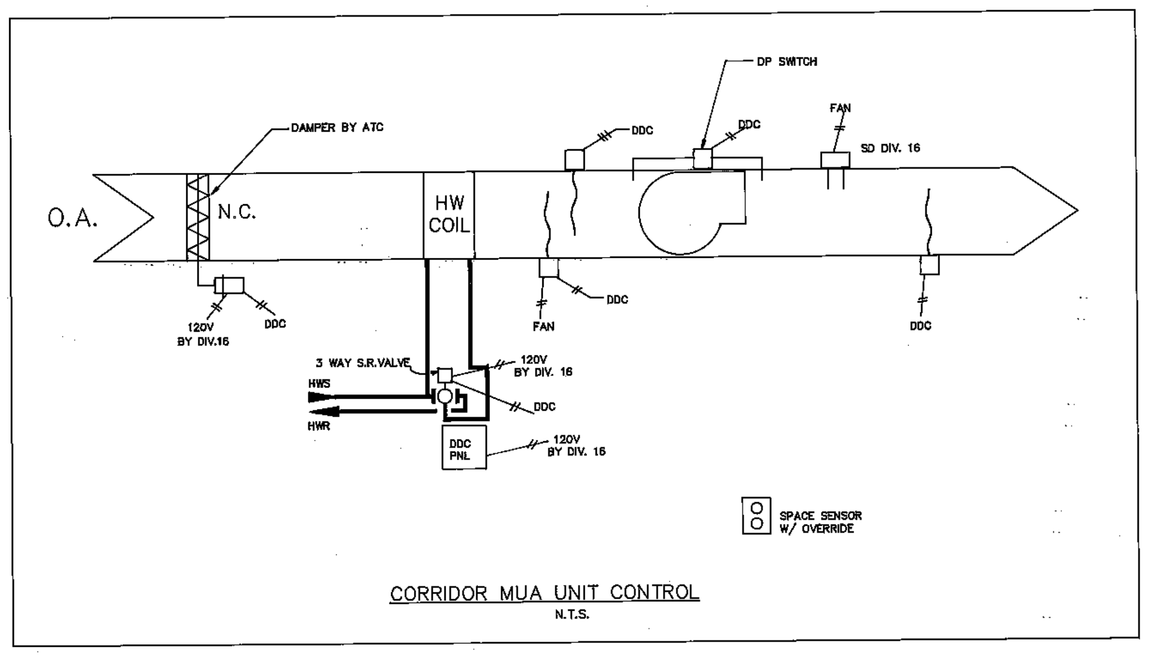
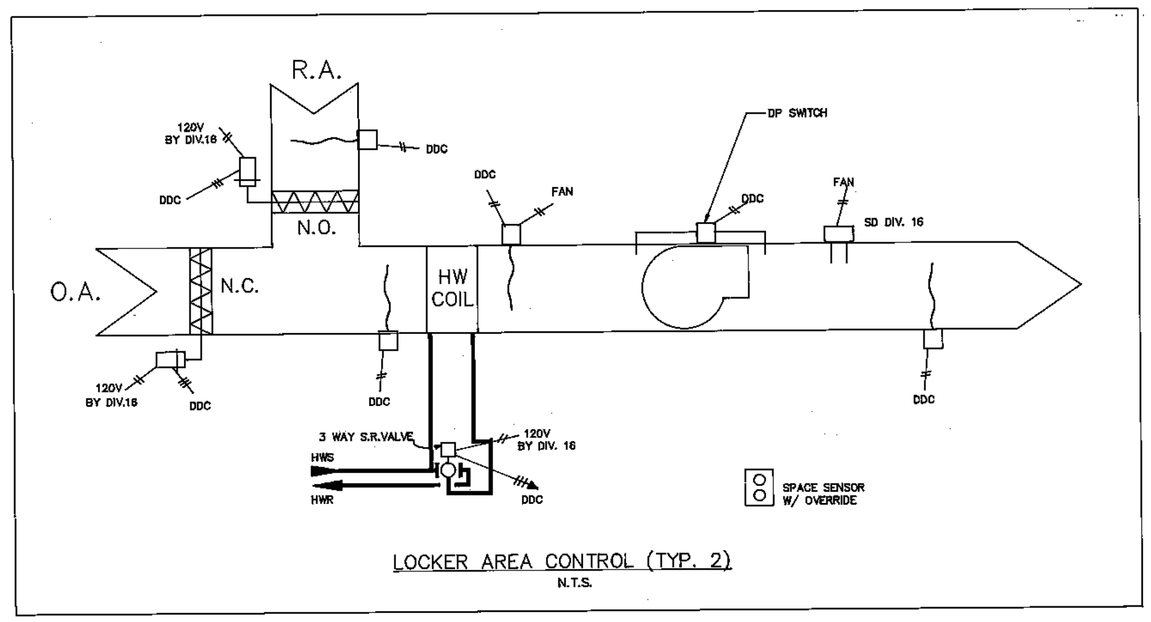


