

Brookhaven National Laboratory
Plant Engineering - E&CS Division
Engineering Change Notice Form

PROJECT: CCWF II

JOB No. 11705

ECN Title: TE-4 function & control sequence

ECN No. 13

Affected Documents: Drawings MH-601 and MH-602

Requested Change (Attach sketch if applicable): Clarify location and intent of TE-4 sensor. TE-4 is a preheat discharge temperature sensor and should be a duct mounted 20 ft capillary type sensor located downstream of preheat coil (12 inches min). Delete the following paragraphs in Sequence of operation and replace with the following revised sequence. Delete sequence D in ACU-2, J in AHU-3 and I in AHU-4.

Revised sequence of operation shall control preheat as follows.

preheat low limit control- This control loops shall be enabled if the outside air temperature is below 55 F or the outside air sensor is invalid, indicating a fault or communication issue. Controller shall modulate preheat output to maintain temperature sensor TE-4 no lower than 50 F. This control loop shall remain operational whether the unit is on or off. Upon freezestat (TSL-1) trip, or if the unit is shut off, the control system shall change the preheat low limit setpoint from 50 F to 70 F. Upon restart, the system shall maintain the 70 F setpoint for 3 minutes to allow the unit to stabilize. The system shall then slowly ramp the setpoint back to normal preheat setpoint over a 5 minute period.

Requested by: BNL/ C. Channing

Date: 12/1/09

Resolution: See attachments.

Approvals: A/E or Proj. Eng.:

Date: 12/1/09

Project Coordinator:

Date: 12/1/09

Manager:

Date:

Contractor shall take the following action:

- Await change order from P&PM
- Proceed with change as described
- Provide cost proposal for change as described

