SEQUENCE OF OPERATION:

A. GENERAL: THE SYSTEM SHALL BE CONTROLLED BY A STAND–ALONE CONTROL SYSTEM. WITH THE H–O–A SWITCH IN THE "AUTO" POSITION, THE SYSTEM SHALL START THROUGH THE BAS SYSTEM AND OPERATE AS DESCRIBED BELOW, PROVIDED THE SAFETIES HAVE BEEN SATISFIED.

B. DISABLED MODE – WHEN THE AHU IS IN THE DISABLED MODE:
1. THE SUPPLY FAN SHALL BE DE–ENERGIZED.
2. THE OUTSIDE AIR DAMPER SHALL BE CLOSED AND THE RETURN AIR DAMPER SHALL BE OPEN.
3. THE CHILLED WATER COIL VALVE SHALL BE CLOSED TO THE COIL.

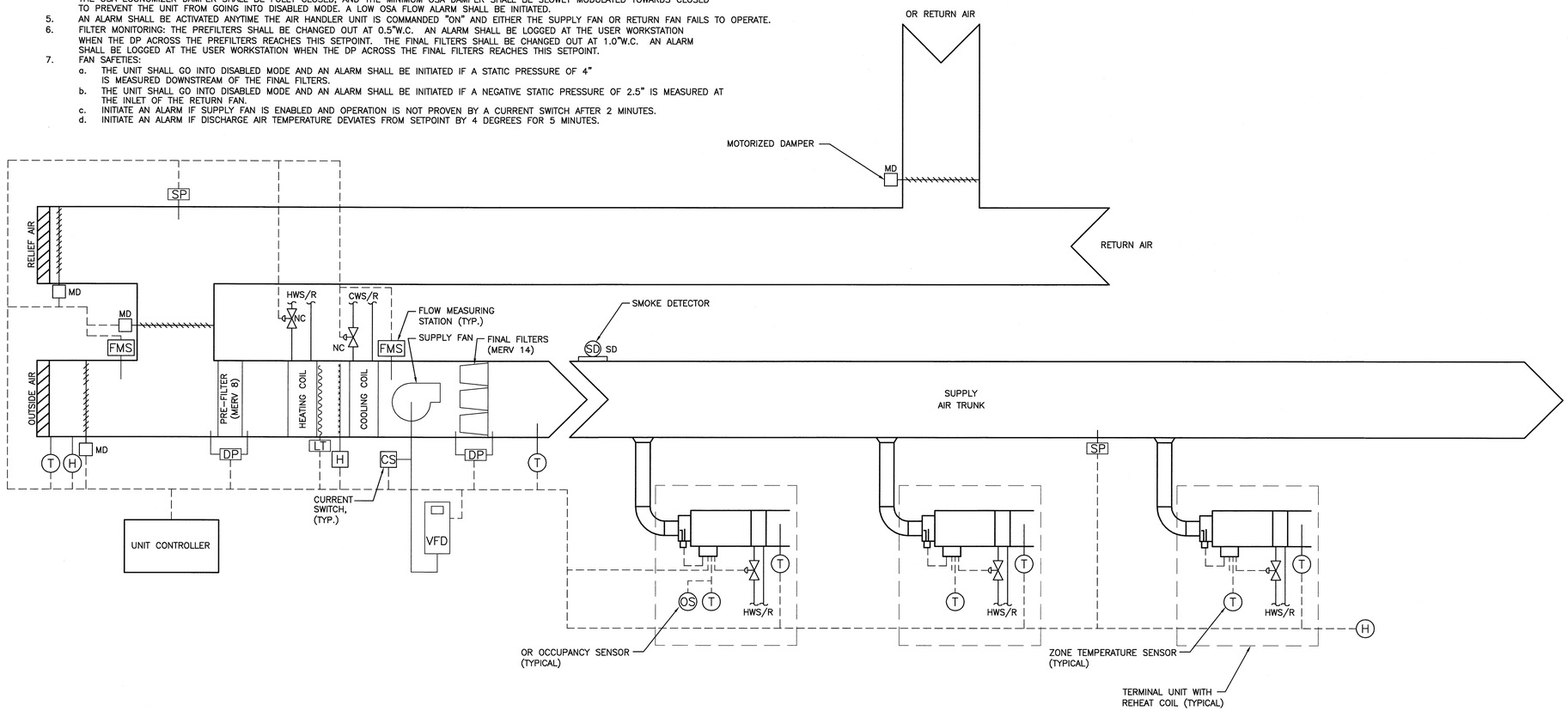
C. UNOCCUPIED PERIOD OPERATING MODE:
1. THE AHU SHALL OPERATE AT ALL TIMES.
2. IF THE OCCUPANCY SENSOR IN THE OR SENSES THAT THE OR IS UNOCCUPIED, THE VAV TERMINAL THAT SERVES THAT SPACE SHALL RESET THE TERMINAL TO 50% DESIGN AIRFLOW. THE OR RETURN AIR DAMPER SHALL MODULATE CLOSED TO MAINTAIN 0.02" W.C. POSITIVE ROOM PRESSURE).

