Motor	1C	34
	AC Power Module Board	4G/6	130
	Comfort Control Center	4G	127
6. Fan runs, but not on all speeds.	Wiring	8B	29
	Motor	1C	34
	Cable Assembly	4G/2	128
	AC Power Module Board	4G/6	130
	Comfort Control Center	4G	127
7. Evaporator freezes.	Operation	1G	100
	Air Flow Obstruction	10C	38
	Air Distribution System	11C	38
	Low Charge	14C	47
	Capillary Tube Blockage	14C	47
	Evaporator Blockage	14C	47
8. Insufficient cooling; compressor runs constantly.	Air Flow Obstruction	10C	38
	Air Distribution System	11C	38
	Heat Gain/Heat Loss	12C/B	44
	Refrigerant System	13C	45
	Compressor	5C	36
9. Insufficient cooling with reduced air output.	Air Flow Obstruction	10C	38
	Air Distribution System	11C	38
	Blower Wheel	12C/E	44
10. Excessive cooling	Remote Sensor	4G/5	129
	AC Power Module	4G/6	130
	Comfort Control Center	4G	127
11. Noisy operation.	Loose Parts	12C/C	44
	Fan Blades Hitting	12C/E	44
	Tubing Vibration	12C/D	44

SYN	ИРТОМ	CAUSE	REFER TO	PAGE
<u>BA</u> HE	SEMENT (DUAL COMPRESSOR) AT PUMP SECTION:			
1.	Unit does not run; no fan, no compressor.	Configuration Operation AC Voltage DC Voltage Breaker Fuse Cable Assembly Comfort Control Center AC Power Module Board	2G 1G 1B 3G 3B 4G/7 4G/2 4G 4G/6	106 100 26 127 26 133 128 127 130
2.	Fan operates; compressor will not come on (does not "hum")	Operation Cable Assembly Compressor AC Power Module Board Comfort Control Center	1G 4G/2 5C 4G/6 4G	100 128 36 130 127
3.	Fan operation; compressor tries to start, cycles "OFF" and "hums" again, or blows circuit breaker.	AC Voltage PTCR Start or Run Capacitor Overload Protector Compressor	1B 4C 2C/3C 6C 5C	26 36 35/36 37 36
4.	Fan operates; compressor runs for a short while, cycles "OFF", cycles back "ON"	Short Cycle Air Flow Obstruction Air Distribution System Overload Protector Compressor Refrigerator System	9C 10C 11C 6C 5C 13C	38 38 38 37 36 45
5.	Compressor runs; no fan.	Wiring Run Capacitor Motor AC Power Module Board Comfort Control Center	8B 2C 1C 4G/6 4G	29 35 34 130 127
6.	Fan runs; but not on all speeds.	Wiring Motor Cable Assembly AC Power Module Board Comfort Control Center	8B 1C 4G/2 4G/6 4G	29 34 128 130 127
7.	Inside coil freezes.	Operation Air Flow Obstruction Air Distribution System Low Charge Capillary Tube Blockage Reversing Valve	1G 10C 11C 14C 14C 9F	100 38 38 47 47 95

SYN	ИРТОМ	CAUSE	REFER TO	PAGE
<u>(Ba</u> <u>Co</u>	asement [Dual Compressor] H/P Sec. ntinued)			
8.	Insufficient cooling or heating; compressor runs constantly.	Air Flow Obstruction Air Distribution System Heat Gain/Heat Loss Refrigerant System Compressor	10C 11C 12C/B 13C 5C	38 38 44 45 36
9.	Insufficient cooling or heating with reduced air output.	Air Flow Obstruction Air Distribution System Blower Wheel	10C 11C 12C/E	38 38 44
10.	Excessive cooling or heating.	Remote Sensor AC Power Module Comfort Control Center	4G/5 4G/6 4G	129 130 127
11.	Unit operates in wrong mode (cool instead of heat pump or reversed).	Operation Ambient Sensor Reversing Valve Comfort Control Center	1G 4G/4 9F 4G	100 129 95 127
12.	Noisy operation.	Loose Parts Fan Blade Hitting Tubing Vibration	12C/C 12C/E 12C/D	44 44 44

DUO-THERM ROOF-MOUNTED HEAT PUMPS

This program will address the most common system problems associated with the **Duo-Therm Heat Pumps** supplied by The Dometic Corporation. Our intent is to provide you with a guideline of checks to make, should you encounter one of the following symptoms.

SY	МРТОМ	CAUSE	REFER TO	PAGE
1.	MECHANICAL CONTROL Unit does not run; no fan, no compressor.	Operating Instructions AC voltage Breaker Selector switch Wiring	4E 1B 3B 8E 5B	60 26 26 63 27
2.	ELECTRONIC & BIMETAL CONTROL Unit does not run; no fan, no compressor.	Operating Instructions AC voltage DC Voltage Breaker Wiring Thermostat Relay board Cable Assembly	5E/6E 1B 7E 3B 11B 9E/B - 9E/C 12E 10E	60-62 26 63 26 64 64 71 70
3.	MECHANICAL CONTROL Fan operates; compressor will not come on (does not hum).	Wiring Selector Switch Thermostat Changeover thermostat Compressor	5B 8E 9E/A 11E 5C	27 63 64 71 36
4.	ELECTRONIC & BIMETAL CONTROL Fan operates; compressor will not come on (does not hum).	Wiring Changeover thermostat Cable assembly Thermostat Relay Board Compressor	11B 11E 10E 9E/1B-9E/C 12E 5C	30 71 70 64 71 36
5.	MECHANICAL, ELECTRONIC & BIMETAL RELAY CONTROL Fan operates; compressor tries to start, cycles OFF and hums again, or blows circuit breaker.	AC voltage PTCR or start relay Start or run capacitor Compressor	1B 4C 2C/3C 5C	26 36 35 36
6.	MECHANICAL, ELECTRONIC & BIMETAL RELAY CONTROL Fan operates; compressor runs for a short while, cycles off, cycles back on, but doesn't run.	Short cycle Air Flow obstruction Condenser fan Compressor Refrigerant system	9C 10C 12C/E 5C 13C	38 38 44 36 45
7.	MECHANICAL CONTROL Compressor runs, no fan.	Wiring Selector Switch Run Capacitor Motor	5B 8E 2C 1C	27 63 35 34
8.	ELECTRONIC & BIMETAL CONTROL Compressor runs, no fan.	Wiring Run Capacitor Motor Thermostat Relay Board Cable Assembly Relay, Fan Speed	11B 2C 1C 9E/B-9E/C 12E 10E 12E	30 35 34 64 71 70 71

SY	МРТОМ	CAUSE	REFER TO	PAGE
9.	MECHANICAL CONTROL Fan runs; but not on all speeds	Selector Switch Wiring Motor	8E 5B 1C	63 27 34
10.	ELECTRONIC & BIMETAL CONTROL Fan runs; but not on all speeds	Wiring Motor Thermostat Relay Board Cable Assembly	11B 1C 9E/B-9E/C 12E 10E	30 34 64 71 70
11.	MECHANICAL, ELECTRONIC & BIMETAL CONTROL WITH AIR DISTRIBUTION BOX Evaporator freezes up.	Ambient Temperature Air Flow Obstruction Low Charge Capillary Tube Blockage Evaporator Blockage	12C/A 10C 14C 14C 14C 14C	44 38 47 47 47
12.	ELECTRONIC & BIMETAL CONTROL WITH DUCT IN CEILING Evaporator freezes up.	Ambient Temperature Air Distribution System Low Charge Capillary Tube Blockage Evaporator Blockage	12C/A 11C 14C 14C 14C 14C	44 38 47 47 47
13.	MECHANICAL, ELECTRONIC & BIMETAL CONTROL WITH AIR DISTRIBUTION BOX Insufficient cooling or heating; compressor runs constantly.	Air Flow Obstruction Heat Gain/Heat Loss Refrigerant System Compressor	10C 12C/B 13C 5C	38 44 45 36
14.	ELECTRONIC & BIMETAL CONTROL WITH DUCT IN CEILING. Insufficient cooling or heating; compressor runs constantly.	Air Distribution System Heat Gain/Heat Loss Refrigerant System Compressor	11C 12C/B 13C 5C	38 44 45 36
15.	MECHANICAL CONTROL Unit operators in wrong mode (cool instead of heat pump or reversed)	Operating Instructions Thermostat Changeover Thermostat Relay, Double Throw Reversing Valve	4E 9E/A 11E 13E 14E	60 64 71 72 73
16.	ELECTRONIC & BIMETAL CONTROL Unit operate in wrong mode (cool instead of heat pump or reversed)	Operating Instructions Thermostat Changeover Thermostat Relay, Double Throw Reversing Valve	5E/6E 9E/B-9E/C 11E 13E 14E	60-62 64 71 72 73
17.	MECHANICAL, ELECTRONIC & BIMETAL RELAY CONTROL WITH AIR DISTRIBUTION BOX: Insufficient cooling; compressor cycles off occasion- ally.	Thermostat Air Flow Obstruction	9E 10C	64 38
18.	ELECTRONIC & BIMETAL CONTROL WITH DUCT IN CEILING: Insufficient cooling; compressor cycles off occasionally	Air Distribution System Thermostat Relay Board	9EB/9EC 12E	38 64 71

DUO-THERM ROOF-MOUNTED HEAT PUMPS ... Continued

CAUSE	REFER TO	STEP
Short Cycle	9C	38
Short Cycle	9C	38
Air Distribution System	11C	38
Air Flow Obstruction	10C	38
Blower Wheel	12C/E	44
Air Distribution System	11C	38
Blower Wheel	12C/E	44
Thermostat	9E/A	64
Thermostat	9E/B-9E/C	64
Relay Board	12E	71
Loose Parts	12C/C	44
Fan Blades Hitting	12C/E	44
Tubing Vibration	12C/D	44
Installation Drain Hole Plugged Air Conditioner Loose Mounting Gasket Damaged Evaporator Bulkhead Leak	12C/F 12C/G 12C/F 12C/F 12C/H	44 44 44 44
	CAUSEShort CycleShort CycleAir Distribution SystemAir Flow Obstruction Blower WheelAir Distribution System Blower WheelThermostat Relay BoardLoose Parts Fan Blades Hitting Tubing VibrationInstallation Drain Hole Plugged Air Conditioner Loose Mounting Gasket Damaged Evaporator Bulkhead Leak	CAUSEREFER TOShort Cycle9CShort Cycle9CAir Distribution System9CAir Flow Obstruction10CBlower Wheel12C/EAir Distribution System11CBlower Wheel12C/EThermostat9E/AThermostat9E/B-9E/CRelay Board12C/ELoose Parts12C/CFan Blades Hitting12C/FTubing Vibration12C/FInstallation12C/FDrain Hole Plugged12C/FMounting Gasket Damaged12C/FEvaporator Bulkhead Leak12C/F

DUO-THERM BASEMENT AIR CONDITIONERS & HEAT PUMPS

This program will address the most common system problems associated with the **Duo-Therm Basement Air Conditioners and Heat Pumps** supplied by The Dometic Corporation. Our intent is to provide you with a guideline of checks to make, should you encounter one of the following symptoms.

SYM	РТОМ	CAUSE	REFER TO	PAGE
MO	DEL 390XX.XXX SECTION			
1.	Unit does not run: No fan, no compressor	Operation AC Volts Breaker Wiring Transformer Thermostat	1F 1B 3B 13B 10F 7F/A-7F/B	74 26 26 31 96 80
2.	Fan operates: Compressor will not come on (does not "hum")	Operation Thermostat Wiring Relay Compressor	1F 7F/A-7F/B 13B 14F/H 5C	74 80 31 99 36
3.	Fan operates: Compressor tries to start, cycles "OFF" and "hums" again, or blows circuit breaker.	AC Volts PTCR Start Capacitor Run Capacitor Overload Protector Compressor	1B 4C 3C 2C 6C 5C	26 36 35 37 36
4.	Fan operates: Compressor runs for a short while, cycles "OFF", cycles back "ON".	Short Cycle Air Flow Obstructions Air Distribution System Overload Protector Compressor Refrigerant System	9C 10C 11C 6C 5C 13C	38 38 38 37 36 45
5.	Compressor runs: No fan	Wiring Thermostat Relay Run Capacitor Motor	13B 7F/A-7F/B 14F/F 2C 1C	31 80 99 35 34
6.	Evaporator freezes	Operation Air Flow Obstruction Air Distribution System Low Charge Capillary Tube Blockage Evaporator Blockage	1F 10C 11C 14C 14C 14C 14C	74 38 38 47 47 47
7.	Insufficient cooling, compressor runs constantly	Air Flow Obstruction Air Distribution System Heat Gain/Heat Loss Refrigerant System Compressor	10C 11C 12C/B 13C 5C	38 38 44 45 36
8.	Insufficient cooling with reduced air output	Air Flow Obstruction Air Distribution System	10C 11C	38 38

SYM	РТОМ	CAUSE	REFER TO	PAGE
(M	odel 390XX.XXX Section Continued)			
1 <u></u>				
9.	Excessive cooling	Thermostat Wiring Relay	7F/A-7F/B 13B 14F/H	80 31 99
10.	Noisy operation	Loose Parts Tubing Vibration	12C/C 12C/D	44 44
MO	DEL 391XX.XXX SECTION			
1.	Unit does not run: No fan, no compressor	Operation AC Volts DC Volts Breaker Wiring Thermostat	2F 1B 6F 3B 14B 7F/C	75 26 80 26 31 83
2.	Fan operates: Compressor will not come on (does not "hum")	Operation Thermostat Wiring Relay Compressor	2F 7F/C 14B 14F/D 5C	74 83 31 98 36
3.	Fan operates: Compressor tries to start, cycles "OFF" and "hums" again or blows circuit breaker	AC Volts PTCR Start Capacitor Run Capacitor Overload Protector Compressor	1B 4C 3C 2C 6C 5C	26 36 35 37 36
4.	Fan operates: Compressor runs for a short while, cycles "OFF", cycles back "ON"	Short Cycle Air Flow Obstruction Air Distribution System Overload Protector Compressor Refrigerant System	9C 10C 11C 6C 5C 13C	38 38 38 37 36 45
5.	Compressor runs, no fan	Wiring Thermostat Relay Run Capacitor Motor	14B 7F/C 14F/E 2C 1C	31 83 98 35 34
6.	Fan runs, but not on all speeds	Wiring Thermostat Relay Motor	14B 7F/C 14F/D 1C	31 83 98 34

DUO-THERM BASEMENT AIR CONDITIONERS & HEAT PUMPS ... Continued

SYMP	том	CAUSE	REFER TO	PAGE
(110				
7.	Evaporator freezes	Operation Air Flow Obstruction Air Distribution System Low Charge Capillary Tube Blockage Evaporator Blockage	2F 10C 11C 14C 14C 14C	74 38 38 47 47 47
8.	Insufficient cooling, compressor runs constantly	Air Flow Obstruction Air Distribution System Heat Gain/Heat Loss Refrigerant System Compressor	10C 11C 12C/B 13C 5C	38 38 44 45 36
9.	Insufficient cooling with reduced air output	Air Flow Obstruction Air Distribution System	10C 11C	38 38
10.	Excessive cooling	Thermostat Wiring Relay	7F/C 14B 14F/D	83 31 98
11.	Noisy operation	Loose Parts Tubing Vibration	12C/C 12C/D	44 44
MO	DELS 393XX.XXX SECTION			
1.	Unit does not run; No fan, no compressor	Operation AC Voltage Breaker Cable Assembly Thermostat Relay Board	3F 1B 3B 8F/C 7F/E 11F	74 26 26 95 87 96
2.	Fan operates: compressor will not come on (does not "hum")	Operation Cable Assembly Compressor Thermostat Changeover Thermostat Relay Board	3F 8F/C 5C 7F/E 13F 11F	74 95 36 87 96 96
3.	Fan operates: compressor tries to start, cycles "OFF" and "hums" again, or blows circuit breaker	AC Voltage PTCR Start Capacitor Run Capacitor Overload Protector Compressor	1B 4C 3C 2C 6C 5C	26 36 35 37 36

DUO-THERM BASEMENT AIR CONDITIONERS & HEAT PUMPS Continued

SYM	РТОМ	CAUSE	REFER TO	PAGE
(MO	DEL 393XX.XXX SECTION CONTINUED)			
4.	Fan operates: compressor runs for a short while, cycles "OFF", cycles back "ON"	Short Cycle Air Flow Obstruction Air Distribution System Overload Protector Compressor Refrigerant System	9C 10C 11C 6C 5C 13C	38 38 38 37 36 45
5.	Compressor runs: no fan	Wiring Run Capacitor Motor Thermostat Relay Relay Board	15B 2C 1C 7F/E 14F/E 11F	31 35 34 87 98 96
6.	Fan runs: but not on all speeds	Wiring Motor Cable Assembly Thermostat Relay Board	15B 1C 8F/C 7F/E 11F	31 34 95 87 96
7.	Inside coil freezes	Operation Air Flow Obstruction Air Distribution System Low Charge Capillary Tube Blockage Reversing Valve	3F 10C 11C 14C 14C 9F	74 38 38 47 47 95
8.	Insufficient cooling or heating: compressor runs constantly	Air Flow Obstruction Air Distribution System Heat Gain/Heat Loss Refrigerant System Compressor	10C 11C 12C/B 13C 5C	38 38 44 45 36
9.	Insufficient cooling or heating with reduced air output	Air Flow Obstruction Air Distribution System	10C 11C	38 38
10.	Excessive cooling or heating	Thermostat Cable Assembly Relay Board	7F/E 8F/C 11F	87 95 96
11.	Unit operates in wrong mode (cool instead of heat pump or reversed)	Operation Thermostat Reversing Valve	3F 7F/E 9F	74 87 95
12.	Noisy operation	Loose Parts Tubing Vibration	12C/C 12C/D	44 44

DUO-THERM BASEMENT AIR CONDITIONERS & HEAT PUMPS Continued

SYMPTOM		CAUSE	REFER TO	PAGE
мо	DEL 39224.601 SECTION			
1.	Unit does not run: No fan, no compressor	Operation AC Voltage DC Voltage Breaker Cable Assembly Thermostat Relay	4F 1B 6F 3B 8F/A 7F/D 14F/A	76 26 80 26 94 85 97
2.	Fan operates: Compressor will not come "ON" (does not "hum")	Operation Cable Assembly Relay Compressor	4F 8F/A 14F/A 5C	76 94 97 36
3.	Fan operates: Compressor tries to start, cycles "OFF" and "hums" again, or blows circuit breaker.	AC Voltage PTCR Start Capacitor Run Capacitor Overload Protector Compressor	1B 4C 3C 2C 6C 5C	26 36 35 37 36
4.	Fan operates: Compressor runs for a short while, cycles "OFF", cycles back "ON"	Short Cycle Air Flow Obstruction Air Distribution System Overload Protector Compressor Refrigerant System	9C 10C 11C 6C 5C 13C	38 38 38 37 36 45
5.	Compressor runs, no fan	Wiring Run Capacitor Motor Cable Assembly Thermostat Relay	16B 2C 1C 8F/A 7F/D 14F/A	32 35 34 94 85 97
6.	Fan runs, but not on all speeds	Wiring Motor Cable Assembly Thermostat Relay	16B 1C 8F/A 7F/D 14F/A	32 34 34 85 97
7.	Evaporator freezes	Operation Air Flow Obstruction Air Distribution System Low Charge Capillary Blockage Evaporator Blockage	4F 10C 11C 14C 14C 14C	76 38 38 47 47 47
8.	Insufficient cooling: Compressor runs constantly	Air Flow Obstruction Air Distribution System Heat Gain/Heat Loss Refrigerant System Compressor	10C 11C 12C/B 13C 5C	38 38 44 45 36

DUO-THERM BASEMENT AIR CONDITIONERS & HEAT PUMPS Continued

SYMPTOM		CAUSE	REFER TO	PAGE
(MO	DEL 39224.601 SECTION CONTINUED)			
9.	Insufficient cooling with reduced air output	Air Flow Obstruction Air Distribution System	10C 11C	38 38
10.	Excessive cooling	Relay Cable Assembly Thermostat	14F/A 8F/A 7F/D	97 94 85
11.	Noisy operation	Loose Parts Tubing Vibration	12C/C 12C/D	44 44
MOI	DEL 39424.601 SECTION			
1.	Unit does not run: No fan, no compressor	Operation AC Voltage DC Voltage Breaker Cable Assembly Relay Board Thermostat	5F 1B 6F 3B 8F/B 11F 7F/E	78 26 80 26 94 96 87
2.	Fan operates; compressor will not come on (does not "hum")	Operation Cable Assembly Compressor Relay Board Thermostat	5F 8F/B 5C 11F 7F/E	78 94 36 96 87
3.	Fan operation: Compressor tries to start, cycles "OFF", and "hums" again, or blows circuit breaker	AC Voltage PTCR Start Capacitor Run Capacitor Overload Protector Compressor	1B 4C 3C 2C 6C 5C	26 36 36 35 37 36
4.	Fan operates: Compressor runs for a short while, cycles "OFF", then cycles back "ON"	Short Cycle Air Flow Obstruction Air Distribution System Overload Protector Compressor Refrigerant System	9C 10C 11C 6C 5C 13C	38 38 38 37 36 45
5.	Compressor runs: No fan	Wiring Run Capacitor Motor Relay Board Thermostat	17B 2C 1C 11F 7F/E	33 35 34 96 87
6.	Fan runs: But not on all speeds	Wiring Motor Cable Assembly Relay Board Thermostat	17B 1C 8F/B 11F 7F/E	33 34 94 96 87

DUO-THERM BASEMENT AIR CONDITIONERS & HEAT PUMPS . . . Continued

SYM	РТОМ	CAUSE	REFER TO	PAGE
(MO	DEL 39424.601 SECTION CONTINUED)			
7.	Inside coil freezes	Operation Air Flow Obstruction Air Distribution System Low Charge Capillary Tube Blockage Reversing Valve	5F 10C 11C 14C 14C 9F	78 38 38 47 47 95
8.	Insufficient cooling or heating: Compressor runs constantly	Air Flow Obstruction Air Distribution System Heat Gain/Heat Loss Refrigerant System Compressor	10C 11C 12C/B 13C 5C	38 38 44 45 36
9.	Insufficient cooling or heating with reduced air output	Air Flow Obstruction Air Distribution System	10C 11C	38 38
10.	Excessive cooling or heating	Cable Assembly Relay Board Thermostat	8F/B 11F 7F/E	94 96 87
11.	Unit operates in wrong mode (cool instead or heat pump or reversed)	Operation Thermostat Reversing Valve	5F 7F/E 9F	78 87 95
12.	Noisy Operation	Loose Parts Tubing Vibration	12C/C 12C/D	44 44

DUO-THERM AIR CONDITIONERS

This program will address the most common system problems associated with the Duo-Therm Air Conditioners supplied by The Dometic Corporation. Our intent is to provide you with a guideline of checks to make, should you encounter one of the following symptoms.

SY	МРТОМ	CAUSE	REFER TO	PAGE
1.	MECHANICAL CONTROL Unit does not run; no fan, no compressor.	Operating Instructions AC voltage Breaker Selector switch	1D 1B 3B 5D/A	49 26 26 53
2.	ELECTRONIC CONTROL	Wiring	10B	30
	Unit does not run; no fan, no compressor.	Operating Instructions AC voltage Breaker Wiring Control board	2D 1B 3B 11B 5D/C	49 26 26 30 54
3.	BIMETAL RELAY CONTROL		50/0	50
	Unit does not run; no fan, no compressor.	Operating Instructions Voltage Breaker Thermostat Relay Board	3D 1B 3B 5D/B 5D/E	51 26 26 53 57
4.	MECHANICAL CONTROL			
	Fan operates; compressor will not come on (does not hum).	Wiring Selector Switch Thermostat Overload Compressor	10B 5D/A 5D/B 6C 5C	30 53 53 37 36
5.	ELECTRONIC CONTROL Fan operates; compressor will not come on (does not hum).	Wiring Overload Compressor Control board Main Board	11B 6C 5C 5D/B 5D/D	30 37 36 53 56
6.	BIMETAL RELAY CONTROL			
	Fan operates; compressor will not come on (does not hum).	Wiring Thermostat Relay Board Overload Compressor	12B 5D/B 5D/E 6C 5C	30 53 57 37 36
7.	MECHANICAL, ELECTRONIC & BIMETAL RELAY CONTROL Fan operates; compressor tries to start, cycles OFF and hums again, or blows circuit breaker.	AC voltage PTCR or start relay Start or run capacitor Overload Compressor	1B 4C 2C/3C 6C 5C	26 36 35-36 37 36
8.	MECHANICAL, ELECTRONIC & BIMETAL RELAY CONTROL Fan operates; compressor runs for a short while, cycles off, cycles back on, but doesn't run.	Short cycle Air Flow obstruction Condenser fan Overload Compressor Refrigerant system	9C 10C 12C/E 6C 5C 13C	38 38 44 37 36 45

SYMPTOM	CAUSE	REFER TO	PAGE
9. MECHANICAL CONTROL Compressor runs, no fan.	Wiring Switch Run Capacitor Motor	10B 5D/A 2C 1C	30 53 35 34
10. ELECTRONIC CONTROL Compressor runs, no fan.	Wiring Run Capacitor Motor Control Board Main Board	11B 2C 1C 5D/B 5D/D	30 35 34 53 56
11. BIMETAL RELAY CONTROL Compressor runs, no fan	Wiring Thermostat Relay Board Run Capacitor Motor	12B 5D/B 5D/E 2C 1C	30 53 57 35 34
12. MECHANICAL CONTROL Fan runs on one or two speeds only	Selector Switch Wiring Motor	5D/A 10B 1C	53 30 34
13. ELECTRONIC CONTROL Fan runs; but not on all speeds	Wiring Motor Control Board Main Board	11B 1C 5D/C 5D/D	30 34 54 56
14. BIMETAL RELAY CONTROL Fan runs; but not on all speeds.	Thermostat Wiring Motor Relay Board	5D/B 12B 1C 5D/E	53 30 34 57
 MECHANICAL, ELECTRONIC & BIMETAL RELAY CONTROL WITH AIR DISTRIBUTION BOX Evaporator freezes up. 	Ambient Temperature Air Flow Obstruction Low Charge Capillary Tube Blockage Evaporator Blockage	12C/A 10C 14C 14C 14C 14C	44 38 47 47 47
 ELECTRONIC & BIMETAL RELAY CONTROL WITH DUCT IN CEILING Evaporator freezes up. 	Ambient Temperature Air Distribution System Cold Control Low Charge Capillary Tube Blockage Evaporator Blockage	12C/A 11C 7C 14C 14C 14C	44 38 37 47 47 47
17. MECHANICAL, ELECTRONIC & BIMETAL RELAY CONTROL WITH AIR DISTRIBUTION BOX Insufficient cooling; compressor runs constantly.	Air Flow Obstruction Heat Gain Refrigerant System Compressor	10C 12C/B 13C 5C	38 44 45 36
 ELECTRONIC & BIMETAL RELAY CONTROL WITH DUCT IN CEILING. Insufficient cooling; compressor runs constantly. 	Air Distribution System Heat Gain Refrigerant System Compressor	11C 12C/B 13C 5C	38 44 45 36

SY	МРТОМ	CAUSE	REFER TO	PAGE
•••				
19.	MECHANICAL, ELECTRONIC & BIMETAL RELAY	Thermostat	5D/B	53
	Insufficient cooling: compressor cycles off occasion-	Air Flow Obstruction	10C	38
	ally.			
20.	ELECTRONIC CONTROL WITH DUCT IN CEIL-	Overload	6C	37
	ING:	Cold Control	70	38
	Insufficient cooling; compressor cycles off occasion-	Control Board	5D/C	54
	any.	Main Board	5D/D	56
		Overload	6C	37
21.	BIMETAL RELAY CONTROL WITH DUCT IN	Air Distribution System	11C	38
	off occasionally	Cold Control	7C	37
		I nermostat Relav Board	5D/B 5D/F	53 57
22	MECHANICAL ELECTRONIC & BIMETAL RELAY	Short Cycle	00,2	38
	CONTROL WITH AIR DISTRIBUTION BOX	Overload	6C	37
	Insufficient cooling; compressor often cycles off.			
23	ELECTRONIC & BIMETAL RELAY CONTROL	Short Cvcle	9C	38
20.	WITH DUCT IN CEILING	Overload	6C	37
	Insufficient cooling; compressor often cycles off.	Air Distribution System	11C	38
			_	
24.		Air Flow Obstruction	10C	38
	Insufficient cooling with reduced air output.	Blower Wheel	120/E	44
25.	ELECTRONIC & BIMETAL RELAY CONTROL	Air Distribution System	11C	38
	WITH DUCT IN CEILING	Blower Wheel	12C/E	44
	Insufficient cooling with reduced air output.			
26.	MECHANICAL CONTROL	Thermostat	5D/B	53
	Excessive cooling.			
27.	ELECTRONIC CONTROL	Control Board	5D/C	54
	Excessive cooling.	Main Board	5D/D	56
28.	BIMETAL RELAY CONTROL	Thermostat	5D/B	53
	Excessive cooling.	Relay Board	5D/E	57
29.	MECHANICAL CONTROL	Wiring	10B	30
	No heat.	Heater Plug	8C	37
		Selector Switch	5D/A	53
20			80	37
30.	TION BOX	Wiring Heater Plug	11B 8C	30 37
	No heat.	Heater Coil	8C	37
		Control Board	5D/C	54
		Main Board	5D/D	56
31.	MECHANICAL, ELECTRONIC & BIMETAL RELAY	Loose Parts	12C/C	44
	CONTROL	Fan Blades Hitting	12C/E	44
	noisy operation.	I ubing Vibration	12C/D	44
32.	MECHANICAL, ELECTRONIC & BIMETAL RELAY	Installation	12C/F	44
		Air Conditioner Loose	12C/F	44
	vvater leaks into RV.	Mounting Gasket Damaged	12C/F	44
		Evaporator Bulkhead Leak	12F/H	44

SECTION A. THERMOSTAT LOCATION

PROPER THERMOSTAT LOCATION

THE THERMOSTAT LOCATION IS VERY IMPORTANT FOR BALANCED TEMPERATURE CONTROL IN AN RV.

Today's interior design of the RV has become both cosmetically more appealing and more efficient in its use of storage space. These improvements have generated complex interior space requirements which, in turn, have caused many RV's to become a maze for heating and air conditioning circulation.

The heating system is usually mounted close to floor level and consists of one or more furnaces. The air conditioner(s) is mounted on the roof with a different air distribution system. It is very important to locate the thermostat and remote sensors in areas that have good air movement. This may be difficult because what works well for heating may not work well for air conditioning.

The thermostat or remote sensors must be placed in a location with good air movement. Placing a thermostat or sensor under a cabinet or in a corner will result in a large fluctuation in the temperature. (See Figure 1).



The proper location for the thermostat or remote sensor is 54" from the floor and on an inside wall. It should be located where it cannot be affected by heat from the sun, lamps, ovens, etc., or other sources of draft. Locations close to entry doors and windows should be avoided. The discharge from registers blowing directly on the thermostat or remote sensor can cause the systems to short-cycle and should be avoided. (See Figure 2).



When the floor plan or interior design of an RV changes, Dometic suggests trying several locations for the thermostat or remote sensors to determine the best location for mounting. Both heating and air conditioning should be tested, especially if they are using different duct systems and the same thermostat. Once the proper thermostat (or remote sensor) location is determined, this location should be used on other RV's with the same basic plan. (See Figure 3)

If you have further questions about properly locating the thermostat or remote sensors, please contact your Dometic Sales Representative or the Technical Service Department at 1-219-463-4858.

1B. AC VOLTAGE

The unit is a 115V AC, 60 Hz. appliance. The proper operation range is between 103 volts and 126.5 volts. The voltage reading should be taken at the unit power supply leads. One test should be performed when the unit is turned OFF and another with it under a load. If the voltage is not within the proper operating range, it must be corrected before operating the heat pump.

