

<u>UNIT CONTROLS:</u>

1. UNIT SHALL BE STARTED AND STOPPED VIA SPACE MOUNTED PROGRAMMABLE THERMOSTAT. ALL SETPOINTS SHALL BE ADJUSTABLE. ALL ACTUATORS SHALL BE ELECTRONIC.

(FOR REFERENCE ONLY)

- 2. ALL TEMPERATURES LISTED ARE FAHRENHEIT.
- 3. PROVIDE APPROPRIATE ANTI-RECYCLE TIME DELAYS ON COMPRESSOR
- 4. OCCUPIED TIMES SHALL BE 7:00 AM TO 7:00 PM, MONDAY THROUGH FRIDAY.
- 5. OCCUPIED COOLING SETPOINT SHALL BE 73°F (ADJ.) AND HEATING SETPOINT SHALL BE 68°F (ADJ.). UNOCCUPIED COOLING SETPOINT SHALL BE 85°F (ADJ.) AND HEATING SETPOINT SHALL BE 55°F (ADJ.).
- 1. WHILE IN THE OFF MODE (OR ON SAFETY OR MANUAL DISCONNECT) RTU SHALL BE OFF WITH THE OUTSIDE AIR DAMPER (OAD) CLOSED, THE CONDENSING UNIT OFF, AND THE RETURN AIR DAMPER
- 2. WHEN STARTED IN OCCUPIED MODE, THE OAD SHALL OPEN TO THE MINIMUM OUTDOOR AIR POSITION, AS SET DURING BALANCING AND THE UNIT SUPPLY FAN SHALL START AND RUN CONTINUOUSLY.

OCCUPIED HEATING CONTROL

- 1. UPON A DROP IN ROOM TEMPERATURE BELOW THE ROOM HEATING SETPOINT OF 68°F, THE ROOFTOP UNIT SHALL STAGE ON IN THE HEATING MODE AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE SETPOINT. THE REVERSE SHALL OCCUR ON A RISE IN SPACE TEMPERATURE. OCCUPIED COOLING CONTROL
- CYCLE SHALL BE ACTIVATED.

1. UPON A RISE IN ROOM TEMPERATURE ABOVE THE ROOM COOLING SETPOINT OF 73°F, THE COOLING

2. THE FIRST MEANS OF COOLING SHALL BE ACTIVATION OF THE ECONOMIZER. IF THE OUTSIDE AIR ENTHALPY IS BELOW THE RETURN AIR ENTHALPY, THE OUTSIDE AND RETURN AIR DAMPERS SHALL NEW 7-DAY PROGRAMMABLE THERMOSTAT

BE PROPORTIONALLY MODULATED UP TO 100% OUTDOOR AIR TO MAINTAIN SPACE TEMPERATURE SETPOINT. DAT SHALL OVERRIDE, IF REQUIRED, TO LIMIT SUPPLY AIR TEMPERATURE TO 55°F MINIMUM DURING ECONOMIZER COOLING (LIMIT SHALL NOT RESULT IN REDUCTION OF THE MINIMUM OUTDOOR AIRFLOW). IF ADDITIONAL COOLING IS REQUIRED, THE CONDENSING UNIT'S COMPRESSORS SHALL BE STAGED ON AS REQUIRED. FOR LOW LOAD OPERATION, RAWAL APR CONTROL DEVICE SHALL BE USED. THE REVERSE SHALL OCCUR ON A DROP IN SPACE TEMPERATURE BELOW COOLING SETPOINT.

3. IF THE OUTSIDE AIR ENTHALPY RISES ABOVE THE RETURN AIR ENTHALPY THE ECONOMIZER SHALL BE POSITIONED TO PROVIDE MINIMUM OUTDOOR AIRFLOW AND THE UNIT STAGED TO MAINTAIN ROOM COOLING SETPOINT TEMPERATURE. DAT SHALL LIMIT SUPPLY AIR TO 55°F MINIMUM, DURING MECHANICAL COOLING.