Distribution: E. W. Howell

Giffels

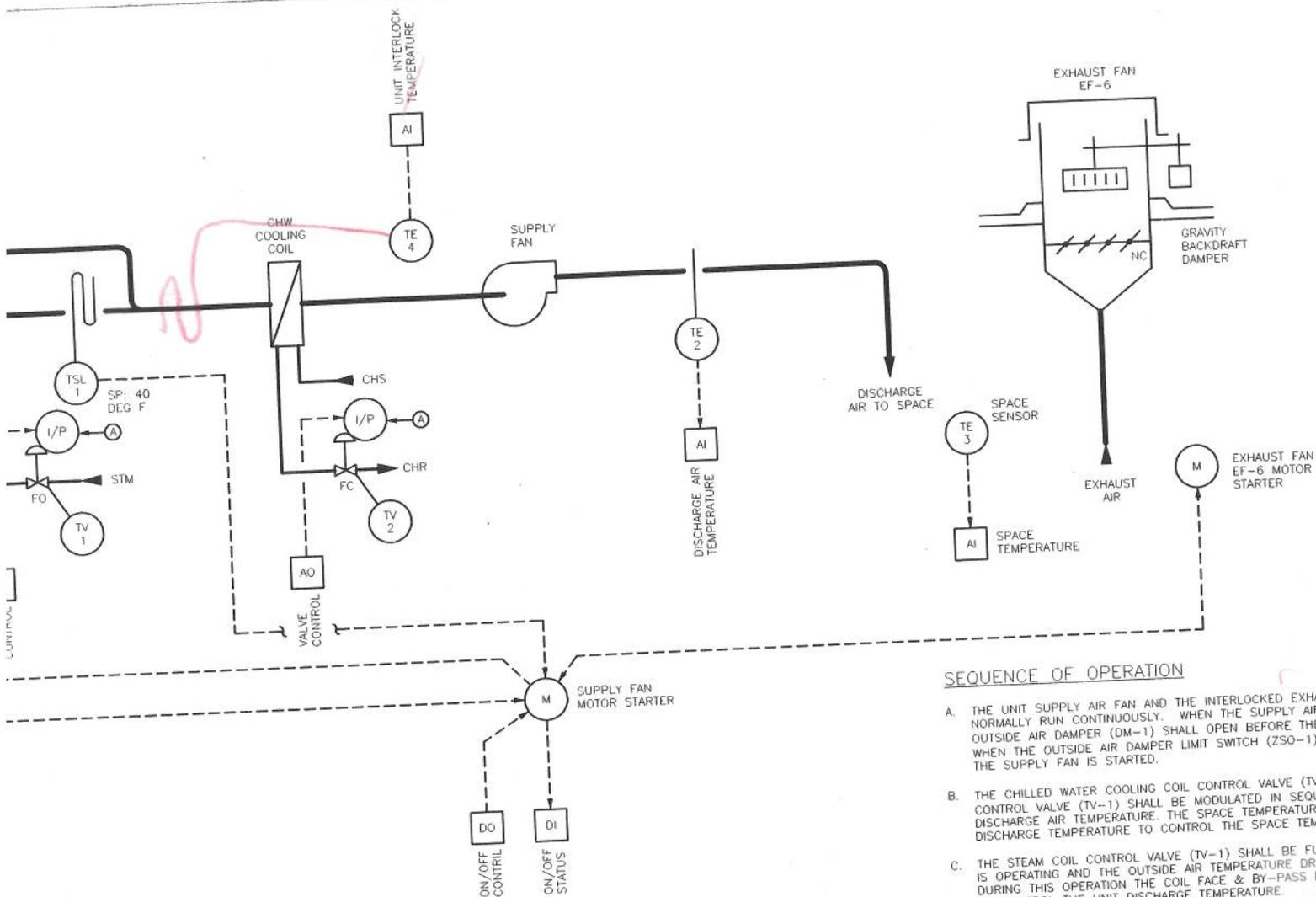
E&U

MPO

O&M

ECN File

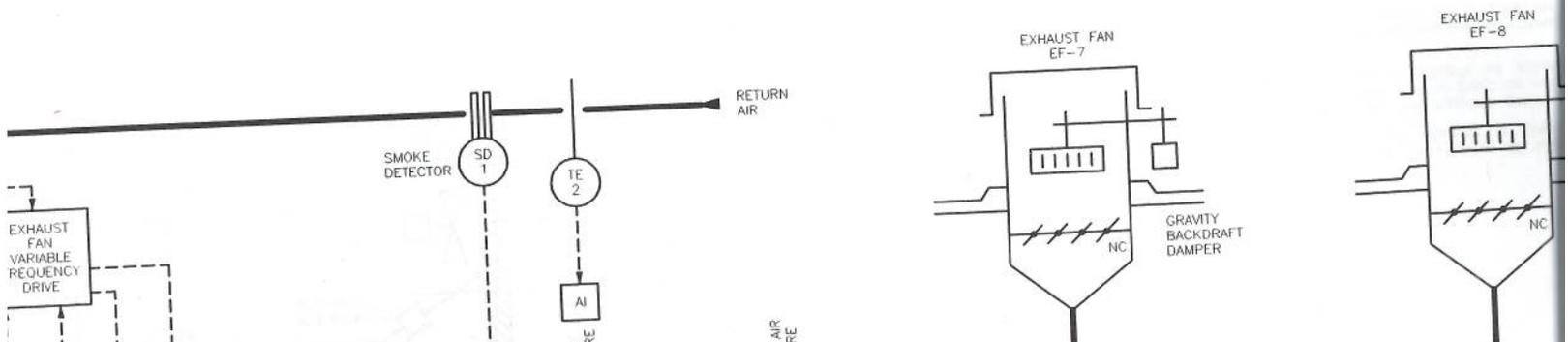
NSLS II



SEQUENCE OF OPERATION

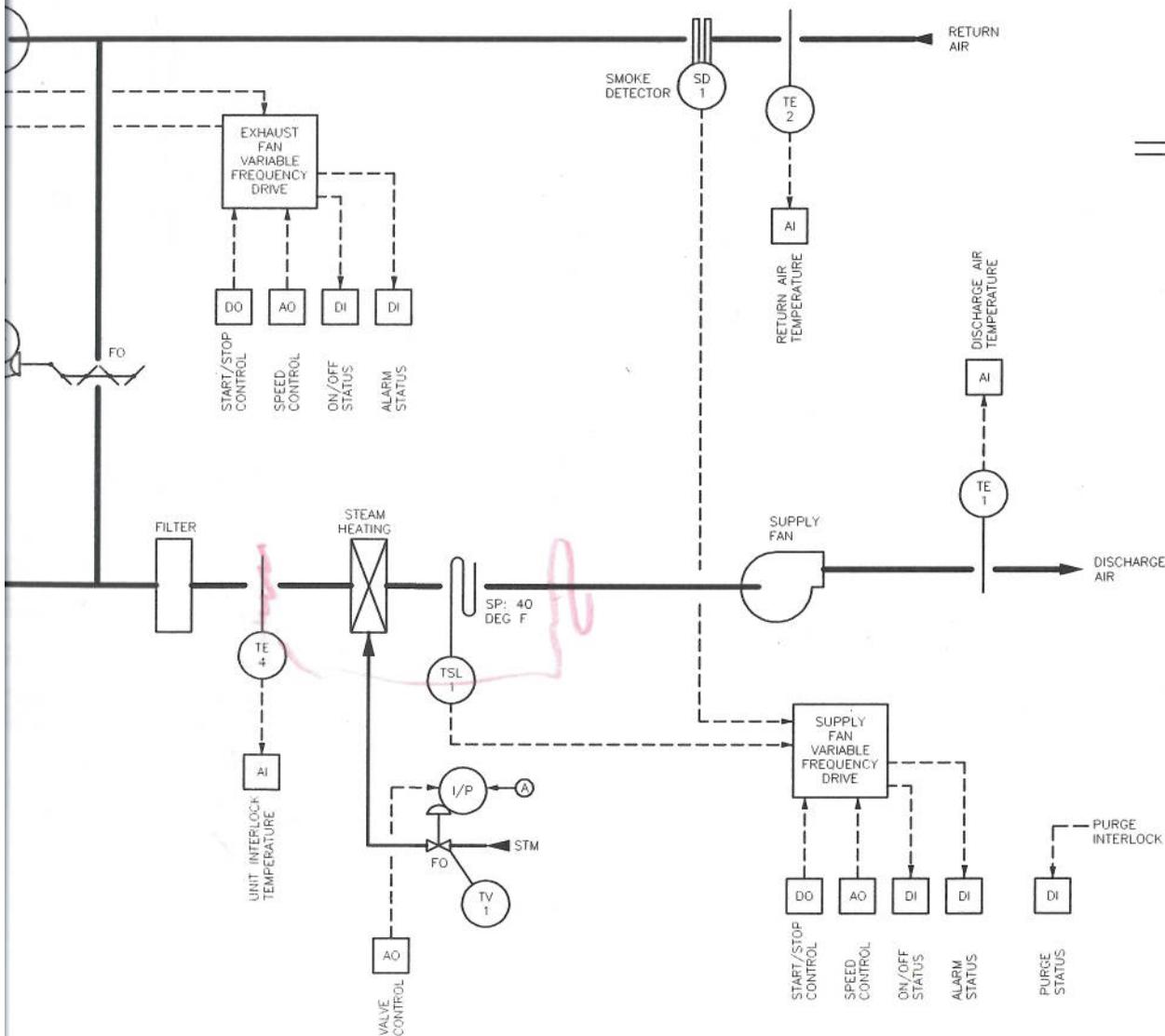
- THE UNIT SUPPLY AIR FAN AND THE INTERLOCKED EXHAUST AIR FAN NORMALLY RUN CONTINUOUSLY. WHEN THE SUPPLY AIR FAN IS STOPPED, THE OUTSIDE AIR DAMPER (DM-1) SHALL OPEN BEFORE THE SUPPLY AIR FAN IS STOPPED. WHEN THE OUTSIDE AIR DAMPER LIMIT SWITCH (ZSO-1) PROVES OPEN, THE SUPPLY FAN IS STOPPED.
- THE CHILLED WATER COOLING COIL CONTROL VALVE (TV-2) AND THE STEAM COIL CONTROL VALVE (TV-1) SHALL BE MODULATED IN SEQUENCE TO CONTROL THE DISCHARGE AIR TEMPERATURE. THE SPACE TEMPERATURE SHALL BE MODULATED TO CONTROL THE SPACE TEMPERATURE.
