

SEQUENCE OF CONTROL CLASSROOM UNIT VENTILATOR NOT TO SCALE

CLASSROOM UNIT VENTILATOR

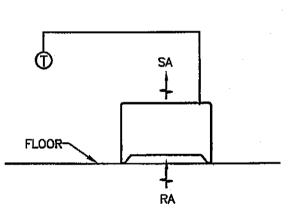
OCCUPIED CYCLE

WHEN INDEXED TO THE OCCUPIED CYCLE, THROUGH THE BUILDING AUTOMATION SYSTEM (BAS), THE FAN SHALL RUN CONTINUOUSLY WHEN INDEXED TO HEATING, THROUGH THE (BAS), THE OUTSIDE AND RETURN AIR DAMPERS SHALL MODULATE TO A FIXED MINIMUM POSITION, AND THE ROOM THERMOSTAT SHALL MODULATE THE FACE AND BYPASS DAMPER ON THE DUAL TEMP WATER COIL TO MAINTAIN SPACE TEMPERATURE. AS THE ROOM SPACE TEMPERATURE STARTS TO RISE ABOVE THE THERMOSTAT SETTING, THE ROOM THERMOSTAT SHALL MODULATE THE OUTSIDE AND RETURN AIR DAMPERS TO MAINTAIN SPACE TEMPERATURE. WHEN INDEXED TO COOLING, THROUGH THE BAS, THE OUTSIDE AND RETURN AIR DAMPERS SHALL GO THE FIXED MINIMUM POSITION AND THE ROOM THERMOSTAT SHALL MODULATE THE FACE AND BYPASS DAMPER TO MAINTAIN SPACE TEMPERATURE.

WHEN INDEXED TO THE UNOCCUPIED CYCLE, THROUGH BAS, THE OUTDOOR AIR DAMPER SHALL BE FULLY CLOSED. RETURN AIR DAMPER SHALL BE OPEN AND THE FACE AND BYPASS DAMPER SHALL BE FULL OPEN TO THE COIL. WHENEVER THE SPACE TEMPERATURE FALLS BELOW THE "UNOCC." SETTING OF THE THERMOSTAT, THE UNIT FAN SHALL START AND OPERATE ON A RECIRCULATING BASIS AND MODULATE THE HEATING AND COOLING UNTIL THE "UNOCC." THERMOSTAT IS SATISFIED.

A DISCHARGE AIR SENSOR SHALL CLOSE THE OUTSIDE AIR DAMPER AND OPEN THE FACE AND BYPASS DAMPER TO THE FACE DAMPER WHEN THE DISCHARGE AIR TEMPERATURE FALLS BELOW 40 DEG. AN EP SWITCH SHALL CLOSE THE OUTSIDE AIR DAMPER ON FAN SHUTDOWN. ONE SAFETY LOW LIMIT THERMOSTAT WITH A 20 FT. SENSING ELEMENT SHALL STOP THE FAN AT ANY TIME THE HEATING DISCHARGE TEMPERATURE FALLS BELOW 35

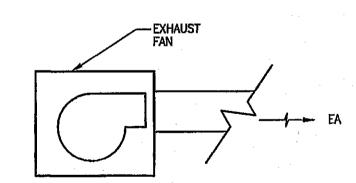
A LIMITING DEVICE SHALL PREVENT THE OUTSIDE AND RETURN AIR DAMPERS FROM MODULATING BEYOND THE FIXED MINIMUM POSITION WHEN THE OUTSIDE AIR DROPS BELOW 32 DEGREES (FIELD ADJUSTABLE).



SEQUENCE OF CONTROL **CABINET HEATER**

CABINET_HEATER

PROVIDE LINE VOLTAGE ROOM THERMOSTAT TO CYCLE FAN "ON-OFF" TO MAINTAIN ROOM TEMPERATURE.