UNOCCUPIED MODE

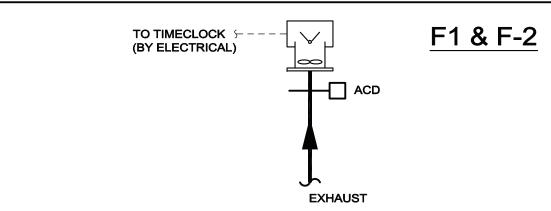
- UNIT'S OUTSIDE AIR DAMPER WILL BE CLOSED. IF SPACE TEMPERATURE FALLS BELOW 55°F (ADJ) FOR A PERIOD OF FIVE MINUTES, RETURN AIR DAMPER WILL BE FULL OPEN, FAN SHALL START AND THE UNIT SHALL OPERATE IN HEATING MODE. WHEN ROOM TEMPERATURE RISES ABOVE 60°F, THE UNIT SHALL SHUT DOWN.
- UNIT'S OUTSIDE AIR DAMPER WILL BE CLOSED. IF SPACE TEMPERATURE RISES ABOVE 85°F (ADJ) FOR A PERIOD OF FIVE MINUTES, RETURN AIR DAMPER WILL BE FULL OPEN, FAN SHALL START AND UNIT SHALL GO INTO COOLING MODE TO SATISFY THERMOSTAT (TR).

WARM-UP CONTROL

1. PROGRAMMABLE THERMOSTAT SHALL PROVIDE OPTIMUM START CAPABILITY. WARM-UP SHALL BE DONE WITH RAD OPEN AND OAD CLOSED. WHEN ROOM TEMPERATURE RISES ABOVE 68°F, OCCUPIED MODE SHALL START.

- THE FOLLOWING SAFETIES EACH WITH ITS OWN MANUAL RESET BUTTON, SHALL SHUT DOWN THE UNIT VIA HARDWIRE BEFORE H-O-A.
 - a. ANY FREEZESTAT (FZ) SHALL SHUTDOWN THE UNIT WHENEVER THE TEMPERATURE IS LESS

ROOFTOP UNIT CONTROL SEQUENCE



EXHAUST FAN:

- OCCUPIED MODE: THE TIME CLOCK (PROVIDED BY ELECTRICAL) LOCATED IN THE ELECTRICAL CLOSET SHALL SEND A SIGNAL TO THE THE EXHAUST FAN TO START. OCCUPIED TIMES SHALL BE 7:00AM - 7:00PM. UPON ACTIVATION THE AUTOMATIC CONTROL DAMPER (ACD) SHALL OPEN AND THE FAN IS ENABLED.
- 2. UNOCCUPIED MODE: THE TIME CLOCK LOCATED IN THE ELECTRICAL CLOSET SHALL SEND A SIGNAL TO THE EXHAUST FAN TO DE-ENERGIZE. UPON DEACTIVATION THE FAN SHALL SHUT DOWN AND THE AUTOMATIC CONTROL DAMPER SHALL CLOSE.

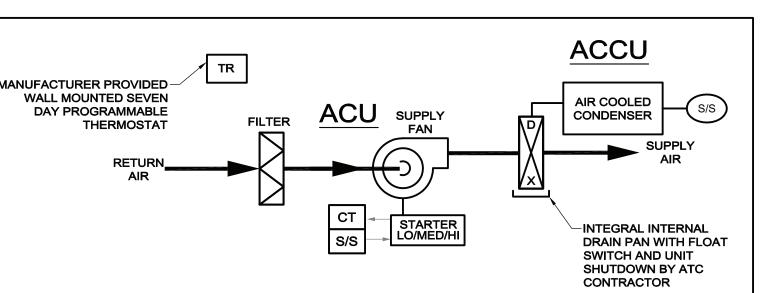
F-1 & F-2 ROOF EXHAUST FAN CONTROL SEQUENCE