THIS IS AN ENERGIZED CIRCUIT. SHOCK CAN OCCUR IF NOT TESTED PROPERLY. TESTING TO BE DONE BY A QUALIFIED SERVICE TECHNI-CIAN.

Check for proper AC volts at the connections at the unit's electronic control box on roof mounted units and at the connections at the electric box on basement units.

The dual units (Models 39224 and 39424) have two AC volt circuits to them. Verify that Circuit 1 is wired into CIR 1 terminal block, and Circuit 2 is wired into CIR 2 terminal block. Check for proper AC volts at each terminal block.

NOTE: Models 39046.601 and 39115.616 are 50/60 Hz. units. On 50 Hz. power, 100 volts, the operating range is 90 to 110 volts.

2B. DC VOLT REQUIREMENTS

DC VOLTS

On certain models of electronic control air conditioners, a DC volt supply is wired to the control board. The operating range is 10 to 16 volts. If voltage is below 10 volts, you could experience improper operation of the components within the main board.

On models 391XX.XXX, a Dc volt supply is supplied to the thermostat location: Positive (+) DC volt wires to R terminals on the thermostat; and negative (–) DC volt wires to the black wire from the unit. Polarity is crucial for proper operation.

The operating range is 10 to 16 volts DC.

3B. BREAKER



MAKE SURE THAT THE POWER SUPPLY TO THE UNIT IS DISCONNECTED BEFORE PERFORMING ANY WORK ON THE UNIT TO AVOID THE POSSI-BILITY OF SHOCK INJURY OR DAMAGE TO THE EQUIPMENT.

The unit circuit is to be protected by a time delay fuse or HACR (heating, air conditioner, refrigerator) breaker. By taking an amp reading at the unit AC voltage supply line, you can determine if the breaker is tripping prematurely. Place a clamp-on type ammeter around the black wire from the breaker going to the unit. Turn on the unit and record amp draw. If the breaker trips before the rated amperage, replace amperage, replace the breaker.

4B. WIRING

WARNING

MAKE SURE THAT THE POWER SUPPLY TO THE UNIT IS DISCONNECTED BEFORE PERFORMING ANY WORK ON THE UNIT TO AVOID THE POSSI-BILITY OF SHOCK INJURY OR DAMAGE TO THE EQUIPMENT.

With the line circuit breaker turned OFF, check to see if the unit is wired correctly. Each unit is supplied with a wiring diagram. Check all wires for proper location and tight connections. If you have difficulty in reading wiring diagrams or schematics, please enroll in an electricity course at your local school or college.

MODELS		CIRCUIT PROTECTION
39125 (Basement)		15 amp T.D. Fuse or 15 amp HACR Breaker
39325 (Basement)		20 amp T.D. Fuse or 20 amp HACR Breaker
39224 (Basement)	Circuit 1 Circuit 2	15 amp T.D. Fuse or 15 amp HACR Breaker 15 amp T.D. Fuse or 15 amp HACR Breaker
39424 (Basement)	Circuit 1 Circuit 2	15 amp T.D. Fuse or 15 amp HACR Breaker 15 amp T.D. Fuse or 15 amp HACR Breaker
All Rooftop Units		20 amp T.D. Fuse or 20 amp HACR Breaker

NOTE: BE SURE TO USE THE WIRING DIAGRAM FOR THE SPECIFIC MODEL OF UNIT YOU ARE DIAGNOSING.

On rooftop units there is a 6-pin connector. Verify that all wires are tight in this connector.

On some basement units there are two 9-pin connectors. Verify all wires are tight in each connector.

TERM 1- Compressor (C) TERM 6- Hi Fan (motor) TERM 2- Compressor (R) TERM 7- Lo Fan (motor) TERM 3- Compressor (S) **TERM 8- Reversing Valve** TERM 4- Common (motor) TERM 9- Reversing Valve TERM 5- Capacitor (motor)



LO FAN-RED COMMON-WHITE CASING GROUND- GREEN/YELLOW	○4 ○5 ○6	3○ 2○ 1○	YELLOW-Reversing Valve or Med. Fan BLACK-HI FAN BLUE-COMPRESSOR B	
AB	CIRC	CUIT 1	CIRCUIT 2	
	1– E	Black	1– Orange	
	2– V	White	2– Gray	
	3- F	Red	3– Brown	
	4- V	White	4– White	

Brown

Black

Violet

Violet

Red

5-

6–

8-

9–

Brown

Black

Red 7-

Open

Open

5-

6–

7–

8–

9–

5B. TYPIC	ALWIRING	DIAGRAM	S FOR RO	OF TOP UNITS



HEAT PUMP



6B. TYPICAL WIRING DIAGRAM FOR SINGLE BASEMENT HEAT PUMP



7B. TYPICAL WIRING DIAGRAM FOR SINGLE BASEMENT AIR CONDITIONER



BIK -CIR.#1 115 VAC 60 Hz 1ø USE COPPER CONDUCTORS ONLY G-Y WHIT 010 BLK ò ₩НТ YEL 무 11 и ИНТ P1 RED CB1 Осом P2 -13 — HERM RUN CAP l _{blk} P3 P4 P5 BLK FAN BLK -WHT WHT - WH T RED--RED-CIR.#1 TO 9-PIN CONNECTOR AT FIELD CONNECT BOX, ON MAIN UNIT ĸŧ ╶┤ 6 F1 STAGE 1 FIELD WIRING CONNECTIONS WHT 3 AMP FUSE WHT BRN --BRN COM N/O O O HR 1 BLK N/C Q BLH -BLK - RED BLK -RED-----12V+ • - RED -- vio - vio -× 8 > 9 VIO - 00 -BLU N/C N/0 COM __YEL_ ---- LOAD SHED • - G - Y 0 BLK -YEI HR 2 + - BLK q 0 RED – BLK — — — — – FURNACE – — — — – FURNACE – -BLU-• ORN - BLU - GRY -GR1 - BRN --BRN-CIR.#2 TO 9-PIN CONNECTOR AT FIELD CONNECT BOX, ON MAIN UNIT – BLK + _____ STAGE 2 OPTIONAL FIELD WIRING CONNECTIONS BRI -BRN-BLK P1 FAN RUN CAP REC <u>≯</u> >8 >9 T2 Осом P2 CB2 HERM T3------RED Bł P3 P4 P5 ORN • • • • • • ABBREVIATION LEGEND ŴН YEL BIK-4 I F1 HR= HEAT RELAY CB= CIRCUIT BOARD FB= FURNACE BLOWER N/C N/O coM O WHT BLK 0 0 N/C N/O FB1 010 ORN CIR.#2 ----115 VAC 60 Hz 10 USE COPPER CONDUCTORS ----ONLY ---coM -0 0 ORN O GR O O GR O TERM BLK CIR 2 _ _ _ G-Y FIELD WIRING ----FB2 ____ - GRY -- -BLK BLK

BLK

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8B. TYPICAL WIRING DIAGRAM FOR DUAL BASEMENT



CIR #1



9B. TYPICAL UNIT WIRING DIAGRAM

10B. TYPICAL MECHANICAL CONTROL WIRING DIAGRAM



11B. TYPICAL ELECTRONIC CONTROL WIRING DIAGRAM



12B. TYPICAL BIMETAL RELAY CONTROL WIRING DIAGRAM





13B. TYPICAL WIRING DIAGRAM FOR MODELS 390XX.XXX

14B. TYPICAL WIRING DIAGRAM FOR MODELS 391XX.XXX



15B. TYPICAL WIRING DIAGRAM MODEL 393XX.XXX



16B. TYPICAL WIRING DIAGRAM MODEL 39224.601



CIR #2

CIR #1







1C. BLOWER MOTOR

1. ROOFTOP UNITS

To check the motor, turn the unit circuit breaker to OFF. With an AC volt meter, verify that the circuit has no AC volts. On most units, the wires from the motor connect directly into a 6 or 9-pin connector. The motor leads are white (common), black (high), red (low) and yellow (medium). Some units are 2-speed. If you are checking a 2-speed system, disregard the yellow wire. Set your VOM to the ohms scale. You will perform a continuity test. Check for continuity between the white wire and each of the other wires.

Lack of continuity between the white wire and any of the other



wires indicates an open circuit and requires that the motor be changed. Next, check for continuity between each wire and the green/yellow wire. If you get continuity, you have a grounded motor and it must be replaced.

On Models 620315 and 630215, the motor leads do not go into a connector. On these units, disconnect the wires from the AC power module and do the previous tests between the motor leads.

2. SINGLE COMPRESSOR UNITS

The units that have a single compressor are Models:

39015.XXX
39025.XXX
39035.XXX
39045.XXX
39115.XXX
39325.XXX
39335.XXX

To check the motor, turn the unit circuit breaker OFF. With an AC voltmeter, verify that the circuit has no AC voltage.

Next, locate the electric box and remove its cover. The motor leads will connect to a relay or a power module board and the run capacitor (see Section 2.3, Wiring). Disconnect the motor leads.

Set your ohm meter to its highest scale for these tests. Check for continuity between the white wire and each of the other wires. Lack of continuity between the white wire and any of the other wires indicates an open circuit and requires that the motor be changed. Next, scrape some paint off the motor casing and check for continuity between each wire and unit casing or the motor casing. If you get continuity between any of the wires and the motor casing, you have a grounded motor and it must be replaced.

There are two types of motors used on these models.

One is a single-speed motor and the other is a two-speed motor (high and low).

The single speed motor has three wires: White (common), Black (high) and Brown (capacitor).

The two-speed has four wires: White (common), Black (high), Red (low) and Brown (capacitor).





3. DUAL COMPRESSOR UNITS

The units that have dual compressors are Models: 39224.601 and 39424.601

To check the motor, turn the unit circuit breaker or breakers OFF. With an AC volt meter, verify that the circuit has no AC voltage. The wires from the motor connect to a 9-pin connector. The motor leads are white (common - Terminal 4), black (high - Terminal 6) and red (low - Terminal 7). Set your ohm meter to its highest scale for these tests. Check for continuity between the white wire and each of the other wires.

Lack of continuity between the white wire and any of the other wires indicates an open circuit and requires that the motor be changed. Next, check for continuity between each wire and the green/yellow wire. If you get continuity, you have a grounded motor and it must be replaced.



2C. RUN CAPACITOR

The run capacitor may be one of two different kinds: Either a single capacitor for the fan or compressor, or a combination capacitor for both the fan and the compressor.

The run capacitor should be checked with a capacitor tester. Follow the tester manufacturer's testing procedures. If one is not available, an ohm meter may be used. Turn the air conditioner circuit breaker OFF. Disconnect the wires to the capacitor.

WARNING

THERE MAY BE A CHARGE ON THE CAPACITOR UNTIL DISCHARGED.

The run capacitor must be manually discharged. Using an AC voltmeter set at the 500 volt scale or higher, connect meter leads to the terminals of the capacitor. After discharging the capacitor, set the VOM meter to the highest ohm scale and connect the probes to the capacitor terminals. The reading should rapidly move toward continuity and slowly return to infinity. You should reverse the leads and repeat the procedure. If there is no reading, or a prolonged reading, replace the run capacitor. The combination run capacitor has three terminals. The terminals are marked "F", "C" and "HERM". To check the combination run capacitor, follow the discharge procedures above. Again, make sure you test from "C" (common) to "F" (fan) and "C" (common) to "HERM" (compressor).



3C. START CAPACITOR

The unit will have one of two types of start capacitor. One type has a 15,000 ohm resistor between the terminals. The other type does not have the resistor.



THERE MAY BE A CHARGE ON THE CAPACITOR UNTIL DISCHARGED.

The start capacitor must be manually discharged in the same way the run capacitor was done a moment ago. Using an AC voltmeter set at the 500 volt scale or higher, connect the meter leads to the terminals of the capacitor.

START CAPACITOR WITH RESISTOR

The start capacitor should be checked with a capacitor tester. Follow the tester manufacturer's testing procedures. If one is not available, an ohm meter may be used. Turn the unit's circuit

breaker OFF. Disconnect the wires to the capacitor. The start capacitor does not need to be manually discharged since it has a built-in resistor. Use only an analog or dial-type ohm meter. Set the ohm meter to the proper scale and connect the probes to the capacitor terminals. The reading should show continuity and slowly return to 15,000



ohms. You should then reverse the leads and check again. If there is no reading or a reading greater than 15,000 ohms, the start capacitor should be replaced.

START CAPACITOR WITHOUT RESISTOR

Check this style capacitor the same way you would check the capacitor with the resistor. The reading will be different. The reading should show continuity and slowly return to infinity. Reverse the leads and check again. If there is no reading or a reading of "0" ohms, the start capacitor should be replaced.



The start capacitor must be manually discharged. Using an AC voltmeter set at the 500 volt scale or higher, connect meter leads to the terminals of the capacitor. Next, disconnect the wires to the capacitor. Set the dial-type VOM to the highest ohm scale and connect the probes to the capacitor terminals. The reading should rapidly move toward continuity and slowly return to infinity. Next, reverse the leads and repeat the procedure. If there is no reading or a prolonged reading, replace the star capacitor.

4C. PTCR DEVICE OR START RELAY

The positive temperature coefficient resistor, or PTCR has replaced the compressor start relay and the start capacitor, on some models. It should be checked in two different ways: First, check continuity. Turn the air conditioner circuit breaker to OFF. Disconnect the PTCR from the circuit. Check for continuity. If there is no continuity, replace PTCR.

THIS IS AN ENERGIZED CIRCUIT. SHOCK CAN OCCUR IF NOT TESTED PROPERLY. TESTING TO BE DONE BY A QUALIFIED SERVICE TECHNICIAN.

The second check to take is an amperage reading. Clamp an ammeter around the wire from the PTCR to the capacitor. Turn the air conditioner circuit breaker to ON and start the air conditioner. When the compressor starts, there will be an amperage reading for approximately one second or less. If there is no reading, or if there is a prolonged reading, the PTCR or start relay is faulty and must be replaced.



5C. COMPRESSOR

To check compressor, turn the air conditioner circuit breaker to OFF. Disconnect the wires from the COMMON, START and RUN terminals. With the ohm meter set on the lowest ohm scale, check for continuity between all three terminals. Lack of continuity between any of the terminals indicates faulty windings in the compressor, and the compressor should be replaced. Next, scrape some paint off the casing of the compressor and check for continuity between each terminal and the casing. If a reading is obtained, the windings are shorted to the casing and the compressor must be replaced.


6C. OVERLOAD PROTECTOR

An overload protector is a component that will open the AC volt circuit to the compressor if the compressor overheats due to an electrical problem. Some compressors have the overload protector built inside the compressor. This type, if defective, requires a complete compressor replacement.

Most compressors have the overload protector mounted on the exterior of the compressor casing. To check this type of protector, turn the air conditioner circuit breaker OFF. Make sure that the overload is at ambient temperature and measure continuity across its terminals. If open, it should be replaced. A weak overload protector in the electrical system will cause the compressor to start and stop rapidly or short-cycle. This situation would be difficult to test. An exact replacement overload protector should be used whenever a replacement is required.

7C. COLD (FREEZE) CONTROL

(Low Temperature Protection Device)

The cold (freeze) control is used on rooftop air conditioners ONLY. If it is used with rooftop heat pumps, it can cause premature shutoff of the compressor.

8C. HEATER

The heater is an optional component. To diagnose the heat strip, turn the air conditioner circuit breaker OFF. Unplug the heater and take an ohm reading across the two wiring terminals. You should have an ohm reading of 9.5 ohms \pm 10%. If the ohm reading is outside of these parameters, replace the heater.

To check the heater limit switch, check for continuity across the limit switch terminals with the limit switch at ambient temperature. If you have an open limit switch, replace it. Also make sure the heater plug is properly connected.





9C. SHORT CYCLE

A. AIR DISTRIBUTION BOX INSTALLATIONS

Short cycle is caused by cold air being drawn back into the intake side of the air conditioner before it is mixed with the warmer room air. This may cause the evaporator coil to freeze up, causing the cold control to open the circuit to the compressor.

Two possible causes of this condition are the air box and the discharge duct. If the air box is not sealed tightly against the ceiling, it will allow cold air to cross over into the return air portion of the air box. Also, if the discharge duct is not installed properly, it can allow cold air to cross over into the return portion of the air conditioner. Make sure you have the correct discharge duct for the thickness of the roof. Seal all problem areas as necessary. You may need to use tape to seal the discharge duct. Also, make sure the discharge louvers are not restricted.

B. DUCTED INSTALLATIONS

Short cycle could be caused by air being circulated directly on the remote sensor. Make sure you do not have a register too close to the remote sensor. Verify the duct connection at the unit is not leaking into the return air. Seal all problems areas.

AIR FLOW OBSTRUCTION 10C.

The coils and filters must be kept clean. Obstructions reduce the amount of air passing through the coils. Dirt acts as an insulator reducing the heat transfer across the fins. Turn the air conditioner circuit breaker to OFF. Brush the fins with a soft bristle brush, and vacuum up the residue. The filters should be cleaned in a soap solution and rinsed in clean water. Air-dry the filters before reinstalling; a wet filter can cause insufficient cooling or freeze-up.



11C. AIR DISTRIBUTION SYSTEM

A. ROOFTOP UNITS

SIZING & DESIGN

The installer of this air conditioner system must design the air distribution system for his particular application. Several requirements for this system MUST be met for the air conditioner to operate properly. These requirements are as follows:

Roof cavity thickness must be between 2.00" to 5.50" . This distance is measured between roof and ceiling surface.

The total cross-sectional discharge area of outlet ducts from the plenum area under the air conditioner must be as follows:

1. 579 & 600 Series 17.5 sq.in.

2. 591, 595 & 630 Series 21.0 sq. in.

Duct Sizing Requirements as Follows:

1/2" 2	2-1/4"
1/4" 2	2-1/4"
)0" -	
ft. :	36 ft.
3 Total	Length
	1/4" 2)0" - ft. 3 3 Total

Register Requirements as Follows:

	MIN.	MAX.
Distance from Duct End	5"	8"
Distance from End of Elbow	15"	
Distance between Registers	24"	
Total Number Required/AC	4	8
Number required per Run/AC	2	
Free Area per Register	14 sq. in	ı. — —
1 5		

The duct material must meet or exceed any agency or RVIA Standard that may be in existence at the time the RV is produced.



IT IS THE RESPONSIBILITY OF THE INSTALLER OF THIS SYSTEM TO ENSURE THE DUCTWORK WILL NOT COLLAPSE OR BEN DURING OR AFTER THE INSTALLATION.

All discharge air ducts must be properly insulated to prevent condensation from forming on their surfaces or adjacent surfaces during operation of the air conditioner or heat pump. This insulation must be R-7 minimum.

Ducts and their joints must be sealed to prevent condensation from forming on adjacent surfaces during operation of the air conditioner.

NOTE

THE DOMETIC CORPORATION WILL NOT BE HELD LIABLE FOR ROOF STRUCTURAL OR CEILING DAM-AGE DUE TO IMPROPERLY INSULATED OR SEALED DUCTWORK.

Return air opening must have 40 sq. in. minimum free area including the filter.

Return air to the air conditioner must be filtered to prevent dirt accumulation on air conditioner cooling surface. Total System Pressure must be between the following:

0.55 to 0.90 in. W.C. for 579 Series

0.40 to 1.10 in. W.C. for 591, 595 & 630

0.12 to 0.65 in W.C. for 600 Series

This is determined with the air conditioner blower operation on high speed and return air filter and grille in place.

INSTALLATION

The Dometic Corporation recommends the basic configuration shown below for installing this Air Conditioner System. We have found by testing, that this configuration works best in most applications of this Air Conditioner System.

It is the responsibility of the Installer of this System to review each RV floor plan and determine the following:

- A. Duct size
- B. Duct layout
- C. Register size
- D. Register locations
- E. Thermostat location.

These items must be determined in conjunction with the Air Distribution System Sizing and Design Requirements listed.

ALTERNATE CONFIGURATIONS AND METHODS MAY BE USED WHICH STILL ALLOW THE AIR CONDI-TIONER TO OPERATE PROPERLY. HOWEVER, THESE ALTERNATE CONFIGURATIONS AND METHODS MUST BE APPROVED BY THE DOMETIC CORPORA-TION IN WRITING.

TOTAL OUTLET

The following instructions are based upon the use of **Dometic Return Air Kit.** The electronic control kit has mounting bolts supplied for use with this Kit.

Before preparing the ceiling opening, the type of system options must be decided upon. If a remote sensor is to be used, provision must be made for it. If the load shed option (Energy Management System feature) is to be used, wires must be run from the load shed control to the Dometic A/C. If a furnace is to be connected, wires must be run from the furnace to the Dometic A/C. **Read all of the following instructions before beginning the installation**.

ROOF AND CEILING OPENING PREPARATION

1) A 14" x 14" opening must be cut through the roof and ceiling of the RV. This opening must be located between the roof and reinforcing members.



THERE MAY BE ELECTRICAL WIRING BETWEEN THE ROOF AND THE CEILING. DISCONNECT ALL POWER SUPPLIES AND THE POSITIVE (+) TERMINAL FROM THE SUPPLY BATTERY. FAILURE TO FOLLOW THIS INSTRUC-TION MAY CREATE A SHOCK HAZARD.

- 2) Mark a 14" x 14" square on the roof and carefully cut the opening.
- 3) Using the roof opening as a guide, cut the matching hole in the ceiling.
- 4) The opening created must be framed to provide adequate support and prevent air from being drawn from the roof cavity. Lumber 3/4" or more in thickness must be used. Remember to provide an entrance hole for power supplies, furnace wiring, 4-conductor telephone cable, remote sensing and load shed options as desired.
- 5) The 14" opening is part of the return air system of the Air Conditioner and must be finished in accordance with NFPA Standard 501C Section 2.7.



- 6) Route a copper 12 AWG, with ground, 115 VAC supply line from the fuse or circuit breaker box to the roof opening.
 - a. This supply line must be located in the front portion of the 14" opening.
 - b. The power supply **MUST** be on a separate Time Delay Fuse or HACR Circuit Breaker.
 - c. Make sure at least 15" of supply wire extends into the roof opening. This ensures easy connection at the Junction Box.
 - d. Wiring must comply with all National, State and Local Wiring Codes.
 - e. Use a steel sleeve and a grommet or equivalent methods to protect the wire where it passes into the opening.
- 7) Route a dedicated 12 VDC supply line (18-22 AWG) from the RV's Converter or Battery to the roof opening.
 - a. This supply line must be located in the front portion of the 14" opening.
 - b. Make sure that at least 15" of supply wire extends into the roof opening.
 - c. In a multiple zone installation, this wiring is required in only one of the 14" openings.
- 8) If a Remote Temperature Sensor is to be used, the connector end must be routed to the roof opening of the system which it will control. Make sure that at least 15" of the sensor cable extends into the roof opening.
- 9) If a furnace is to be controlled by the system, the two furnace thermostat leads must be routed to the roof opening of the air conditioner that will control it. Make sure at least 15" of the furnace thermostat wires extend into the roof opening.
- 10) If an Energy Management System- EMS (load shed) is to be used with the control, two wires must be routed to the roof opening of the zone to be managed. The signal required for this function is a normally open relay contact. when the EMS calls for the compressor to shut off, the relay contacts should close. Make sure that at least 15" of the EMS wires extend into the roof opening.

DOMETIC COMFORT CONTROL CENTER

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- 11) Route a 4-conductor telephone cable from the Comfort Control Center[™] mounting position into the 14" roof opening. Make sure that at least 15" of the wire extends into the roof opening and 6" extend from the wall at the mounting position of the Comfort Control Center[™].
- 12) In the event that other A/C's are to be installed (additional zones) an additional 4-conductor telephone cable must be routed to the **other A/C's**. Make sure that at least 15" of the wire extends into each of the roof openings. See FIG. 3.



12V DC INPUT 2 WIRES

115V AC FRONT A/C

B. BASEMENT UNITS MODELS 39335 AND 39125

OUTDOOR SECTION:

The condenser coil is designed to have a fresh supply of air. If skirting is installed, allow a 15" x 22" opening (330 square inches) for supply air and a 15" x 22" opening (330 square inches) for discharge air. Use the cross flow method for good air circulation.

DO NOT TOTALLY ENCLOSE THE UNDERSIDE OF THE UNIT. AIR CIRCULATION PREVENTS HEAT FROM BUILD-ING UNDER UNIT AND YOUR SYSTEM WILL PERFORM AS DESIGNED.

The condenser section is a "blow-through" type. When the face of the coil is positioned behind a louvered or other type of restrictive opening, the FREE AREA of the opening must be at least 260 square inches.

FREE AREA — is the opening that remains in a grill or louvered panel after the restrictions are taken away. For example, an opening of 10×20 inches has 200 square inches. When this opening is covered with a grill that is 56 percent open, the FREE AREA is (200 x .56), 112 square inches.



Expanded and perforated metal grills in general vary from 30 percent to 60 percent open. Be certain that **260 square inches** of FREE AREA is available to the face of the condenser.

NOTE: Service access must always be supplied either as clearance or as a defined access panel.

MOUNTING

Vibration eliminators are supplied to prevent the transmittance of vibration into the living area.

The air conditioning unit may be attached to rails beneath the vehicle, attached to the frame, or mounted directly to the floor of some vehicles.

Unit should be mounted with a tilt toward the rear (condenser) a half-bubble using a level. Unit rear should be 1/4" lower than the front.

SERVICE ACCESS

Be sure **NOT** to block the inlet or discharge air, or service access, when mounting.

INDOOR SECTION CLEARANCES

The minimum clearances to the evaporator are zero inches to the bottom, top, left and right sides. Access to the electrical connections and drain connection must be provided when making the installation.



Be sure to allow sufficient room to service the electrical components.

INLET AIR

The evaporator section must have free access to room air. **A minimum of 180 square inches** of FREE AREA opening is required. Where the return air must be provided through louvers or mesh screen, the FREE AREA percentage of the material used shall be taken into consideration when making this determination. An example of how to determine FREE AREA is included under **"2. OUTDOOR SECTION"**.

GRILLS AND REGISTERS:

NOTE: The return air grill must have the same square surface as the coil face $(15"H \times 17"L)$.

For each air conditioning system, there must be a return grill to bring cabin air back into the unit. There must also be at least four discharge grills per unit.

Each return air grille must be filtered and accessible for cleaning or replacement.

OUTLET AIR

The central air conditioning unit is designed to use a discharge air duct with a static pressure of .10 to .25 inches water column. Proper duct size is necessary to maintain proper air flow without loss of static pressure and provide good air circulation.

All air handling ducts must be properly insulated to prevent condensation forming on their surface during operation. A vapor barrier must also be supplied on the outer surface of the insulation to prevent moisture from traveling through the insulation and condensing on the cold ductwork.



C. BASEMENT UNITS MODELS 39224 AND 39424

CONDENSER SECTION:

SUPPLY AIR

The inlet of the condenser coil should be positioned so that it draws air from outside the vehicle. **SPECIAL CARE MUST BE TAKEN TO PREVENT THE DISCHARGE AIR FROM RECIRCULATING TO THE INLET OF THE CONDENSER COIL.** Shields should be added to ensure fresh air supply.

WARNING

DO NOT INSTALL THE CONDENSER WHERE THE FAN WILL DRAW AIR FROM THE EXHAUST OF THE VE-HICLE, A MOTOR GENERATOR SET, TRANSMISSION, ROAD HEAT OR <u>ANY</u> OTHER HEAT PRODUCING SOURCE.



FIELD INSTALLED SHIELD THAT WILL PREVENT RECIRCULATION OF CONDENSER AIR.

The condenser section is a "draw-through" type. When the face of the coil is positioned behind a louvered or other type of restrictive opening, the FREE AREA of the opening must be at least 460 square inches.

FREE AREA — is the opening that remains in a grill or louvered panel after the restrictions are taken away. For example, an opening of 10 x 20 inches has 200 square inches. When this opening is covered with a grill that is 56 percent open, the FREE AREA is (200 x .56), 112 square inches.

Expanded and perforated metal grills in general vary from 30 percent to 60 percent open. Be certain that **460 square inches** of FREE AREA is available to the face of the condenser.



NOTE: Service access must always be supplied either as clearance or as a defined access panel.

CLEARANCES

The air conditioning unit clearances depend on:

- 1. Inlet air access used;
- 2. Discharge air duct arrangement;
- 3. Return air duct;
- 4. Storage compartment location and design.

A one (1) inch clearance is required on three (3) sides of the air conditioner if the top return is used. When using the side access for return, please allow a minimum of eight (8) inches for the return air duct. Access to the electrical connections must be provided when making the installation.

EVAPORATION SECTION

INLET AIR

The evaporation section must have free access to room air. A minimum of 128 square inches of FREE AREA opening is required. Where the return air must be provided through louvers or mesh screen, the FREE AREA percentage of the material used shall be taken into consideration when making this determination. An example of how to determine FREE AREA is included under "CONDENSER SECTION".



GRILLS

NOTE: The return air grill must have the same square surface as the return air duct.

- 1) For each air conditioning system, there must be a return grill to bring cabin air back into the unit. There must also be at least four discharge grills per unit.
- 2) Return grills must be mounted in front of the evaporator. If this is not possible, make sure there is nothing blocking the air flow from the grill to the evaporator.
- 3) The unit must have a return filter between the grill and the unit. This filter must be accessible for periodic cleaning.

OUTLET AIR

The air diffusion system, supplied by the installer, must be sized to maintain a static pressure at the blower outlet between .4 and 1.2 inches water column.

All air handling ducts must be properly insulated to prevent condensation forming on their surface during operation. A vapor barrier must also be supplied on the outer surface of the insulation to prevent moisture from traveling through the insulation and condensing on the cold ductwork.

12C. OTHER

A. AMBIENT TEMPERATURE

Running the air conditioner at a temperature below 75 degrees Fahrenheit may cause the evaporator to freeze up. The most common time for this to occur is at night. Even after the ambient temperature has gone up, the coils will remain frozen. Therefore, to assist the defrosting of the evaporator coils, turn the air conditioner to HI FAN mode; set the temperature selector to a higher setting and let the air conditioner run until the coils are defrosted.

B. HEAT GAIN

Heat gain can be caused by several factors: A hot, humid and sunny day; a large number of people in the coach; frequent opening of the door; excessive showering and cooking, etc.

Other factors to be taken into consideration as possible heat gain causes are the size of the air conditioner relative to the size of the coach; the "R" factor of insulation; and the size and placement of widows. The manufacturer of the RV should be consulted for recommendations.

C. LOOSE PARTS

Loose parts can cause the air conditioner to operate noisily. Check for any loose bolts, any component rubbing against its housing, or any plastic parts which might be cracked. Repair or replace parts as necessary to correct any noise problems.

D. TUBING VIBRATION

If any of the copper tubing is rubbing against itself or any other part, verify that the proper tubing has been installed. Duo-Therm air conditioners are designed to avoid this problem if the correct tubing is used. Replace or position tubing as necessary.

E. CONDENSER OR BLOWER FAN

The blower motor will have either a squirrel-cage or blade-type fan attached to it. Turn the air conditioner circuit breaker to OFF. Adjust the component to make sure it is not rubbing against the bulkhead. If it is a blade-type fan, the blades should be half through the opening for proper operation. Replace the blade fan or squirrel-cage if necessary.

F. INSTALLATION

The installation must be according to manufacturer's instructions for the specific model.

The air conditioner must not be installed in a valley on the roof; water may pool around the drain holes and be drawn into the air conditioner.

Make sure the air conditioner is tightened to the specifications. Overtightening can cause the unit to leak. Use caution not to damage the mounting gasket when placing the air conditioner over the opening, as this can allow water to leak into the coach.

The air conditioner may be installed across a roof seam, but make sure this area is properly sealed to prevent leakage.

G. DRAIN HOLE PLUGGED

Some drain pan problems may be caused by a blockage or restriction of the drain holes. This could be a piece of styrofoam or dirt, etc., in or around a drain hole causing water to accumulate in the drain pan and be sucked up into the unit. Remove any blockage as necessary.