D. EMERGENCY POWER START–UP MODE:
1. IF POWER IS INTERRUPTED, THE UNIT FANS SHALL RAMP BACK TO NORMAL SPEED AT A RATE NOT GREATER THAN 5 HZ PER MINUTE.

E. NORMAL OPERATING MODE:
1. THE UNIT SHALL GO INTO NORMAL OPERATING MODE WHEN THE BUILDING ENTERS THE OCCUPIED PERIOD.
2. THE MINIMUM OUTSIDE AIR DAMPER SHALL OPEN FULLY.
4. ONCE THE MINIMUM OUTSIDE AIR DAMPER IS PROVEN OPEN, THE SUPPLY FAN SHALL BE ENABLED.
5. SUPPLY FAN CONTROL:
   a. THE SUPPLY FAN SHALL OPERATE CONTINUOUSLY DURING THE OCCUPIED PERIOD.
   b. A SUPPLY FAN VFD SHALL MODULATE THE FAN SPEED AS NECESSARY TO MAINTAIN THE DUCT SYSTEM STATIC PRESSURE AT SETPOINT (DETERMINED DURING BALANCING).
6. DAMPER CONTROL:
   a. AN AIRFLOW MONITORING STATION SHALL CONTROL THE MINIMUM OSA DAMPER TO MAINTAIN OSA MINIMUM AIRFLOW AT SETPOINT.
   b. ECONOMIZER DAMPER CONTROL – IF THE OSA ENTHALPY IS LESS THAN THE RA ENTHALPY, THE OSA DAMPER AND RETURN AIR DAMPER SHALL BE MODULATED TO MAINTAIN DISCHARGE AIR TEMPERATURE AT SETPOINT. IF THE OSA ENTHALPY IS LESS THAN THE RA ENTHALPY, THE OSA DAMPER IS 100% OPEN AND THE DISCHARGE AIR TEMPERATURE IS ABOVE SETPOINT, THEN MECHANICAL COOLING SHALL BE ENABLED AS DESCRIBED BELOW TO MAINTAIN SETPOINT. IF OSA ENTHALPY IS GREATER THAN THE RA ENTHALPY, THEN MECHANICAL COOLING SHALL BE ENABLED TO MAINTAIN SETPOINT.
   c. RELIEF DAMPER CONTROL – MODULATE THE RELIEF DAMPER TO IN SEQUENCE WITH THE ECONOMIZER DAMPER TO PREVENT SPACE OVERPRESSURIZATION.
   d. THE MINIMUM OUTSIDE AIR AND ECONOMIZER DAMPERS SHALL FAIL CLOSED. THE RELIEF DAMPER SHALL FAIL CLOSED. THE RETURN DAMPER SHALL FAIL OPEN.
7. DISCHARGE AIR TEMPERATURE CONTROL:
   a. THE DISCHARGE AIR TEMPERATURE SHALL BE MAINTAINED AT 53F.
   b. IF THERE IS A CALL FOR COOLING, AND THE SYSTEM IS IN ECONOMIZER MODE, THE OUTSIDE AIR DAMPER AND THE RETURN AIR DAMPER SHALL MODULATE TO MAINTAIN DISCHARGE AIR TEMPERATURE AT SETPOINT.
   e. IF THERE IS A CALL FOR COOLING AND THE SYSTEM IS NOT IN ECONOMIZER MODE, THE COOLING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN DISCHARGE TEMPERATURE AT SETPOINT.
   f. IF THE DISCHARGE AIR TEMPERATURE IS LESS THAN SETPOINT, THE HEATING COIL CONTROL VALVE SHALL BE MODULATED TO MAINTAIN DISCHARGE AIR TEMPERATURE AT SETPOINT.
8. HUMIDIFIER CONTROL
   a. THE HUMIDIFIER STEAM CONTROL VALVE SHALL BE MODULATED TO MAINTAIN 35% RH AS MEASURED IN THE RETURN DUCT.
   b. A SEPARATE HUMIDITY SENSOR SHALL CONNECT TO THE DDC SYSTEM TO MONITOR RETURN DUCT HUMIDITY LEVEL AT THE USER WORKSTATION.
   c. PROVIDE A HIGH LIMIT HUMIDITY SWITCH AND AIRFLOW PROVING SWITCH.