HVAC EQUIPMENT HOURS OF OPERATION SCHEDULE THERMOSTAT SET-POINT FAN SPEED OCCUPIED UNOCCUPIED REMARKS COOLING (°F) HEATING (°F) COOLING (°F) HEATING (°F) OCCUPIED UNOCCUPIED SEE NOTES

SYSTEM OCCUPIED HOURS OF OPERATION ROOFTOP UNIT 7 A.M. - 7 P.M. SPLIT HEAT PUMPS (ACU/ACCU) 7 A.M. - 7 P.M. AUTO SEE NOTES 73 OUTDOOR AIR FAN 7 A.M. - 7 P.M. SEE NOTES TOILET/JANITORS EXHAUST FAN 7 A.M. - 7 P.M. OFF SEE NOTES LAN AND ELEC ROOM AC UNITS 75 SEE NOTES

. COORDINATE FINAL HOURS OF OPERATION WITH LANDLORD. 2. REFER TO CONTROL SEQUENCES FOR ADDITIONAL INFORMATION.

3. HOURS OF OPERATION ARE SPECIFIED FOR WEEKDAYS MONDAY THROUGH FRIDAY AND EXCLUDES HOLIDAYS AS DETERMINED BY LANDLORD (UNLESS OTHERWISE NOTED).



DUCTLESS SPLIT AIR CONDITIONING UNIT CONTROL SEQUENCE:

- 1. THIS SEQUENCE APPLIES TO THE DUCTLESS SPLIT AIR CONDITIONING UNITS SERVING THE LAN AND ELECTRICAL
- UNIT SHALL BE STARTED AND STOPPED VIA A WALL MOUNTED SEVEN DAY PROGRAMMABLE THERMOSTAT. CONTROL SHALL BE BY MANUFACTURER SUPPLIED MICROPROCESSOR CONTROLLER.
- 4. OCCUPIED COOLING SETPOINT SHALL BE 75°F (ADJ.). OCCUPIED HEATING SETPOINT SHALL BE 55°F (ADJ.).
- 5. PROVIDE APPROPRIATE ANTI-RECYCLE TIME DELAYS ON COMPRESSOR.
- 6. UNIT SHALL BE IN OCCUPIED MODE AT ALL TIMES.

- THE FAN OPERATION AND SPEED SHALL BE CONTROLLED BY UNIT CONTROLLER TO MAINTAIN FAN AT OPTIMUM SPEED WHILE THE UNIT IS IN OCCUPIED MODE AS SPACE CONDITIONS REQUIRE.
- UPON AN INCREASE IN SPACE TEMPERATURE ABOVE 75°F (ADJ.), AS SENSED BY THE SPACE MOUNTED SEVEN DAY PROGRAMMABLE THERMOSTAT, THE UNIT SHALL ENERGIZE IN COOLING MODE IN ORDER TO MAINTAIN SPACE TEMPERATURE.
- THE REVERSE SHALL OCCUR UPON A DROP IN SPACE TEMPERATURE.
- UPON A DROP IN SPACE TEMPERATURE BELOW 55°F (ADJ.), AS SENSED BY THE SPACE TEMPERATURE SENSOR, THE ASSOCIATED AC UNIT SHALL OPERATE IN THE HEATING MODE AS REQUIRED TO MAINTAIN SPACE
- 2. THE REVERSE SHALL OCCUR UPON A RISE IN SPACE TEMPERATURE.

COOLING CONTROL

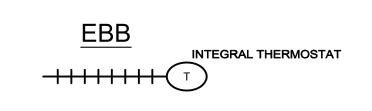
- 1. IF THE AC UNIT FAILS, ROOM TEMPERATURE IS ABOVE 80°F (ADJ), ROOM TEMPERATURE IS BELOW 50°F (ADJ.), OR ANY SAFETY IS TRIPPED, THE CONTROLLER SHALL SHALL GENERATE AN AUDIBLE ALARM WITHIN THE SPACE.
- 2. UPON ACTIVATION OF THE FLOAT SWITCH, UNIT SHALL TURN OFF.