- THE STEAM COIL CONTROL VALVE (TV-1) SHALL BE FULLY OPEN WHEN THE UNIT IS OPERATING AND THE OUTSIDE AIR TEMPERATURE DROPS BELOW 40 DEG F. DURING THIS OPERATION THE COIL FACE & BY-PASS DAMPER SHALL BE MODULATED TO CONTROL THE UNIT DISCHARGE TEMPERATURE.
- WHENEVER THE UNIT IS STOPPED, AND THE OUTSIDE AIR TEMPERATURE DROPS BELOW 40 DEG F, THE STEAM COIL CONTROL VALVE (TV-1) SHALL BE FULLY OPEN TO MAINTAIN THE UNIT INTERIOR TEMPERATURE (10 DEG DIFFERENTIAL) TO MAINTAIN THE UNIT INTERIOR TEMPERATURE.
- THE STEAM COIL FREEZESTAT (TSL-1) SHALL STOP THE UNIT WHEN THE DISCHARGE AIR TEMPERATURE FROM THE COIL DROPS BELOW 40 DEG F.
- WHENEVER THE SUPPLY AIR FAN IS STOPPED THE CHILLED WATER COIL CONTROL VALVE (TV-2) SHALL BE FULLY CLOSED.
- WHENEVER THE UNIT IS STOPPED, AND THE OUTSIDE AIR TEMPERATURE DROPS BELOW 40 DEG F, THE STEAM COIL CONTROL VALVE (TV-1) SHALL BE FULLY OPEN.
- WHENEVER THE UNIT IS STOPPED, THE OUTSIDE AIR DAMPER SHALL BE CLOSED.