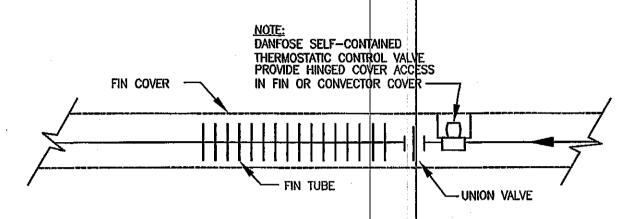
SEQUENCE OF CONTROL **EXHAUST FANS** NOT TO SCALE

EXHAUST FAN

WHEN BUILDING IS INDEXED TO OCCUPIED CYCLE, THE FANS SHALL RUN BASED ON TIME OF DAY SCHEDULING.

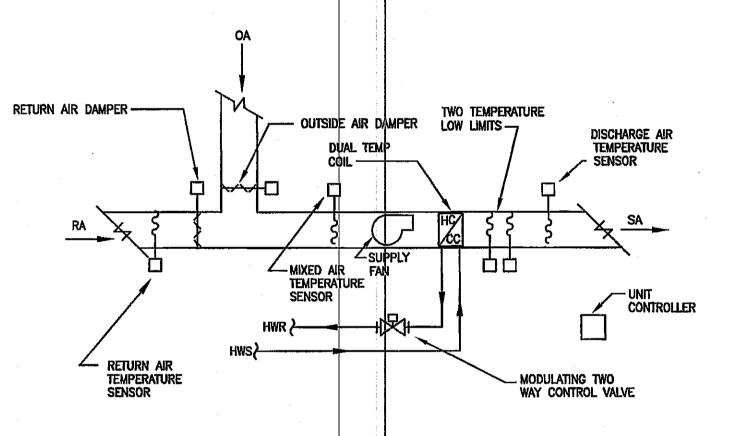
TEMPERATURE CONTROL NOTES

- NETWORK ALL DDC CONTROLLERS TOGETHER AND PROVIDE COMMON COMPUTER PORT CONNECTION IN AT LEAST ONE BAS PANEL, AS DIRECTED BY ENGINEER/ARCHITECT. CONNECT TO EXISTING BUILDING FRONT END EQUIPMENT
- ALL HEATING VALVES AND DAMPERS TO FAIL IN FAIL-SAFE POSITION (FULL HEAT TO COIL, FULL RETURN AIR, NO OUTSIDE
- MECHANICAL CONTRACTOR IS TO COORDINATE, AND INCLUDE AS NEEDED, ALL WORK FOR TEMPERATURE CONTROLS WITH OTHER TRADES. INCLUDE ALL WIRING (POWER AND CONTROL). CONDUIT TRANSFORMERS, AND CONTROLS FOR A COMPLETE AND FUNCTIONAL INSTALLATION.
- 4. ALL BAS PROGRAMMING POINTS SHALL BE ADJUSTABLE.
- PROVIDE A PORTABLE COMPUTER INTERFACE CONNECTION TO EACH NEW UNIT VENT, AND EACH NEW AIR HANDLING UNIT AT ROOM THERMOSTAT OR AT DDC CONTROL (BA\$) PANEU



SEQUENCE OF CONTROL FIN RADIATION

VALVE SETTING TO MODULATE HOT WATER SUPPLY TO MAINTAIN SPACE



SEQUENCE OF CONTROL FAN COIL UNIT

FAN_COIL_UNIT_FC-1

OCCUPIED CYCLE

THE UNIT SHALL BE INDEXED TO OCCUPIED MODE ON PROGRAMMED OCCUPIED/UNOCCUPIED SCHEDULE, SUMMER OR WINTER OPERATION IS THROUGH BAS

THE UNIT FAN MOTOR SHALL RUN CONTINUOUSLY. WHEN INDEXED TO HEATING AND AFTER WARM UP, THE OUTSIDE AIR, AND RETURN AIR DAMPERS SHALL OPEN IN UNISON TO THE MINIMUM OUTSIDE AIR POSITION. A DISCHARGE AIR SENSOR SHALL INSURE THE DISCHARGE AIR TEMPERATURE DOES NOT DROP BELOW 52'F (BAS ADJUSTABLE). THE COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN SPACE SETPOINT. DISCHARGE AIR SENSOR SHALL FULLY OPEN THE WATER VALVE WHEN THE DISCHARGE AIR TEMPERATURE FALLS BELOW 50F (BAS ADJUSTABLE).

