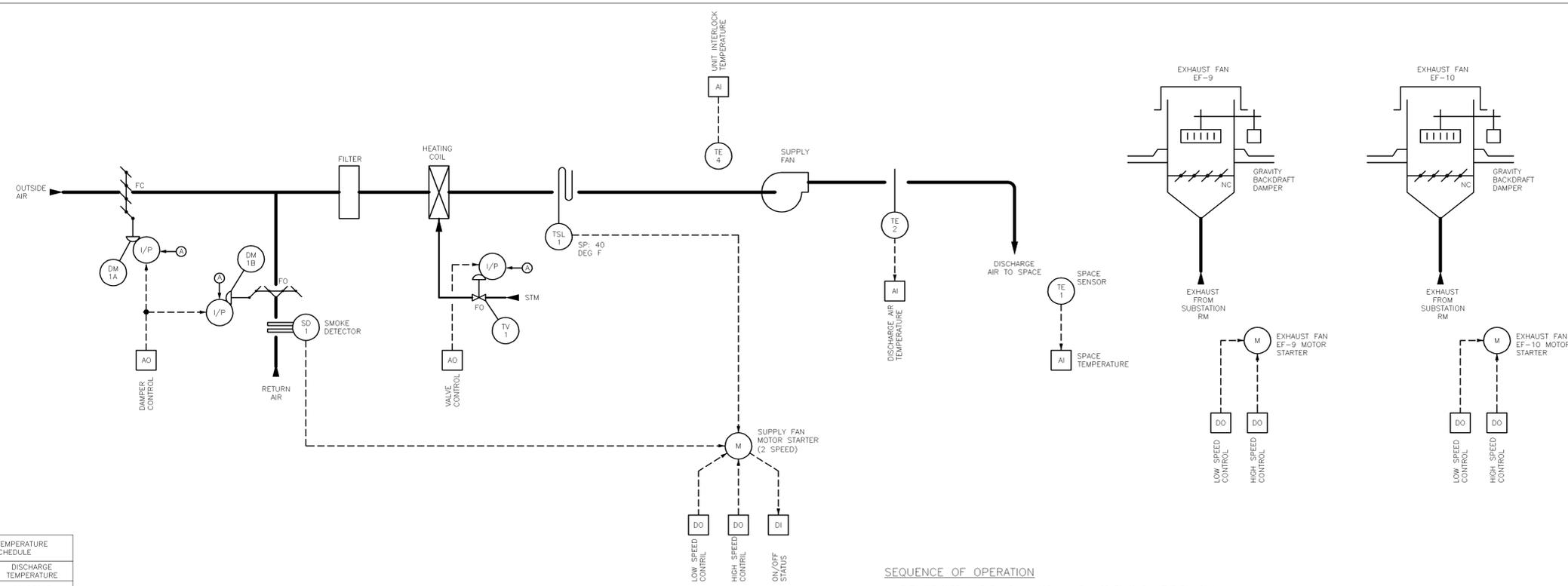


Date (mm dd yyyy)	Issued For	Rev.
09-21-2007	TITLE 1 60% REVIEW	A
10-24-2007	TITLE 1 100% COMPLETE	B
12-07-2007	TITLE II DESIGN 30% REVIEW SUBMITTAL	C
03-28-2008	TITLE II DESIGN 60% REVIEW SUBMITTAL	D
07-31-2008	TITLE II DESIGN 90% REVIEW SUBMITTAL	E
08-25-2008	TITLE II DESIGN 100% OWNER REVIEW	F
02-19-2009	TITLE II CONSTRUCTION BID ISSUE	G