F. SAFETY DEVICES:
1. THE UNIT SHALL GO INTO DISABLED MODE IF SMOKE IS DETECTED AT THE SMOKE DETECTOR LOCATED IN THE RETURN DUCT.
2. IF THE RETURN WATER TEMPERATURE FROM THE HEATING COIL DROPS TO 80F, THE OUTSIDE AIR DAMPER SHALL BE CLOSED FULLY AND AN ALARM SHALL BE LOGGED AT THE DDC USER WORKSTATION.
3. IF THE FREEZESTAT SERPENTINED ACROSS THE COOLING COIL FACE SENSES A TEMPERATURE BELOW AT 36F (OR AS SET), THE UNIT SHALL GO INTO DISABLED MODE AND ALARM SHALL BE INITIATED.
4. IF THE DISCHARGE AIR TEMPERATURE DROPS BELOW SETPOINT BY 2 DEGREES FOR 5 MINUTES AND THE HEATING COIL VALVE IS FULLY OPEN, THE OSA ECONOMIZER DAMPER SHALL BE FULLY CLOSED, AND THE MINIMUM OSA DAMPER SHALL BE SLOWLY MODULATED TOWARDS CLOSED TO PREVENT THE UNIT FROM GOING INTO DISABLED MODE. A LOW OSA FLOW ALARM SHALL BE INITIATED.
5. AN ALARM SHALL BE ACTIVATED ANYTIME THE AIR HANDLER UNIT IS COMMANDED "ON" AND EITHER THE SUPPLY FAN OR RETURN FAN FAILS TO OPERATE.
6. FILTER MONITORING: THE PREFILTERS SHALL BE CHANGED OUT AT 0.5"W.C. AN ALARM SHALL BE LOGGED AT THE USER WORKSTATION WHEN THE DP ACROSS THE PREFILTERS REACHES THIS SETPOINT. THE FINAL FILTERS SHALL BE CHANGED OUT AT 1.0"W.C. AN ALARM SHALL BE LOGGED AT THE USER WORKSTATION WHEN THE DP ACROSS THE FINAL FILTERS REACHES THIS SETPOINT.
7. FAN SAFETIES:
   a. THE UNIT SHALL GO INTO DISABLED MODE AND AN ALARM SHALL BE INITIATED IF A STATIC PRESSURE OF 4" IS MEASURED DOWNSTREAM OF THE FINAL FILTERS.
   b. THE UNIT SHALL GO INTO DISABLED MODE AND AN ALARM SHALL BE INITIATED IF A NEGATIVE STATIC PRESSURE OF 2.5" IS MEASURED AT THE INLET OF THE RETURN FAN.
   c. INITIATE AN ALARM IF SUPPLY FAN IS ENABLED AND OPERATION IS NOT PROVEN BY A CURRENT SWITCH AFTER 2 MINUTES.
   d. INITIATE AN ALARM IF DISCHARGE AIR TEMPERATURE DEVIATES FROM SETPOINT BY 4 DEGREES FOR 5 MINUTES.

H. THE FOLLOWING POINTS SHALL BE AVAILABLE FOR MONITORING AT THE USER WORKSTATION:
1. OUTSIDE AIR TEMPERATURE.
2. MIXED AIR TEMPERATURE.
3. DISCHARGE AIR TEMPERATURE.
4. SUPPLY AIRFLOW.
5. MINIMUM OUTSIDE AIRFLOW.
7. RETURN AIR HUMIDITY LEVEL.
8. SUPPLY FAN SPEED IN HZ.
9. RETURN FAN SPEED IN HZ.
10. SUPPLY FAN STATUS
11. OUTSIDE AIR DAMPER POSITION
12. RETURN DAMPER POSITION
13. RELIEF DAMPER POSITION
14. PRE–FILTER PRESSURE DROP
15. FINAL FILTER PRESSURE DROP



NOTE:

1. SEE SHEET M–001 FOR LEGEND AND ABBREVIATIONS.

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2-24-09

CURRENT ISSUE STATUS:

REV	DESCRIPTION	DATE
0	ISSUED FOR CONSTRUCTION	2-24-09

GRAPHIC SCALE: 0" 1"

SCALE:	NOT TO SCALE
PROJECT MANAGER:	DJV
JC/DRAWN BY:	DIL
A/E OF RECORD:	TC
CAD FILE:	M-651-05169
PROJECT NO:	05169
DATE:	2-24-09

SHEET TITLE:
SCHEMATICS

SHEET No.
M-651

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