BETWEEN 45'F AND 75'F OA TEMPERATURE, AND WHEN THE SPACE TEMPERATURE EXCEEDS SETPOINT BY 3'F, OUTSIDE AIR, RETURN AIR, DAMPERS SHALL MODULATE TO PROVIDE ECONOMIZER COOLING.

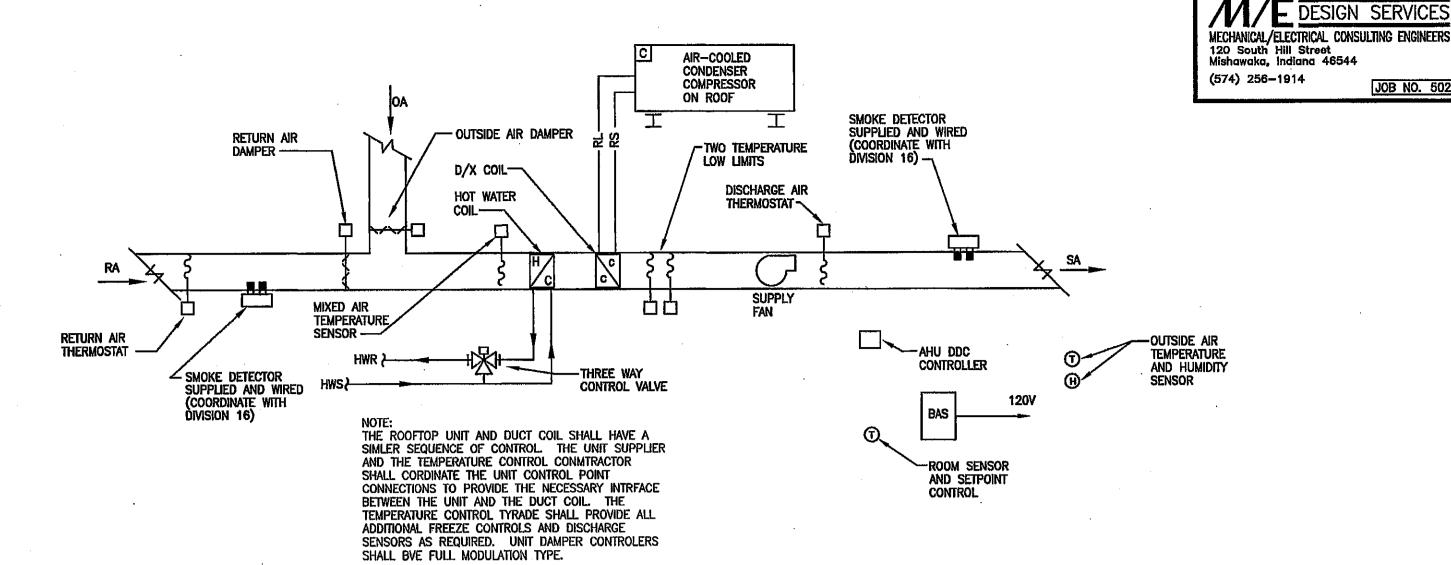
WHEN INDEXED TO COOLING THE OUTSIDE AND RETURN DAMPERS SHALL BE SET AT THE FIXED MINIMUM POSITION. ROOM SENSOR SHALL MODULATE THE VALVE ON THE COIL TO MAINTAIN SPACE TEMPERATURE.