H. EVAPORATOR BULKHEAD LEAK

The rear section of the air conditioner which contains the compressor, blower motor and condenser coil is designed to dispose of any water which may enter. However, to ensure that

no water enters the evaporator section, a watertight seal must exist along the entire evaporator bulkhead which separates the two compartments. Check for sealant along this entire section and add sealant at any area where none is visible. Note that the sealed portion extends up the sides of the unit.



If you are going to use the braze-on processing valve, once the refrigerant has been drained, use a tubing cutter and cut the tube near the end. Do this on both the low and high side processing tubes.



13C. SEALED SYSTEM

A. RECHARGING

NOTE: The *Clean Air Act* of 1990 set guidelines in regard to recapturing or disposition of refrigerants. Check with local authorities for proper handling or evacuation of refrigerants.

The equipment items needed to properly evacuate and recharge a sealed system are: a piercing type clamp-on saddle valve; a braze-on processing valve; a core removal tool; a process tube fitting; a set of compound gauges; a vacuum pump; equipment to weigh a precise amount of refrigerant; R-22 refrigerant; gas welding equipment; a R-22 refrigerant leak detector and recapturing or recycling equipment. If you have not been properly trained in sealed system repairs, do not attempt this procedure.

NOTE: This is not a thorough sealed system repair training program. For additional information or training, you may want to attend a basic air conditioning course at your local college.

To drain the R-22 refrigerant, attach a clamp-on saddle valve on the low side process tube. If the air conditioner does not have a low side process tube, attach a saddle valve at the point where you will add a process tube.

Slowly drain the R-22 refrigerant by using recapturing or recycling equipment. Do not leave the clamp-on saddle valve on the unit as it will cause leaks.

Next weld the process tube in place. We recommend using a brazing material

a brazing material which melts between 950° and 1450° Fahrenheit, and contains a minimum of 2% silver, and 5% to 10% phosphorous. This type of brazing material does not require the use of a flux to join copperto cop-



per. If you are using the weld on the process valve, be sure the valve core is removed before any heat is applied.

Connect the blue colored low pressure line of the compound gauges to the charging port on the low side pressure tubing. Next, connect the red colored high pressure line of the compound gauges to the charging port on the high side pressure tubing.

Next, connect the yellow colored line of the compound gauges to the charging cylinder and add 2 or more ounces of R-22 refrigerant to the sealed system and check all weld joints for leaks. Allow the refrigerant to stay in the system for at least 10 minutes. If a leak is detected, drain the system and repair the leak before you proceed.

When you are certain the system is sealed, drain any refrigerant from the system and connect the yellow common line of the compound gauges to the vacuum pump.

Open the pressure relief valve on the vacuum pump. This allows the major contaminants from the sealed system to escape into the atmosphere rather than enter the oil in the vacuum pump.

Both the low and high side valves on the compound gauge set should be opened and the vacuum pump turned on.

After five minutes, close the pressure relief valve on the vacuum pump. Check the blue gauge after running the vacuum pump for 10 minutes. A vacuum reading of zero to 10 inches would indicate a leak in the system or the hose connections.



Check all hose connections for tightness. If the low side gauge does not change, there is a leak in the sealed system. Locate the leak and correct it before proceeding.

If the blue low side gauge is well below 10 inches of vacuum, continue the evacuation for at least 40 to 45 minutes or until **you have a dry system**.

At this time there should be a good, deep evacuation, or dry atmosphere inside the sealed system. Close both the low and high side valves on the compound gauge set and turn off the vacuum pump.

Disconnect the yellow colored hose at the vacuum pump and connect it to the bottom port or connection on the charging cylinder. Open the valve on the cylinder.

For the correct amount of R-22 refrigerant charge, check the data plate of the air conditioner you are working on. To compensate for the red liquid line, on the gauge set (approx. 30—36 inches long), add one ounce to the data plate amount. You are now ready to do a weighted charge.

The air conditioner charge is critical and must be exact for proper cooling.

Allow the refrigerant charge to equalize by waiting 10 minutes before starting the system. After 10 minutes, do a cooling performance test to determine whether the problem was in the amount of charge or within the components of the system.



Now the blue low side and the red high side lines should be disconnected. Make sure that the air conditioner connection is sealed before removing the lines. The process tube can be pinched off in two places; the charging port cut off, and the end of the tube brazed for a hermetically sealed system.

14C. SEALED SYSTEM PROBLEMS

One mechanical problem you may encounter is refrigerant flow restriction. There are two types of restrictions, high side and low side. The basics to use to determine a restriction are amp draw and pressure.

To determine the high side pressure, add 32 degrees to your ambient temperature. Find that temperature on the chart on Page 25. The pressure listed to the right of the temperature should be your correct high side pressure, plus or minus 7 PSIG. For the low side pressure, divide the high side pressure by four. This will be the low side pressure, plus or minus 3 PSIG.

High side restriction will cause higher than normal amp draw, drastically higher than normal high side pressures, and slightly higher than normal low side pressures.

Low side restriction will cause lower than normal amp draw, drastically lower than normal low side pressures and slightly lower than normal high side pressures.

A restriction that would not follow these basic conditions is a liquid line restriction, which is in the high side of the air conditioner. It will give the same results as a low side restriction.

The most common restriction is the capillary tube or tubes, and/ or at the filter-drier. If there is a restriction in the liquid line, there will be a temperature drop from one side of the restriction to the other side.

In the case of a capillary tube restriction, one tube would be normal (warm to the touch) and the restricted tube would be cool or cold to the touch, and could even sweat if operated long enough. A restriction in the filter-drier would cause a temperature drop at the point of the restriction. A buildup of frost or sweat could be evident if operated long enough.

Refrigerant leaks can occur from an improper weld, a broken line or other damage. Compressor oil will often be noticeable at the location of major leaks.

Replace any parts that are found to be bad. Whenever a component is replaced in the sealed system, or the system has been opened to the atmosphere, a new filter-drier and evacuation is required.

REFRIGERANT VAPOR PRESSURES (PSIG)

Temp. Deg. F.	Pressure PSIG R-22	Temp. Deg. F.	Pressure PSIG R-22	Temp. Deg. F.	Pressure PSIG R-22	Temp. Deg. F.	Pressure PSIG R-22
20	43.0	57	96.1	94	179.1	131	300.7
21	44.1	58	97.9	95	181.8	132	304.6
22	45.3	59	99.8	96	184.6	133	308.6
23	46.4	60	101.6	97	187.4	134	312.6
24	47.6	61	103.5	98	190.2	135	316.6
25	48.8	62	105.4	99	193.0	136	320.7
26	50.0	63	107.3	100	195.9	137	324.8
27	51.2	64	109.3	101	198.8	138	328.9
28	52.4	65	111.2	102	201.8	139	333.1
29	53.6	66	113.2	103	204.7	140	337.3
30	54.9	67	115.2	104	207.7	141	341.5
31	56.2	68	117.3	105	210.3	142	345.8
32	57.5	69	119.4	106	213.8	143	350.1
33	58.8	70	121.4	107	216.9	144	354.5
34	60.1	71	122.5	108	220.0	145	358.9
35	61.5	72	125.7	109	223.2	146	363.4
36	62.8	73	127.8	110	226.4	147	367.8
37	64.2	74	130.0	111	229.6	148	372.4
38	65.6	75	132.2	112	232.8	149	376.9
39	67.1	76	134.5	113	236.1	150	381.5
40	68.5	77	136.7	114	239.4	151	386.2
41	70.0	78	139.0	115	242.7	152	390.9
42	71.5	79	141.3	116	246.1	153	395.6
43	73.0	80	143.6	117	249.5	154	400.4
44	74.5	81	146.0	118	253.0	155	405.2
45	76.0	82	148.4	119	256.4	156	410.0
46	77.6	83	150.8	120	259.9	157	414.9
47	79.2	84	153.2	121	263.5	158	419.9
48	80.0	85	155.7	122	267.0	159	424.8
49	82.4	86	158.2	123	270.6	160	429.9
50	84.0	87	160.7	124	274.3	161	434.9
51	85.7	88	163.2	125	278.0	162	440.1
52	87.4	89	165.8	126	281.7	163	445.2
53	89.1	90	168.4	127	285.4	164	450.4
54	90.8	91	171.0	128	289.2	165	455.7
55	92.6	92	173.7	129	293.0		
56	94.3	93	176.4	130	296.8		

The operating instructions can change from one model to another.

Be sure you are familiar with the proper operating instructions for the specific model of air conditioner you are diagnosing. An installation and operating manual is packaged with each air conditioner system.

1D. MECHANICAL CONTROLS

This type of air conditioner has an air distribution box that has a mechanical selector switch and thermostat installed in it.

CONTROLS:

The Selector Switch has eight positions including "OFF". This controls fan speed, heating mode and cooling modes.

The Thermostat controls the temperature range from 65° F on the coldest side to 90° F on the warmest side. In the cooling mode, the compressor ON/OFF is controlled by the thermostat setting.

COOLING OPERATION:

Set the thermostat at the desired temperature level. Select the fan speed that best satisfies your needs.

- a. **HIGH COOL**: Selected when maximum cooling and dehumidification is required.
- b. **MED. COOL**: Selected when normal or average cooling is required.
- c. **LOW COOL**: Selected when room is at desired comfort level and needs to be maintained. Normally this speed is used for nighttime operation.

NOTE: The blower runs continuously to circulate air and maintain an even temperature. The compressor will come on as cooling is required to maintain the selected temperature level.

CAUTION

AFTER SHUTTING THE AIR CONDITIONER DOWN WITH EITHER SELECTOR SWITCH OR THERMOSTAT, WAIT AT LEAST TWO (2) MINUTES BEFORE RESTARTING. THIS ALLOWS THE REFRIGERANT PRESSURE TO EQUALIZE AND COMPRESSOR TO RESTART EASILY.

FAN OPERATION:

This will circulate the air in your RV without cooling or heating. There are three positions: HIGH FAN, MED. FAN or LOW FAN to select from, depending upon personal choice.

HEATING OPERATION: (With Optional Heat Kit Installed)

NOTE: This electric heater will not replace a furnace for heating your RV in cold weather. The intent is to remove the chill on cool days or mornings.

- 1. Turn the selector switch to "OPT. HEAT".
- 2. The heater will come on and begin heating.
- 3. When desired temperature level in RV is reached, move the selector switch to off position or fan position. (NOTE: Thermostat does not control heater ON/OFF cycle.)

"OFF" POSITION: This is to turn Unit off.

2D. ELECTRONIC CONTROLS

This type of air conditioner has a main board and a control board that replaces the mechanical switch and thermostat on the mechanical controlled air conditioner. The control board can be mounted in the air distribution box or on a wall. The control board that is mounted on a wall allows the air conditioner to utilize a ceiling duct to distribute the cool air throughout the structure. NOTE: Remember to check the installation and operating instructions for the specific model of air conditioner you are diagnosing.



CONTROL DESCRIPTION



POWER SWITCH

Located lower center of control.

Turns air conditioner or gas furnace ON to set condition. Turns air conditioner or gas furnace OFF.

Green LED lights next to MODE switch light up to indicate power ON.

No LED lights on when control is OFF.

MODE SWITCH

Four position switch located on right side of control.

- Used to select COOLING, FAN or GAS HEAT mode of operation.
- Mode selected is indicated by green LED light when control is turned on.

FAN SWITCH

Four position switch located on left side of control.

- Used to select HIGH, MEDIUM, LOW or AUTOMATIC FAN operation of air conditioner
- Fan speed selection is indicated by green LED light when control is turned on.

TEMPERATURE SLIDE

Located top center of control.

Movable arm on control selects temperature at which the compressor or gas heat is turned ON and OFF.

User sets to position to maintain temperature level desired.

COOLING MODE OPERATION



Turn POWER switch to ON position.

Place mode switch to COOL position.

Set temperature slide switch to your desired temperature level.

Select your desired fan speed. NOTE: See Special Features Section for AUTO Fan Operation.

The fan starts immediately and after a delay of approximately two minutes, the compressor will start.

The compressor will now cycle OFF per the thermostat set point. The fan will:

- a. Continue to operate in the selected fan speed if AUTO FAN position is not selected.
- b. Cycle OFF and ON with the compressor cycle if AUTO FAN position is selected.

The compressor (and fan) will restart in approximately two minutes after the thermostat senses the need for cooling.

FAN MODE OPERATION



Turn POWER switch to ON position. Place MODE switch in either FAN position. Select the desired fan speed: HI-MED-LOW-AUTO. NOTE: In AUTO position the fan operates only at low speed in the FAN mode of operation.

ELECTRIC HEAT MODE OPERATION (If So Equipped)



Turn POWER switch to ON position. Place mode switch in ELEC HEAT position. Set temperature slide switch to your desired temperature level.

Select your desired fan speed (HI-MED-LOW-AUTO). NOTE: In AUTO position, the fan operates only at low speed in ELEC HEAT mode of operation.

SPECIAL CONTROL FEATURES



Auto Fan: When selected, FAN will:

a. Automatically select the fan speed depending on the difference between set temperature and room temperature.

For temperature difference of:

8° or more - Fan operates on HIGH

4° to 8° - Fan operates on MEDIUM

4° or Below - Fan operates on LOW

b. Cause the fan to cycle ON and OFF with the compressor and electric heat. Any change of any switch on the thermostat will cause the fan to come on.

Refrigerant Compressor Time Delay:

The compressor will always have a delay in starting of approximately two minutes any time it is required to begin the cooling cycle.

Power Interruption:

In the event power to the air conditioner is interrupted for any reason, the system will restart in the condition previously set by user.

GAS HEAT MODE OPERATION (If Installed)



Turn POWER switch to ON position.

Place mode switch to GAS HEAT position. Notice that the fan indicators extinguish and the GAS HEAT indicator illuminates. (The Dometic A/C fan will not operate in the GAS HEAT mode.)

Set temperature slide switch to your desired temperature. The gas furnace will cycle ON and OFF to provide the selected temperature.

3D. BIMETAL RELAY CONTROLS

This type of air conditioner has a wall mounted bimetal thermostat and a relay board that replaces the mechanical switch and thermostat on the mechanical units and replaces the main board and control board on the electronic units.

NOTE: Remember to check the installation and operating instructions for the specific model of air conditioner you are diagnosing.

COOLING OPERATION

Place the **<u>Temperature Set Lever</u>** to desired temperature level (located at top of thermostat). Select fan speed that best satisfies your needs: (upper right switch at bottom of thermostat).

- a. **<u>High Speed</u>**: Selected when maximum cooling and dehumidification are required.
- b. Low Speed: Selected when RV reaches desired comfort level and needs to be maintained. Normally this speed is used for nighttime operation.

Select Auto/ON Switch operation as follows:

(Lower right switch at bottom of thermostat)

- Auto Position: Air conditioner fan runs whenever cooling is required and stops whenever cooling is not required.
- b. **On Position**: Air conditioner fan runs continuously to circulate air in RV.

Set the **<u>Heat/Off/Cool Switch</u>** to cool position (Located at lower left side of thermostat)

The air conditioner will now come on when cooling is required and cycle off when the temperature level selected is reached.



CAUTION

Wait at least two (2) minutes before restarting the air conditioner after shutting off with either the Heat/Off/ Cooling Switch or the Temperature Set Lever. This allows the refrigerant pressure in the air conditioner to equalize and will allow the compressor to restart easily.

HEATING OPERATION

(If Furnace is connected to Thermostat)

Set Temperature Set Lever to desired temperature level (located at top of thermostat).

Set the Heat/Off/Cool Switch to heat position (located at lower left side of thermostat).

The furnace will now come on when heat is required and cycle off when temperature level selected is reached.

SPECIAL FEATURE:

When thermostat:

Heat/Off/Cool Switch is in the OFF or HEAT position and **Auto/On Switch** is in the ON position, the air conditioner fan will run continuously to circulate the air inside the RV.

4D. DC VOLTAGE REQUIREMENTS

DC VOLTS

On certain models of electronic control air conditioners, a DC volt supply is wired to the control board. The operating range is 10 to 16 volts. If voltage is below 10 volts, you could experience improper operation of the components within the main board.

5D. COMPONENTS

WARNING

MAKE SURE THAT THE POWER SUPPLY TO THE UNIT IS DISCONNECTED BEFORE PERFORMING ANY WORK ON THE UNIT TO AVOID THE POSSIBILITY OF SHOCK INJURY OR DAMAGE TO THE EQUIPMENT.

A. SELECTOR SWITCH

The selector switch in a mechanical air conditioner has several positions. The various switch positions can be tested for continuity with a volt/ohm meter set on the highest ohm scale.

- First, turn the 20 amp air conditioner breaker to OFF and remove wires from the switch.
- With the switch in the OFF position, you should not have continuity between terminal L1 and any other terminals.
- In the HIGH FAN position, you should have continuity between L1 and terminal 1.
- In the MEDIUM FAN position, you should have continuity between L1 and terminal 2.
- In the LOW FAN position, you should have continuity between L1 and terminal 4.
- In the HIGH COOLING mode, you should have continuity between L1 and C, and L1 and 1.
- In the MEDIUM COOLING mode, you should have continuity between L1 and C, and L1 and 2.
- In the LOW COOLING mode, you should have continuity between L1 and C, and L1 and 4.
- In the HEATING mode, you should have continuity between L1 and H, and L1 and 4.

Be sure to check the switch in all positions and be sure you have continuity only on the terminals for the selected mode. Lack of continuity or continuity on incorrect terminals designates a defective switch, and it must be replaced.

POSITION	TERMINALS
OFF	
HI FAN	L1 and 1
MED FAN	L1 and 2
LOW FAN	L1 and 4
HI COOL	L1 and C; L1 and 1
MED COOL	L1 and C; L1 and 2
LOW COOL	L1 and C; L1 and 4
HEAT	L1 and H; L1 and 4

B. THERMOSTAT

1) MECHANICAL CONTROL

The thermostat controls the ON/OFF cycling of the compressor. It has two terminals. The air temperature around the sensor tube should be between approximately 65 degrees and 90 degrees Fahrenheit. To check the thermostat for operation, turn the air conditioner circuit breaker off, and disconnect the wires to the thermostat. Turn the control knob to MAXIMUM. You should have continuity between the two terminals. Turn the thermostat to MINIMUM, and you should not have continuity between the two terminals. If you have incorrect readings, replace the thermostat.

2) **BIMETAL RELAY CONTROL**

This thermostat has a bimetal coil that makes or breaks a set of points to regulate the temperature.

The thermostat is mounted on a wall of the RV and is connected to the relay board (mounted in the return air grille assembly) with red, orange, yellow and blue wires.

The thermostat is a "heat/cool thermostat". These instructions cover only the cooling connections required. If connection of furnace is required, follow the instructions provided with the furnace. Normally the furnace will connect to the **"RH"** and **"W"** terminals on the thermostat.

- 1. Remove the cover of the provided thermostat.
- 2. Connect the **"RED"** wire from the air conditioner to the **"RC"** terminal on the thermostat.
- 3. Connect the **"YELLOW"** wire from the air conditioner to the **"Y**" terminal on the thermostat.
- 4. Connect the **"BLUE"** wire from the air conditioner to the **"H"** terminal on the thermostat.

- 5. Connect the **"ORANGE"** wire from the air conditioner to the **"G"** terminal on the thermostat.
- 6. Push the thermostat wires into hole in wall and fill excess hole with insulation.
- 7. Mount thermostat base to the wall with screws provided.
- 8. Check all thermostat wires on base to ensure they are completely clear of the bimetal coil of the thermostat. Adjust if necessary.
- 9. Replace thermostat cover.

THERMOSTAT BASE



If nothing operates on the air conditioner, remove the return air grille assembly and verify the red, orange, yellow and blue wires are properly connected (red to red, orange to orange, etc.). Next disconnect the red wires and check for 12 volt D.C. between red wire from roof section and the orange or blue wire from roof section. If no voltage is received, refer to section 4.5. If voltage is received, the problem lies with the thermostat or thermostat wires.

Next disconnect all four wires (red, orange, yellow and blue) from the thermostat. With the thermostat set on COOL mode, the FAN mode set on AUTO and HIGH, and the temperature selector set lower than room temperature, check for continuity between:

terminal RC (red wire) and terminal Y (yellow wire), and RC (red wire) and terminal G (orange wire) and RC (red wire) and terminal H (blue wire).

If continuity is achieved on each, next set FAN switch to LOW. Continuity should NOT be present between terminal RC and terminal H, but present between the other terminals (Y and G) and terminal RC.

If all the previous checks are good, the thermostat is good. Do not replace it. If any one of these checks are not correct, replace the thermostat.



C. CONTROL BOARD

On electronic units two types of control boards have been used. They are 115 AC volt and DC volt controlled.

1) 115 AC VOLT CONTROLLED

NOTE: The PAL tester with the air conditioning module attached, will allow for proper testing of communication integrity between the control board and main board. The PAL and the AIR CONDITIONER MODULE are available from your Dometic parts distributor.

This control board is a signal receiver and completer. All power is supplied by the 115 AC volt main board. With the power switch ON, the FAN and MODE LED's will illuminate. To check the control board, first verify the power switch is on. Next, move the fan switch to all positions. The LED for each position should light. Next, move the mode switch to all positions. The LED for each position should light. If all the LED's light when switches are changed, the control board is good. If a LED does not light when switch is at that position, check the cable connections for a bent pin or improper connection. Also, check for any discolored or burnt areas on the board. If a discolored or burnt area is found correct the short in the cable before installing a new control board. If all lights illuminate and no discoloration or burnt area is found, the control board does NOT need to be replaced.

115 VOLT AC CONTROLLED



2) DC VOLT CONTROLLED

NOTE: The PAL tester with the air conditioning module attached, will allow for proper testing of communication integrity between the control board and main board. The PAL and the AIR CONDITIONER MODULE are available from your Dometic parts distributor.

This control board is wired to a DC volt supply and is capable of operating a DC volt furnace as well as operating the air conditioner. Only one of these will operate at a time. When the mode selection switch is at GAS HEAT, no lights for the air conditioner will illuminate.

DC volts is wired to the control board by attaching positive (+) DC to the red wire and negative (-) to the black wire. POLARITY has to be correct for operation. With the Center Slide (Power) switch to ON, all the way to the right, the control board sends DC volts to the main board and the main board sends signals to control board. It then completes the signals according to fan selection and mode selection to the appropriate appliance.

The DC volt operation range is 10 to 16 volts. To verify DC volts, check between the black wire and the red wire. If no volts are detected or voltage is outside of the operation range, correct the DC volt supply. If voltage is within the operating range, next check between Pin 1 and 10 on the cable. The voltage should be the same. If none is detected, the control pad is defective. Before replacing the part, verify where the shorted wire is and correct the problem. The most likely problem area would be in the cable that connects the main board and control board.

To check the gas heat mode, verify the control board is turned on, temperature control slide is all the way to the right, mode switch is to gas heat position and green LED is on. Next, remove furnace wiring from the two blue wires. Then check for continuity on the blue wires. Continuity means the thermostat is good.

CAUTION

BE SURE THE FOLLOWING CHECK IS DONE PROP-ERLY. AN INCORRECT TEST WILL DAMAGE THE CON-TROL BOARD.

If your results are no continuity, then check for DC volts between black wire and bottom of **CR2 Anode** (side closest to green device). If DC volts are not present, check cable and main board. If DC volts are present (10 to 16), place a jumper wire between black wire and bottom of CR2 Anode. Next check continuity on the blue wires. Lack of continuity designates a defective control board. A continuity reading indicates a problem with the cable or main board.

If the furnace continues to operate when the control board is turned "OFF", check continuity on blue wires. Lack of continuity designates the control board is good. Continuity on the blue wires designates a defective control board.



DC VOLT CONTROLLED

D. MAIN BOARD

On electronic units, two types of main boards have been used: 115 volt AC and DC volt controlled.

1) 115 VOLT AC CONTROLLED

NOTE: The PAL tester with the air conditioning module attached, will allow for proper testing of communication integrity between the control board and main board. The PAL and the AIR CONDITIONER MODULE are available from your Dometic parts distributor.

To check this main board, disconnect all power to the air conditioner. Remove the fan speed wires and the compressor wire from the main board. Set the control board to COOL and HIGH FAN positions. Connect power to the air conditioner. Verify the lights on the control board are on. If no lights are lit, remove control board and attach directly into main board ribbon cable. If lights do not come on, replace main board. With lights on control board, use a 115 AC volt incandescent bulb with one lead to the AC WHITE terminal and the other lead on HIGH and then to compressor terminal to verify the circuit is being completed through the main board. Switch the control pad to other settings and verify all circuits are being completed. If not, replace the main board.

2) DC VOLT CONTROLLED

NOTE: The PAL tester with the air conditioning module attached, will allow for proper testing of communication integrity between the control board and main board. The PAL and the AIR CONDITIONER MODULE are available from your Dometic parts distributor.

This main board is controlled by DC volts supplied from the control board. To check DC volts, be sure OFF/ON switch on control board is "ON". Measure the outside (#1 [+] and #10 [-]) terminals on the cable between the main board and the control board. The operating range is 10 to 16 volts DC. If DC volts are not within this range, correct the DC volt supply.

To check the circuit completing capabilities of the main board, first disconnect all power to the air conditioner. Then remove the fan speed wires and the compressor wire from the main board. Set the control board to COOL and HIGH FAN positions. Next, connect power to the air conditioner. Verify the lights on the control board are on. If no lights are on, remove control board and attach directly into the main board ribbon cable. If lights do not come on, replace the main board. With lights on control board, use a 115 AC volt incandescent bulb with one lead to the AC WHITE wire and the other lead on HIGH terminal and then to compressor terminal to verify the circuit is being completed through the main board. Switch the control board to other settings and verify all circuits are being completed according to the operation manual for the specific model you are diagnosing. If not, replace the main board. If the circuits are being completed, DO NOT replace the main board.

NOTE: When the control board fan setting is in the AUTO mode, the fan motor will cycle OFF and ON with the compressor cycle. There is a two minute delay on start after the control board senses cooling is needed.



115 VOLT AC CONTROLLED



E. RELAY BOARD

The relay board is controlled by the bimetal type thermostat. It consists of a transformer, compressor relay, two fan relays and other components. If any one of these are defective the complete relay board must be replaced.

The relay board completes circuits to the fan motor and compressor depending on what mode switch and temperature setting is on the thermostat.

The first check would be to turn all power OFF to the air conditioner. Disconnect the four wires (red, yellow, orange and blue) from the thermostat wires and wire all four wires together. Turn power ON to the air conditioner. The compressor and high fan should operate. Next, remove the blue wire from the others. With the red, yellow and orange wires connected, the compressor and low fan should operate. If these checks are not correct, the problem is in the relay board or its wiring.

Remove the cover from the relay box housing and verify the red wire is on terminal RC, orange wire is on terminal G, blue wire is on terminal H and yellow wire is on terminal Y.

With AC power to the relay board, check between terminals RC and G or H. There should be 12 volts DC. If no voltage is detected, the transformer on the relay board is defective. Replace the relay board.

If 12 volts DC is available, disconnect power to the air conditioner and remove the HI FAN wire (black) and the LOW FAN wire (red) and the compressor wire (large blue) from the NO terminal on the compressor relay on the relay board.

Next, connect together all four low voltage wires (red, yellow, orange and blue) that go to the thermostat from the relay box. Provide power to the air conditioner. Using an incandescent bulb, check from AC WHITE terminal (one lead from bulb) to NO terminal and HI FAN terminal (other lead from bulb). The bulb should illuminate. Next, disconnect the blue wire from the other three. Check from AC WHITE to LO FAN and NO terminals. The light should illuminate. If these tests are correct, the relay board is good. Do NOT replace it. If any one of these tests are incorrect, replace the relay board.



SECTION E. ROOF-MOUNTED HEAT PUMP OPERATION

E. OPERATION

The heat pump operates in two different modes: cooling and heating.

The same mechanism is used for both cycles, but the travel or flow of refrigerant is reversed to change from cooling to heating. The items used to accomplish this are a compressor, an inside coil, an outside coil, capillary tube or tubes (the metering device/s), a series of copper lines (refrigerant grade tubing), a reversing valve, an air movement system (motor and wheel or blades), and refrigerant (R22).

1E. THE COOLING MODE

To cool the air inside a structure, heat is removed from the inside air and released to the outside air or ambient.

To accomplish this, first air flow is established to pass over both coils (inside and outside). Next, a refrigerant cycle is established to cause refrigerant (R22) to flow through both coils.

The refrigerant cycle starts at the compressor. Its function is to take the low pressure R22 vapor and discharge it as high pressure vapor. As the refrigerant (R22) is compressed, it gives off heat causing the discharge line to be quite warm or hot to the touch in hot weather.

The R22 high pressure vapor leaves the compressor through the discharge line and enters the reversing valve. The reversing valve routes the high pressure vapor to the outside coil. In the cooling mode, the outside coil is a condenser coil.

The high pressure R22 vapor enters the outside coil (condenser). Here it is cooled and condensed into liquid

REVERSING VALVE INSIDE COIL OUTSIDE COIL (EVAPORATOR) (CONDENSER) Low Pressure Vapor High Pressure Vapo Low Pressure Vapo High Pressure Vapor COMPRESSOR High Pressure Liquid 🛹 COOL AIR HEATED TO INSIDE AIR TO INSIDE AIR **OUTSIDE AIR** OUTSIDE Capillary Tube

COOLING MODE

R22 by passing through the coil. The heat removed from the refrigerant is expelled to the outside air. The refrigerant leaves the outside coil as high pressure liquid.

As the high pressure liquid R22 leaves the outside coil (condenser) it passes through the small capillary tube or tubes. This is the metering or flow control device in the sealed system. It determines the amount and force of which the R22 enters the inside coil. It is *imperative* that the capillary tube's length and diameter not be altered. If the tube is altered, the unit will not operate as efficiently as it should.

The high pressure liquid R22 enters the inside coil in a controlled amount from the capillary tube. When the liquid enters the low pressure atmosphere of the inside coil (evaporator) it evaporates into vapor. When the evaporative process takes place, heat is removed from the air flowing through the inside coil (evaporator). The air with the heat removed is returned to the inside of the structure via the air movement system (blower assembly).

From the inside coil (evaporator), the low pressure refrigerant (R22) vapor returns to the reversing valve. The reversing valve routes the low pressure vapor to the compressor through the suction line to start the cooling process again.

2E. THE HEATING MODE:

To heat the air inside a structure, heat is removed from the outside air or ambient and released to the inside air.

To accomplish this, first air flow is established to pass over both coils (inside and outside), Next, a refrigerant cycle is established to cause the refrigerant (R22) to flow through both coils.



HEATING MODE

The refrigerant cycle starts at the compressor. Its function is to take the low pressure R22 vapor and discharge it as high pressure vapor. As the refrigerant (R22) is compressed, it gives off heat causing the discharge line to be quite warm to the touch.

The R22 high pressure vapor leaves the compressor through the discharge line and enters the reversing valve. The reversing valve routes the high pressure vapor to the inside coil. In the heating mode the inside coil is a condenser coil.

The high pressure R22 vapor enters the inside coil (condenser). Here it is cooled and condensed into liquid R22 by passing through the coil. The heat removed from the refrigerant is expelled to the inside air. The refrigerant leaves the inside coil as high pressure liquid.

As the high pressure liquid R22 leaves the inside coil (condenser) it passes through the small capillary tube or tubes. This is the metering or flow control device in the sealed system. It determines the amount and force of which the R22 enters the outside coil.

It is imperative that the capillary tube's length and diameter not be altered. If the tube is altered, the unit will not operate as efficiently as it should.

The high pressure liquid R22 enters the outside coil in a controlled amount from the capillary tube. When the liquid enters the low pressure atmosphere of the outside coil (evaporator) it evaporates into vapor. When the evaporative process takes place, heat is removed from the air flowing through the outside coil (evaporator). The air with the heat removed is returned to the outside air (ambient) via the air movement system (blower assembly).

From the outside coil (evaporator), the low pressure refrigerant (R22) vapor returns to the reversing valve. The reversing valve routes the low pressure vapor to the compressor through the suction line to start the heating process again.