HC02

HC04

1. CONDUIT FOR INTERCONNECTING CONTROL WIRING BETWEEN INDOOR AND OUTDOOR UNITS TO BE PROVIDED

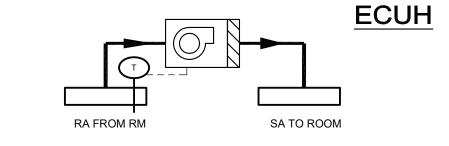
DUCTLESS SPLIT AC UNIT HC04



ELECTRIC BASEBOARD

- 1. THIS SEQUENCE APPLIES TO ELECTRIC BASEBOARD HEATER.
- 2. THE ELECTRIC BASEBOARD SHALL BE CONTROLLED BY AN INTEGRAL THERMOSTAT. THE ELECTRIC BASEBAORD HEATER SHALL BE OFF DURING UNOCCUPIED HOURS.
- 3. UPON A CALL FOR HEAT FROM THE THERMOSTAT, ELECTRIC BASEBOARD SHALL BE ENERGIZED AS REQUIRED TO MAINTAIN THE SPACE TEMPERATURE SETPOINT, 68°F (ADJUSTABLE). THE REVERSE SHALL OCCUR UPON A RISE IN

ELECTRIC BASEBOARD HEATER



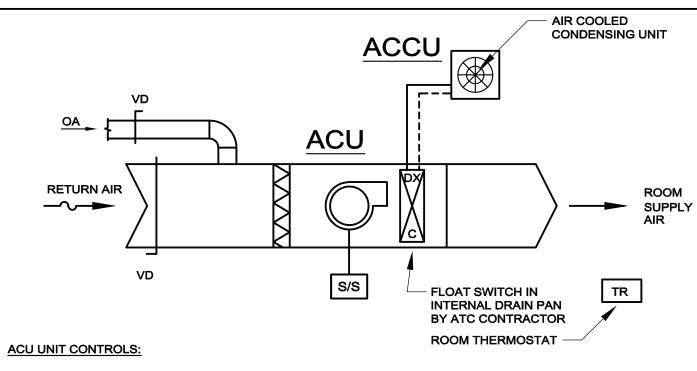
VESTIBULE CEILING MOUNTED ELECTRIC CABINET UNIT HEATER:

1. THE FAN AND ELECTRIC HEATING COIL SHALL BE CONTROLLED BY THE THERMOSTAT MOUNTED IN RETURN GRILLE.

CONTROL SEQUENCE

WHEN THE SENSOR LOCATED IN THE ASSOCIATED RETURN GRILLE SENSES A DROP IN SPACE TEMPERATURE BELOW SETPOINT (68°F ADJ) THE FAN SHALL ENERGIZE AND THE ELECTRIC COIL SHALL STAGE ON/OFF AS REQUIRED.