A ACU-2 CONTROL DIAGRAM
NO SCALE



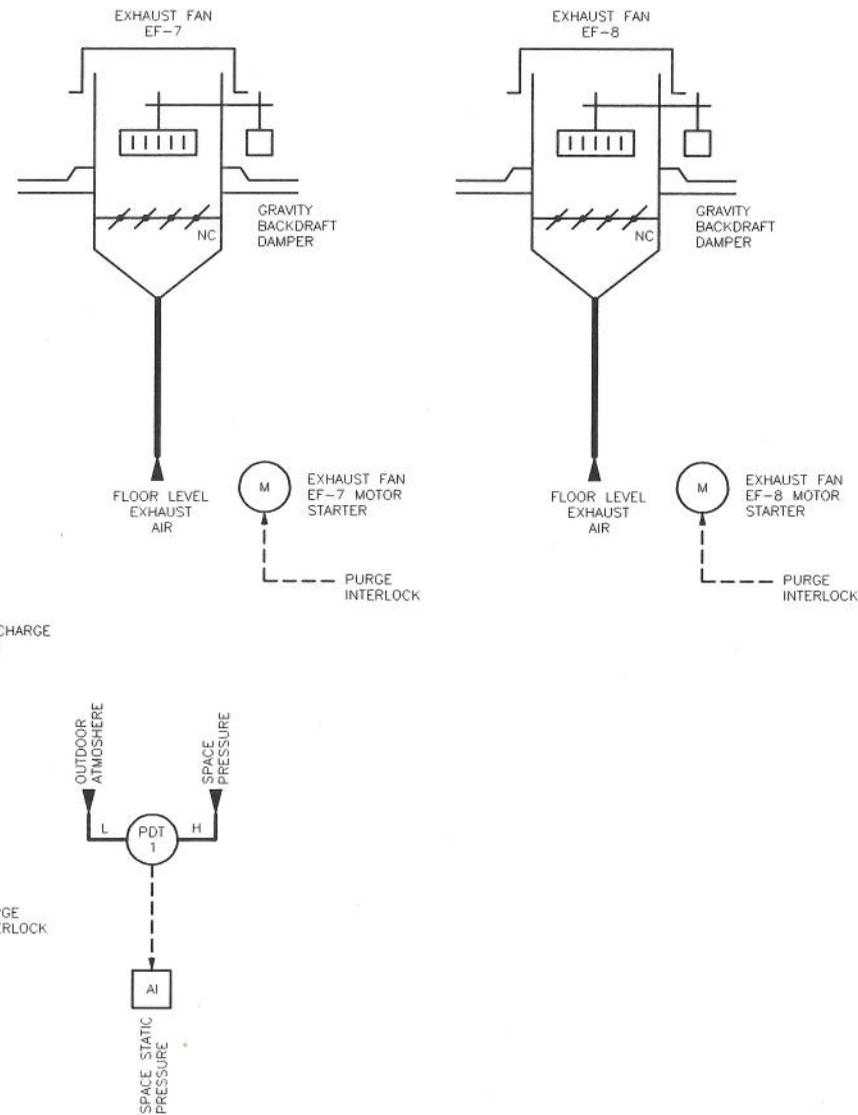
A ACU-2 CONTROL DIAGRAM

NO SCALE



B AHU-3 CONTROL DIAGRAM

NO SCALE



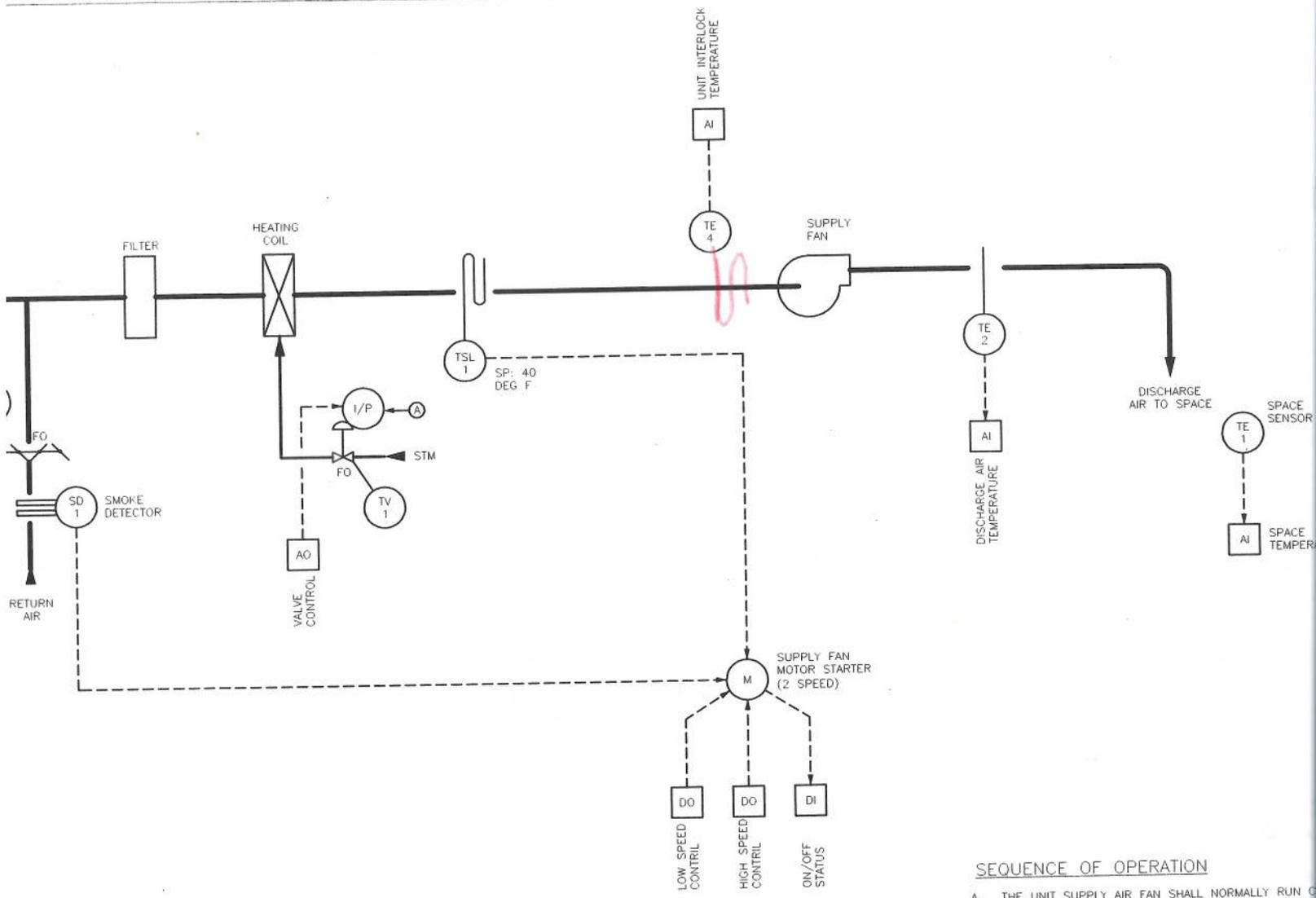
- B. THE CHILLED WATER COOLING COIL CONTROL VALVE (TV-2) AND THE STEAM COIL CONTROL VALVE (TV-1) SHALL BE MODULATED IN SEQUENCE TO CONTROL THE UNIT DISCHARGE AIR TEMPERATURE. THE SPACE TEMPERATURE SHALL RESET THE UNIT DISCHARGE TEMPERATURE TO CONTROL THE SPACE TEMPERATURE.
- C. THE STEAM COIL CONTROL VALVE (TV-1) SHALL BE FULLY OPENED WHEN THE UNIT IS OPERATING AND THE OUTSIDE AIR TEMPERATURE DROPS BELOW 45 DEG F. DURING THIS OPERATION THE COIL FACE & BY-PASS DAMPER SHALL BE MODULATED TO CONTROL THE UNIT DISCHARGE TEMPERATURE.
- D. WHENEVER THE UNIT IS STOPPED, AND THE OUTSIDE AIR TEMPERATURE IS BELOW 50 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.
- E. THE STEAM COIL FREEZESTAT (TSL-1) SHALL STOP THE UNIT SUPPLY AIR FAN IF THE DISCHARGE AIR TEMPERATURE FROM THE COIL DROPS BELOW 40 DEG F.
- F. WHENEVER THE SUPPLY AIR FAN IS STOPPED THE CHILLED WATER COIL CONTROL VALVE (TV-2) SHALL BE FULLY CLOSED.
- G. 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.
- H. WHENEVER THE UNIT IS STOPPED, THE OUTSIDE AIR DAMPER (DM-1) SHALL BE CLOSED.