3E. GENERAL INFORMATION

The roof-top heat pump was designed to operate in a MILD GEOGRAPHICAL AREA for heating where the heat loss is minimal. The heat pump was designed to operate down to an outside ambient temperature of 40°F. At 40°F., the outdoor thermostat will turn off the heat pump circuit and start up the coach's main furnace. As long as the temperature remains below 40 degrees, the main furnace will heat your home. As the outside temperature increases to 45°F., the outdoor thermostat switches back to the heat pump circuit.

NOTE: Model 59126.501 does not have an outdoor thermostat. When outdoor temperature is at or below 40°F., use the main furnace to heat your home.

The advantages of the heat pump are:

- 1. User friendly; only one unit for both heating and cooling;
- 2. Heat pump heating uses campsite electrical hookup and saves on trips to refill L.P. tanks;
- 3. When used in mild climates where the outdoor temperature range is 40 degrees or higher, an LP furnace is not needed.

NOTE: Geographical location usage should be determined before omitting a central furnace.

TO MAINTAIN DESIRED TEMPERATURE:

The ability of the air conditioner mode to maintain the desired inside temperature depends on the heat gain of the RV. Some preventative measures taken by the occupants of the RV can reduce the heat gain and improve the performance of the air conditioner. During extremely high outdoor temperatures, the heat gain of the vehicle may be reduced by:

- a. Parking the RV in a shaded area
- b. Using window shades (blinds and/or curtains)
- c. Keeping windows and doors shut or minimizing usage
- d. Avoiding the use of heat producing appliances

Starting the air conditioner early in the morning and giving it a "head start" on the expected high outdoor ambient will greatly improved its ability to maintain the desired indoor temperature.

NOTE

The manufacturer of this heat pump will not be responsible for damage caused by condensed moisture on ceilings or other surfaces. Air contains moisture and this moisture tends to condense on cold surfaces. When air enters the RV, condensed moisture may appear on the ceiling, windows, metal parts, etc. The heat pump removes this moisture from the air during normal operation. Keeping doors and windows closed when this heat pump is in operation will minimize condensed moisture on cold surfaces.

Operating instructions can change from one model to another.

Be sure you are familiar with the proper operating instructions for the specific model of heat pump you are diagnosing. An installation and operating manual is packaged with each heat pump system.

4E. MECHANICAL CONTROLS

This type of heat pump has an air distribution box that has a mechanical selector switch and thermostat installed in it.

NOTE: Remember to check the installation and operating instructions for the specific model you are diagnosing. **CONTROLS:**

The **Selector Switch** has eight positions including "OFF". This controls fan speed, heating mode and cooling modes.

The **Thermostat** controls the temperature range from 65°F. on the coldest side to 90°F. on the warmest side. In the cooling/heating mode, the compressor ON/ OFF is controlled by the thermostat setting.

COOLING OPERATION:

Set the thermostat at the desired temperature level. Select the fan speed that best satisfies your needs:

- a. **HIGH COOL**: Selected when maximum cooling and dehumidification required.
- b. **LOW COOL**: Selected when room is at desired comfort level and needs to be maintained. Normally this speed is used for nighttime operation.

NOTE: The blower runs continuously to circulate air and maintain an even temperature. The compressor will come on when cooling is required to maintain the selected temperature level.

WARNING

AFTER SHUTTING THE HEAT PUMP DOWN WITH EITHER SELECTOR SWITCH OR THERMOSTAT, WAIT AT LEAST TWO (2) MINUTES BEFORE RESTARTING. THIS ALLOWS THE REFRIGERANT PRESSURE TO EQUALIZE AND COMPRESSOR TO RESTART EAS-ILY.

FAN OPERATION:

This will circulate the air in your RV without cooling or heating. There are two positions: HIGH FAN or LOW FAN to select from, depending upon personal choice.

HEATING OPERATION:

NOTE: This heat pump will not replace a furnace for heating your RV in cold weather. The intent is to remove the chill on cool days or mornings.

- 1. Turn the selector switch to "HEAT PUMP";
- 2. The Fan and Compressor will come on and begin heating.
- 3. When desired temperature level in RV is reached, the blower will run continuously to circulate air and maintain an even temperature. The compressor will cycle as required to maintain selected temperature.

OFF POSITION: This position turns the unit off.

5E. ELECTRONIC (DIGITAL) CONTROLS

This type of heat pump is controlled by a DIGITAL wallmounted thermostat. The air distribution can be an air distribution box or a ducted air system.

NOTE: Remember to check the installation and operating instructions for the specific model you are diagnosing.

DIGITAL THERMOSTAT OPERATION

Your heat pump is operated from the control panel of the electronic wall thermostat. When the furnace is connected to this thermostat, it will operate from the same control panel.

Identification and operational descriptions for all control panel switches and display are listed below:

A. Liquid Crystal Display: This display will be illuminated any time the system is in operation. NOTE: When switching from OFF to any other mode, the liquid crystal display may not illuminate for approximately three minutes.

The display shows the operator both the mode of the display (indicated by the arrow at the left side of the display), and the temperature for that mode.

There are three display modes: ACTUAL, COOL and HEAT.



The operator may choose the mode he desires to view by depressing the "MODE" switch. Each time the MODE switch is depressed, the display advances to the next mode. If the display is left in either COOL or HEAT, the thermostat will automatically return the display to ACTUAL in approximately three minutes. A description of the three modes is:

- **ACTUAL**: When in actual mode, the display is indicating current room temperature.
- **COOL SET**: When in COOL mode, the display is indicating the current cooling setpoint temperature. At this time the cooling system setpoint temperature may be adjusted up or down to meet the individual's comfort level. See "Adjusting Setpoint" for further instructions.
- **HEAT SET**: When in the HEAT mode, the display is indicating the current heating system setpoint temperature. At this time, the heating system setpoint temperature may be adjusted up or down to meet the operator's comfort level. See "Adjusting Setpoint" for further instructions.

All three display modes can be accessed without affecting the operation of the system. The system operation will remain normal unless a change is made to the setpoint to force a change in the system operation.

B. System Switch: The system switch has four positions to control the operation of the heating and cooling systems. They are as follows:

<u>COOL</u>: When in the COOL position, the compressor will cycle from the cooling system setpoint. Blower operation will be controlled by the position of the Cooling Fan Switch.

HEAT: When in the heat position, the heating system will cycle from the heating system setpoint. The heating blower will operate per the heating system manufacturer specifications.

OFF: When in the OFF position, no thermostat or system operation will occur. The liquid crystal will indicate room temperature until backup power is depleted (approximately two minutes).

AUXILIARY HEAT:

1) Set the system switch to AUX;

2) Set the FAN switch AUTO;

- NOTE: The AUXILIARY HEAT position is only used if:
 - a) You have a factory installed furnace operating from the heat pump system thermostat.
 - b) The outside temperature is above 40°F. and you wish to operate your furnace.
 - c) For quick interior warm-ups.
 - d) There is no 115 volt AC power available to operate your heat pump and you must operate the furnace for your comfort.

C. FAN SWITCH: The Fan Switch has four positions to control the operation of the heat pump blower. It controls the operation of the blower only after the system switch is placed into the COOL or HEAT PUMP position.

<u>HIGH AUTO</u>: When in the high auto position, the heat pump blower operates at high speed and cycles off and on with the compressor.

LOW AUTO: When in low auto position, the heat pump blower operates at low speed and cycles off and on with the compressor.

<u>HIGH and LOW ON</u>: When in the high or low position, the heat pump blower operates continuously. The compressor cycles off and on as needed.

MOMENTARY SWITCHES: There are three momentary switches. Momentary switches are activated by depressing the center of the switch. A description of these three switches follows:

MODE: Depressing this switch advances the display mode from ACTUAL to COOL, HEAT and back to ACTUAL. When using this switch, you are indicating your desire to check or adjust the setpoint temperatures for cooling or heating. The cool setting determines the temperature at which the air conditioner will start to operate. The heat setting determines the temperature at which the heating system will start to operate.

UP: Depressing this switch increases the temperature setpoint.

DOWN: Depressing this switch decreases the temperature setpoint.

To adjust the setpoint for heating or cooling, press the MODE button until the arrow on the display indicates the desired setpoint you wish to change: COOL or HEAT. The display will indicate the current setpoint of the thermostat. Press UP or DOWN to change the setpoint. Once the new desired setpoint is displayed, press the MODE button until the arrow is pointing to ACTUAL. If the thermostat is left in the COOL or HEAT mode, the display will return to ACTUAL in about three minutes. After the display returns to ACTUAL, it takes 15 to 30 seconds for the thermostat to recognize the changes made to the setpoint.

6E. BIMETAL CONTROLS

This type of heat pump is controlled by a Bimetal type wall thermostat. The air distribution can be an air distribution box or a ducted air system.

NOTE: Remember to check the installation and operating instructions for the specific model you are diagnosing.

BIMETAL THERMOSTAT OPERATION: COOLING:

- A. Set the System Switch to Cool;
- B. Set the Temperature Lever to your comfort level.
- C. Set the Fan Switch to:
 - 1) **AUTO**: The fan will cycle off and on with the compressor.
 - 2) **ON**: The fan will run continuously. The compressor will cycle off and on with the thermostat demand.

HEATING

- A. Set the System Switch to HEAT PUMP.
- B. Set the Temperature Lever to your comfort level.
- C. Set the Fan Switch to:
 - 1) AUTO: The fan will cycle off and on with the compressor.
 - ON: The fan will run continuously. The compressor will cycle off and on with the thermostat.

AUXILIARY HEAT:

- A. Set the System Switch to AUX. HEAT.
- B. Set the Fan Switch to AUTO.
- C. Set the temperature lever to your comfort level.

NOTE: The auxiliary heat position is only used if:

- 1) You have a factory installed furnace operating from the heat pump system thermostat.
- 2) The outside temperature is above 40°F. and you wish to operate your furnace.
- 3) For quick interior warm-up.
- There is no 115 volt AC power available to operate your heat pump and you must operate the furnace for your comfort.

FAN:

To circulate air without heating or cooling:

A. Set the System Switch to OFF.

B. Set the Fan Switch to ON.

HIGH/LOW:

HIGH: Fan speed position. LOW: Fan speed position.



7E. DC VOLT REQUIREMENTS

DC VOLTS

On certain models of electronic heat pumps, a DC volt supply is wired to the control board. The operating range is 10 to 16 volts. If voltage is below 10 volts, you could experience improper operation of the components within the heat pump.

NOTE: See Section 4.2B & C for Thermostat Wiring.

COMPONENTS

WARNING

MAKE SURE THAT THE POWER SUPPLY TO THE UNIT IS DISCONNECTED BEFORE PERFORMING ANY WORK ON THE UNIT TO AVOID THE POSSIBIL-ITY OF SHOCK INJURY OR DAMAGE TO THE EQUIP-MENT.

8E. SELECTOR SWITCH

The selector switch in a mechanical heat pump has several positions. The various switch positions can be tested for continuity with a volt/ohm meter set on the highest ohm scale.

A. MODEL 59126.501

First turn the 20 amp heat pump breaker to OFF. Next, remove the wires from the switch. With the switch in the OFF position, you should not have continuity between Terminal L1 and any other white numbered terminal.

In the HIGH 2 FAN position, you should have continuity between Terminal L1 and Terminal 4 only.

In the HIGH 1 FAN position, you should have continuity between Terminal L1 and Terminal 2 only.

In the LOW FAN position you should have continuity between Terminal L1 and Terminal 1 only.

In the LOW COOLING position, you should have continuity between Terminal L1 and Terminal C; and Terminal L1 and Terminal 1 only.

In the HIGH 1 COOLING position, you should have continuity between Terminal L1 and Terminal C; and Terminal L1 and Terminal 2 only.

In the HIGH 2 COOLING position, you should have continuity between Terminal L1 and Terminal C; and Terminal L1 and Terminal 4 only.

In the HEAT PUMP position, you should have continuity between Terminal L1 and Terminal H; and Terminal L1 and Terminal 4 only.

NOTE: The terminals are identified with white ink.

Be sure to check the switch in all positions and be sure you have continuity only on the terminals for the selected position. Lack of continuity or continuity on incorrect terminals designates a defective switch, and it must be replaced. NOTE: The numbers without circles are the white inkstamped numbers.

POSITION	TERMINALS
OFF	
HIGH 2 FAN	L1 and 4
HIGH 1 FAN	L1 and 2
LOW FAN	L1 and 1
LOW COOLING	L1 and C; L1 and 1
HIGH 1 COOLING	L1 and C; L1 and 2
HIGH 2 COOLING	L1 and C; L1 and 4
HEAT PUMP	L1 and H; L1 and 4

B. MODEL 59126.502, 630025

First, turn the 20 amp air conditioner breaker to OFF. Next, remove the wires from the switch. With the switch in the OFF position, you should not have continuity between Terminal L1 and any other white numbered terminal.

In the 1st HIGH FAN position you should have continuity between Terminal L1 and Terminal 1 only.

In the 2nd HIGH FAN position, you should have continuity between Terminal L1 and Terminal 2 only.

In the LOW FAN position you should have continuity between Terminal L1 and terminal 4 only.

In the 1st HIGH COOLING position you should have continuity between Terminal L1 and Terminal H; and Terminal L1 and Terminal 1 only.

In the 2nd HIGH COOLING position, you should have continuity between Terminal L1 and H; and Terminal L1 and Terminal 2 only.

In the LOW COOLING position, you should have continuity between Terminal L1 and Terminal H; and Terminal L1 and Terminal 4 only.

In the 1st HIGH HEATING position, you should have continuity between Terminal L1 and Terminal C; and Terminal L1 and Terminal 1 only.

In the 2nd HIGH HEATING position, you should have continuity between Terminal L1 and Terminal C; and Terminal L1 and Terminal 2 only.

In the LOW HEATING position, you should have continuity between Terminal L1 and Terminal C; and Terminal L1 and Terminal 4 only. Be sure to check the switch in all positions and be sure you have continuity only on the terminals for the selected position. Lack of continuity or continuity on incorrect terminals designates a defective switch, and it must be replaced.

NOTE: Numbers	without circles are the	white ink stamped numbers.
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POSITION	TERMINALS	
OFF 1st HIGH FAN 2nd HIGH FAN LOW FAN	L1 and 1 L1 and 2 L1 and 4	
1st HIGH COOLING 2nd HIGH COOLING LOW COOLING 1st HIGH HEATING 2nd HIGH HEATING LOW HEATING	L1 and H; L1 and 1 L1 and H; L1 and 2 L1 and H; L1 and 4 L1 and C; L1 and 1 L1 and C; L1 and 2 L1 and C; L1 and 4	
	BACK VIEW OF TYPIC	AL SELECTOR SWITCH

9E. THERMOSTAT

There are three types of thermostats used on heat pump units. Each type is explained in this section.

A. MECHANICAL

This type is used on the mechanical series of heat pumps. The thermostat controls the ON/OFF cycling of the compressor. It has three terminals. The air temperature around the sensor tube should be between approximate 65°F. and 90°F. To check the thermostat for operation, turn the heat pump circuit



breaker off, and disconnect the wires to the thermostat. Turn the control knob to COOLER. You should have continuity between Terminals 2 to 3 and **no** continuity between Terminals 2 to 1. Turn the thermostat to WARMER. You should **not** have continuity between Terminals 2 to 3; and have continuity between Terminals 2 to 3; and have continuity between Termostat. If you have incorrect readings, replace the thermostat. If you have the readings as indicated above, DO NOT replace the thermostat.

B. DIGITAL

This thermostat is designed to operate 12V DC singlestage heat pump and an independent single-stage auxiliary heat system. It is a manual changeover thermostat between heating, cooling and auxiliary heat. It also incorporates time delay circuitry to protect against system short cycling.

There is a time delay of approximately three minutes between OFF and ON cycles. Default temperatures of 65°F. for Heat and 75°F. for Cool have been incorporated into this thermostat. If the thermostat is without power for 10 to 15 seconds, it will default to these temperatures.

Operating temperatures for both heating and cooling systems are changeable to suit the comfort needs of the occupants.

This thermostat is used as a remote wall mounted thermostat. The heat pump can have an air distribution box or a ducted system. To check the operation, refer to Section 1.2.

Next, verify the wiring to the thermostat is correct.

Thermostat Wiring for DIGITAL Thermostat: Route the (10) conductor cable from the 14" x 14" opening to the thermostat location. Route a two conductor cable from the coach's 12 volt DC power source to the thermostat location. Connect 12 volt **positive** lead to the green wire on the thermostat cable.

Connect the 12 DC volt **<u>negative</u>** lead to the brown lead. Secure both connections using wire nuts.

NOTE: The DC volt connections are needed to power the liquid crystal display (LCD) and thermostat in the AUX. HEAT mode when 115 volt AC is not available.

At the thermostat location, leave about six (6") inches of cable extending through the wall. Plug the thermostat cable into the thermostat connector.

When an auxiliary furnace is used with the heat pump, a single-wire conductor must be routed from the furnace to the thermostat location. Connect this wire from the furnace to the violet pigtail at the thermostat and secure with wire nut. Tuck the excess wire back into the wall and fill opening with insulation to prevent drafts that could affect the thermostat operation. Using the two screws provided, secure the thermostat to the wall.

THERMOSTAT CONNECTIONS



NOTE: The furnace has two wires for thermostat connections. One wire should be marked 12V DC or (+) and the other wire may be unmarked, or labeled "thermostat". The wire marked 12V DC or (+) should be capped and not used with the heat pump setup. The wire marked "thermostat" or the unmarked wire is the wire to connect to the violet thermostat pigtail.

If the 12V DC(+) is hooked to the violet wire at the thermostat, the heat pump fan motor will NOT operate in any mode.

Before checking the thermostat for operation, first determine that the thermostat is receiving DC power from the relay board then disconnect the cable assembly from the back of the thermostat.

Next, use a DC voltmeter and check from red wire or Pin 2 on cable assembly (positive [+] lead from voltmeter) to brown wire or Pin 7 (negative [-] lead from voltmeter). You should get a voltage reading of approximately 12V DC. Next, move the negative (-) lead from the voltmeter to each of the following wires or pins: **Blue (Pin 6), Yellow (Pin 5), Black (Pin 4) White (Pin 3)**. You should get a voltage reading of approximately 12V DC on each wire. This indicates the relay board and cable assembly are providing proper power and circuits to the thermostat.



NOTE: Pin 2 (red wire) is positive DC volts when ambient (outside) air is above 40°F. Pin 1 (violet wire) is positive DC volts when ambient (outside) air is below 40°F. When ambient (outside) air is below 40°F., only "FAN LO ON" and "HI ON" will operate in the heat pump.

If the above voltage checks are correct and the unit does not operate correctly, check the thermostat.

If the above voltage checks are not as described, check the relay board (Section 4.5) and the cable assembly (4.3).

To check the thermostat, first verify positive (+) DC is to red wire (Pin 2), and negative (-) DC is to brown wire (Pin 7) at the back of the thermostat. Operating range is 10 to 16 volts DC.

With System Switch in COOL, Fan Switch in HI AUTO and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4), yellow wire (pin 5) and blue wire (Pin 6). You should **NOT** have voltage between brown wire to violet or white wires. With room temperature BELOW setpoint temperature, you should **NOT** have voltage between brown wire to violet, white, black, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in COOL, Fan Switch in LO AUTO and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4) and yellow wire (P5). You should NOT have voltage between brown wire to violet, white or blue wires. With room temperature BELOW setpoint temperature, you should NOT have voltage between brown wire to violet, white, black, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in COOL, Fan Switch in LO ON and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4) and yellow wire (Pin 5). You should NOT have voltage between brown wire to violet, white or blue wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4). You should NOT have voltage between brown wire to violet, white, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in COOL, Fan Switch in HI ON and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4), yellow wire (Pin 5) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet or white wire. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet, white or yellow wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals. With System Switch in the OFF, Fan Switch in HI AUTO or LO AUTO and room temperature ABOVE or BELOW setpoint temperature, you should NOT have voltage between brown wire to violet, white, black, yellow or blue wires.

With System Switch in OFF, Fan Switch in LO ON and room temperature ABOVE or BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4). You should NOT have voltage between brown wire to violet, white, yellow or blue wires.

With System Switch in OFF, Fan Switch in HI ON and room temperature ABOVE or BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet, white or yellow wires.

With System Switch in HEAT PUMP, Fan Switch in HI AUTO and room temperature ABOVE setpoint temperature, you should NOT have voltage between brown wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to white wire (Pin 3), black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet or yellow wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in HEAT PUMP, Fan Switch in LO AUTO and room temperature ABOVE setpoint temperature, you should NOT have voltage between brown wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, You should have voltage between brown wire (Pin 7) to white wire (Pin 3) and black wire (Pin 4). You should NOT have voltage between brown wire to violet, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in HEAT PUMP, fan switch in LO ON and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4). You should NOT have voltage between brown wire to violet, white, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to white wire (Pin 3) and black wire (Pin 4). You should NOT have voltage between brown wire to violet, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals. With System Switch in HEAT PUMP, Fan Switch in HI ON and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet, white or yellow wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to white wire (Pin 3), black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet or yellow wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

Before checking the thermostat for operation in AUX.

HEAT, verify that DC volts (10 to 16) are available between the green wire (+) and brown wire (-) at the back of the thermostat.

With System Switch in AUX HEAT, Fan Switch in HI AUTO and room temperature ABOVE setpoint temperature, you should NOT have voltage between brown wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to violet wire (Pin 1). You should NOT have voltage between brown wire to white, black, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in AUX HEAT, Fan Switch in LO AUTO and room temperature ABOVE setpoint temperature, you should NOT have voltage between brown wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to violet wire (Pin 1). You should NOT have voltage between brown wire to white, black, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in AUX HEAT, Fan Switch in LO ON and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4). You should NOT have voltage between brown wire to violet, white, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to violet wire (Pin 1) and black wire (Pin 4). You should NOT have voltage between brown wire to white, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals. With System Switch in AUX HEAT and fan switch in HI ON and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet, white or yellow wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to violet wire (Pin 1), black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to white or yellow wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.





SWITCH COMBINATIONS AND THEIR CORRESPONDING "ACTIVE" TERMINALS

SWITCH COMBINA- TIONS		If room Temp. is Above/	Те	Terminals tha			are "ON"		
System Switch	Fan Switch	Below setpoint temp:	Pin 3 White	Pin 1 Violet	Pin 5 Yellow	Pin 6 Blue	Pin 4 Black		
		Above			\checkmark	\checkmark	\checkmark		
		Below							
		Above			\checkmark		<		
		Below							
	10.00	Above			\checkmark		\checkmark		
Ū		Below					\checkmark		
	HI On	Above			\checkmark	\checkmark	<		
		Below				\checkmark	\checkmark		
		Above							
		Below							
		Above							
LL_	LO Auto -	Below							
Ц		Above					<		
O	LO On –	Below					\checkmark		
	HI On _	Above				<u> </u>	<u> </u>		
		Below				√	\		
	HI Auto -	Above							
		Below	\checkmark			\checkmark	\checkmark		
15	LO Auto -	Above							
ום		Below	1				\		
	LO On -	Above	-						
		Below	1				\checkmark		
ш		Above				<u> </u>	\		
		Below	\checkmark			1	1		
		Above							
		Below		\checkmark					
		Above							
14		Below		\checkmark					
	100	Above		-			\checkmark		
	LO ON -	Below		1			\checkmark		
		Above				1	<u> </u>		
		Below		\checkmark		\checkmark	\checkmark		

TO CHECK "ACTIVE" TERMINALS: Place the negative (–) lead from the voltmeter on Pin 7 or Brown wire and the positive (+) lead from the voltmeter to the "ACTIVE" pin or wire to read DC voltage.

After setpoint temperature is changed, there could be a three (3) minute delay on some "ACTIVE" terminals.

C. BIMETAL

This thermostat is designed to operate 12V DC singlestage heat pump and an independent single-stage auxiliary heat system. It is a manual changeover thermostat between heating, cooling and auxiliary heat. Operating temperatures for both heating and cooling systems are changeable to suit the comfort needs of the occupants.

This thermostat is used for a remote wall mounted thermostat. The heat pump can have an air distribution box or a ducted system. To check the operation refer to Section 1.3. Next, verify the wiring to the thermostat is correct.

Thermostat Wiring for Dometic Bimetal Thermostat:

Route the (10) conductor cable from the 14" x 14" opening to the thermostat location. Leave enough cable within the 14" x 14" opening to connect to the low voltage cable. At the thermostat location, leave about six (6") inches of cable extending through the wall. Plug the thermostat cable into the thermostat connector cable.

When an auxiliary furnace is used with the heat pump, a two conductor cable must be routed from the furnace to the thermostat location. Connect one wire from the furnace to the violet wires with a wirenut. Connect the other wire from the furnace to the green wire in the thermostat cable and secure with a wire nut. Tuck the excess wire back into the wall and fill opening with insulation to prevent drafts that could affect the thermostat operation. Secure the thermostat to the wall using the two screws.

NOTE: Verify the heat anticipator is set properly for the auxiliary furnace. Failure to set the anticipator can cause incorrect operation or failure of thermostat in AUX HEAT or HEAT PUMP setting.





Before checking the thermostat for operation, first determine that the thermostat is receiving DC power from the relay board then disconnect the cable assembly from the back of the thermostat.

Next, use a DC voltmeter and check from red wire or Pin 2 on cable assembly (positive [+] lead from voltmeter) to brown wire or Pin 7 (negative [-] lead from voltmeter). You should get a voltage reading of approximately 12V DC. Next, move the negative (-) lead from the voltmeter to each of the following wires or pins:

Blue (Pin 6), Yellow (Pin 5), Black (Pin 4) White (Pin 3). You should get a voltage reading of approximately 12V DC on each wire. This indicates the relay board and cable assembly are providing proper power and circuits to the thermostat.

NOTE: Pin 2 (red wire) is positive DC volts when ambient (outside) air is above 40°F. Pin 1 (violet wire) is positive DC volts when ambient (outside) air is below 40°F.

If the above voltage checks are correct and the unit does not operate correctly, check the thermostat.

If the above voltage checks are not as described, check the relay board (Section 4.5) and the cable assembly (4.3).

To check the thermostat, first remove it from its mounting on the wall. Then disconnect the thermostat assembly from the cable assembly in the wall. Now you are ready to do a continuity check on the thermostat assembly. Place the positive (+) lead from the ohm meter on red wire (Pin 2) and negative (-) lead from the ohm meter to the active pin or wire to read continuity. **POLARITY IS IMPORTANT FOR A PROPER CHECK TO BE DONE**.

With System Switch in COOL, Fan Switch in HI AUTO and room temperature ABOVE setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4), yellow wire (Pin 5) and blue wire (Pin 6). You should NOT have continuity between red wire to violet or white wires. With room temperature BELOW setpoint temperature, you should NOT have continuity between red wire to violet, white, black, yellow or blue wires.

With System Switch in COOL, Fan Switch in LOW AUTO and room temperature ABOVE setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4) and yellow wire (Pin 5). You should NOT have continuity between red wire to violet, white or blue wires. With room temperature BELOW setpoint temperature, you should NOT have continuity between red wire to violet, white, black, yellow or blue wires.

With system switch in COOL, Fan Switch in LOW ON and room temperature ABOVE setpoint temperature you should have continuity between red wire (Pin 2) to black wire (Pin 4) and yellow wire (Pin 5). You should NOT have continuity between red wire to violet, white, or blue wires. With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4). You should NOT have continuity between red wire to violet, white, yellow or blue wires.

With System Switch in COOL, Fan Switch in HI ON and room temperature ABOVE setpoint temperature you should have continuity between red wire (Pin 2) to black wire (Pin 4), yellow wire (Pin 5) and blue wire (Pin 6). You should NOT have continuity between red wire to violet or white wires. With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have continuity between red wire to violet, white or yellow wires.

With System Switch in OFF, Fan Switch in HI AUTO or LOW AUTO and room temperature ABOVE or BELOW setpoint temperature, you should NOT have continuity between red wire to violet, white, black, yellow or blue wires.

With System Switch in OFF, Fan Switch in LOW ON and room temperature ABOVE or BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4). You should NOT have continuity between red wire to violet, white, yellow or blue wires.

With System Switch in OFF, Fan Switch in HI ON and room temperature ABOVE or BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have continuity between red wire to violet, white or yellow wires.

With System Switch in HEAT PUMP, Fan Switch in HI AUTO and room temperature ABOVE setpoint temperature, you should NOT have continuity between red wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to white wire (Pin 3), black wire (Pin 4), and blue wire (Pin 6). You should NOT have continuity between red wire to violet or yellow wires.

With System Switch in HEAT PUMP, Fan Switch in LOW AUTO and room temperature ABOVE setpoint temperature, you should NOT have continuity between red

wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to white wire (Pin 3) and black wire (Pin 4). You should NOT have continuity between red wire to violet, yellow or blue wires.

With System Switch in HEAT PUMP, Fan Switch in LOW ON and room temperature ABOVE setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4). With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to white wire (Pin 3) and black wire (Pin 4). You should NOT have continuity from red wire to violet, yellow or blue wires.

With System Switch in HEAT PUMP, Fan Switch in HI ON and room temperature ABOVE setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have continuity between red wire to violet, white or yellow wires. With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to white wire (Pin 3), black wire (Pin 4) and blue wire (Pin 6). You should NOT have continuity between red wire to violet or yellow wires.

With System Switch in AUX HEAT, Fan Switch in HI AUTO and room temperature ABOVE setpoint temperature, you should NOT have continuity between red wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have continuity between violet wire (Pin 1) and green wire. You should NOT have continuity between red wire to violet, white, black, yellow or blue wires.



With System Switch in AUX HEAT, Fan Switch in LOW AUTO and room temperature ABOVE setpoint temperature, you should NOT have continuity between red wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have continuity between violet wire (Pin 1) and green wire. You should NOT have continuity between red wire to violet, white, black, yellow or blue wires.

With System Switch in AUX HEAT, Fan Switch in LOW ON and room temperature ABOVE setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4). You should NOT have continuity between red wire to violet, white, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to black wire)Pin 4) and between violet wire (Pin 1) to green wire. You should NOT have continuity between red wire to violet, white, yellow or blue wires.

With System Switch in AUX HEAT, Fan Switch in HI ON and room temperature ABOVE setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have continuity between red wire to violet, white or yellow wires. With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4) and blue wire (Pin 6) and between violet wire (Pin 1) and green wire. You should NOT have continuity between red wire to violet, white or yellow wires.

SWITCH COMBINATIONS AND THEIR CORRESPONDING "ACTIVE" TERMI-NALS

To check "ACTIVE" terminals, place the positive (+) lead from the ohm meter on Pin 2 or red wire and negative

(-) lead from ohm meter to the "active" pin or wire to read continuity.

With System Switch in AUX HEAT and room temperature BELOW setpoint temperature, continuity will exist between violet wire and green wire. With room temperature ABOVE setpoint temperature, continuity will NOT exist between violet and green wire.

SWITCH COMBINA- TIONS		If room Temp. is Above/	Те	erminal	s that a	are "O	N"
System Switch	Fan Switch	Below setpoint temp:	Pin 3 White	Pin 1 Violet	Pin 5 Yellow	Pin 6 Blue	Pin 4 Black
	HI Auto -	Above			\checkmark	\checkmark	\checkmark
		Below					
	LO Auto -	Above			\		\checkmark
Q		Below					
0	LO On -	Above			\checkmark		
		Below					
	HI On _	Above			\checkmark		
		Below					\checkmark
	HI Auto –	Above					
		Below					
	LO Auto -	Above					
		Below					
H	LO On –	Above					\checkmark
		Below					\checkmark
	HI On	Above				\checkmark	\checkmark
		Below					
	HI Auto –	Above					
Σ		Below	\checkmark			\checkmark	\checkmark
	LO Auto -	Above					
		Below	√				
	LO On	Above					
		Below	√				\checkmark
単	HIOn -	Above				<u> </u>	
<u> </u>		Below	 ✓ 			√	✓
	HI Auto -	Above					
HEAT		Below					
	LO Auto	Above					
		Below					-
×	LO On -	Above					
n		Below					
A	HI On -	Above					
		Polow	1			. /	

10E.CABLE ASSEMBLY

This is a group of ten (10) wires used with remote wall mounted thermostats. It connects the wall mounted thermostat (bimetal and electronic thermostat assemblies) to the relay board mounted in the Roof-Top Heat Pump.