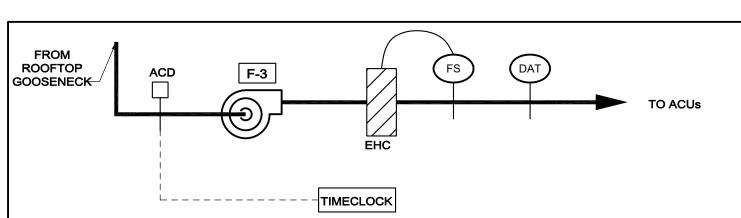
CEILING MOUNTED CABINET UNIT HEATER CONTROL SEQUENCE



. THE UNIT SHALL BE STARTED AND STOPPED VIA A 7-DAY PROGRAMMABLE THERMOSTAT WITH

- MICROPROCESSOR CONTROLS CAPABLE OF CONTROLLING THE ACU . 2. PROVIDE APPROPRIATE ANTI-CYCLE TIME DELAYS ON COMPRESSOR.
- 3. OCCUPIED TIMES SHALL BE 7:00AM TO 7:00PM.
- 4. OCCUPIED COOLING SETPOINT SHALL BE 73°F (ADJ.) AND THE HEATING SETPOINT SHALL BE 68°F (ADJ.).
- 5. UNOCCUPIED COOLING SETPOINT SHALL BE 85°F (ADJ.) AND THE HEATING SETPOINT SHALL BE 55°F (ADJ.).
- 1. DURING OCCUPIED HOURS, THE FAN SHALL RUN CONTINUOUSLY.
- 2. DURING UNOCCUPIED HOURS, THE FAN SHALL RUN UPON A CALL FOR HEATING OR COOLING.
- . DURING OCCUPIED COOLING THE UNIT SHALL OPERATE AS REQUIRED TO MAINTAIN A SPACE TEMPERATURE OF 73°F (ADJ.), AS SENSED BY THE ROOM THERMOSTAT.
- DURING UNOCCUPIED COOLING THE UNIT SHALL OPERATE AS REQUIRED TO MAINTAIN A SPACE TEMPERATURE OF 85°F (ADJ.), AS SENSED BY THE ROOM THERMOSTAT.
- 1. DURING OCCUPIED HEATING THE UNIT SHALL OPERATE AS REQUIRED TO MAINTAIN A SPACE TEMPERATURE OF 68°F (ADJ.), AS SENSED BY THE ROOM THERMOSTAT.
- 2. DURING UNOCCUPIED HEATING THE UNIT SHALL OPERATE AS REQUIRED TO MAINTAIN A SPACE TEMPERATURE OF 55°F (ADJ.), AS SENSED BY THE ROOM THERMOSTAT.
- PROGRAMMABLE THERMOSTAT SHALL PROVIDE OPTIMUM START CAPABILITY. WARM-UP SHALL BE DONE WITH ACD OPEN. WHEN ROOM TEMPERATURE RISES ABOVE 68°F, OCCUPIED MODE SHALL START.
- 1. UPON ACTIVATION OF THE FLOAT SWITCH, UNIT SHALL TURN OFF.

ACU/ACCU CONTROL SEQUENCE HC03



- OUTDOOR AIR FANS AND ELECTRIC HEATING COILS
- 1. THIS SEQUENCE APPLIES TO THE OUTDOOR AIR FANS AND ELECTRIC HEATING COILS.
- 2. OCCUPIED MODE: DURING OCCUPIED HOURS.

HC02

- 2.1. A TIMECLOCK SHALL SEND A SIGNAL TO OPEN THE DAMPER (ACD) FOR F-1 TO START. AFTER ENDSWITCH (ES) PROVES ACD OPEN, THE FAN SHALL START. OCCUPIED TIMES SHALL BE 9:00AM - 5:00PM (ADJ) AND SHALL BE CONFIRMED BY OWNER. THE FAN SHALL RUN CONTINUOUSLY DURING OCCUPIED HOURS.
- 2.2. FAN F-1 SHALL BE CONSTANT VOLUME. 2.3. UPON PROOF OF AIRFLOW, AT FLOW SWITCH (FS), ELECTRIC HEATING COIL (EHC) SHALL ENERGIZE AS
- REQUIRED TO MAIN A DISCHARGE TEMPERATURE (DAT) OF 60°F (ADJ.) 3. UNOCCUPIED MODE: THE TIMECLOCK SHALL SEND A SIGNAL FOR THE ELECTRIC HEATING COIL TO DE-ENERGIZE, FANS TO STOP, AND DAMPER (ACD) TO CLOSE.
- 4. COORDINATE LOCATION OF TIMECLOCK WITH GENERAL CONTRACTOR.
- 5. TIMECLOCK SHALL BE PROVIDED BY MECHANICAL CONTRACTOR. ATC CONTRACTOR SHALL PROVIDE ALL CONTROL WIRING.
- 6. FAN SHALL SHUT DOWN IF ASSOCIATED SMOKE FIRE DAMPER CLOSES.

OUTDOOR AIR FAN AND ELECTRIC HC04 **HEATING COIL CONTROL SEQUENCE**



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