UNOCCUPIED CYCLE

THE OUTSIDE AIR DAMPER SHALL BE CLOSED, AND THE RETURN AIR DAMPER FULL OPEN. THE COIL CONTROL VALVE SHALL BE FULL OPEN TO THE COIL IF THE OUTSIDE AIR TEMPERATURE IS BELOW 55'F (BAS ADJUSTABLE).

BAS SHALL SELECT NIGHT SETPOINT FOR CONTROL (55°F WINTER, ADJUSTABLE). UPON A CALL FOR HEAT, THE UNIT FAN SHALL CYCLE TO MAINTAIN SETPOINT.

- NOTES: 1. A SAFETY LOW LIMIT THERMOSTAT, WITH AN AVERAGING ELEMENT, SHALL STOP THE SUPPLY FAN, OPEN THE HOT WATER VALVE, AND CLOSE THE OUTSIDE AIR DAMPER, ANYTIME THE DISCHARGE AIR FALLS
 - 3. UPON FAN SHUTDOWN, THE OUTSIDE AIR DAMPERS SHALL BE CLOSED.
 - 5. ALL SENSOR INPUTS AND CONTROL OUTPUTS SHALL BE THROUGH THE AHU CONTROLLER TIED TO BAS.
 - 6. TWO (2) SAFETY LOW LIMIT THERMOSTAT WITH 20 FOOT SENSING ELEMENTS SHALL STOP THE FAN ANY TIME THE UNIT FAN DISCHARGE TEMPERATURE FALLS BELOW 35'F.



TEMPERATURE CONTROL

SEQUENCE OF CONTROL (ALTERNATE #3)

AIR HANDLING UNITS AH-1. AH-3. AH-4. AH-5. AH-6. AND AH-7

OCCUPIED CYCLE

THE UNIT SHALL BE INDEXED TO OCCUPIED MODE ON PROGRAMMED OCCUPIED/UNOCCUPIED SCHEDULE. SUMMER OR WINTER OPERATION IS THROUGH BAS

THE UNIT FAN MOTOR SHALL RUN CONTINUOUSLY. WHEN INDEXED TO HEATING AND AFTER WARM UP, THE OUTSIDE AIR, AND RETURN AIR DAMPERS SHALL OPEN IN UNISON TO THE MINIMUM OUTSIDE AIR POSITION. A DISCHARGE AIR SENSOR SHALL INSURE THE DISCHARGE AIR TEMPERATURE DOES NOT DROP BELOW 52'F (BAS ADJUSTABLE). THE HOT WATER COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN SPACE SETPOINT. DISCHARGE AIR SENSOR SHALL FULLY OPEN THE WATER VALVE WHEN THE DISCHARGE AIR TEMPERATURE FALLS BELOW 50'F (BAS ADJUSTABLE).

BETWEEN 45'F AND 75'F OA TEMPERATURE, AND WHEN THE SPACE TEMPERATURE EXCEEDS SETPOINT BY 3'F, OUTSIDE AIR, RETURN AIR, DAMPERS SHALL MODULATE TO PROVIDE ECONOMIZER COOLING.

WHEN INDEXED TO COOLING THE OUTSIDE AND RETURN DAMPERS SHALL BE SET AT THE FIXED MINIMUM POSITION. THE ROOM SESOR SHALL MODULATE THE THREE-WAY CONTROL VALVE TO MAINTAIN SPACE TEMPERATURE. UNOCCUPIED CYCLE

THE OUTSIDE AIR DAMPER SHALL BE CLOSED, AND THE RETURN AIR DAMPER FULL OPEN. THE HOT WATER COIL CONTROL VALVE SHALL BE FULL OPEN TO THE COIL IF THE OUTSIDE AIR TEMPERATURE IS BELOW 55°F (BAS ADJUSTABLE).