The cable assembly for the Roof-Top Heat Pump is available in 15, 25 and 30 foot lengths. This cable assembly has a male connector on one end (thermostat connection) and a female connector on the other end (heat pump connection).

The cable assembly has 10 wires. The arrow on each connector designates Pin 1.

To check the cable assembly, disconnect each end of the cable assembly and check for continuity on each wire in the assembly.

Also, check each connector for bent pins or loose wires. Each wire has a receptacle that snaps into the connector.



11E. CHANGEOVER THERMOSTAT

The changeover thermostat is a capillary tube/bellowstype switch. Its function is to allow the compressor to operate only when outside ambient is 40°F. or warmer.

To check the changeover thermostat, first verify the air temperature at the capillary tube. If the temperatures are above 45°F., continuity should be between terminals 2 to 3 and no continuity between terminals 2 to 1. For temperatures below 40°F., continuity should be between terminals 2 to 1 and no continuity between terminals 2 to 3.

NOTE: A defective changeover thermostat can keep the compressor from operating in the COOL or HEAT PUMP modes.



12E. RELAY BOARD

The relay board consists of a transformer, compressor relay, two fan relays and other components. If any one of these are defective, the complete relay board must be replaced.

The relay board completes circuits to the fan motor and compressor depending on what mode switch and temperature setting is on the thermostat.

Remove the cover from the electric box and verify the red wire is on terminal RC, black wire is on terminal G, blue wire is on terminal H and yellow wire is on terminal Y.

With AC power to the relay board, check between terminals RC and G or H. There should be 12 volts DC. If no voltage is detected, the transformer on the relay board is defective. Replace the relay board.

If 12 volts DC is available, disconnect power to the heat pump and remove the HI FAN wire (black) and the LOW FAN wire (red) and the compressor wire (large black) from the NO terminal on the compressor relay on the relay board.



Next, remove the red, yellow, black and blue wires from terminals RC, Y, G and H on the relay board. Place a jumper from terminal RC to terminal Y. Provide power to the heat pump. Using an incandescent bulb, check from AC white terminal (one lead from bulb) to NO terminal on compressor relay on the relay board (other lead from bulb). The bulb should illuminate. Remove the jumper and the bulb would NOT illuminate. Next, place a jumper from terminal RC to terminal G. Now place one lead from bulb to AC white terminal and the other lead from bulb to LOW FAN terminal. The bulb should illuminate. Remove the jumper and the bulb should not illuminate. Next, place a jumper from terminal RC to terminals G and H. Now place one lead from bulb to AC white terminal and the other lead from bulb to HIGH FAN. The bulb should illuminate. Remove the jumper and the bulb should not illuminate. If these tests are correct, the relay board is good. DO NOT replace it. If any one of these tests are incorrect, replace the relay board.

13E. RELAY, DOUBLE THROW

The relay controls AC power to the reversing valve. There are two different relays used. One relay has a 12V DC rated coil and is used on all Duo-Therm Heat Pumps except the mechanical control types. The mechanical control Duo-Therm Heat Pumps use a relay that has a 120V AC rated coil. Both relays have five (5) terminals. Terminals 1 and 3 are the coil terminals. When the coil (terminals 1 and 3) is not energized (no power to terminals 1 and 3), continuity should exist between terminals 4 to 5; and no continuity between terminals 2 to 4.

When the coil (terminals 1 and 3) is energized (power to terminals 1 and 3), continuity should exist between terminals 2 to 4 and no continuity between terminals 4 to 5.


14E. REVERSING VALVE

The reversing valve is the heart of a heat pump. It directs refrigerant flow to the coils to achieve proper direction of flow that allows the same system to supply heated or cooled air to enter the inside atmosphere of the structure according to occupants' desires.

The reversing valve's solenoid can be energized in either HEAT or COOL mode of operation. Duo-Therm Heat Pumps that are roof-mounted units have the solenoid energized in the COOL mode of operation.

One way to check the reversing valve is to feel the refrigerant line at the top of the inside coil. In the COOL mode, this line will be cool or cold to the touch. In the HEAT mode, this line will be warm or hot to the touch. If you do not achieve these results, direction of refrigerant flow is not correct. Check the relay (see Section 4.10), wiring (see Section 2.3) and thermostat (see Section 4.2). Refer to Section 1 for Principals of Heat Pump Operation.

The ohms resistance of the reversing valve solenoid coil is approximately 465 ohms plus or minus (\pm) 10%.

15E. RELAY, FAN SPEED (DPST)

The relay is a double pole, single throw and controls the fan motor in the roof mounted unit. When the AUX HEAT mode is selected or the outside temperature is too cold for HEAT PUMP operation and automatically goes to auxiliary operation, the relay will interrupt the circuit to the fan motor.

When COOL, OFF and HEAT PUMP modes are selected, the relay coil is not energized. When AUX. HEAT mode is selected the relay coil is energized with 12V DC.

To check the relay, first remove the wires from COM and NC terminals. Next verify the relay coil is not energized (no DC power), continuity should exist between terminals COM and NC and no continuity between terminals COM and NO. Next energize the relay coil with DC volts (10 to 16). Continuity should exist between terminals COM and NO and no continuity between COM and NC. If the above checks are correct, the relay is good – DO NOT replace it. If the above checks are not correct, the relay is defective and should be replaced.

NOTE: Verify the thermostat is wired properly from the furnace, as incorrect polarity on the furnace thermostat wires will energize the relay coil and keep the fan motor from operating in the roof mounted unit.



SECTION F. DUO-THERM BASEMENT AIR CONDITIONERS & HEAT PUMPS

OPERATION

1F. MODELS 390XX.XXX

This unit functions like a residential air conditioner.

Set the **System Switch** to COOL. Set the **Temperature Lever** to your comfort level. Set the **Fan Switch** to:

"**AUTO**": The fan cycles off and on with the compressor. "**ON**": The fan will run continuously. The compressor will turn off when the room temperature is low enough to satisfy the thermostat setting.

Air Circulation Without Cooling: Set the system switch to "**OFF**";

Set the fan switch to "**ON**". The fan will run continuously, circulating air.

FURNACE TO THERMOSTAT WIRING

When connecting a gas furnace to Dometic's **Heat/Cool** thermostat, the "**W**" and "**R**" terminals are used. This means there will be two wires on the "R" terminal (one wire from the furnace and one wire from the air conditioner).

FURNACE OPERATION

Set the fan switch to "**AUTO**" Set the system switch to "**HEAT**" Set the **temperature lever** to your comfort level. The furnace will come on and heat your coach as required. The furnace and blower will cycle ON and OFF as needed to maintain your comfort.

2F. MODELS 391XX.XXX

This unit functions like a residential air conditioner.

COOLING

Set the system switch to "COOL" Set the temperature lever to your comfort level Set the fan speed switch to "HI" or "LO" as desired. Set the fan auto switch to:

"ON", the fan will run continuously. The cooling unit will turn OFF when the room temperature is low enough to satisfy the thermostat setting from Item 2 above.

"AUTO", The fan will cycle OFF and ON with the cooling unit.

HEATING

Set the system switch to "HEAT".

Set the temperature lever to your comfort level.

Set the fan speed switch to "HI" or "LO" as desired.

Set the fan "AUTO" Switch to:

"**ON",** the fan will run continuously helping the furnace circulate air.

"AUTO", The fan will not operate.

AIR CIRCULATION with or

without cooling or heating: Set the system switch to "OFF", Set the fan mode switch to "ON" Set the fan speed to "HI" or "LO"

as desired

OFF

Set the system switch to "OFF", Set the fan mode switch to "AUTO".

THERMOSTAT FACE PLATE



3F. MODEL 393XX.XXX

BIMETAL THERMOSTAT OPERATION Cooling:

Set the SYSTEM SWITCH to COOL.

Set the temperature LEVER to your comfort level. Set the FAN switch to:

"AUTO", the fan cycles off and on with the compressor.

"ON", the fan will run continuously. The compressor will turn off when the room temperature is cool enough to satisfy the thermostat setting.

Heating:

Set the system switch to HEAT:

Set the temperature LEVER to your comfort level. Set the FAN switch to:

"AUTO", the fan will cycle off and on with the compressor.

"ON", The fan will run continuously. The compressor will cycle off and on with thermostat demand.

Auxiliary Heat:

Set the system switch to AUX.HEAT. Set the fan switch to AUTO.



BIMETAL

NOTE: The auxiliary heat position is only used if:

- You have a factory installed furnace operating from the heat pump system thermostat.

 The outside temperature is above 40 degrees and you wish to operate your furnace.

- For quick interior warm up.

 There is no 115 volt AC power available to operate your heat pump and you must operate the furnace for your comfort.

Fan:

To circulate air without heating or cooling: Set the SYSTEM SWITCH to OFF. Set the FAN SWITCH to ON.

Hi/Low:

HIGH: Fan speed position LOW: Fan speed position

DIGITAL THERMOSTAT OPERATION

Your air conditioner is operated from the control panel of the electronic wall thermostat. When the furnace is connected to this thermostat, it will operate from the same control panel.

Identification and operational descriptions for all control panel switches and display are listed below:

Liquid Crystal Display: This display will be illuminated any time the system is in operation.

The display shows the operator both the mode of the display (indicated by the arrow at the left side of the display), and the temperature for that mode.

There are three display modes: ACTUAL, COOL and HEAT.

The operator may choose the mode he desires to view by depressing the "MODE" switch. Each time the MODE switch is depressed, the display advances to the next mode. If the display is left in either COOL or HEAT, the thermostat will automatically return the display to ACTUAL in approximately three minutes.

A description of the three modes is:

ACTUAL: When in actual mode, the display is indicating current room temperature.

COOL SET: When in COOL mode, the display is indicating the current cooling setpoint temperature. At this time the cooling system setpoint temperature may be adjusted up or down to meet the individual's comfort level. See "Adjusting Setpoint" for further instructions.

HEAT SET: When in the HEAT mode, the display is indicating the current heating system setpoint temperature. At this time, the heating system setpoint temperature may be adjusted up or down to meet the operator's comfort level. See "Adjusting Setpoint" for further instructions.

All three display modes can be accessed without affecting the operation of the system. The system operation will remain normal unless a change is made to the setpoint to force a change in the system operation.

System Switch: The system switch has four positions to control the operation of the heating and cooling systems. They are as follows:

COOL: When in the COOL position, the compressor will cycle from the cooling system setpoint. Blower operation will be controlled by the position of the Cooling Fan Switch.

HEAT: When in the heat position, the heating system will cycle from the heating system setpoint. The heating blower will operate per the heating system manufacturer specifications.

OFF: When in the OFF position, no thermostat or system operation will occur. The liquid crystal will indicate room temperature until backup power is depleted (approximately 2 minutes).

AUXILIARY HEAT:

Set the system switch to AUX. HEAT. Set the FAN switch to AUTO.

NOTE: The AUXILIARY HEAT position is only used if:

You have a factory installed furnace operating from the heat pump system thermostat.

The outside temperature is above 40 degrees and you wish to operate your furnace.

For quick interior warm-ups.

There is no 115 volt AC power available to operate your heat pump and you must operate the furnace for your comfort.



FAN SWITCH: The Fan Switch has four positions from which to control the operation of the heat pump blower. The fan switch controls operation of the blower only after the system switch is place into the COOL or HEAT PUMP position.

HIGH AUTO: When in the high auto position, the heat pump blower operates at high speed and cycles off and on with the compressor.

LOW AUTO: When in low auto position, the heat pump blower operates at low speed and cycles off and on with the compressor.

HIGH and LOW ON: When in the high or low position, the heat pump blower operates continuously. The compressor cycles off and on as needed.

MOMENTARY SWITCHES: There are three momentary switches. Momentary switches are activated by depressing the center of the switch. A description of these three switches follows:

MODE: Depressing this switch advances the display mode from ACTUAL to COOL, HEAT and back to ACTUAL. When using this switch, you are indicating your desire to check or adjust the setpoint temperatures for cooling or heating. The cool setting determines the temperature at which the air conditioner will start to operate. The heat setting determines the temperature at which the heating system will start to operate.

UP: Depressing this switch increases the temperature setpoint.

DOWN: Depressing this switch decreases the temperature setpoint.

To adjust the setpoint for heating or cooling, press the MODE button until the arrow on the display indicates the desired setpoint you wish to change: COOL or HEAT. The display will indicate the current setpoint of the thermostat. Press UP or DOWN to change the setpoint. Once the new desired setpoint is displayed, press the MODE button until the arrow is pointing to ACTUAL. If the thermostat is left in the COOL or the HEAT mode the display will return to ACTUAL in about three minutes. After the display returns to ACTUAL, it takes 15 to 30 seconds for the thermostat to recognized the changes made to the setpoint.

4F. MODEL 39224.601

AIR CONDITIONER & THERMOSTAT

This packaged air conditioner contains a dual compressor refrigeration system. Each compressor is connected to a separate refrigeration circuit and air system. The system can be operated with a single compressor when the cooling requirement is low, or with two compressors when maximum cooling performance is required.

THERMOSTAT



This air conditioner operates a two-stage cooling system. The first compressor and refrigeration circuit is referred to as "**Stage 1 Cooling**". The second compressor and refrigeration circuit and air system is referred to as "**2nd Stage Cooling**". The first and second stage cooling will operate as indicated below.

1st Stage Cooling (the first compressor and air system) will operate when:

The thermostat is calling for cooling.

Power is being supplied by either shoreline or the on-board generator.

2nd Stage Cooling (the second compressor and air system) will operate when:

The thermostat senses room temperature is two degrees higher than set point.

The vehicle is being powered by the on-board generator. A 30 amp shoreline by itself will not provide enough power to operate the 1st and 2nd Stage cooling.

Switching and control of the 1st and 2nd Stage cooling is automatic. When operating from shoreline, the system automatically limits operation to 1st Stage cooling only. When the shoreline is plugged into the on-board generator, the system automatically allows 1st and 2nd Stage cooling. However, if powering both systems from the generator and cooling demand does not required both systems to operate, Stage 2 will shut down and only Stage 1 will operate.

THERMOSTAT:

This thermostat controls 12 volt DC heating and air conditioning systems. It can control one stage of heat and two stages of cooling. Changeover from heating to cooling is operator controlled — the thermostat can not make this change. Time delay circuits have been incorporated to protect the cooling system components.

The time delay is 3 minutes between "OFF" and "ON" cycles. There is a 30 second delay when the compressors turn on. This allows time for the generator to stabilize on initial starting. The balance of the delay (2.5 minutes) occurs when the compressor cycles off. This is to allow the compressor pressures to balance before restarting. There is a 30 second delay and 2 degrees between 1st and 2nd stage cooling operation.

OPERATION

Your air conditioner is operated from the control panel of the electronic wall thermostat. When the furnace is connected to this thermostat, it will operate from the same control panel.

Identification and operational descriptions for all control panel switches and display are listed below: (Refer to Figure 6A)

A. LIQUID CRYSTAL DISPLAY: This display will be illuminated any time the system is in operation.

The display shows the operator both the mode of the display (indicated by the arrow at the left side of the display) and the temperature for that mode. There are three display modes: **ACTUAL**, **COOL** and **HEAT**. The operator may choose the mode to view by depressing the "**MODE**" switch. Each time the **MODE** switch is depressed, the display advances to the next mode. If the display is left in either **COOL** or **HEAT**, the thermostat will automatically return the display to **ACTUAL** in approximately three minutes.

A description of the three modes is:

- **<u>ACTUAL</u>**: When in this mode, the display is indicating current room temperature.
- **COOL SET**: When in this mode, the display is indicating the current cooling setpoint temperature. At this time the cooling system setpoint temperature may be adjusted up or down to meet the individual comfort level. See "Adjusting Setpoint" for further instructions.
- **HEAT SET**: When in this mode, the display is indicating the current heating system setpoint temperature. At this time, the heating system setpoint temperature may be adjusted up or down to meet the operator's comfort level. See "Adjusting Setpoint" for further instructions.

All three display modes can be accessed without affecting the operation of the system. The system operation will remain normal unless a change is made to the setpoint to force a change in the system operation. **B. SYSTEM SWITCH**: The system switch has four positions to control the operation of the heating and cooling systems. They are as follows:

COOL: When in the "**COO**L" position, 1st and 2nd Stage cooling will cycle from the cooling system setpoint. Blower operation will be controlled by the position of the Cooling Fan Switch.

HEAT: When in this position, the heating system will cycle from the heating system setpoint. The heating blower will operate per the heating system manufacturer specifications.

OFF: When in the "**OFF**" position, no thermostat or system operation will occur. The liquid crystal display will indicate room temperature until backup power is depleted (approximately 2 minutes).

FAN: When in the fan position, the blower will operate continuously at high speed.

C. COOLING FAN SWITCH: The fan switch has four positions to control the operation of the cooling blower. The fan switch controls operation of the cooling blower only after the system switch is placed into the **COOL** position.

With the system switch in any other position, the fan switch will have no affect on the operation of the cooling blower. Fan switch positions and their resulting functions are as follows:

HIGH AUTO: When in the high auto position, the cooling blower operates at high speed and cycles "OFF" and "ON" with the 1st Stage compressor. The 2nd Stage cooling will cycle "ON" and "OFF" as needed. **LOW AUTO**: When in LOW AUTO position, the cooling blower operates at low speed and cycles "OFF" and "ON" with the 1st Stage compressor, the 2nd Stage cooling will cycle "ON" and "OFF" as needed.

HIGH and LOW ON: When in the HIGH or LOW ON positions, the cooling blower operates continuously. The 1st and 2nd Stage compressors cycle OFF and ON as needed.

D. MOMENTARY SWITCHES: Momentary Switches are activated by depressing the center of the switch. There are three momentary switches:

MODE: Depressing this switch advances the display mode from ACTUAL to COOL, HEAT and back to ACTUAL.

When using this switch, you are indicating your desire to check or adjust the setpoint temperatures for cooling or heating. The cooling setting determines the temperature at which the air conditioner will start to operate. The heat setting determines the temperature at which the heating system will start to operate.

UP: Depressing this switch increases the temperature setpoint.

DOWN: Depressing this switch decreases the temperature setpoint.

ADJUSTING SETPOINT

To adjust the setpoint for heating or cooling, press the MODE button until the arrow on the display indicates the desired setpoint you which to change, cool or heat. The display will indicate the current setpoint of the thermostat. Press UP or DOWN to change the setpoint. Once the new desired setpoint is displayed, press the MODE button until the arrow is pointing to ACTUAL. If the thermostat is left in the COOL or HEAT mode, the display will return to ACTUAL in about 3 minutes. After the display returns to ACTUAL, it takes 15 to 30 seconds for the thermostat to recognize the changes made to the setpoint.

5F. MODEL 39424.601

AIR CONDITIONER & THERMOSTAT

This packaged air conditioning heat pump contains a dual compressor refrigeration system. Each compressor is connected to a separate refrigeration circuit and air system. The system can be operated with a single compressor when the cooling requirement is low, or with two compressors when maximum cooling performance is required.

THERMOSTAT



The first compressor and refrigeration circuit is referred to as "**Stage 1 Cooling**". The second compressor and refrigeration circuit and air system is referred to as "**2nd Stage Cooling**". The first and second stage cooling will operate as indicated below.

1st Stage Cooling (the first compressor and air system) will operate when:

The thermostat is calling for cooling.

Power is being supplied by either shoreline or the on-board generator.

2nd Stage Cooling (the second compressor and air system) will operate when:

The thermostat senses room temperature is two degrees higher than set point.

The vehicle is being powered by the on-board generator. A 30 amp shoreline by itself will not provide enough power to operate the 1st and 2nd Stage cooling.

Switching and control of the 1st and 2nd Stage cooling is automatic. When operating from shoreline, the system automatically limits operation to 1st Stage cooling only. When the shoreline is plugged into the on-board generator, the system automatically allows 1st and 2nd Stage cooling. However, if powering both systems from the generator and cooling demand does not required both systems to operate, Stage 2 will shut down and only Stage 1 will operate.

THERMOSTAT

This thermostat controls the 12V DC heating and air conditioning systems. It can control one stage of heat and two stages of cooling and has an auxiliary heat mode for gas heating. Changeover from heating to cooling is operator controlled. The thermostat can not make this change. Time delay circuits have been incorporated to protect the heat pump system components. The time delay is 3 minutes between off and on cycles. Thirty seconds delay is at the turn "ON" of the compressors. This is to allow time for the generator to stabilized on initial starting. The balance of the delay (2.5 minutes) occurs when the compressor cycles "OFF". This is to allow the compressor pressures to balance before restarting. There is a thirty second delay and two degrees between the first and second stage cooling operation.

OPERATION

Your air conditioner is operated from the control panel of the electronic wall thermostat. When the furnace is connected to this thermostat, it will operate from the same control panel. Identification and operational descriptions for all control panel switches and display are listed below:

A. LIQUID CRYSTAL DISPLAY: This display will be illuminated any time the system is in operation.

The display shows the operator both the mode of the display (indicated by the arrow at the left side of the display) and the temperature for that mode. There are three display modes: **ACTUAL**, **COOL** and **HEAT**. The operator may choose the mode to view by depressing the "**MODE**" switch. Each time the **MODE** switch is depressed, the display advances to the next mode. If the display is left in either **COOL** or **HEAT**, the thermostat will automatically return the display to **ACTUAL** in approximately three minutes.

A description of the three modes is:

- **ACTUAL**: When in this mode, the display is indicating current room temperature.
- **COOL SET**: When in this mode, the display is indicating the current cooling setpoint temperature. At this time the cooling system setpoint temperature may be adjusted up or down to meet the individual comfort level. See "Adjusting Setpoint" for further instructions.
- **HEAT SET**: When in this mode, the display is indicating the current heating system setpoint temperature. At this time, the heating system setpoint temperature may be adjusted up or down to meet the operator's comfort level. See "Adjusting Setpoint" for further instructions.

All three display modes can be accessed without affecting the operation of the system. The system operation will remain normal unless a change is made to the setpoint to force a change in the system operation.

B. SYSTEM SWITCH: The system switch has four positions to control the operation of the heating and cooling systems. They are as follows:

COOL: When in the "**COO**L" position, 1st and 2nd Stage cooling will cycle from the cooling system setpoint. Blower operation will be controlled by the position of the Cooling Fan Switch.

HEAT: When in this position, the heating system will cycle from the heating system setpoint. The heating blower will operate per the heating system manufacturer specifications.

OFF: When in the "**OFF**" position, no thermostat or system operation will occur. The liquid crystal display will indicate room temperature until backup power is depleted (approximately 2 minutes).

AUX. HEAT: When in the auxiliary heat mode the gas furnace will heat your coach. The fan will operate per manufacturer specifications. **NOTE: THE FAN SWITCH MUST BE IN THE "AUTO" POSITION WHEN OPER-ATING FROM THE AUX. HEAT MODE**. **C. FAN SWITCH**: The fan switch has four positions from which to control the operation of the blower. The fan switch controls operation of the heat pump air conditioner blower.

HIGH AUTO: When in the high auto position, the cooling blower operates at high speed and cycles "OFF" and "ON" with the 1st Stage compressor. The 2nd Stage cooling will cycle "ON" and "OFF" as needed.

LOW AUTO: When in LOW AUTO position, the cooling blower operates at low speed and cycles "OFF" and "ON" with the 1st Stage compressor, the 2nd Stage cooling will cycle "ON" and "OFF" as needed.

HIGH and LOW ON: When in the HIGH or LOW ON positions, the cooling blower operates continuously. The 1st and 2nd Stage compressors cycle OFF and ON as needed.

E. MOMENTARY SWITCHES: Momentary Switches are activated by depressing the center of the switch. There are three momentary switches:

MODE: Depressing this switch advances the display mode from ACTUAL to COOL, HEAT and back to ACTUAL.

When using this switch, you are indicating your desire to check or adjust the setpoint temperatures for cooling or heating.

The cooling setting determines the temperature at which the air conditioner will start to operate. The heat setting determines the temperature at which the heating system will start to operate.

UP: Depressing this switch increases the temperature setpoint.

DOWN: Depressing this switch decreases the temperature setpoint.

ADJUSTING Setpoint

To adjust the setpoint for heating or cooling, press the MODE button until the arrow on the display indicates the desired setpoint you which to change, cool or heat. The display will indicate the current setpoint of the thermostat. Press UP or DOWN to change the setpoint. Once the new desired setpoint is displayed, press the MODE button until the arrow is pointing to ACTUAL. If the thermostat is left in the COOL or HEAT mode, the display will return to AC-TUAL in about 3 minutes. After the display returns to ACTUAL, it takes 15 to 30 seconds for the thermostat to recognize the changes made to the setpoint.

6F. DC VOLT REQUIREMENTS

DC VOLTS

On models 391XX.XXX, a DC volt supply is supplied to the thermostat location: Positive (+) DC volt wires to R terminal on the thermostat; and negative (–) DC volt wires to the black wire from the unit. Polarity is crucial for proper operation.

The operating range is 10 to 16 volts DC.

7F. COMPONENTS THERMOSTAT

A. MODEL 39015.601 and 39025.501

Two thermostats were used on these models: a cooling only thermostat and a heating and cooling thermostat. Both are 24V AC controlled systems.

On the base of the **cooling only thermosta**t, the is a FAN switch with two positions, AUTO and ON. This operates the air conditioner only. A separate thermostat is needed for the furnace.



Verify that the thermostat wiring is correct.

A three connector cable 19 to 22 AWG is to be used for low voltage connections. Low voltage wires in the control compartment are marked "R", "G" and "Y". Route low voltage cable from thermostat to unit electrical box.

Connect "R" from thermostat to red wire in control compartment. Connect "G" from thermostat to blue wire in control box. Connect "Y" from thermostat to yellow wire in control box. Use wire nuts to ensure good connections.

To check the thermostat, be sure the OFF switch is all the way to the right side. Next, disconnect all three wires at the terminals R, G and Y.

Next, using an ohmmeter, check for continuity between R and G and/or Y in the following manner. With room temperature above the set point temperature and FAN switch in AUTO position, continuity should exist between R to Y and R to G. With room temperature below the set point and FAN switch AUTO position, no continuity should exist between R to Y and R to G.

With FAN switch to ON position, continuity should exist between R to G regardless of room temperature.



To check ACTIVE terminals, place one lead from ohm meter to R terminal and the other lead to the ACTIVE terminal.

SWITCH COMBINATION	IF ROOM TEMP. IS ABOVE/BELOW Setpoint	TERMINALS THAT ARE "ON"		
FAN SWITCH	TEMP.:	G	Y	
Αυτο	ABOVE BELOW	X	X	
ON	BELOW	x	•	

The heating and cooling thermostat has two switches on the base. They are HEAT-OFF-COOL on the left side, and FAN-AUTO-ON on the right. This thermostat will operate an air conditioner and a furnace.

HEATING AND COOLING THERMOSTAT (FRONT)	
10 20 30 °C 50 60 70 80 90	
Duo-Therm	
HEAT-JULCOOL AUTO LON OFF	

Verify that the wiring to the thermostat is correct.

A three-connector cable 19 to 22 AWG is to be used for low voltage connections. Low voltage wires in the control compartment are marked " \mathbf{R} ", " \mathbf{G} " and " \mathbf{Y} ". Route low voltage cable from thermostat to unit electrical box. Use .50 dia. snap-bushing for routing cable into electrical box.

Connect **RC** from thermostat to red wire in control compartment. Connect **G** or **F** from thermostat to blue wire in control box. Connect **Y** from thermostat to yellow wire in control box. Use wire nuts to ensure good connections.

When connecting a gas furnace to this thermostat, the ${f RH}$ and ${f W}$ terminals are used.

To check the thermostat remove all wires. Next, using an ohm meter, put the HEAT-OFF-COOL switch in the COOL position. With room temperature above the setpoint temperature and FAN switch in AUTO position, continuity should exist between **RC** to **Y** and **RC** to **G**. With room temperature below set point temperatures, no continuity should exist between **RC** to **Y** and **RC** to **G**. With FAN switch to ON position, continuity should exist between **RC** to **G** regardless of room temperature.

With HEAT-OFF-COOL switch in the OFF position and FAN switch in the AUTO position, no continuity should exist between **RC** to **Y** and **RC** to **G** regardless of room temperature. With FAN switch to ON position, continuity should exist between **RC** to **G** and no continuity between **RC** to **Y** regardless of room temperature. With HEAT-OFF-COOL switch to HEAT and FAN switch to AUTO position, no continuity should exist between **RC** to **Y** and **RC** to **G** regardless of room temperature. With FAN switch to ON position, continuity should exist between **RC** to **G** and no continuity between **RC** to **Y** regardless of room temperature. With room temperature below setpoint temperature, continuity should exist between **RH** to **W**. With room temperature above setpoint temperature no continuity should exist between **RH** to **W**.



To check ACTIVE terminals, place one lead from ohm meter to \mathbf{RC} (cooling) or \mathbf{RH} (heating) terminal and the other lead to the ACTIVE (ON) terminal.

SWITCH COMBINATION		IF ROOM TEMP. IS ABOVE/BELOW Setpoint	TERMINALS THAT ARE "ON"			
SYSTEM SWITCH	FAN SWITCH	TEMP.:	G	Y	W	
		ABOVE	X	X		
Z		BELOW ABOVE	x	x		
ŏ	ON	BELOW	X			
L.	Αυτο	ABOVE BELOW ABOVE	X			
0	ON		•			
AT	AUTO	ABOVE BELOW ABOVE	x		x	
뽀	ON	BELOW	X		X	

B. MODELS 39025.502, 39035.601, 39045.601 & 39045.616

The thermostat is a 24V AC controlled system and is a bimetal type. It has two switches on the face of the thermostat. On the left side there is a SYSTEM switch and on the right side there is a FAN switch. This thermostat will operate an air conditioner and a furnace.



Verify the thermostat wiring is correct.

A three-conductor cable 18 to 22 AWG is to be used for low voltage connections. Route low voltage cable from thermostat to unit electrical box. Use .50 dia. snap-bushing for routing cable into electrical box.

Connect **R** from thermostat to red wire in control compartment. Connect **G** or **F** from thermostat to blue wire in control box. Connect Y from thermostat to yellow wire in control box. Use wire nuts to ensure good connections.

When connecting a gas furnace to Dometic's Heat/Cool thermostat, the \underline{W} and \underline{R} terminals are used. This means there will be two wires on the \underline{R} terminal (one wire from the furnace and one wire from the air conditioner).

To check the thermostat, remove all wires. Next, using an ohm meter with the SYSTEM switch in COOL position and the FAN switch in AUTO position and the room temperature above the setpoint temperature, continuity should exist between \mathbf{R} to \mathbf{Y} and \mathbf{R} to \mathbf{G} . No continuity should exist between \mathbf{R} to \mathbf{W} . With room temperature below setpoint temperature, no continuity should exist between \mathbf{R} to \mathbf{Y} , \mathbf{R} to \mathbf{W} and \mathbf{R} to \mathbf{G} . With the FAN switch to ON position and the room temperature above the set point temperature continuity should exist between \mathbf{R} to \mathbf{Y} and \mathbf{R} to \mathbf{G} . No continuity should exist between \mathbf{R} to \mathbf{W} . With the room temperature below the set point temperature, continuity should exist between R to G and no continuity between R to Y and R to W.

With the SYSTEM switch in OFF position and the FAN switch in AUTO position, no continuity should exist \mathbf{R} to $\underline{\mathbf{Y}}$, \mathbf{R} to $\underline{\mathbf{G}}$ and \mathbf{R} to $\underline{\mathbf{W}}$. With the FAN switch to ON position, continuity should exist between \mathbf{R} to $\underline{\mathbf{G}}$ and no continuity between \mathbf{R} to $\underline{\mathbf{Y}}$ and \mathbf{R} to $\underline{\mathbf{W}}$ regardless of room temperature.

