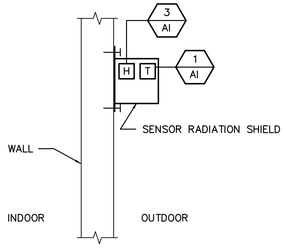
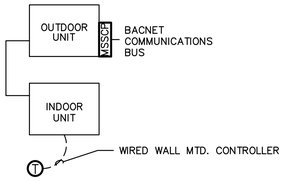


1 M-16 OUTDOOR AIR TEMPERATURE AND HUMIDITY CONTROL SCHEMATIC

DDC POINT TABLE - OUTDOOR AIR SENSORS					
INPUTS			OUTPUTS		
POINT	TYPE	DESCRIPTION	POINT	TYPE	DESCRIPTION
1	ANALOG	OUTDOOR AIR TEMPERATURE	2	–	–
3	ANALOG	OUTDOOR AIR HUMIDITY	4	–	–



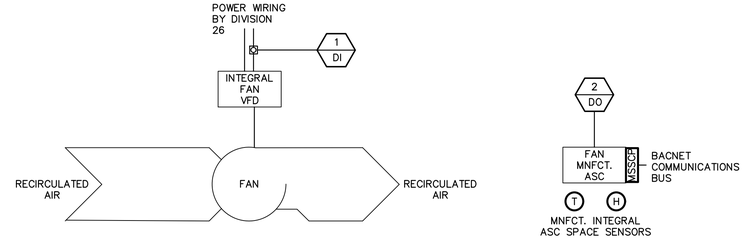
2 M-16 MINI-SPLIT SYSTEM (MSS) CONTROL SCHEMATIC

TYPICAL FOR DX/CU-1 AND DX/CU-2

SEQUENCE OF OPERATION

MINI-SPLIT SYSTEM

1. CONFIGURE SYSTEM TO CONTROL ON SPACE IN LIEU OF RETURN AIR TEMPERATURE.
2. MONITORING POINTS: THE EMS SHALL MONITOR EQUIPMENT AND PROVIDE A REAL-TIME GRAPHICAL DISPLAY OF THE STATUS AND VALUE OF ALL MINI-SPLIT SYSTEM POINTS AT THE OPERATOR WORKSTATION. SAFETY AND ALARM STATUS SHALL BE DISPLAYED.
3. MINI-SPLIT OPERATING PARAMETERS SHALL BE OBTAINED THROUGH A COMMUNICATIONS BUS INTERFACE CARD AND DISPLAYED ON THE MINI-SPLIT SYSTEM EMS GRAPHIC AT THE OPERATOR WORKSTATION. THE INTERFACE CARD PROVIDED WITH THE DRIVE SHALL BE COMPATIBLE WITH AND FULLY COMMUNICATE WITH THE EMS.
4. ALARMS: PROVIDE THE FOLLOWING ALARMS AT THE OPERATORS WORKSTATION:
   A. MINI-SPLIT SYSTEM ALARMS PROVIDED THRU THE NETWORK CONNECTION.



3 M-16 HIGH VOLUME LOW SPEED CIRCULATING FAN CONTROL SCHEMATIC

TYPICAL FOR EF-7-2 TO -7-4

DDC POINT TABLE - HVLS EXHAUST FANS					
INPUTS			OUTPUTS		
POINT	TYPE	DESCRIPTION	POINT	TYPE	DESCRIPTION
1	DIGITAL	EXHAUST FAN STATUS (ONE POINT PER FAN)	2	DIGITAL	EXHAUST FAN GROUP START/STOP
3	–	–	4	–	–
5	–	–	6	–	–

SEQUENCE OF OPERATION

EXHAUST FANS:

1. OCCUPANCY SCHEDULE: A TIME OF DAY SCHEDULE SHALL BE CONFIGURED AT THE BMS REFLECTING BUILDING OCCUPANCY WITH OCCUPIED AND UNOCCUPIED OPERATIONAL MODES. OCCUPIED AND UNOCCUPIED MODE SCHEDULES SHALL BE ADJUSTABLE.THE CONTROL CONTRACTOR SHALL COORDINATE SCHEDULING REQUIREMENTS WITH THE OWNER.
2. START/STOP: A HAND-OFF-AUTO (H-O-A) SWITCH SHALL BE PROVIDED FOR LOCAL CONTROL OF FAN START/STOP OPERATION. IN THE HAND POSITION THE FAN SHALL START. IN THE OFF POSITION THE FAN SHALL STOP. IN THE AUTO POSITION THE FAN SHALL START.
3. PROOF OF FAN OPERATION: FAN RUN STATUS SHALL BE VERIFIED VIA A CURRENT SENSOR AT THE FAN MOTOR. COMMAND FAN OFF IN THE EVENT OF A FAN FAILURE ALARM.
4. SPACE TEMPERATURE SETPOINT:
   A. THE SPACE TEMPERATURE SETPOINT SHALL BE 80°F (ADJUSTABLE).
5. EXHAUST FAN START/STOP CONTROL:
   A. FANS SHALL HAVE START/STOP CAPABILITY AT THE OPERATORS WORK STATION.
   B. FAN STATUS SHALL BE MONITORED AND ALARMED.
   C. FANS SHALL HAVE A USER DEFINABLE MINIMUM RUN TIME (ADJUSTABLE).
6. EXHAUST FAN CONSTANT AIR VOLUME CONTINUOUS OPERATION:
   A. APPLICABLE TO FANS EF-1-2, -1-8, -5-1, -6-4 (SEE EQUIPMENT SCHEDULE).
   B. THE FAN SHALL RUN CONTINUOUSLY.
7. CONSTANT AIR VOLUME SPACE TEMPERATURE CONTROL:
   A. APPLICABLE TO FAN EF-1-5 (SEE EQUIPMENT SCHEDULE).
   B. WHEN SPACE TEMPERATURE RISES ABOVE THE COOLING TEMPERATURE SETPOINT, THE EF SHALL START. WHEN THE SPACE TEMPERATURE FALLS BELOW SETPOINT, THE EF SHALL STOP.
   C. PROVIDE MINIMUM FAN RUN TIME TO PROHIBIT RAPID START/STOP CYCLING.
8. EXHAUST FAN CONSTANT AIR VOLUME VARIABLE SPEED CONTROL:
   A. APPLICABLE TO BATHROOM EXHAUST RISER FANS REF-A1, -B1, -B2, -C1, -C2, -D1 (SEE EQUIPMENT SCHEDULE).
   B. APPLICABLE TO DRYER EXHAUST RISER FANS DEF-LPH-A, -LPH-B (SEE EQUIPMENT SCHEDULE).
   C. THE FAN SHALL RUN CONTINUOUSLY.
   D. A DUCT MOUNTED STATIC PRESSURE SENSOR LOCATED IN THE EXHAUST AIR DUCT SHALL PROVIDE AN INPUT SIGNAL TO THE CAC AND THE CAC SHALL PROVIDE AN ANALOG SIGNAL TO THE FAN ECM FOR CONTROL OF FAN SPEED TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT. WHEN DUCT STATIC PRESSURE FALLS BELOW SETPOINT FAN SPEED SHALL SLOWLY INCREASE TO MAINTAIN SETPOINT. WHEN THE DUCT STATIC PRESSURE RISES ABOVE SETPOINT, FAN SPEED SHALL SLOWLY DECREASE TO MAINTAIN SETPOINT.
   E. THE TEST AND BALANCE CONTRACTOR SHALL DETERMINE THE INITIAL FAN ECM SPEED AND CORRESPONDING DUCT STATIC PRESSURE SETPOINT.
   F. HIGH AND LOW DUCT PRESSURE CONDITIONS SHALL BE MONITORED AND ALARMED.
9. POWER FAILURE: UPON A LOSS OF POWER THE FAN SHALL SHUT DOWN. WHEN POWER IS RESTORED, THE FAN RESTART AUTOMATICALLY. FAN START-UP SHALL BE STAGGERED TO LIMIT KW DEMAND.
10. MONITORING POINTS: THE BMS SHALL MONITOR EQUIPMENT AND PROVIDE A REAL-TIME GRAPHICAL DISPLAY OF THE STATUS AND VALUE OF ALL FAN POINTS AT THE OPERATOR WORKSTATION. THE FAN OPERATING STATUS AND OCCUPANCY MODE SHALL BE DISPLAYED (OCCUPIED/UNOCCUPIED/OVERRIDE) AS WELL AS THE ACTIVE CONTROL MODE OF OPERATION IN ADDITION, ALARM STATUS SHALL BE DISPLAYED. AN OVERALL FLOOR PLAN OF THE AREA SERVED BY EACH FAN SHALL BE PROVIDED THAT DISPLAYS THE LOCATION OF EACH FAN AND THE TEMPERATURE EACH ROOM SENSOR. GRAPHICALLY INDICATE THE LIMITS OF THE AREA THAT EACH FAN SERVES.
11. ALARMS: PROVIDE THE FOLLOWING ALARMS AT THE OPERATORS WORKSTATION:
   A. FAN COMMAND MISMATCH: FAN START COMMAND ISSUED AND STATUS NOT PROVED AFTER A 60 SECOND DELAY (ADJUSTABLE); FAN STOP COMMAND ISSUED AND RUN STATUS CONTINUES TO BE SENSED, AFTER A 60 SECOND DELAY (ADJUSTABLE); UNAUTHORIZED FAN START/STOP DURING UNOCCUPIED AND OCCUPIED MODES.
   B. FAN RUNTIME EXCEEDED – FAN STATUS EXCEEDS A USER DEFINABLE RUNTIME LIMIT (ADJUSTABLE).
   C. HIGH DUCT STATIC PRESSURE – IF SETPOINT 10% GREATER (ADJUSTABLE) THAN SETPOINT.
   D. LOW DUCT STATIC PRESSURE – IF SETPOINT 10% LESS (ADJUSTABLE) THAN SETPOINT.

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