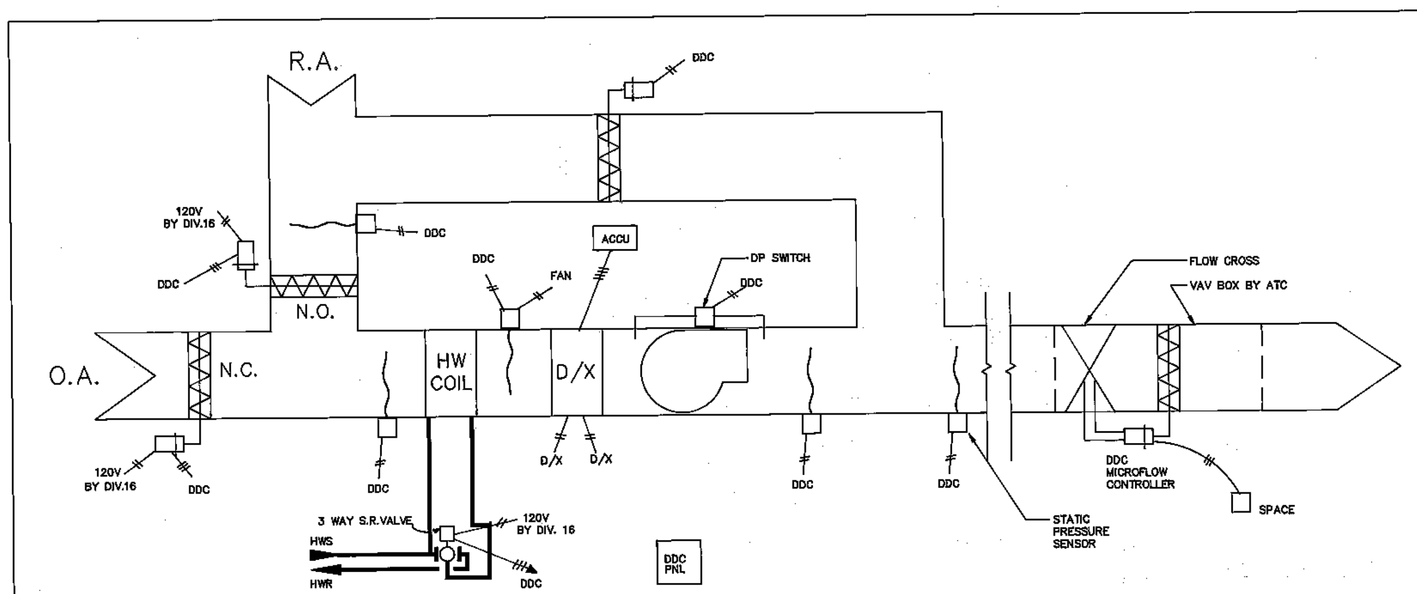
CORRIDOR MUA UNIT CONTROL

N.T.S.