With the SYSTEM switch in HEAT position, FAN switch in AUTO and room temperature above setpoint temperature, no continuity should exist between \mathbf{R} to \mathbf{Y} , \mathbf{R} to \mathbf{G} and \mathbf{R} to \mathbf{W} . With room temperature below set point temperature, continuity should exist between \mathbf{R} to \mathbf{W} and no continuity between \mathbf{R} to \mathbf{Y} and \mathbf{R} to \mathbf{G} . With the FAN switch to ON, continuity should exist between \mathbf{R} to \mathbf{G} regardless of room temperature.

To check ACTIVE terminals, place one lead from the ohm meter to the \mathbf{R} terminal and the other lead from the meter to the ACTIVE (ON) terminal.

SWITCH COMBINATION		IF ROOM TEMP. IS ABOVE/BELOW Setpoint	TERMINALS THAT ARE "ON"			
SYSTEM SWITCH	FAN SWITCH	TEMP.:	G	Y	W	
	AUTO	ABOVE BELOW	X	X		
5		ABOVE	x	x		
X	ON	BELOW	X			
	AUTO					
LL_		ABOVE	х			
0	ON	BELOW	X			
L	Αυτο					
		ABOVE	х		^	
""	ON	BELOW	X		X	

C. MODELS 39115.601, 39115.602, 39115.616 & 39115.626

The thermostat is a 12V DC controlled system and is a bimetal type. It has three (3) switches on the face of the thermostat. On the left side there is a SYSTEM switch and on the right side there are two FAN switches. The top switch if for HI or LOW FAN and the bottom one is for ON or AUTO. This thermostat will operate an air conditioner and a furnace.



Verify the wiring is correct.

A 2-conductor cable, 18 to 22 AWG is required for the 12V DC power source. This can be routed into the system at either the unit or the thermostat.

Select the shortest direct route between the power supply and the system. A negative wire must be supplied. Frame work grounding is not adequate.

At the unit, route both leads from the 12V DC supply and the four wires from the thermostat up through the plastic bushing in the bottom left of the electric box for connection.

Or at the thermostat, route both leads from the 12V DC supply through the wall and behind the thermostat.

Route the four wires from the thermostat up through the plastic bushing in the bottom left of the electric box for connection.

For furnace hookup or use of another thermostat, consult the installation instructions provided with the furnace and/ or the thermostat. Normally, the furnace will connect to the **RH** and **W** terminals of the thermostat.

WIRE CONNECTIONS:



There are four low voltage wires in the electric box of the air conditioner. They are black, yellow, blue and orange. The black wire goes to negative (–) DC volt power source. The yellow goes to thermostat Y terminal. The blue goes to thermostat **H** terminal and the orange goes to thermostat **G** terminal. The DC volt positive (+) from the power source goes to thermostat **RC** terminal. If a furnace is wired to the heat-cool thermostat, one furnace thermostat wire goes to terminal **RH** on the thermostat. The other furnace thermostat wire goes to terminal **W** on the thermostat.

AC	Terminal RC	Unit Wire Color Black	Bower Source +12V DC
	Ë G RH & W	Yellow Blue Orange (Furnace Option)	Field Supply Wires
			\uparrow
HEAT			

To check the thermostat remove all wires. Next, using an ohm meter, with the SYSTEM switch in the COOL position and the FAN switches in AUTO and HI and the room temperature above the setpoint temperature, continuity should exist between RC to G, RC to Y and RC to H. No continuity should exist between RH to W. With room temperature below setpoint temperature, no continuity would exist between RC to G, RC to Y and RC to H, and RH to W. With FAN switches in AUTO and LOW, and room temperature above setpoint temperature, continuity should exist between **RC** to **G** and **RC** to **Y**. No continuity should exist between **RC** to **H** and **RH** to **W**. With the FAN switches in ON and LOW and the room temperature above the setpoint temperature, continuity should exist between **RC** to **G** and **RC** to **Y**. No continuity should exist between **RC** to **H** and **RH** to **W**.

With the room temperature below the setpoint temperature, continuity should exist between **RC** to **G**. No continuity should exist between **RC** to **Y**, **RC** to **H**, and **RH** to **W**. With FAN switches to ON and HI and room temperature above setpoint temperature, continuity should exist between **RC** to **G**, **RC** to **Y** and **RC** to **H**. There should be no continuity between **RH** to **W**. With room temperature below set point temperature, continuity should exist between **RC** to **G** and **RC** to **H**; and no continuity should exist between **RC** to **Y** and **RH** to **W**.

With the SYSTEM switch to OFF and FAN switches to AUTO and HI or LOW and room temperature **above or below** set point temperature, no continuity should exist between **RC** to **G**, **RC** to **Y**, **RC** to **H** and **RH** to **W**. With FAN switches to ON and LOW and room temperature above or below setpoint temperature, continuity should exist between **RC** to **G** and no continuity between **RC** to **Y**, **RC** to **H** and **RH** to **W**. With FAN switches to ON and HI and room temperature above or below setpoint temperature. Continuity should exist between RC to **G** and RC to H and no continuity between RC to G and RC to H and no continuity between RC to Y and RH to W.

With the SYSTEM switch HEAT position, FAN switches to AUTO and HI or LOW positions, and room temperature above setpoint temperature. No continuity would exist between RC to G, RC to Y, RC to H and RH to W. With room temperature below setpoint temperature continuity would exist

between RC to G, RC to Y and RC to H. With FAN switches to ON and LOW and room temperature above setpoint temperature, continuity would exist between RC to Y, RC to H, and RH to W. With room temperature below setpoint temperature, continuity should exist between RC to G and RH to W. No continuity would exist between RC to Y and RC to H. With FAN switches to ON and HI and room temperature above setpoint temperature, continuity should exist between RC to G and RC to H and no continuity between RC to Y and RH to W. With room temperature below setpoint temperature, continuity should exist between RC to G, RC to H and RH to W. No continuity would exist between RC to Y.

To check ACTIVE (ON) terminals, place on lead from ohm meter to RC or RH terminal and the other lead from the meter to the ACTIVE terminal.

SWITCH COMBINATION		IF ROOM TEMP. IS ABOVE/BELOW	TERMINALS THAT ARE "ON"			
SYSTEM SWITCH	FAN SWITCH	TEMP.:	G	Y	H	W
		ABOVE	Х	X	X	
	HIAUIO	BELOW	v	v		
		BELOW	X			
۲	LO AUTO					
ŏ		ABOVE	х	x		
Ŭ		BELOW	X			
		ABOVE	<u>X</u>	X		
	HI ON	BELOW	X			
		ABOVE	x	×		
	HI AUTO	BELOW	~			
		ABOVE				
ļL.	LO AUTO	BELOW				
ЦО		ABOVE	x			
	LOON	BELOW	X			
		ABOVE	X		X	
	HI ON	BELOW	X		X	
		ABOVE				
	HI AUTO	BELOW				X
⊢		BELOW			1	x
EA.	LO AUTO	-				
I		ABOVE	x			
		BELOW	X		Y	X
		BELOW	X		X X	x
	HI ON					

D. MODEL 39224.601

This thermostat is designed to operate DC volt controlled air conditioner systems and an independent heat system. It is a manual changeover thermostat between heating and cooling. It also incorporates time delay circuitry to protect against system short cycling. This thermostat has delay circuitry on start-up so Circuit 1 compressor starts after fan motors, then delay circuitry for Circuit 2 compressor start. It is an electronic thermostat with three pushbuttons (MODE, SET TEMPERATURE UP AND DOWN) and an LCD (Liquid Crystal Display).



To check the thermostat, first verify the wiring to it is correct. A two-conductor cable, 18 to 22 AWG is required for the DC volt power source. This MUST be routed to the system at the thermostat. There is a nine-terminal block on the back of the thermostat.

Looking at the back of the thermostat, the terminal designation from right-to-left is Y2, Y1, W, R, B, GH, GL and the last two are not designated. DC volt supply wires into terminal R, positive (+); and terminal B, negative (-). There is a five-wire (white, yellow, black orange and blue) harness assembly that wires into the terminal block also. White goes to <u>Y2</u>, yellow goes to <u>Y1</u>, black goes to <u>B</u> (this makes two wires on this terminal), orange goes to GH, and blue goes to **GL**. If a furnace is wired to the thermostat the two furnace thermostat wires **MUST** be wired correctly. The furnace has two wires for thermostat connections. One wire should be marked 12V DC or (+) and the other wire may be unmarked, or labeled "thermostat". The wire marked 12V DC or (+) must be wired to terminal W. The unmarked wire (or one labeled "thermostat") must be wired to B terminal (this will be the third wire to this terminal).



To check the thermostat, first verify positive (+) DC is to terminal \mathbf{R} and negative (-) is to terminal \mathbf{B} , at the back of the thermostat. Operating range is 10 to 16 volts DC. NOTE: To check voltage between terminals, at the back of the thermostat, place the negative (-) lead from the voltmeter to terminal \mathbf{B} and the positive (+) lead from the voltmeter to the ACTIVE terminal.

With the SYSTEM switch to COOL and FAN switch to HIGH AUTO and room temperature ABOVE setpoint temperature, you should have voltage between terminal **B** (black wire) to terminal **Y1** (yellow wire) and terminal **B** (black wire) to terminal **GH** (orange wire). You should NOT have voltage between terminal **B** (black wire) to terminals **GL** (blue wire) and **W**. With room temperature BELOW setpoint temperature you should NOT have voltage between terminal **B** (black wire) to terminals **Y1**, **Y2**, **GL**, **GH** or **W**.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three minute delay in "active" terminals. If setpoint temperature is more than two degrees from room temperature, there will be a thirty second delay to $\underline{Y2}$ terminal after $\underline{Y1}$ terminal is active.

With SYSTEM switch to COOL and FAN switch to AUTO LOW, and room temperature is above setpoint temperature, you should have voltage between terminal **B** (black wire) to terminal **Y1** (yellow wire) and terminal **B** (black wire) to terminal **GL** (blue wire). You should **NOT** have voltage between terminal **B** (black wire) to terminals **GH** (orange) and **W**. With room temperature BELOW setpoint temperature you should NOT have voltage between terminal **B** (black wire) to terminals **Y1**, **Y2**, **GL**, **GH** and **W**.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three minute delay in "active" terminals. If setpoint temperature is more than two degrees from room temperature, there will be a thirty second delay to $\underline{Y2}$ terminal after $\underline{Y1}$ terminal is active.

With the SYSTEM switch to COOL and FAN switches to LOW ON, and room temperature ABOVE setpoint temperature, you should have voltage between terminal **B** (black wire) to terminals **Y1** (yellow wire) and **GL** (blue wire). You should **NOT** have voltage between terminal **B** (black wire) to terminals **GH** (orange wire) and **W**. With room temperature BELOW setpoint temperature, you should have voltage between terminal **B** (black wire) to terminals **GL** (blue wire). You should **NOT** have voltage between terminal **B** (black wire) to terminal **GL** (blue wire). You should **NOT** have voltage between terminal **B** (black wire) to terminal **GL** (blue wire) to terminals **Y1**, **Y2**, **GH** and **W**.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals. If setpoint temperature is more than two degrees from room temperature, there will be a thirty second delay to <u>Y2</u> terminal after <u>Y1</u> terminal is active.

With the SYSTEM switch to COOL and FAN switches to HIGH ON and room temperature ABOVE setpoint temperature, you should have voltage between terminal **B** (black wire) to terminals **Y1** (yellow wire) and **GH** (orange wire).

You should NOT have voltage between terminal \underline{B} to terminals <u>GL</u> and <u>W</u>. With room temperature BELOW setpoint temperature, you have voltage between terminal <u>B</u> (black wire) to terminal <u>GH</u> (orange wire). You should NOT have voltage between terminal <u>B</u> to terminals <u>Y1</u>, <u>Y2</u>, <u>GL</u> and <u>W</u>.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals. If setpoint temperature is more than two degrees from room temperature, there will be a thirty second delay to <u>Y2</u> terminal after <u>Y1</u> terminal is active.

With the SYSTEM switch to OFF and FAN switches to AUTO HIGH, AUTO LOW, ON LOW and ON HIGH with room temperature ABOVE or BELOW setpoint temperature, you should **NOT** have voltage between terminal **B** to **Y1**, **Y2**, **GL**, **GH** or **W**.

With the SYSTEM switch to FAN and FAN switches to AUTO HIGH, AUTO LOW, ON LOW or ON HIGH with room temperature ABOVE or BELOW setpoint temperature, you should have voltage between terminal **B** (black) to terminal **GH** (orange). You should NOT have voltage between terminal **B** to terminals **Y1**, **Y2**, **GL** or **W**.

With the SYSTEM switch to HEAT and FAN switches to AUTO HIGH, AUTO LOW, ON LOW or ON HIGH and room temperature ABOVE setpoint temperature, you should NOT have voltage between terminal \underline{B} to any other terminal (<u>Y1</u>, <u>Y2</u>, <u>GL</u>, <u>GH</u> or <u>W</u>) except <u>R</u>. With room

temperature BELOW setpoint temperature, you should have voltage between \underline{B} (black) to terminal \underline{W} . You should **NOT** have voltage between terminal \underline{B} to $\underline{Y1}$, $\underline{Y2}$, \underline{GL} or \underline{GH} .

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals. If setpoint temperature is more than two degrees from room temperature, there will be a thirty second delay to <u>Y2</u> terminal after <u>Y1</u> terminal is active.

SWITCH COMBINATIONS		IF ROOM TEMP.	TERMINALS THAT ARE "ON"				
SYSTEM SWITCH	FAN SWITCH	SET-POINT TEMP:	Y1 Yellow	Y2 White	GL Blue	GH Orange	w
		ABOVE	Х			Х	
	HIAUTO	BELOW					
	LO AUTO	ABOVE	х		х		
٦L		BELOW					
0 0	LO ON	ABOVE	х		х		
0		BELOW			x		
	HI ON	ABOVE	Х			Х	
		BELOW				х	
		ABOVE					
	IIIAOTO	BELOW					
	LO AUTO	ABOVE					
L.		BELOW					
Ο	LO ON	ABOVE					
		BELOW					
	HI ON	ABOVE					
		BELOW					
		ABOVE			х		
		BELOW			х		
	LO AUTO	ABOVE			х		
Z		BELOW			x		
FΑ		ABOVE			х		
		BELOW			Х		
	HION	ABOVE			Х		
	_	BELOW			х		
	ΗΙΔΗΤΟ	ABOVE					
		BELOW					х
	LO AUTO	ABOVE					
AT		BELOW					х
Ψ	LO ON	ABOVE					
		BELOW					х
	HI ON	ABOVE					
		BELOW					Х

To check ACTIVE terminals: Place the negative (–) lead from the DC voltmeter on terminal B (black wire) and the positive (+) lead to the ACTIVE terminal. When the SYSTEM switch is in the COOL position and room temperature is more than two degrees ABOVE set point temperature, terminal Y2 is ACTIVE thirty seconds after terminal Y2 is ACTIVE.

E. MODEL 39424.601 & 393XX.XXX DIGITAL

This thermostat is designed to operate 12V DC single-stage heat pump and an independent single-stage auxiliary heat system. It is a manual changeover thermostat between heating, cooling and auxiliary heat. It also incorporates time delay circuitry to protect against system short cycling.

There is a time delay of approximately three minutes between OFF and ON cycles.

Default temperatures of 65°F. for heat and 75°F. for cool have been incorporated into this thermostat. If the thermostat is without power for 10 to 15 seconds, it will default to these temperatures.

Operating temperatures for both heating and cooling systems are changeable to suit the comfort needs of the occupants.

This thermostat is used as a remote wall mounted thermostat. The heat pump can have an air distribution box or a ducted system.

Next, verify the wiring to the thermostat is correct.

Thermostat Wiring for DIGITAL Thermostat:

Route the ten-conductor cable from the $14" \times 14"$ opening to the thermostat location. Route a two-conductor cable from the coach's 12 volt DC power source to the thermostat location. Connect 12 volt **positive** lead to the green wire on the thermostat cable.

Connect the 12 volt DC volt **<u>negative</u>** lead to the brown lead. Secure both connections using wire nuts.

NOTE: The DC volt connections are needed to power the liquid crystal display (LCD) and thermostat in the AUX. HEAT mode when 115 volt AC is not available.

At the thermostat location, leave about six inches of cable extending through the wall. Plug the thermostat cable into the thermostat connector.

When an auxiliary furnace is used with the heat pump, a singlewire conductor must be routed from the furnace to the thermostat location. Connect this wire from the furnace to the violet pigtail at the thermostat and secure with wire nut. Tuck the excess wire back into the wall and fill opening with insulation to prevent drafts that could affect the thermostat operation. Using the two screws provided, secure the thermostat to the wall.

THERMOSTAT CONNECTIONS



NOTE: The furnace has two wires for thermostat connections. One wire should be marked 12V DC or (+) and the other wire may be unmarked, or labeled "thermostat". The wire marked 12V DC or (+) should be capped and not used with the heat pump setup. The wire marked "thermostat" or the unmarked wire is the wire to connect to the violet thermostat pigtail.

If the 12V DC(+) is hooked to the violet wire at the thermostat, the heat pump fan motor will NOT operate in any mode.

Before checking the thermostat for operation, first determine that the thermostat is receiving DC power from the relay board then disconnect the cable assembly from the back of the thermostat.

Next, use a DC voltmeter and check from red wire or Pin 2 on cable assembly (positive [+] lead from voltmeter) to brown wire or Pin 7 (negative [-] lead from voltmeter). You should get a voltage reading of approximately 12V DC. Next, move the negative (-) lead from the voltmeter to each of the following wires or pins:

Blue (Pin 6), Yellow (Pin 5), Black (Pin 4) White (Pin 3). You should get a voltage reading of approximately 12V DC on each wire. This indicates the relay board and cable assembly are providing proper power and circuits to the thermostat.



NOTE: Pin 2 (red wire) is positive DC volts when ambient (outside) air is above 40°F. Pin 1 (violet wire) is positive DC volts when ambient (outside) air is below 40°F. When ambient (outside) air is below 40°F., only "FAN LO ON" and "HI ON" will operate in the heat pump.

If the above voltage checks are correct and the unit does not operate correctly, check the thermostat.

To check the thermostat, first verify positive (+) DC is to red wire (Pin 2), and negative (-) DC is to brown wire (Pin 7) at the back of the thermostat. Operating range is 10 to 16 volts DC.

With System Switch in COOL, Fan Switch in HI AUTO and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4), yellow wire (pin 5) and blue wire (Pin 6). You should **NOT** have voltage between brown wire to violet or white wires. With room temperature BELOW setpoint temperature, you should **NOT** have voltage between brown wire to violet, white, black, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in COOL, Fan Switch in LO AUTO and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4) and yellow wire (P5). You should NOT have voltage between brown wire to violet, white or blue wires. With room temperature BELOW setpoint temperature, you should NOT have voltage between brown wire to violet, white, black, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in COOL, Fan Switch in LO ON and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4) and yellow wire (Pin 5). You should NOT have voltage between brown wire to violet, white or blue wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4). You should NOT have voltage between brown wire to violet, white, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in COOL, Fan Switch in HI ON and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4), yellow wire (Pin 5) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet or white wire. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet, white or yellow wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in COOL, Fan Switch in LO ON and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4) and yellow wire (Pin 5). You should NOT have voltage between brown wire to violet, white or blue wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4). You should NOT have voltage between brown wire to violet, white, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in COOL, Fan Switch in HI ON and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4), yellow wire (Pin 5) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet or white wire. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet, white or yellow wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in the OFF, Fan Switch in HI AUTO or LO AUTO and room temperature ABOVE or BELOW setpoint temperature, you should NOT have voltage between brown wire to violet, white, black, yellow or blue wires.

With System Switch in OFF, Fan Switch in LO ON and room temperature ABOVE or BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4). You should NOT have voltage between brown wire to violet, white, yellow or blue wires. With System Switch in OFF, Fan Switch in HI ON and room temperature ABOVE or BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet, white or yellow wires.

With System Switch in HEAT PUMP, Fan Switch in HI AUTO and room temperature ABOVE setpoint temperature, you should NOT have voltage between brown wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to white wire (Pin 3), black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet or yellow wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in HEAT PUMP, Fan Switch in LO AUTO and room temperature ABOVE setpoint temperature, you should NOT have voltage between brown wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, You should have voltage between brown wire (Pin 7) to white wire (Pin 3) and black wire (Pin 4). You should NOT have voltage between brown wire to violet, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in HEAT PUMP, fan switch in LO ON and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4). You should NOT have voltage between brown wire to violet, white, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to white wire (Pin 3) and black wire (Pin 4). You should NOT have voltage between brown wire to violet, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in HEAT PUMP, Fan Switch in HI ON and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet, white or yellow wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to white wire (Pin 3), black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet or yellow wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

Before checking the thermostat for operation in AUX. HEAT, verify that DC volts (10 to 16) are available between the green wire (+) and brown wire (–) at the back of the thermostat.

With System Switch in AUX HEAT, Fan Switch in HI AUTO and room temperature ABOVE setpoint temperature, you should NOT have voltage between brown wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to violet wire (Pin 1). You should NOT have voltage between brown wire to white, black, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in AUX HEAT, Fan Switch in LO AUTO and room temperature ABOVE setpoint temperature, you should NOT have voltage between brown wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to violet wire (Pin 1). You should NOT have voltage between brown wire to white, black, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in AUX HEAT, Fan Switch in LO ON and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4). You should NOT have voltage between brown wire to violet, white, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to violet wire (Pin 1) and black wire (Pin 4). You should NOT have voltage between brown wire to white, yellow or blue wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.

With System Switch in AUX HEAT and fan switch in HI ON and room temperature ABOVE setpoint temperature, you should have voltage between brown wire (Pin 7) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to violet, white or yellow wires. With room temperature BELOW setpoint temperature, you should have voltage between brown wire (Pin 7) to violet wire (Pin 1), black wire (Pin 4) and blue wire (Pin 6). You should NOT have voltage between brown wire to white or yellow wires.

NOTE: When setpoint temperature is changed above or below room temperature, there will be a three (3) minute delay in "active" terminals.





SWITCH COMBINATIONS AND THEIR CORRESPONDING "ACTIVE" TERMINALS

SWITCH COMBINA- TIONS		If room Temp. is Above/ Below	Terminals that are "ON		N"		
System Switch		setpoint temp:	Pin 3 White	Pin 1 Violet	Pin 5 Yellow	Pin 6 Blue	Pin 4 Black
	HI Auto –	Above			X	X	X
_		Below					
		Above			X		X
Q		Below					
Ο	OS Lo on -	Above			X		X
S		Below					X
	HI On	Above			X	Х	X
		Below				Χ	X
		Above					
		Below					
		Above					
	LU Auto -	Below					
Ц	10.07	Above					X
		Below					X
HI On		Above				X	X
		Below				Χ	X
	Above						
K		Below	X			Χ	X
5		Above					
P		Below	X				X
F	10.07	Above					X
Þ		Below	X				Х
ш		Above				X	X
Н		Below	X			X	X
_		Above					
		Below		X			
		Above					
		Below		X			
	10.07	Above					X
		Below		X			X
A		Above				X	X
		Below		X		X	X

TO CHECK "ACTIVE" TERMINALS: Place the negative (–) lead from the voltmeter on Pin 7 or Brown wire and the positive (+) lead from the voltmeter to the "ACTIVE" pin or wire to read DC voltage.

After setpoint temperature is changed, there could be a three (3) minute delay on some "ACTIVE" terminals.

BIMETAL

This thermostat is designed to operate 12V DC singlestage heat pump and an independent single-stage auxiliary heat system. It is a manual changeover thermostat between heating, cooling and auxiliary heat. Operating temperatures for both heating and cooling systems are changeable to suit the comfort needs of the occupants.

This thermostat is used for a remote wall mounted thermostat. Check the operation. Next, verify the wiring to the thermostat is correct.

Thermostat Wiring for Dometic Bimetal Thermostat:

Route the ten-conductor cable from the unit to the thermostat location. Leave enough cable to connect to the low voltage cable. At the thermostat location, leave about six (6") inches of cable extending through the wall. Plug the thermostat cable into the thermostat connector cable.

When an auxiliary furnace is used with the heat pump, a two conductor cable must be routed from the furnace to the thermostat location. Connect one wire from the furnace to the violet wires with a wirenut. Connect the other wire from the furnace to the green wire in the thermostat cable and secure with a wire nut. Tuck the excess wire back into the wall and fill opening with insulation to prevent drafts that could affect the thermostat operation. Secure the thermostat to the wall using the two screws.

NOTE: Verify the heat anticipator is set properly for the auxiliary furnace. Failure to set the anticipator can cause incorrect operation or failure of thermostat in AUX HEAT or HEAT PUMP setting.





Before checking the thermostat for operation, first determine that the thermostat is receiving DC power from the relay board then disconnect the cable assembly from the back of the thermostat.

Next, use a DC voltmeter and check from red wire or Pin 2 on cable assembly (positive [+] lead from voltmeter) to brown wire or Pin 7 (negative [-] lead from voltmeter). You should get a voltage reading of approximately 12V DC. Next, move the negative (-) lead from the voltmeter to each of the following wires or pins:

Blue (Pin 6), Yellow (Pin 5), Black (Pin 4) White (Pin 3). You should get a voltage reading of approximately 12V DC on each wire. This indicates the relay board and cable assembly are providing proper power and circuits to the thermostat.

NOTE: Pin 2 (red wire) is positive DC volts when ambient (outside) air is above 40°F. Pin 1 (violet wire) is positive DC volts when ambient (outside) air is below 40°F.

If the above voltage checks are correct and the unit does not operate correctly, check the thermostat.

If the above voltage checks are not as described, check the relay board and the cable assembly.

To check the thermostat, first remove it from its mounting on the wall. Then disconnect the thermostat assembly from the cable assembly in the wall. Now you are ready to do a continuity check on the thermostat assembly. Place the positive (+) lead from the ohm meter on red wire (Pin 2) and negative (-) lead from the ohm meter to the active pin or wire to read continuity. **POLARITY IS IMPORTANT FOR A PROPER CHECK TO BE DONE**.

With System Switch in COOL, Fan Switch in HI AUTO and room temperature ABOVE setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4), yellow wire (Pin 5) and blue wire (Pin 6). You should NOT have continuity between red wire to violet or white wires.

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With room temperature BELOW setpoint temperature, you should NOT have continuity between red wire to violet, white, black, yellow or blue wires.

With System Switch in COOL, Fan Switch in LOW AUTO and room temperature ABOVE setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4) and yellow wire (Pin 5). You should NOT have continuity between red wire to violet, white or blue wires. With room temperature BELOW setpoint temperature, you should NOT have continuity between red wire to violet, white, black, yellow or blue wires.

With system switch in COOL, Fan Switch in LOW ON and room temperature ABOVE setpoint temperature you should have continuity between red wire (Pin 2) to black wire (Pin 4) and yellow wire (Pin 5). You should NOT have continuity between red wire to violet, white, or blue wires. With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4). You should NOT have continuity between red wire to violet, white, yellow or blue wires.

With System Switch in COOL, Fan Switch in HI ON and room temperature ABOVE setpoint temperature you should have continuity between red wire (Pin 2) to black wire (Pin 4), yellow wire (Pin 5) and blue wire (Pin 6). You should NOT have continuity between red wire to violet or white wires. With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have continuity between red wire to violet, white or yellow wires.

With System Switch in OFF, Fan Switch in HI AUTO or LOW AUTO and room temperature ABOVE or BELOW setpoint temperature, you should NOT have continuity between red wire to violet, white, black, yellow or blue wires.

With System Switch in OFF, Fan Switch in LOW ON and room temperature ABOVE or BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4). You should NOT have continuity between red wire to violet, white, yellow or blue wires.

With System Switch in OFF, Fan Switch in HI ON and room temperature ABOVE or BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have continuity between red wire to violet, white or yellow wires.

With System Switch in HEAT PUMP, Fan Switch in HI AUTO and room temperature ABOVE setpoint temperature, you should NOT have continuity between red wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to white wire (Pin 3), black wire (Pin 4), and blue wire (Pin 6). You should NOT have continuity between red wire to violet or yellow wires.

With System Switch in HEAT PUMP, Fan Switch in LOW AUTO and room temperature ABOVE setpoint temperature, you should NOT have continuity between red

wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to white wire (Pin 3) and black wire (Pin 4). You should NOT have continuity between red wire to violet, yellow or blue wires.

With System Switch in HEAT PUMP, Fan Switch in LOW ON and room temperature ABOVE setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4). With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to white wire (Pin 3) and black wire (Pin 4). You should NOT have continuity from red wire to violet, yellow or blue wires.

With System Switch in HEAT PUMP, Fan Switch in HI ON and room temperature ABOVE setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have continuity between red wire to violet, white or yellow wires. With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to white wire (Pin 3), black wire (Pin 4) and blue wire (Pin 6). You should NOT have continuity between red wire to violet or yellow wires.

With System Switch in AUX HEAT, Fan Switch in HI AUTO and room temperature ABOVE setpoint temperature, you should NOT have continuity between red wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have continuity between violet wire (Pin 1) and green wire. You should NOT have continuity between red wire to violet, white, black, yellow or blue wires.



With System Switch in AUX HEAT, Fan Switch in LOW AUTO and room temperature ABOVE setpoint temperature, you should NOT have continuity between red wire to violet, white, black, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have continuity between violet wire (Pin 1) and green wire. You should NOT have continuity between red wire to violet, white, black, yellow or blue wires.

With System Switch in AUX HEAT, Fan Switch in LOW ON and room temperature ABOVE setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4). You should NOT have continuity between red wire to violet, white, yellow or blue wires. With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to black wire)Pin 4) and between violet wire (Pin 1) to green wire. You should NOT have continuity between red wire to violet, white, yellow or blue wires.

With System Switch in AUX HEAT, Fan Switch in HI ON and room temperature ABOVE setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4) and blue wire (Pin 6). You should NOT have continuity between red wire to violet, white or yellow wires. With room temperature BELOW setpoint temperature, you should have continuity between red wire (Pin 2) to black wire (Pin 4) and blue wire (Pin 6) and between violet wire (Pin 1) and green wire. You should NOT have continuity between red wire to violet, white or yellow wires.

SWITCH COMBINATIONS AND THEIR CORRESPONDING "ACTIVE" TERMINALS

To check "ACTIVE" terminals, place the positive (+) lead from the ohm meter on Pin 2 or red wire and negative (–) lead from ohm meter to the "active" pin or wire to read continuity.

With System Switch in AUX HEAT and room temperature BELOW setpoint temperature, continuity will exist between violet wire and green wire. With room temperature ABOVE setpoint temperature, continuity will NOT exist between violet and green wire.

SWITCH COMBINA- TIONS		If room Temp. is Above/	Те	ermina	Is that a	are "O	N"
System Switch	Fan Switch	setpoint temp:	Pin 3 White	Pin 1 Violet	Pin 5 Yellow	Pin 6 Blue	Pin 4 Black
	HI Auto -	Above			Χ	Χ	Χ
		Below					
	LO Auto -	Above			X		Χ
Q		Below					
O	LO On -	Above			X		Χ
S	LO On	Below					Χ
	HI On _	Above			X	Χ	Χ
	_	Below				X	Х
	HI Auto - LO Auto - LO On -	Above					
		Below					
		Above					
		Below					
F		Above					Χ
	Below					X	
	HI On _	Above				Х	Χ
		Below				Χ	Х
Д	HI Auto –	Above					
Σ		Below	X			Χ	Χ
Π	LO Auto -	Above					
Δ		Below	<u>X</u>				X
	LO On -	Above					X
		Below	X				Χ
14	HI On -	Above				<u>X</u>	X
4		Below	X			<u>X</u>	X
	HI Auto –	Above					
A		Below					
Ш	LO Auto-	Above					
I		Below					
×	LO On	Above					X
N		Below					X
A	HI On –	Above				<u>X</u>	X
		Below	1			Х	X

CABLE ASSEMBLY 8F.