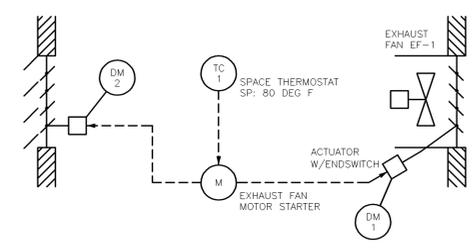


DISCHARGE TEMPERATURE RESET SCHEDULE	
SPACE TEMPERATURE	DISCHARGE TEMPERATURE
68 DEG F	90 DEG F
80 DEG F	55 DEG F

A AHU-4 CONTROL DIAGRAM
NO SCALE

SEQUENCE OF OPERATION

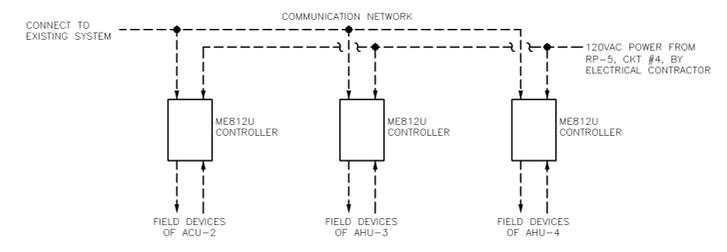
- THE UNIT SUPPLY AIR FAN SHALL NORMALLY RUN CONTINUOUSLY. THE FAN SHALL OPERATE IN LOW SPEED WHEN HEATING THE SPACE AND SHALL OPERATE IN HIGH SPEED WHEN COOLING THE SPACE.
- WHEN THE UNIT IS STARTED, THE OUTSIDE AIR (DM-1) AND THE RETURN AIR (DM-1B) DAMPERS SHALL BE OPENED TO THE MINIMUM OUTDOOR AIR POSITION OF 10% OUTSIDE AIR.
- THE STEAM COIL CONTROL VALVE (TV-1) AND THE OUTSIDE & RETURN AIR DAMPERS (DM-1A & 1B) SHALL BE MODULATED IN SEQUENCE TO CONTROL THE UNIT DISCHARGE AIR TEMPERATURE. THE SPACE TEMPERATURE SHALL RESET THE DISCHARGE AIR SETPOINT, TO CONTROL THE SPACE TEMPERATURE. DURING THIS OPERATION THE SUPPLY AIR FAN SHALL OPERATE AT LOW SPEED.
- WHEN THE OUTSIDE AIR DAMPER (DM-1A) EXCEEDS 60% OPEN, EXHAUST AIR FAN EF-9 SHALL BE STARTED IN LOW SPEED. WHEN THE OUTSIDE AIR DAMPER POSITION EXCEEDS 90% OPEN, EXHAUST AIR FAN EF-10 SHALL BE STARTED IN LOW SPEED.
- WHEN THE SPACE TEMPERATURE EXCEEDS 85 DEG F, THE UNIT SUPPLY AIR FAN SHALL BE CYCLED TO HIGH SPEED AND THE ASSOCIATED EXHAUST AIR FANS EF-9 & 10 SHALL BE CYCLED TO HIGH SPEED. THE FANS SHALL OPERATE IN HIGH SPEED UNTILL THE SPACE TEMPERATURE DROPS BELOW 81 DEG F.
- THE STEAM COIL FREEZESTAT (TSL-1), SHALL STOP THE SUPPLY AIR FAN IF THE DISCHARGE AIR TEMPERATURE SENSED FALLS BELOW 40 DEG F.
- THE RETURN AIR SMOKE DETECTOR (SD-1) SHALL STOP THE SUPPLY AIR FAN IF ACTIVATED.
- WHENEVER THE SUPPLY AIR FAN IS STOPPED, THE OUTSIDE AIR (DM-1A) DAMPER SHALL BE FULLY CLOSED AND THE RETURN AIR (DM-1B) DAMPER SHALL BE FULLY OPENED.
- WHENEVER THE UNIT IS STOPPED, AND THE OUTSIDE AIR TEMPERATURE IS BELOW 55 DEG F, THE STEAM COIL CONTROL VALVE (TV-1) SHALL BE CYCLED (TWO POSITION, 10 DEG DIFFERENTIAL) TO MAINTAIN THE UNIT INTERIOR TEMPERATURE AT 70 DEG F.
- WHENEVER THE UNIT IS STOPPED, AND THE OUTSIDE AIR TEMPERATURE IS ABOVE 55 DEG F, THE STEAM COIL CONTROL VALVE (TV-1) SHALL BE CLOSED.



B EXHAUST FAN EF-2 CONTROL DIAGRAM
NO SCALE

SEQUENCE OF OPERATION

- THE SPACE THERMOSTAT (TC-1) SHALL CYCLE THE EXHAUST FAN WHEN THE SPACE TEMPERATURE EXCEEDS THE THERMOSTAT SETPOINT.
- THE FAN'S DAMPER (DM-1) SHALL OPEN BEFORE THE FAN MOTOR IS ENERGIZED. WHEN THE ACTUATOR END SWITCH PROVIDES THE DAMPER OPEN, THE FAN IS STARTED.
- THE OUTSIDE AIR DAMPER (DM-2) SHALL BE INTERLOCKED WITH THE OPERATION EXHAUST FAN. THE DAMPER SHALL OPEN WHEN THE FAN IS STARTED AND SHALL CLOSE WHEN THE FAN IS STOPPED.



C SYSTEM NETWORK DIAGRAM
NO SCALE

This drawing has been prepared solely for the use of Brookhaven National Laboratory and there are no representations of any kind made by Giffels, Partnership to any party with whom Giffels Partnership has not entered into a contract.

This drawing shall not be used for construction purposes until the seal and signature of the responsible registrant appears on the drawing, and proper permit forms and related fees are transmitted by the Owner, Owner's Agent or Contractor to the Authority Having Jurisdiction.

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BROOKHAVEN NATIONAL LABORATORY		UNDER CONTRACT WITH UNITED STATES DEPARTMENT OF ENERGY PLANT ENGINEERING DIVISION UPTON, NEW YORK 11973	
JOB TITLE CENTRAL CHILLED WATER FACILITY PHASE II	DWG. TITLE HVAC CONTROL DIAGRAMS	DATE 10-17-2007	SHEET NO. 11705
SCALE NO SCALE	APP. BY W. HARRISON	BLDG. NO. 600	MH-602