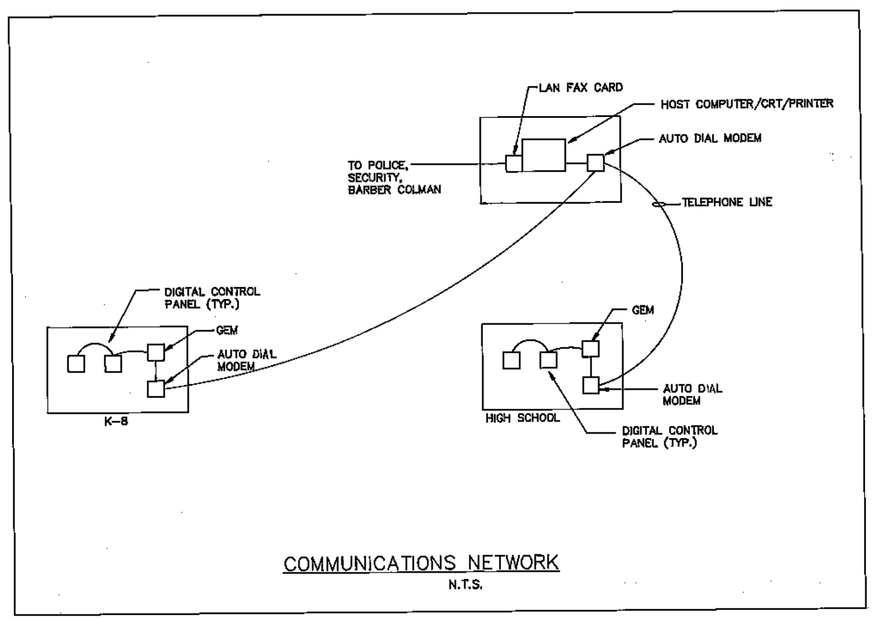
LOCKER AREA CONTROL (TYP. 2)

N.T.S.



ADMINISTRATION AREA UNIT CONTROL

N.T.S.



COMMUNICATIONS NETWORK

N.T.S.

SEQUENCE OF OPERATIONS

HOT WATER SUPPLY CONTROL:

EACH BOILER SHALL BE HYDRONICALLY ISOLATED BY A TWO POSITION, NORMALLY OPEN, SPRING RETURN CONTROL VALVE. BOILER FIRING SEQUENCE SHALL BE DETERMINED BY INDEXING THROUGH THE EMS SYSTEM. LEAD BOILER ISOLATION VALVE SHALL REMAIN OPEN. LEAD BOILER SHALL BE INDEXED LOW FIRE/HIGH FIRE THROUGH HEADER SUPPLY TEMPERATURE SENSOR TO MAINTAIN 180 DEG. F. SETPOINT. WHEN THE SUPPLY/RETURN WATER TEMPERATURE DIFFERENTIAL EXCEEDS 20 DEG. F., AND THE LEAD BOILER IS ON HIGH FIRE, THE #2 BOILER ISOLATION VALVE SHALL OPEN, LEAD BOILER SHALL REMAIN AT HIGH FIRE, AND #2 BOILER SHALL BE INDEXED LOW FIRE/HIGH FIRE UNTIL THE SUPPLY/RETURN TEMPERATURE DIFFERENCE DROPS TO 15 DEG. F., OR SUPPLY TEMPERATURE RISES TO 185 DEG. F., UPON WHICH #2 BOILER SHALL SHUT DOWN. PROVIDE VALVE END SWITCHES WITH EMS INPUT AND ALARM. SYSTEM SUPPLY WATER TEMPERATURE SHALL BE RESET FROM OUTSIDE AIR TEMPERATURE BY MODULATING 3-WAY CONTROL VALVE WITH SPRING RETURN. 3-WAY VALVE SHALL BE SIZED FOR TOTAL FLOW IN ALTERNATE #10 BID.

HOT WATER PUMP CONTROL

LEAD PUMP SHALL BE INDEXED AT THE EMS SYSTEM. LEAD PUMP SHALL RUN WHEN OUTDOOR AIR TEMPERATURE DROPS BELOW 65 DEG. F. SHOULD LEAD PUMP AS INDEXED, FAIL TO RUN AS PROVEN BY COMMON DIFFERENTIAL PRESSURE SWITCH, LAG PUMP SHALL RUN AND ALARM SHALL OCCUR.

COMBUSTION AIR DAMPER CONTROL:

INTERLOCK COMBUSTION AIR DAMPERS SUCH THAT WHEN ANY BOILER OR DHW HEATER ENERGIZES, N.O. DAMPERS OPEN. PROVIDE DAMPER END SWITCH PERMISSIVES.