A. MODEL 39224.601 (AIR CONDITIONER)

The cable assembly is a five-wire assembly. The thermostat end has a five-pin flat connector:

Pin 1	=	Yellow Wire
Pin 2	=	White Wire
Pin 3	=	Orange Wire
Pin 4	=	Blue Wire
Pin 5	=	Black wire

The unit end has a six-pin square connector.

Pin 1	=	Yellow Wire
Pin 2	=	White Wire
Pin 3	=	Orange Wire
Pin 4	=	Blue Wire
Pin 5	=	Black Wire

To check the cable assembly, first unplug each end of the cable assembly. Next, check for continuity on each wire such as Pin 1 to Pin 1, etc. Continuity should be present from Pin 1 to Pin 1, etc.

Next, check for continuity from one wire to each of the other wires, such as Pin 1 to Pin 2; then Pin 1 to Pin 3, etc. No continuity should be present from one wire to any other wire in the assembly. Be sure to check each wire.



B. MODEL 39424.601 HEAT PUMP

The cable assembly is a ten-wire cable with seven of the ten wires used. The thermostat end has a 10-pin flat connector with seven positions used.

- Pin 1 Violet Wire =
- Pin 2 Red Wire =
- Pin 3 White Wire =
- Pin 4 Black Wire =
- Yellow Wire Pin 5 =
- Pin 6 Blue Wire =
- Pin 7 = **Brown Wire**

The unit end has a 9-pin square connector with seven positions used.

Pin 1	=	Violet Wire
Pin 2	=	Red Wire
Pin 3	=	White Wire
Pin 4	=	Black Wire
Pin 5	=	Yellow Wire
Pin 6	=	Blue Wire
Pin 7	=	Brown Wire

To check the cable assembly, first unplug each end of the cable assembly. Next, check for continuity on each wire, such as Pin 1 to Pin 1, then Pin 2 to Pin 2, etc. Continuity should be present from Pin 1 to Pin 1, then Pin 2 to Pin 2, etc.

Next, check for continuity from one wire to each of the other wires, such as Pin 1 to Pin 2, then Pin 1 to Pin 3, etc. NO continuity should be present from one wire to any other wire in the assembly. Be sure to check each wire.

5

8

9

Use this row

PIN 10

BROWN

YELLOW

BLACK

WHITE

VIOLET

Violet Wire

Red Wire

White Wire

Black Wire

Yellow Wire

Brown Wire

Blue Wire

RED

PIN 1

Pin 1 =

Pin 2 =Pin 3 =

Pin 4 =Pin 5 =

Pin 6 =

Pin7 =

Pin 8 & 9 = Open

BLUE

for checks

C. MODEL 39325.XXX AND 39335.XXX HEAT PUMPS

The cable assembly is a ten wire cable with seven of the ten wires used. The thermostat end has a 10-pin flat connector with seven positions used.

Pin 1 =	Violet Wire
Pin 2 =	Red Wire
Pin 3 =	White Wire
Pin 4 =	Black Wire
Pin 5 =	Yellow Wire
	Dive M/ine

- Pin 6 = Blue Wire
- Pin 7 = Brown Wire

The unit end has the above seven wires stripped and needs to be wired to the corresponding color of wire in the electric box of the unit. To check the cable assembly, first unplug the thermostat end and disconnect each wire at the unit. Next, check for continuity on each wire such as violet to violet, red to red, etc. Continuity should be present from violet to violet, red to red, etc.

Next, check for continuity from one wire to each of the other wires. NO continuity should be present from one wire to any other wire in the assembly.



9F. REVERSING VALVE

The reversing valve is the heart of a heat pump. It directs refrigerant flow to the coils to achieve proper direction of flow that allows the same system to supply heated or cooled air to enter the inside atmosphere of the structure according to occupants' desires.

The reversing valve's solenoid can be energized in either HEAT or COOL mode of operation. Most Duo-Therm Heat Pumps have the solenoid energized in the COOL mode of operation. The Dual (Model 39424) has the solenoid energized in the HEAT mode of operation.

One way to check the reversing valve is to feel the refrigerant line at the top of the inside coil. In the COOL mode, this line will be cool or cold to the touch. In the HEAT mode, this line will be warm or hot to the touch. If you do not achieve these results, direction of refrigerant flow is not correct.

The ohms resistance of the reversing valve solenoid coil is approximately 465 ohms plus or minus (\pm) 10%. If ohms reading is within this range, the solenoid coil is good. If ohms reading is outside this range, replace the solenoid coil.

On Model 39424, verify AC volts are to the solenoid coil when in HEAT mode. If AC volts are NOT present, verify wiring is correct and the 9-pin terminal connector is proper; and connection is completed through it. Next, verify power module board and the relay are good. If AC volts are present and solenoid coil is good, but refrigerant flow is not proper, the reversing valve assembly needs to be replaced.

On all other models verify AC volts is to the solenoid coil when in COOL mode. If AC volts is NOT present, verify wiring is correct and the 6-pin terminal connector is proper; and connection is completed through it. Next, verify power module board is correct, then verify relay is correct. If AC volts are present and solenoid coil is good, but the refrigerant flow is not proper, the reversing valve assembly needs to be replaced.

10F. TRANSFORMER

The transformer supplies low AC volts for the control circuit on the following air conditioner models:

39025.XXX, 39035.XXX & 39045.XXX

The transformer is a 120 volt AC, 50/60 Hz. primary (line terminals) with a 24 volt AC secondary (load terminals), and will handle up to 20 volt-amps.

To check the transformer, first verify 120 volt AC is to the line terminals. Next, verify at least 24 volt AC is on the load terminals. If 24 volt AC is present on the load terminals, the transformer is good. If 24 volt AC is **NOT** present on the load terminals and 120 volt AC is present on the line terminals, the transformer is defective.



11F. RELAY BOARD

The relay board is used on heat pump models: 39325.XXX, 39335.XXX & 39424.601

The relay board consists of a transformer, compressor relay, two fan relays and other components. If any one of these are defective, the complete relay board must be replaced.

The relay board completes circuits to the fan motor and compressor depending on what mode switch and temperature setting is on the thermostat.

Remove the cover from the electric box and verify the red wire is on terminal RC, black wire is on terminal G, blue wire is on terminal H and yellow wire is on terminal Y.

With AC power to the relay board, check between terminals RC and G or H. There should be 12 volts DC. If no voltage is detected, the transformer on the relay board is defective. Replace the relay board.

If 12 volts DC is available, disconnect power to the heat pump and remove the HI FAN wire (black) and the LOW FAN wire (red) and the compressor wire (large black) from the NO terminal on the compressor relay on the relay board.



Next, remove the red, yellow, black and blue wires from terminals RC, Y, G and H on the relay board. Place a jumper from terminal RC to terminal Y. Provide power to the heat pump. Using an incandescent bulb, check from AC white terminal (one lead from bulb) to NO terminal on compressor relay on the relay board (other lead from bulb). The bulb should illuminate. Remove the jumper and the bulb would NOT illuminate. Next, place a jumper from terminal RC to terminal G. Now place one lead from bulb to AC white terminal and the other lead from bulb to LOW FAN terminal. The bulb should illuminate. Remove the jumper and the bulb should not illuminate. Next, place a jumper from terminal RC to terminals G and H. Now place one lead from bulb to AC white terminal and the other lead from bulb to HIGH FAN. The bulb should illuminate. Remove the jumper and the bulb should not illuminate. If these tests are correct, the relay board is good. DO NOT replace it. If any one of these tests are incorrect, replace the relay board.

13F. CHANGEOVER THERMOSTAT

The changeover thermostat is used on heat pump models: 39325.XXX, 39335.XXX and 39424.601

The changeover thermostat is a capillary tube/bellows-type switch. Its function is to allow the compressor to operate only when outside ambient is 40° F. or warmer.

To check the changeover thermostat, first verify the air temperature at the capillary tube. If the temperatures are above 45°F., continuity should be between terminals 2 to 3 and no continuity between terminals 2 to 1. For temperatures below 40°F., continuity should be between terminals 2 to 1 and no continuity between terminals 2 to 3.

NOTE: A defective changeover thermostat can keep the compressor from operating in the COOL or HEAT PUMP modes.



13F. TIME DELAY RELAY

The time delay relay is used on Model 39424.601. Its purpose is to provide a thirty second delay of power to Circuit 2 System after Circuit 1 System. To check the relay, use a voltmeter. Place one lead of voltmeter to Circuit 1 terminal block <u>N</u> (neutral) and the other lead of voltmeter to terminal <u>1</u> of relay. Thirty seconds after terminal <u>1</u> receives AC volts, move voltmeter lead to terminal <u>2</u> of relay. AC volts should be present.



14F. RELAY

A. Relay, SPST (single pole/single throw) is used on Models 39224.601 and 39424.601.

On Model 39224.601, it is used to complete the 115 volt AC circuit to the compressors, high fan and low fan. On Model 39424.601, it is used to complete 115 volt AC to the reversing valves for Circuit 1 and Circuit 2.

The relay has a DC volt coil. The coil terminals are 1 and 3. When the coil is NOT energized (no power to terminals 1 and 3), no continuity will exist between terminals 4 to 2. When the coil is energized (power to terminals 1 and 3), continuity will exist between terminals 4 to 2.



B. Relay, SPDT (single pole/double throw) is used on Models 39325.XXX and 39335.XXX.

On Model 39325.XXX it is used to complete the 115 volt AC circuit to the reversing valve.

On Model 39335.XXX is used to complete the 115 volt AC circuit to the reversing valve and to the furnace blower relay coil. The relay has a DC volt coil.

Terminals 1 and 3 are the coil terminals. When the coil (terminals 1 and 3) is NOT energized (no power to terminals 1 and 3), continuity should exist between terminals 4 to 5; and no continuity between terminals 2 to 4.

When the coil (terminals 1 and 3) is energized (power to terminals 1 and 3), continuity should exist between terminals 2 to 4 and no continuity between terminals 4 to 5.



C. Relay, SPDT (single pole/double throw) is used on Models 39424.601, 39115.626, 39125.601, 39335.601 and 39335.636.

On Model 39424.601 it is used to complete 115 volt AC circuit to Circuit 2 compressor. On Models 39115.626, 39125.601, 39335.601 and 39335.636 it is a furnace blower relay.

The relay has a 115 volt AC coil.

Terminals 1 and 3 are the coil terminals. When the coil (terminals 1 and 3) is NOT energized (no power to terminals 1 and 3), continuity should exist between terminals 4 to 5; and no continuity between terminals 2 to 4.

When the coil (terminals 1 and 3) is energized (power to terminals 1 and 3), continuity should exist between terminals 2 to 4 and no continuity between terminals 4 to 5.



D. Relay, SPST (single pole/single throw) is used on Models 39115.602, 39115.616 and 39115.626

On these models it is used to complete 115 volt AC circuits to the compressor and for fan speeds.

The relay has a DC volt coil. To check the relay, first verify AC volts have been turned off to the unit.

Next, verify the relay coil is NOT energized (no DC power). No continuity should exist between terminals COM to NO. Energize the coil with DC volts (10 to 16). Continuity should exist between terminals COM to NO. If the above checks are correct, the relay is good – DO NOT replace it. If the previous checks are not correct, the relay is defective and should be replaced.



E. Relay, SPDT (single pole/double throw) is used on Models 39115.XXX, 39325.XXX, 39335.XXX and 39424.601.

On Models 39115.XXX it controls HIGH and LOW FAN speeds. On Models 39325.XXX, 39335.XXX and 39424.601, it opens the control circuit for the fan motor when the coil is energized.

NOTE: Incorrect wiring to the thermostat can energize the relay coil on heat pump models 39325.XXX, 39335.XXX and 39424.601.

The relay has a DC volt coil. To check the relay, first verify all AC volts have been turned off to the unit.

Next, remove the wires from COM and NC terminals. Verify the relay coil is not energized (no DC power). Continuity should exist between terminals COM and NC and no continuity between terminals COM and NO. Next, energize the relay coil with DC volts (10 to 16). Continuity should exist between terminals COM and NO and no continuity between COM and NC. If the above checks are correct, the relay is good – DO NOT replace it. If the above checks are not correct, the relay is defective and should be replaced.



F. Relay, SPDT (single pole/double throw) is used on Models 390XX.XXX. It controls the fan motor.

The relay has a 24 volt AC coil. To check the relay, first verify all AC volts have been turned off to the unit.

Next, remove the wires from COM and NC terminals. Verify the relay coil is not energized (no AC power). Continuity should exist between terminals COM and NO. Next, energize the relay coil with 24 volts AC. Continuity should exist between terminals COM and NO and no continuity between COM and NC. If the above checks are correct, the relay is good – DO NOT replace it. If the above checks are not correct, the relay is defective and should be replaced.



G. Relay, DPST (double pole/single throw) is used on model 39424.601.

It controls HIGH FAN and LOW FAN on Circuit 1 and 2. If this relay is not wired correctly, Circuit 1 fan will not operate with Circuit 1 compressor.

The relay has a 120 volt AC coil. To check the relay, first verify all AC volts have been turned off to the unit.

Next remove the wires from terminals 2, 4, 6 and 8. Verify the coil (terminals 0 and 1) are not energized (no AC power). Continuity should not exist between terminals 2 to 4 or terminals 6 to 8. Next, energize the coil (terminals 0 and 1). Continuity should exist between terminals 2 to 4 and terminals 6 to 8. If the above checks are correct, the relay is good DO NOT replace it. If the checks are not correct, the relay is defective – replace it.



H. Relay, DPST (double pole/single throw) is used on Models 390XX.XXX. It controls the compressor. The relay has a 24 volt AC coil. To check the relay, first verify all AC volts have been turned off to the unit.

Next, remove the wires from terminals 2, 4, 6 and 8. Verify the coil (terminals 0 and 1) are not energized (no AC power). Continuity should not exist between terminals 2 to 4 or terminals 6 to 8. Next, energize the coil (terminals 0 and 1). Continuity should exist between terminals 2 to 4 and terminals 6 to 8. If the above checks are correct, the relay is good – DO NOT replace it. If the checks are not correct, the relay is defective – replace it.



SECTION G. DUO-THERM COMFORT CONTROL CENTER SYSTEMS

1G. OPERATION

The recreational vehicle manufacturer has equipped the vehicle with Duo-Therm's Comfort Control Center™. The Comfort Control Center has been designed for you to easily operate all the air conditioning and gas heating appliances found in your vehicle from one location.

In order to familiarize yourself with the operation of the Comfort Control Center, the following diagram along with the accompanying text will explain all the functional characteristics of the system.



- A. LIQUID CRYSTAL DISPLAY The Comfort Control Center is equipped with a liquid crystal display (LCD) that identifies the mode of operation, the temperature set-point, the zone identification and the fan speed. The Comfort Control Center is designed to accept and control many varied air conditioning and gas heating appliances. When you begin to first operate the Comfort Control Center, you will see that the LCD readout will only show the options available based on the appliances installed on your vehicle. An incandescent light will illuminate the LCD area when a selector button is pushed for easy reading at all times.
- B. FAN SPEEDS Possible available fan speeds are: LOW, MEDIUM, HIGH and AUTO. To select the desired fan speed, momentarily depress the FAN push button. You will need to continue to depress and release the FAN button until the desired fan speed is shown in the LCD readout area of the Comfort Control Center.

C. MODE SELECTOR BUTTON – Modes of operation available are: OFF, FAN ONLY, COOL, HEAT PUMP, FUR-NACE and HEAT STRIP. Remember, the LCD readout will only show the options available based on the appliances installed on your vehicle. To select the mode of operation, momentarily depress the MODE push-button. You will need to continue to depress and release the button until the desired mode is shown in the LCD readout area on the Comfort Control Center.

To determine the Comfort Control Center options available to you, depress and release the **MODE** push-button until it goes through all selections.

- D. **TEMPERATURE SELECTOR BUTTONS** The temperature Set-point range is from 40° to 99° Fahrenheit. Determination of Fahrenheit or Celsius standard is done at the time of your manufacturer's installation of the Climate Control Center. To set the temperature at your comfort level, simply depress and release the **UP** or **DN** pushbutton until the desired temperature is shown in the LCD readout area of the Comfort Control Center.
- E. ZONE AND STAGE SELECTOR BUTTONS A ZONE is also established at the time of installation of the Comfort Control Center. If you have one air conditioner, you will have one **ZONE**. If the vehicle has more than one cooling system, depending on the manufacturing installation, you may have 2, 3 or 4 ZONES. Zones are defined and preset by the manufacturer. A zone is an area of cooling/heating which is controlled independently within that area, and regulated at the Comfort Control Center. A typical example of a two zone application would be a vehicle with two air conditioning systems, one in the front area (living room, kitchen) and one in the back section (bedroom and bath). The front area could be established as **ZONE 1** and the back section ZONE 2. You can select the desired temperature and fan speeds for each zone independently, thereby keeping your bedroom cooler than the front portion of the vehicle. To determine the number of established zones in the vehicle, simultaneously depress the FAN and MODE push-buttons. Zone 1 will be the first Zone to appear in the LCD readout. Continue to depress and release these buttons until you see Zone 1 reappear.

If the vehicle has a dual basement air conditioner or dual heat pump system, the word **STAGE** will be illuminated. Both of these units operate in two different stages, and the word **STAGE** will show when the second stage operation has been selected. To select the second stage, simultaneously depress the **FAN** and **MODE** push-buttons. F. **ON/OFF SWITCH** – The ON/OFF switch is located on the lower right hand edge of the Comfort Control Center. Move the lever from side to side to change status.

GENERAL INFORMATION

- A. The ability of the air conditioner to maintain the desired inside temperature depends on the heat gain of the RV. Some preventative measures taken by the occupants of the RV can reduce the heat gain and improve the performance of the air conditioner. During extremely high outdoor temperatures, the heat gain of the vehicle may be reduced by:
 - 1. Parking the RV in a shaded area.
 - 2. Using window shades (blinds and/or curtains).
 - 3. Keeping windows and doors shut or minimizing usage.
 - 4. Avoiding the use of heat producing appliances.

Starting the air conditioner early in the morning and giving it a "head start" on the expected high outdoor ambient will greatly improve its ability to maintain the desired indoor temperature.

- B. The manufacturer of this air conditioner will not be responsible for damage caused by condensed moisture on ceilings or other surfaces. Air contains moisture and this moisture tends to condense on cold surfaces. When air enters the RV, condensed moisture may appear on the ceiling, windows, metal parts, etc. The air conditioner removes this moisture from the air during normal operation. Keeping doors and windows closed when this air conditioner is in operation will minimize condensed moisture on cold surfaces.
- C. This equipment must be serviced by qualified personnel and some states require these people to be licensed.

A. FAN ONLY MODE OF OPERATION

- 1. Begin by placing the power switch on the lower right hand edge of the Control Center in the **ON** position. To do this, simply move the lever to the right.
- 2. Momentarily depress and release the **MODE** pushbutton until the **FAN ONLY** indicator on the Liquid Crystal Display (LCD) is illuminated.
- Momentarily depress and release the FAN pushbutton until the desired fan speed indicator (LOW, MED, HIGH, AUTO) is illuminated. If your vehicle is equipped with a heat pump or a dual basement air conditioning system, your selection choice will be LOW, HIGH or AUTO.

- 4. After approximately 5 seconds, the selected fan speed will come on. The **MODE** and **FAN** speed you have selected will remain shown in the LCD area of the Control Center until you change your selection.
- If the vehicle contains more than one ZONE, depress the FAN and MODE pushbuttons simultaneously to select ZONE 2, and repeat procedures from step two above. Repeat entire procedure for each additional zone.



B. COOLING MODE OPERATION

(To set cooling temperatures and fan speeds on Duo-Therm Air Conditioners & the cooling mode of Duo-Therm Heat Pumps)

- 1. Momentarily depress and release the **MODE** pushbutton until the **COOL** indicator on the LCD is illuminated.
- 2. Depress and release the **FAN** pushbutton to select your desired fan speed.
- Depress and release the UP pushbutton to increase the temperature or the DN pushbutton to decrease the desired temperature. The final selected SETPOINT will be displayed in the LCD area of the Comfort Control Center.
- 4. After a delay of approximately 2 minutes the air conditioner's compressor will come on and the cooling process will begin. Once the room temperature reaches the selected **SETPOINT**, the compressor will cycle off. Once the Comfort Control Center senses the need for cooling, the compressor will restart in approximately two minutes. At this point, the fan will either:
- a. continue to operate in the single selected fan speed or,
- b. cycle **OFF** and **ON** with the compressor if the **AUTO** fan speed has been selected.

 If the vehicle contains more than one ZONE, depress the FAN and MODE push-buttons simultaneously to select ZONE 2, and repeat procedures from Step 1. Repeat entire procedure for each additional zone. NOTE: If set point is too low, the inside coil could freeze up.



C. HEAT PUMP OPERATION

(To set heating temperatures for vehicles equipped with a Duo-Therm rooftop or basement heat pump. To operate cooling mode with a heat pump, see "B. Cooling Mode Operation".)

- 1. Momentarily depress and release the **MODE** pushbutton until the **HEAT PUMP** indicator on the LCD is illuminated.
- 2. If you have not previously set your fan speed, you may do so by depressing and releasing the **FAN** pushbutton to select.
- Depress and release the UP pushbutton to increase the temperature or the DN pushbutton to decrease the desired temperature. The final selected SETPOINT will be displayed in the LCD area of the Comfort Control Center.
- 4. After a delay of approximately 2 minutes the heat pump's compressor will come on and the heating process will begin. Once the room temperature reaches the selected **SETPOINT**, the compressor will cycle off. Once the Comfort Control Center senses the need for heating, the compressor will restart in approximately two minutes. At this point, the fan will either:
 - a. continue to operate in the single selected fan speed or,
 - b. cycle **OFF** and **ON** with the compressor if the **AUTO** fan speed has been selected.
- If the vehicle contains more than one ZONE, depress the FAN and MODE pushbuttons simultaneously to select ZONE 2, and repeat procedures from Step 1 above. Repeat entire procedure for each additional zone.



NOTE: See Sections K & L for additional Special Heat Pump Features.

D. FURNACE MODE OPERATION

(If the vehicle is equipped with a gas furnace connected to the Comfort Control Center)

- 1. Momentarily depress and release the **MODE** pushbutton until the **FURNACE** indicator on the LCD is illuminated.
- 2. The A/C fan does not operate in the **FURNACE** mode.
- Depress and release the UP pushbutton to increase the temperature or the DN pushbutton to decrease the desired temperature. The final selected SETPOINT will be displayed in the LCD area of the Comfort Control Center.
- 4. The Duo-Therm air conditioning system will not operate when the Comfort Control System is in the **FUR-NACE** mode. For cooling, change the **MODE** to **COOL**.
- 5. If the vehicle contains more than one ZONE, depress the FAN and MODE pushbuttons simultaneously to select ZONE 2, and repeat procedures from Step 1 above. Repeat entire procedure for each additional zone. NOTE: When furnace mode is selected in any Zone, all air conditioner or heat pump units will terminate operation.



E. HEAT STRIP MODE OPERATION

(For Duo-Therm air conditioners with an electric heat strip)

- 1. Momentarily depress and release the MODE pushbutton until the **HEAT STRIP** indicator on the LCD is illuminated.
- 2. The fan will operate in **LOW**, **MED** or **AUTO**. You will not be able to select HIGH speed when in the **HEAT STRIP** mode. Depress and release the **FAN** pushbutton to select desired speed.
- Depress and release the UP pushbutton to increase the temperature or the DN pushbutton to decrease the temperature. The final selected SETPOINT will be displayed in the LCD area of the Comfort Control Center.
- 4. The electric heat strip will cycle **ON** and **OFF** per the temperature **SETPOINT** displayed. The fan will either:
 - a. continue to operate in the selected fan speed or,
 - b. cycle **OFF** and **ON** with the heat strip if the **AUTO** fan speed has been selected.
- If the vehicle contains more than one ZONE, depress the FAN and MODE pushbuttons simultaneously to select ZONE 2, and repeat procedures from Step 1 above. Repeat entire procedure for each additional zone.



F. AUTO FAN

When **AUTO FAN** is selected, the fan speed will be determined by the mode you are in.

- **COOL MODE** In the **COOL** mode, which is the air conditioning mode, the fan will automatically select the speed depending upon the difference between the temperature **SETPOINT** and the room temperature. When that difference is:
 - 8° or moreThe fan will operate on HIGH4° to 8°The fan will operate on MED4° or belowThe fan will operate on LOW

HEAT PUMP MODE – When HEAT PUMP mode is selected, the fan will automatically run in the LOW speed.

- **HEAT STRIP MODE** When **HEAT STRIP** mode is selected, the fan will automatically run in the **LOW** speed.
- **FAN ONLY MODE** In the **FAN ONLY** mode, the fan automatically runs in the **LOW** speed.

G. REFRIGERANT COMPRESSOR TIME DELAY

A time delay of approximately two minutes occurs any time the compressor is required to begin the cooling or heat pump cycle.

H. POWER INTERRUPTION

In the event that power to the air conditioner or control is interrupted, the system will restart with the same settings you have previously set.

I. ZONE CONTROL

The Duo-Therm Control Center will operate cooling and heating appliances which the vehicle manufacturer has designed to heat or cool different areas (ZONES) of your RV. The Comfort Control Center will advise you if the vehicle has multiple **ZONES**, by showing **ZONE 1, 2 3** or **4** illuminated in the LCD readout. In the event the vehicle has multiple zones.

designed, you have the freedom of selecting the **MODE** of operation for each zone independently. To change from one zone to another, simultaneously depress the **FAN** and **MODE** pushbuttons. Each time you depress and release these pushbuttons, the indicator will change the zone data displayed. To program each zone, simply repeat the programming steps shown in the operation section of this manual. Please note: The Comfort Control Center will prevent operating **FUR-NACE** and **COOL** or **FURNACE** and **HEAT PUMP** at the same time.



J. STAGE CONTROL OPERATION

If the vehicle is equipped with a Duo-Therm Dual Basement Air Conditioner or a Dual Basement Heat Pump, you have an air conditioning system that is designed to optimize comfort and running efficiencies. (Two units wired in series within one compartment). This is accomplished as long as the required electrical power is available, by providing an on-demand secondary stage of operation. (NOTE: The primary stage will continue to operate even if there isn't enough electrical power available to run the second stage.) The Comfort Control Center simplifies this operation by allowing you to set the primary temperature set-point and the differential temperature set-point which activates the secondary stage. After turning on your Comfort Control Center, perform the following steps to set and activate the stage control operation.

 Momentarily depress the MODE pushbutton until the desired mode of operation is selected. (FAN ONLY, COOL, HEAT PUMP)

- 2) Momentarily depress the **FAN** pushbutton until the desired fan speed indicator is illuminated (**LOW, HIGH, AUTO**)
- 3) Momentarily depress the **UP** and **DN** pushbutton until the desired room temperature set-point is displayed.



This completes the setup for the primary stage of the Dual Basement Air Conditioner or Dual Basement Heat Pump. Next, you will setup the secondary stage.

TO SET UP THE SECONDARY STAGE:

- 1) Simultaneously depress and release the **FAN** and **MODE** pushbuttons until the STAGE indicator on the LCD is illuminated.
- Momentarily depress the MODE pushbutton until the desired mode of operation for the second stage is selected. (FAN ONLY, COOL, HEAT PUMP). Normally, the mode of operation is the same as the primary stage.
- Momentarily depress the FAN pushbutton until the desired fan speed indicator is illuminated. (LOW, HIGH, AUTO)
- 4) Momentarily depress the UP or DN pushbutton to set the desired differential temperature setpoint (0°F to 10°F). The secondary stage will run once the actual room temperature reaches the differential temperature setpoint. Example: Desired room temperature setpoint for the primary stage in the COOL MODE is set at 72°F; differential temperature set-

point is set at 5°F. The secondary stage will activate when the actual room temperature reaches 77°F (72°F + 5°F), and will continue to operate until the room once again becomes 72°F.



K. AUX. HEAT

When in the **HEAT PUMP** mode, if the outside ambient temperature is measured to be below 24°F, the control will automatically select the **FURNACE** operation. When this happens, the **AUX. HEAT** and the **HEAT PUMP** indicators on the LCD will illuminate. Once the outside ambient temperature is measured above 34°F, the control will return to the **HEAT PUMP** operation. If your vehicle does not contain a furnace, and you have a Duo-Therm Heat Pump, once the outside ambient temperature goes below 24°F, the system will shut down until the outside temperature reaches 34°F, at which time the Heat Pump will resume operation.



L. DEFROST CYCLE

This cycle is active during **HEAT PUMP** operation and allows the heat pump to operate down to 24°F. When the

outside ambient temperature is less than 42°F and greater than 24°F, a defrost timing cycle will begin. The defrost timing cycle will allow operation of the heat pump for 40 minutes. The fan will then be shut off, the refrigerant flow reversed and run for 4-1/2 minutes, this is the **DEFROST** cycle. The refrigerant flow will then be returned to normal and, after a 30 second delay will continue until the temperature is greater than 42°F or until the temperature becomes less than 24°F, at which time the furnace will activate. (See **AUX. HEAT**). During the defrost cycle, the **DEFROST** indicator on the LCD shall be illuminated.



M. RESET

If the Comfort Control Center is not operational, inadequate data or no functions occur, reset the Comfort Control Center to factory setting. When a reset procedure is done, all previous program memory is removed. The factory setting of 72°F for cooling mode and 68°F for heating modes are entered.

To initiate a RESET, do the following in the order listed:

- Turn control on to ensure annunciator data and light are present. If data and light are present, continue to next step. If data and light are not present, see Sec. 1.6.
- 2) Depress **MODE** switch to activate annunciator light.
- Simultaneously depress the bottom two buttons (temperature UP and DOWN) and hold.
- 4) While holding these buttons down, depress the MODE button once and release.
- 5) Release the two buttons previously held down.
- 6) Depress the MODE button once again.
- 7) At this time the light should extinguish, and the mode should register "OFF". If not, repeat Steps 2 through 6.
- 8) Retest system ensuring that all functions are present and operational.

2G. CONFIGURATION

The Comfort Control Center configuration relates to setting the Dip switches and particular components (remote temperature sensor, cold [freeze] control and ambient sensor) that can be plugged into the AC power module board according to the type of unit and accessories included.

NOTE: If the configuration of the Dip switches and plug-in components are not correct, the air conditioner or heat pump could operate erratically or not operate at all.

CAUTION

Improper configuration could cause damage to components of the system.

We recommend the configuration be done at the time of installation by the installer.

To check the configuration, first locate the Electronic Control Kit on roof-mounted units or the Electronic Control Box on basement mounted units. Next remove any cover or covers for access to Dip switches and Sensor Plugs (P3, P4 and P5). Both are located on the AC Power Module Board. All Dip switches are in the "OFF" position at the time of manufacture of the appliance.

NOTE: The only exceptions are Models 620315.XXX, 39424.XXX and 39224.XXX.



If the configuration is not correct, turn Comfort Control Center OFF before changing the configuration.

ONE ROOFTOP AIR CONDITIONER



A. ONE COMFORT ZONE

1) ONE ROOFTOP AIR CONDITIONER

To configure one rooftop air conditioner, all Dip switches are to "OFF" position and the cold (freeze) control is plugged into P5 (blue) connector. 115VAC, 12VDC and the telephone cable communications line is properly connected to the air conditioner electronic control box. NOTE: if a remote sensor is used, it must be plugged into the P4 (white) connector.





CIRCUIT BREAKER BOX



Typical installation for one comfort zone with rooftop air. Comfort control may serve as a room temperature sensor, or a remote sensor may be used. 2. ONE ROOFTOP AIR CONDITIONER PLUS ONE GAS FURNACE

To configure one rooftop air conditioner plus one gas furnace, all Dip switches are "OFF" and the freeze control is plugged into the proper connector (blue) 115VAC, 12VDC. Two thermostat wires from the furnace and telephone cable communications line are properly connected to the air conditioner electronic control box. **NOTE:** If a remote sensor is used, it must be plugged into the P4 (white) connector.