BAS SHALL SELECT NIGHT SETPOINT FOR CONTROL (55'F WINTER, ADJUSTABLE). UPON A CALL FOR HEAT, THE UNIT FAN SHALL CYCLE TO MAINTAIN SETPOINT.

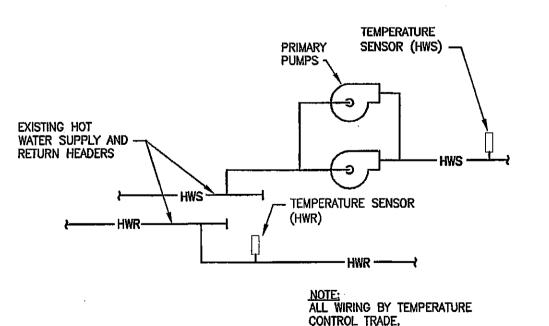
ROOM SENSOR

AND SETPOINT

WHEN INDEXED TO THE UNOCCUPIED CYCLE, THROUGH BAS, THE OUTDOOR AIR DAMPER SHALL BE FULLY CLOSED. RETURN AIR DAMPER SHALL BE OPEN AND THE CONTROL VALVE SHALL BE FULL OPEN TO THE COIL WHENEVER THE SPACE TEMPERATURE FALLS BELOW THE "UNOCC." SETTING OF THE THERMOSTAT, THE UNIT FAN SHALL START AND OPERATE ON A RECIRCULATING BASIS AND MODULATE THE HEATING AND COOLING REFREGERATION CYCLE UNTIL THE "UNOCC." THERMOSTAT IS SATISFIED.

NOTES: 1. A SAFETY LOW LIMIT THERMOSTAT, WITH AN AVERAGING ELEMENT, SHALL STOP THE SUPPLY FAN. OPEN THE HOT WATER VALVE, AND CLOSE THE OUTSIDE AIR DAMPER, ANYTIME THE DISCHARGE AIR FALLS

- 2. UPON INDICATION OF SMOKE BY THE RETURN AIR SMOKE DETECTOR, THE UNIT SUPPLY FAN SHALL SHUT DOWN, THE CONTRACTOR SHALL PROVIDE AND WIRE THE SMOKE DETECTORS TO THE UNIT MOTOR STARTER AND THE BUILDING FIRE ALARM SYSTEM.
- 3. UPON FAN SHUTDOWN, THE OUTSIDE AIR DAMPERS SHALL BE CLOSED.
- 5. ALL SENSOR INPUTS AND CONTROL OUTPUTS SHALL BE THROUGH THE AHU CONTROLLER TIED TO BAS.
- 6. TWO (2) SAFETY LOW LIMIT THERMOSTAT WITH 20 FOOT SENSING ELEMENTS SHALL STOP THE FAN ANY TIME THE UNIT FAN DISCHARGE TEMPERATURE FALLS BELOW 35°F.

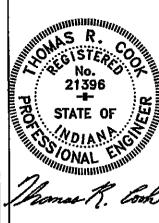


SEQUENCE OF CONTROL **NEW CIRCULATION PUMPS** NOT TO SCALE

CIRCULATION PUMP

THE HOT WATER SYSTEM SHALL BE ACTIVATED AUTOMATICALLY AS DESCRIBED BELOW.

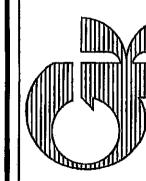
THE NEW HOT WATER PUMPS SHALL START WHENEVER THE BOILERS ARE BROUGHT ON LINE. A PRESSURE SENSOR ACROSS THE PUMP SHALL PROVIDE INDICATION OF PUMP OPERATION. BAS PROGRAMING SHALL PROVIDE PUMP SEQUINCING AND AUTOMATIC START OF SECONDARY PUMP UPON FAILER OF PRIMARY PUMP.



REVISIONS

JOB NO. 5021

DMIN



10-06-04 AS SHOWN

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