GYMNASIUM AIR HANDLING UNIT CONTROL: (TYPICAL FOR (2) SYSTEMS IN GYM & (1) SYSTEM IN STAGE AREA

SYSTEM SHALL BE INDEXED OCC/UNOCC/WARMUP BY OPTIMAL START PROGRAM IN THE EMS SYSTEM.

WARMUP: SUPPLY FAN SHALL RUN SUBJECT TO SMOKE DETECTOR FURNISHED BY DIV. 16, MOUNTED BY SHEET METAL CONTRACTOR, WIRED TO FIRE ALARM PANEL BY DIV. 16 AND WIRED TO FAN STARTER BY ATC, AND SUBJECT TO AUTOMATIC RESET DOUBLE POLE LOW TEMPERATURE THERMOSTAT (38 DEG. F.) ON HEATING COIL DISCHARGE. EXHAUST FAN SHALL REMAIN OFF AND O.A. DAMPER SHALL BE CLOSED. SPACE SENSOR SHALL MODULATE COIL 3-WAY VALVE TO MAINTAIN OCCUPIED SETPOINT.

OCCUPIED: SUPPLY FAN SHALL CONTINUE TO RUN, EXHAUST FAN SHALL RUN ON LOW SPEED AND O.A. DAMPER SHALL OPEN TO MINIMUM. SPACE BUTTON SENSOR SHALL RESET DISCHARGE AIR BY MODULATING 3-WAY HEATING VALVE IN SEQUENCE WITH O.A. DAMPER SUBJECT TO 55 DEG. F. PROPORTIONAL MIXED AIR LOW LIMIT ACCORDING TO THE FOLLOWING SCHEDULE:

SPACE TEMP.	DISCH. TEMP.
65	85
75	55

WHEN THE O.A. DAMPER OPENS TO 60%, EXHAUST FAN SHALL RUN ON HIGH SPEED. PROVIDE TIME DELAY TO PRECLUDE EF CYCLING ON LOW LIMIT.

UNOCCUPIED: HOT WATER VALVE SHALL REMAIN OPEN TO THE COIL, O.A. DAMPER SHALL BE CLOSED (E.F. OFF) AND SPACE SENSOR SHALL CYCLE FAN TO MAINTAIN SETBACK TEMPERATURE.

CLASSROOM MAKEUP AIR UNIT CONTROL: (TYPICAL)

UNIT SHALL RUN WHEN CLASSROOM GENERAL EXHAUST FAN RUNS. FAN SHALL RUN SUBJECT TO SMOKE DETECTOR & LOW TEMPERATURE THERMOSTAT. WHEN FAN RUNS, O.A. DAMPER SHALL FULLY OPEN. CLASSROOM SPACE SENSOR WHICH IS SENSING THE HIGHEST SPACE TEMPERATURE (VERSUS SETPOINT) SHALL RESET DISCHARGE AIR TEMPERATURE BY MODULATING 3-WAY HEATING VALVE ACCORDING TO THE FOLLOWING SCHEDULE:

HIGHEST SPACE TEMP.	DISCH. TEMP.
65	80
75	55

IN UNOCCUPIED MODE, FAN SHALL REMAIN OFF, O.A. DAMPER CLOSED & HOT WATER VALVE OPEN.

LOCKER AREA UNIT VENTILATOR CONTROL: (TYPICAL FOR (2) SYSTEMS IN LOCKER AREAS)

SYSTEM SHALL BE INDEXED OCC/UNOCC/WARMUP BY OPTIMAL START PROGRAM IN THE EMS SYSTEM.

WARMUP: SUPPLY FAN SHALL RUN SUBJECT TO AUTOMATIC RESET DOUBLE POLE LOW TEMPERATURE THERMOSTAT (38 DEG. F.) ON HEATING COIL DISCHARGE. EXHAUST FAN SHALL REMAIN OFF AND O.A. DAMPER SHALL BE CLOSED. SPACE SENSOR SHALL MODULATE COIL 3-WAY VALVE TO MAINTAIN OCCUPIED SETPOINT.