Improper connections can cause component damage.



3. ONE ROOFTOP AIR CONDITIONER WITH HEAT STRIP PLUS ONE GAS FURNACE

To configure one rooftop air conditioner with heat strip plus one gas furnace, turn heat strip (#1) Dip switch to ON and all other Dip switches to OFF. The freeze control is plugged into the proper connector (blue). 115VAC, 12VDC, two thermostat wires from the furnace and telephone cable communications line are properly connected to the air conditioner electronic control box. **NOTE:** If a remote sensor is used, it must be plugged into the P4 (white) connector.



Improper connections can cause component damage.


4. ONE ROOFTOP HEAT PUMP PLUS ONE GAS FURNACE

To configure one rooftop heat pump plus one gas furnace, all Dip switches are OFF. The freeze control is NOT used. The blue connector must stay open (P5). The ambient sensor is plugged into the proper connector (red). 115VAC, 12VDC, two thermostat wires from the furnace and telephone cable communications line are properly connected to the heat pump electronic control box. **NOTE**: If a remote sensor is used, it must be plugged into the P4 (white) connector.





5. ONE BASEMENT AIR CONDITIONER PLUS ONE GAS FURNACE

To configure one basement air conditioner plus one gas furnace, all Dip switches are OFF. 115VAC, 12VDC, two thermostat wires from the furnace and telephone cable communications line are properly connected to the air conditioner electronic control box. **NOTE**: If a remote sensor is used, it must be plugged into the P4 (white) connector.





6. ONE BASEMENT HEAT PUMP PLUS ONE GAS **FURNACE**

To configure one basement heat pump plus one gas furnace, all Dip switches are OFF. The ambient sensor is plugged into the proper connector (red). 115VAC, 12VDC, two thermostat wires from the furnace and telephone cable communications line are properly connected to the AC power module in the unit's electrical box.

 \bigcirc P3 Plugged In SENSOR PLUGS \sim BLUE P5 P4 □ WHITE P3 RED Zone -Zone 3 ONE BASEMENT HEAT PUMP FIELD Zone 4 + ONE GAS FURNACE § ⊘≱ Stage DIP SWITCHES IN OFF POSITION Heat Strip LOW HIGH AUTO FAN OFF MODE FAN ONLY COOL HEAT PUMP UP DUO-THERM DN COMFORT CONTROL FURNACE OFF CIRCUIT **TELEPHONE CABLE** BREAKER **COMMUNICATIONS LINE** BOX FURNACE ALL WIRING REMOTE FURNACE ELECTRICAL BOX ATTACHMENT 2 WIRES 115V AC BASEMENT HEAT PUMP Typical installation for one comfort zone with basement heat pump and one furnace. Comfort control may serve as a room temperature sensor, or a remote sensor may be used. 12V DC INPUT 2 WIRES

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NOTE: If a remote sensor is used, it must be plugged into the P4 (white) connector.



7. ONE DUAL BASEMENT AIR CONDITIONER PLUS ONE GAS FURNACE

To configure one dual basement air conditioner plus one gas furnace, the STAGE Dip switch on AC power module for Circuit 2 must be turned to ON. All other Dip switches are OFF on both AC power modules. 115V AC (Circuit 1 and Circuit 2) are connected properly to CIR 1 and CIR 2 terminal blocks;

12VDC, two thermostat wires from the furnace and telephone cable communications line are properly connected to Circuit 1, AC power module in the electrical box. **NOTE**: If a remote sensor(s) is used, it must be plugged into the P4 (white) connector.



Improper connections can cause component damage.



DUO-THERM COMFORT CONTROL

TELEPHONE CABLE COMMUNICATIONS LINE ONE DUAL BASEMENT AIR CONDITIONER + ONE GAS FURNACE



ALL WIRING REMOTE ELECTRICAL BOX ATTACHMENT

Typical installation for one comfort zone with dual basement air and one furnace. Comfort control may serve as a room temperature sensor, or a remote sensor may be used.

115V AC

115V AC

CIRCUIT 1

CIRCUIT 2

CIRCUIT

BOX

BREAKER

FURNACE 2 WIRES

FURNACE

DUAL BASEMENT AIR

12V DC INPUT 2 WIRES

8. ONE DUAL BASEMENT HEAT PUMP PLUS ONE GAS FURNACE

To configure one dual basement heat pump plus one gas furnace, the STAGE Dip switch on AC power module for Circuit 2 must be turned to ON. All other Dip switches are OFF on both AC power modules. Two (2) ambient sensors (one per AC power module), are plugged into the proper connector (red) on each AC power module. 115V AC (Circuit 1 and Circuit 2) are connected properly to CIR 1 and CIR 2 terminal blocks; 12VDC, two thermostat wires from the furnace and telephone cable communications line are properly connected to Circuit 1 AC power module in the electrical box.

NOTE: If a remote sensor(s) is used, it must be plugged into the P4 (white) connector.





B. TWO COMFORT ZONES

1. TWO ROOFTOP AIR CONDITIONERS PLUS ONE GAS FURNACE

To configure two rooftop air conditioners plus one gas furnace, **ZONES** need to be established. For explanation purposes the front unit will be ZONE 1 and the rear unit will be ZONE 2. ZONES can be arranged per the customer's wishes.

<u>EACH</u> unit must have 115V AC Only one unit requires 12VDC. Telephone communications line must be between the Comfort Control Center and ONE unit.

Another telephone communications line must be between the two units.

Two (2) furnace thermostat wires must be routed to ONE unit.

For explanation purposes, the 12VDC, Comfort Control Center telephone communications line and the two (2) furnace thermostat wires are to ZONE 1 (front) unit.

ZONE 1 configuration should have all Dip switches in the OFF position, and the cold (freeze) control plugged into P5 (blue) connector on the AC power module. (Refer to Figure "ZONE 1")



ZONE 2 configuration should have Dip switch 5 (ZONE 2) in the ON position and all other Dip switches in the OFF position. The cold (freeze) control should be plugged into P5 (blue) connector and the remote sensor plugged into P4 (white) connector on the AC power module. (Refer to Figure "ZONE 2")



NOTE: If a remote sensor(s) is used, it must be connected into the P4 (white) connector.





(B. Two Comfort Zones, continued)

2. TWO ROOFTOP AIR CONDITIONERS WITH HEAT STRIP PLUS ONE FURNACE

To configure two rooftop air conditioners with heat strip plus one gas furnace, **ZONES** need to be established. For explanation purposes the front air conditioner will be ZONE 1 and the rear air conditioner will be ZONE 2. ZONES can be arranged per the customer's wishes.

<u>EACH</u> unit must have 115V AC Only one unit requires 12VDC. Telephone communications line must be between the Comfort Control Center and ONE unit.

Another telephone communications line must be between the two units.

Two (2) furnace thermostat wires must be routed to ONE unit.

For explanation purposes the 12VDC, Comfort Control Center telephone communications line and the two (2) furnace thermostat wires are to ZONE 1 (front) unit. **ZONE 1** configuration should have Dip switch 1 (heat strip) to ON position and all other Dip switches to OFF position. The cold (freeze) control should be plugged into P5 (blue) connector on the AC power module. (Refer to Figure "ZONE 1")



ZONE 2 configuration should have Dip switch 1 (heat strip) and 5 (ZONE 2) to ON position. The cold (freeze) control should be plugged into P5 (blue) connector and remote sensor plugged into P4 (white) connector on the AC power module. (Refer to Figure "ZONE 2")

NOTE: If a remote sensor(s) is used, it must be connected into the P4 (white) connector.





3. ONE ROOFTOP AIR CONDITIONER PLUS ONE ROOFTOP HEAT PUMP PLUS ONE GAS FURNACE

To configure one rooftop air conditioner plus one rooftop heat pump plus one gas furnace, ZONES need to be established. For explanation purposes the front unit will be a heat pump on ZONE 1. The rear unit will be an air conditioner on ZONE 2. Zones can be arranged per the customer's wishes.

EACH unit must have 115V AC Only one unit requires 12VDC. Telephone communications line must be between the Comfort Control Center and ONE unit.

Another telephone communications line must be between the two units.

Two (2) furnace thermostat wires must be routed to ONE unit.

For explanation purposes the 12VDC, Comfort Control Center telephone communications line and the two (2) furnace thermostat wires are to ZONE 1 (front) unit.

ZONE 1 (Heat Pump) configuration should have all Dip switches to OFF position. The cold (freeze) control is NOT used. The P5 (blue) connector must stay open. The ambient sensor must be plugged into the P3 (red) connector on the AC power module. (Refer to Figure "ZONE 1")



ZONE 2 (Air Conditioner) configuration should have



NOTE: If a remote sensor(s) is used, it must be connected into the P4 (white) connector.



Improper connections can cause component damage.

(Refer to diagram on top of Next Page)



4. TWO ROOFTOP HEAT PUMPS PLUS ONE GAS FURNACE

To configure two rooftop heat pumps plus one gas furnace, ZONES need to be established. For explanation purposes, the front unit will be ZONE 1 and the rear unit will be ZONE 2. Zones can be arranged per the customer's wishes.

<u>EACH</u> unit must have 115V AC Only one unit requires 12VDC. Telephone communications line must be between the Comfort Control Center and ONE unit.

Another telephone communications line must be between the two units.

Two (2) furnace thermostat wires must be routed to ONE unit.

For explanation purposes the 12VDC, Comfort Control Center telephone communications line and the two (2) furnace thermostat wires are to ZONE 1 (front) unit. **ZONE 1** configuration should have all Dip switches to OFF position. The cold (freeze) control is NOT used. The P5 (blue) connector must stay open. The ambient sensor must be plugged into the P3 (red) connector on the AC power module. (Refer to Figure "ZONE 1")



ZONE 2 configuration should have Dip switch 5 (ZONE 2) to ON position and all other Dip switches to OFF position. The cold (freeze) control is NOT used. The P5 (blue) connector must stay open. The ambient sensor must be plugged into the P3 (red) connector on the AC power module. (Refer to Figure "ZONE 2")







5. TWO BASEMENT AIR CONDITIONERS PLUS ONE GAS FURNACE

To configure two basement air conditioners plus one gas furnace, ZONES need to be established. For explanation purposes, the front unit will be ZONE 1, and the rear unit will be ZONE 2. Zones can be arranged per the customer's wishes.

<u>EACH</u> unit must have 115V AC Only one unit requires 12VDC. Telephone communications line must be between the Comfort Control Center and ONE unit.

Another telephone communications line must be between the two units.

Two (2) furnace thermostat wires must be routed to ONE unit.

For explanation purposes the 12VDC, Comfort Control Center telephone communications line and the two (2) furnace thermostat wires are to ZONE 1 (front) unit.

- **ZONE 1** configuration should have all Dip switches to OFF position. (Refer to Figure "ZONE 1")
- **ZONE 2** configuration should have Dip switch 5 (ZONE 2) to ON position and all other Dip switches to OFF position. (Refer to Figure "ZONE 2")
- **NOTE**: If a remote sensor(s) is used, it must be connected into the P4 (white) connector.







6. TWO BASEMENT HEAT PUMPS PLUS ONE GAS FURNACE

To configure two basement air heat pumps plus one gas furnace, ZONES need to be established. For explanation purposes, the front unit will be ZONE 1, and the rear unit will be ZONE 2. Zones can be arranged per the customer's wishes.

EACH unit must have 115V AC Only one unit requires 12VDC. Telephone communications line must be between the Comfort Control Center and ONE unit.

Another telephone communications line must be between the two units.

Two (2) furnace thermostat wires must be routed to ONE unit.

For explanation purposes the 12VDC, Comfort Control Center telephone communications line and the two (2) furnace thermostat wires are to ZONE 1 (front) unit.

- ZONE 1 configuration should have all Dip switches to OFF position. The ambient senor should be plugged into P3 (red) connector. (Refer to Figure "ZONE 1", Page 28)
- **ZONE 2** configuration should have Dip switch 5 (ZONE 2) to ON position and all other Dip switches to OFF position. The ambient sensor should be plugged into P3 (red) connector. The remote sensor should be plugged into P4 (white) connector. (Refer to Figure "ZONE 2", Page 28)



7. TWO ROOFTOP AIR CONDITIONERS PLUS TWO GAS FURNACES

To configure two rooftop air conditioners plus two gas furnaces, ZONES need to be established. For explanation purposes, the front air conditioner and one furnace will be Zone 1, and the rear air conditioner and one furnace will be Zone 2. Zones can be arranged per the customer's wishes.

<u>EACH</u> air conditioner must have 115V AC Only one air conditioner requires 12VDC. Telephone communications line must be between the Comfort Control Center and ONE air conditioner only.

Another telephone communications line must be between the two air conditioners.

Two (2) furnace thermostat wires must be between front furnace and front air conditioner. Two (2) furnace thermostat wires must be between rear furnace and rear air conditioner.

For explanation purposes the 12VDC, Comfort Control Center telephone communications line and the two (2) furnace thermostat wires from front furnace are to ZONE 1 (front) air conditioner. The two (2) furnace thermostat wires from rear furnace are to Zone 2 (rear) air conditioner.

- **ZONE 1** configuration should have all Dip switches to OFF position and the cold (freeze) control plugged into P5 (blue) connector. (Refer to Figure "ZONE 1")
- **ZONE 2** configuration should have Dip switch 5 (ZONE 2) to ON position and all other Dip switches to OFF position. The cold (freeze) control should be plugged into P5 (blue) connector. The remote sensor (if used) must be plugged into P4 (white) connector. (Refer to Figure "ZONE 2")
- **NOTE**: If a remote sensor(s) is used, it must be connected into the P4 (white) connector.













8. ONE ROOFTOP HEAT PUMP PLUS ONE ROOF-TOP AIR CONDITIONER PLUS TWO GAS FUR-NACES

To configure one rooftop heat pump plus one rooftop air conditioner plus two gas furnaces, ZONES need to be established. For explanation purposes, the front unit (heat pump) and one furnace will be Zone 1; and the rear unit (air conditioner) and one furnace will be Zone 2. Zones can be arranged per the customer's wishes.

<u>EACH</u> air conditioner must have 115VAC. Only one air conditioner requires 12VDC. Telephone communications line must be between the Comfort Control Center and ONE unit only.

Another telephone communications line must be between the two units.

Two (2) furnace thermostat wires must be between front unit and front furnace. Two (2) furnace thermostat wires must be between rear unit and rear furnace.

For explanation purposes the 12VDC, Comfort Control Center telephone communications line and the two (2) furnace thermostat wires from front furnace are to ZONE 1 (front) unit.

The two (2) furnace thermostat wires from rear furnace are to Zone 2 (rear) unit.

ZONE 1 (heat pump) configuration should have all Dip switches to OFF position. The cold (freeze) control is NOT used and P5 (blue) connector should remain open. The ambient sensor should be connect into P3 (red) connector. (Refer to Figure "ZONE 1")



ZONE 2 (air conditioner) configuration should have Dip switch 5 (ZONE 2) to ON position and all other Dip switches to OFF position. The cold (freeze) control should be plugged into P5 (blue) connector. The remote sensor (if used) must be plugged into P4 (white) connector. (Refer to Figure "ZONE 2")



NOTE: If a remote sensor(s) is used, it must be connected into the P4 (white) connector.









C. THREE COMFORT ZONES

To configure three units, ZONES need to be established. Refer to Section 2.3A and 2.3B for Zone 1 and Zone 2 configuration.

115V AC must be to ZONE 3 unit. A telephone communication line must be between ZONE 2 and ZONE 3 units.

Configure ZONE 3 unit the same as other <u>like</u> units, <u>EXCEPT</u> for the Dip Switches. Dip Switch 4 (ZONE 3) to ON position, and all other Dip Switches to OFF position.

D. FOUR COMFORT ZONES

To configure four units, ZONES need to be established. Refer to Section 2.3A, 2.3B and 2.3C for Zone 1, Zone 2 and Zone 3 configuration.

115V AC must be to ZONE 4 unit. A telephone communication line must be between ZONE 3 and ZONE 4 units.

Configure ZONE 4 unit the same as other <u>like</u> units, <u>EXCEPT</u> for the Dip Switches. Dip Switch 3 (ZONE 4) to ON position, and all other Dip Switches to OFF position.

3G. DC VOLT REQUIREMENTS

A DC volt supply is required for operation of the Comfort Control Center. The operating range is 10 to 30 volts DC. If DC volts are outside of the operating range, you could experience improper or erratic operation.



DC VOLTS IN EXCESS OF 30 VOLTS CAN CAUSE DAMAGE TO THE COMPONENTS OF THE SYS-TEM.

To check DC volts, first check the incoming DC volts between red (+) positive, and black (—) negative, at the connections on the electronic control box on rooftop units; or at the connections at the electric box on basement units.



Next check the output DC volts from the AC power module. This can be done by using a short telephone communications line. One end plugged into one of the RJ11 connectors on the AC power module and the other end plugged into a standard telephone jack. Next measure the DC volts between red (+) and black (–). If volts are more at this check, AC ripple is on the incoming DC source. Be sure DC volts are less than 30.

The AC power module has a filter within the circuitry to filter any AC ripple and will increase DC volts if AC ripple is present.



4G. COMPONENTS

1. COMFORT CONTROL CENTER™

The comfort control center is the component that makes all decisions for operation depending on the system and the accessories connected to it.

NOTE: The PAL tester with the air conditioner Comfort Control Center Data Capture Module attached will test the integrity and circuitry of the Comfort Control Center.

If the system is to be used <u>WITHOUT</u> a **Remote Temperature Sensor**, the proper location of the **Comfort Control Center** is very important to ensure that it will provide a comfortable RV temperature. Observe the following rules when selecting a location:

- a) Locate the Comfort Control Center 54" above the floor.
- b) Install the Comfort Control Center on a partition, not on an outside wall.
- c) **NEVER** expose it to direct heat from lamps, sun or other heat producing items.
- d) Avoid locations close to doors that lead outside, windows or adjoining outside walls.
- e) Avoid locations close to supply registers and the air from them.

If the system is to be used **WITH** a **Remote Temperature Sensor** in **ALL** zones, the Comfort Control Center may be mounted anywhere that is convenient in the coach. Try to avoid hard to see areas. To check the Comfort Control Center, first verify the ON/OFF switch is in the ON position. Next, verify DC volts (10 to 30) and polarity are correct (see Sec. 4). Then do a reset procedure (see Sec. 1M). If the Comfort Control Center still does not illuminate when depressing any selector button or the liquid crystal display does not read (See Sec. 1), replace it. If the correct function does not show on the liquid crystal display, verify configuration is correct (see Sec. 2) before replacing the Comfort Control Center.

2. CABLE ASSEMBLY

A flat telephone extension cable must be routed from the unit to the Comfort Control Center. It must be 26 gauge, stranded copper wire, four (4) conductor (yellow, green, red and black). The cable must be terminated with a four (4) position telephone RJ-11 connector.

NOTE: DO NOT USE A PRE-MADE TELEPHONE EXTENSION CABLE. THE POLARITY OF THE CON-NECTORS IS REVERSED AND WILL CAUSE A FAIL-URE OF THE SYSTEM.



The cable assembly should be made in the following manner:

Cut the modular cable to the desired length. When cutting, make sure ends are cut straight, not diagonally. Next, use an RJ11 connector crimping tool.

Use the stripper section of the tool's blade to remove the outer insulation from each end of the cable. Be careful not to remove or break the colored insulation on the inner conductors.

NOTE: Fully insert the cable into the stripper slot, holding cable in one hand and tool in the other hand. Squeeze down on tool and pull away. This will remove the correct amount of outer insulation for insertion into RJ-11 modular plug.

Now you are ready to insert the prepared cable into the RJ-11 modular plug. When inserting cable into plug, you **MUST** be sure that the black wire is on your left as you look at the top of the plug (with the spring clip facing you) and that the conductors are flush with the tip of the plug and touching the small teeth-like gold conductors. Insert the RJ-11 modular plug with the cable into the tool's cavity, squeeze down to the STOP and hold for a few seconds. This completes connections for one end of the cable. To prepare the other end of the cable, repeat this procedure.

NOTE: Be sure polarity is the same on each plug. Example: Black on left (viewing plug from top, spring clip side).



3. RELAY, 2-POLE

The relay is used on basement air conditioner Model 39125 and Basement heat pump Model 39335 ONLY. The relay has five (5) terminals. It is used to complete a circuit to the furnace.

Terminals 1 and 3 are the coil terminals. When the coil (terminals 1 and 3) is not energized (no power to terminals 1 and 3), continuity should exist between terminals 4 to 5; and no continuity between terminals 2 to 4.

4. AMBIENT SENSOR

The ambient sensor is the outside air temperature sensor and is used on heat pump units only. This component allows the heat pump to operate down to 24°F. See Sec. 1G for detailed information on operation.

To check the ambient sensor, first measure outside temperature surround the sensor. This is called "ambient". Next, unplug the ambient sensor (red plug) from the AC power module board. Now do an ohms test on the wire side of the plug.

For the specific ambient (outside) temperature listed below, you should have the following readings:



Should Have
s Reading of:
11667
10212
8959
7876
6939
6126
5418
4802
4264
3793

NOTE: Any ohms reading has a tolerance of plus or minus (\pm) 10% to be a good component. A very precise and accurate ohm meter must be used before condemning the sensor.

5. REMOTE SENSOR

The remote sensor is the temperature sensor that allows the unit for that zone to cycle "ON" and "OFF" by temperature. Normally, a remote sensor is used for each unit or zone. A remote sensor is optional for Zone 1, or a single unit installation.



When the coil (terminals 1 and 3) is energized (power to terminals 1 and 3), continuity should exist between terminals 2 to 4 and no continuity between terminals 4 to 5. This relay is used to energize the furnace blower any time the compressor is energized. This circuit has been added to enhance both the cooling and heating operation.

NOTE: This circuit will not work with all furnaces. Before sing this circuit, check with the furnace manufacturer for proper wire connection to the furnace. Other components may or may not be required. Read and follow the instructions provided with the furnace.

INSTRUCTIONS FOR FURNACE CONNECTIONS:



THE FOLLOWING FURNACE CONNECTION INSTRUC-TIONS ONLY PERTAIN TO ONE SPECIFIC FURNACE MANUFACTURER, AND MAY NOT APPLY TO YOUR IN-STALLATION.

Run a 12 volt DC positive lead to one of the gray wires in the unit electrical box and secure with an approved connector.

Run a second lead from the furnace blower motor or terminal board to the remaining gray lead in the unit electrical box. Secure with an approved connector. Ensure that the compressor is operational by:

- A. Placing mode switch to cool.
- B. Lower temperature setting to start compressor operation (approx. 2 min. time delay)
- C. Once compressor is operational adjust setting up to shut down compressor system.

Locate sensor attached to zone being tested. Using a hair dryer or other heat producing air device, GRADUALLY heat up the area surrounding the thermistor. *Ensure that device does not place excessive heat on plastic cover.*

If compressor system comes on, sensor is operational

If the compressor does not come on, reverify connections at air conditioner.

If the system is still not operational, unplug sensor from unit and verify its cable by checking the ohms.



For the specific temperature surrounding the sensor, the ohms readings should be as follows:

At room Temperature of:	You Should Have Ohms Reading of:
55°F	11667
60°F	10212
65°F	8959
70°F	7876
75°F	6939
80°F	6126
85°F	5418
90°F	4802
95°F	4264
100°F	3793

NOTE: Any ohms reading has a tolerance of plus or minus (\pm) 10% to be a good component. A very precise and accurate ohm meter must be used before condemning the sensor.

The proper location of the Remote Sensor is very important to ensure that a comfortable RV temperature is maintained. Observe the following rules when selecting a location.

 Locate the Remote Sensor 54" above the floor. Install the Remote Sensor on a partition, not on an outside wall.



- <u>NEVER</u> expose it to direct heat from lamps, sun or other heat producing items.
- Avoid locations close to doors that lead outside, windows or adjoining outside walls.
- Avoid locations close to cold air supply registers.

■ Avoid area with air stagnation such as under cupboards. Improper location can cause improper operation of the unit, such as repeated on/off cycle.

6. AC POWER MODULE BOARD

The AC power module board consists of relays, Dip switches, plug receptacles and other components. If any one of these are defective, the complete AC power module board must be replaced. The 3-amp fuse is the only replaceable component.

The board is a signal receiver and completes AC volt circuits according to what signal it receives. Before diagnosing the AC power module, verify Configuration Operation, Comfort Control,

DC volts are within operation range and

115 volts AC is supplied to the AC power module board.

A. ROOFTOP AIR CONDITIONERS

To verify circuits are being completed by the AC power module board, you would first disconnect the 6-pin plug connector from the electric kit.



Using a 115 volt incandescent bulb, check from terminal 5 (white-common) to the other terminals to determine if a particular circuit is completed through the board. If the circuit is completed, the light will illuminate.

Terminal 1 is blue wire and is the compressor circuit

Terminal 2 is black wire and is High Fan circuit

Terminal 3 is yellow wire and is Medium Fan circuit

Terminal 4 is red wire and is Low Fan circuit

Terminal 5 is white wire and is Common 115 V

Terminal 6 is Green/Yellow wire and is casing ground

NOTE: DO NOT use a voltmeter to do these checks as it will give erroneous readings.

If the circuit is completed and that component is not operating, the problem is in the rooftop unit or the connection is not being completed through the connector.

B. ROOFTOP HEAT PUMP

To verify circuits are being completed by the AC power module board you would first disconnect the 6-plug connector from the electric kit. (Refer to the above illustration)

Using a 115 volt incandescent bulb, check from terminal 5 (white-common) to the other terminals to determine if a particular circuit is completed through the board. If the circuit is completed, the light will illuminate.

Terminal 1 is blue wire and is the compressor circuit Terminal 2 is black wire and is High Fan circuit

Terminal 3 is yellow wire and is reversing valve circuit. This circuit is energized in cooling mode and not energized in the heat pump mode.

Terminal 4 is red wire and is Low Fan circuit

Terminal 5 is white wire and is Common 115 V

Terminal 6 is Green/Yellow wire and is casing ground

NOTE: DO NOT use a voltmeter to do these checks as it will give erroneous readings.

If the circuit is completed and that component is not operating, the problem is in the rooftop unit or the connection is not being completed through the connector.

It is possible to make the above checks on the board, if necessary.

C. SINGLE BASEMENT AIR CONDITIONER

To verify circuits are being completed by the AC power module board, you would first remove the electric box cover and locate the AC power module board.

Using a 115 volt incandescent bulb, check from AC white (common) of incoming 115V AC; one lead from incandescent bulb, the other lead from incandescent bulb to the terminals listed below to determine if a particular circuit is completed through the board. If the circuit is completed, the light will illuminate.



NO on compressor relay is black wire and is compressor circuit.

Terminal T1 is black wire and is High Fan circuit Terminal T2 is jumpered to T1 terminal Terminal T3 is red wire and is Low Fan circuit

NOTE: DO NOT use a voltmeter to do these checks as it will give erroneous readings.

If the circuit is completed and that component is not operating, the problem is in the wiring to the component or the component.

D. SINGLE BASEMENT HEAT PUMP

To verify circuits are being completed by the AC power module board, you would first remove the electric box cover and locate the AC power module board.



Using a 115 volt incandescent bulb, check from AC white (common) of incoming 115V AC; one lead from incandescent bulb and the other lead from incandescent bulb to the terminals listed below to determine if a particular circuit is completed through the board. If the circuit is completed, the light will illuminate.

NO on compressor relay is black wire and is compressor circuit.

Terminal T1 is black wire and is High Fan circuit

Terminal T2 is black wire and is Reversing Valve circuit. This circuit is energized in cooling mode and NOT energized in the Heat Pump mode.

Terminal T3 is red wire and is Low Fan circuit.

NOTE: DO NOT use a voltmeter to do these checks as it will give erroneous readings.

If the circuit is completed and that component is not operating, the problem is in the wiring to the component or the component.

E. DUAL BASEMENT AIR CONDITIONER AND HEAT PUMP

To verify circuits are being completed by the AC power module board you would first disconnect the two 9-pin connectors that connect the electric kit to the unit.

Using a 115V incandescent bulb check from terminal 4, white wire (115V common) to the other terminals to determine if a particular circuit is completed through the board. If the circuit is completed, the light will illuminate.



CIRCUIT 1:

Terminal 1 is black wire and is compressor circuit

Terminal 2 is white wire and is run circuit to compressor. **DO NOT TEST**.

Terminal 3 is red wire and is start circuit to compressor. **DO NOT TEST**.

Terminal 4 is white wire and is 115V common

Terminal 5 is brown wire and is fan capacitor circuit to fan motor. **DO NOT TEST**.

Terminal 6 is black wire and is high fan circuit

Terminal 7 is red wire and is low fan circuit

Terminal 8 is violet wire and is 115V common

Terminal 9 is violet wire and is reversing valve circuit. This circuit is energized in heat pump mode only.

NOTE: DO NOT use a volt meter to do these checks as it will give erroneous readings.

CIRCUIT 2:

Terminal 1 is orange wire and is compressor circuit

Terminal 2 is gray wire and run circuit to compressor. **DO NOT TEST**.

Terminal 3 is brown wire and is start circuit to compressor. **DO NOT TEST**.

Terminal 4 is white wire and is 115V common

Terminal 5 is brown wire and is fan capacitor circuit to fan motor. **DO NOT TEST**.

Terminal 6 is black wire and is high fan circuit.

Terminal 7 is red wire and is low fan circuit

Terminals 8 & 9 are open.

NOTE: The Circuit 2 AC power module board is the one that is staged and will have a delay from the Circuit 1 system. Verify that Circuit 2 should be operating before start of diagnosis.

NOTE: DO NOT use a volt meter to do these checks as it will give erroneous readings.

7. FUSE

A 3-amp DC fuse is installed in the AC power module board to protect the system from shorts or overload created by disconnecting or reconnecting components when DC volts are to the system.



One test is to remove the fuse and do a continuity test. No continuity requires the fuse be replaced. Continuity means the fuse is good. Another test can be done without removing the fuse. Use a DC volt meter to check between ground or negative (–) DC to each side of fuse. If there is voltage on each side, the fuse is good. If there is voltage on one side only, the fuse is defective and requires replacement.

8. ELECTRIC HEATER ASSEMBLY

The electric heater assembly is an optional component for most roof top air conditioners; however, it is standard equipment for Model 620315. It is not used with any heat pump unit.

To check the heater limit switch, check for continuity across the limit switch terminals with the limit switch at ambient temperature. If you have an open limit switch (no continuity), replace it.

9. RELAY 9T91/120V)

The relay is used on basement air conditioner Model 39224 and basement heat pump Model 39424 ONLY.

The relay has five terminals. Two terminals are not identified; they are the coil terminals. When the coil is not energized (no power to the coil terminals), continuity should exist between COM to NC and no continuity between COM to NO.

When the coil is energized (power to the coil terminals), continuity should exist between COM to NO and no continuity between COM to NC.



There are four relays used in Models 39224 and 39424. Two are used in the reversing valve circuit and are designated as HR (heat relay) on the wiring diagram. Two are used in the furnace blower circuit and are designated as FB (furnace blower) on the wiring diagram. The FB (furnace blower) relays were installed for an ADDI-TIONAL FEATURE; to provide a circuit for the furnace blower motor to enhance both the cooling and heating operation.

NOTE: This circuit will not work with all furnaces. Before sing this circuit, check with the furnace manufacturer for proper wire connection to the furnace. Other components may or may not be required. Read and follow the instructions provided with the furnace.

INSTRUCTIONS FOR FURNACE CONNECTIONS:

THE FOLLOWING FURNACE CONNECTION INSTRUC-TIONS ONLY PERTAIN TO ONE SPECIFIC FURNACE MANUFACTURER, AND MAY NOT APPLY TO YOUR IN-STALLATION.

Run a 12 volt DC positive lead to one of the gray wires in the unit electrical box and secure with an approved connector.

Run a second lead from the furnace blower motor or terminal board to the remaining gray lead in the unit electrical box. Secure with an approved connector.