DO ON/OFF CONTROL
DI ON/OFF STATUS

DO START/STOP CONTROL
AO SPEED CONTROL
DI ON/OFF STATUS
DI ALARM STATUS

DO START/STOP CONTROL
AO SPEED CONTROL
DI ON/OFF STATUS
DI ALARM STATUS
DI PURGE STATUS

AI SPACE STATIC PRESSURE



A AHU-4 CONTROL DIAGRAM
NO SCALE

SEQUENCE OF OPERATION

- A. THE UNIT SUPPLY AIR FAN SHALL NORMALLY RUN ON LOW SPEED WHEN HEATING THE SPACE AND ON HIGH SPEED WHEN COOLING THE SPACE.
- B. WHEN THE UNIT IS STARTED, THE OUTSIDE AIR (DM-1A & 1B) DAMPERS SHALL BE OPENED TO THE MINIMUM OUTSIDE AIR.
- C. THE STEAM COIL CONTROL VALVE (TV-1) AND THE OUTSIDE AIR DAMPERS (DM-1A & 1B) SHALL BE MODULATED IN SEQUENCE TO MAINTAIN THE SPACE TEMPERATURE AT THE SPACE THERMOSTAT SETPOINT, TO CONTROL THE SPACE TEMPERATURE. WHEN THE SPACE TEMPERATURE EXCEEDS 85 DEG F, THE SUPPLY AIR FAN SHALL OPERATE AT LOW SPEED.
- D. WHEN THE OUTSIDE AIR DAMPER (DM-1A) EXCEEDS 90% OPEN, EXHAUST AIR FAN EF-10 SHALL BE STARTED IN LOW SPEED.
- E. WHEN THE SPACE TEMPERATURE EXCEEDS 85 DEG F, THE SUPPLY AIR FAN SHALL BE CYCLED TO HIGH SPEED AND THE ASSOCIATED EXHAUST AIR FAN SHALL BE CYCLED TO HIGH SPEED. THE FANS SHALL BE CYCLED TO LOW SPEED WHEN THE SPACE TEMPERATURE DROPS BELOW 81 DEG F.
- F. THE STEAM COIL FREEZESTAT (TSL-1), SHALL STOP THE SUPPLY AIR FAN WHEN DISCHARGE AIR TEMPERATURE SENSED FALLS BELOW 40 DEG F.
- G. THE RETURN AIR SMOKE DETECTOR (SD-1) SHALL STOP THE SUPPLY AIR FAN WHEN ACTIVATED.
- H. WHENEVER THE SUPPLY AIR FAN IS STOPPED, THE OUTSIDE AIR DAMPERS SHALL BE FULLY CLOSED AND THE RETURN AIR (DM-1A & 1B) DAMPERS SHALL BE FULLY OPENED.
- I. WHENEVER THE UNIT IS STOPPED, AND THE OUTSIDE AIR DAMPER (DM-1A) EXCEEDS 90% OPEN, EXHAUST AIR FAN EF-10 SHALL BE STARTED IN LOW SPEED. WHEN THE OUTSIDE AIR DAMPER (DM-1A) CLOSURES, EXHAUST AIR FAN EF-10 SHALL BE STOPPED.
- J. WHENEVER THE UNIT IS STOPPED, AND THE OUTSIDE AIR DAMPER (DM-1A) EXCEEDS 90% OPEN, EXHAUST AIR FAN EF-10 SHALL BE STARTED IN LOW SPEED. WHEN THE OUTSIDE AIR DAMPER (DM-1A) CLOSURES, EXHAUST AIR FAN EF-10 SHALL BE STOPPED.