OCCUPIED: SUPPLY FAN SHALL CONTINUE TO RUN, EXHAUST FAN SHALL RUN AND O.A. DAMPER SHALL OPEN AND RETURN DAMPER SHALL CLOSE. SPACE BUTTON SENSOR SHALL RESET DISCHARGE AIR BY MODULATING 3-WAY HEATING VALVE ACCORDING TO THE FOLLOWING SCHEDULE:

SPACE TEMP.	DISCH. TEMP.
65	85
75	55

UNOCCUPIED: HOT WATER VALVE SHALL REMAIN OPEN TO THE COIL, O.A. DAMPER SHALL BE CLOSED (E.F. OFF) AND SPACE SENSOR SHALL CYCLE FAN TO MAINTAIN SETBACK TEMPERATURE.

CAFETERIA AIR HANDLING UNIT CONTROL (AHU 18 & 17):

BASE BID: SYSTEM SHALL BE INDEXED OCC/UNOCC/WARMUP BY OPTIMAL START PROGRAM IN THE EMS.

WARMUP: SUPPLY FAN SHALL START SUBJECT TO SMOKE DETECTOR AND GREASE HOOD ANSUL SYSTEM, EXHAUST FANS SHALL REMAIN OFF AND O.A. DAMPER SHALL BE CLOSED. SPACE SENSOR SHALL CYCLE ELECTRIC HEAT IN STAGES TO MAINTAIN OCCUPIED SETPOINT.

OCCUPIED: (VENTILATION) FAN SHALL CONTINUE TO RUN, EXHAUST FAN SHALL RUN ON LOW SPEED, O.A. DAMPER SHALL OPEN TO 50% MINIMUM POSITION. SPACE SENSOR SHALL RESET DISCHARGE AIR AND CYCLE ELECTRIC HEAT IN STAGES,IN SEQUENCE WITH O.A. DAMPER THROUGH MIXED AIR LOW LIMIT. WHEN O.A. DAMPERS POSITION TO 75% O.A., RESPECTIVE EXHAUST FAN SHALL RUN AT HIGH SPEED. WHEN THE KITCHEN HOOD FAN IS ENERGIZED; BOTH EXHAUST FANS SHALL STOP AND THE O.A. DAMPERS ON BOTH UNITS SHALL POSITION TO 14000CFM O.A. EACH UNIT, AND MUA-1 SHALL START SUBJECT TO ANSUL SYSTEM.

UNOCCUPIED: UNIT WILL CYCLE WITH EXHAUST FANS OFF & O.A. DAMPER CLOSED TO MAINTAIN SETBACK.

ALTERNATE BID: PROVIDE ADD/DEDUCT PRICE FOR HOT WATER HEATING IN LIEU OF ELECTRIC HEAT. PROVIDE 3-WAY VALVES, LOW TEMPERATURE THERMOSTAT & DISCHARGE RESET FROM SPACE, IN ADDITION TO THE SEQUENCE DESCRIBED.

ADMINISTRATION AREA UNIT CONTROL:

SYSTEM SHALL BE INDEXED OCC/UNOCC. & WARMUP/COOLDOWN BY THE OPTIMAL START PROGRAM IN THE EMS SYSTEM.

WARMUP/COOLDOWN:

THE UNIT FAN WILL RUN SUBJECT TO SMOKE DETECTOR AND LOW TEMPERATURE THERMOSTAT AND THE OUTSIDE AIR DAMPER WILL REMAIN CLOSED. ZONE SPACE SENSOR WHICH SENSES THE COLDEST TEMPERATURE WILL MODULATE THE 3-WAY HOT WATER VALVE TO MAINTAIN 70 DEG. F. ZONE SPACE SENSOR WHICH SENSES THE HOTTEST TEMPERATURE WILL CYCLE THE D/X COOLING TO MAINTAIN 74 DEG. F. IN THE COOLDOWN MODE. ZONE SPACE SENSOR WILL MODULATE RESPECTIVE VAV BOX THROUGH THE EMS SYSTEM. H.W. RADIATION (WHERE APPLICABLE) WILL BE CONTROLLED IN UNISON WITH VAV BOX. BOX ACTION WILL BE DETERMINED BY UNIT STATUS. BYPASS DAMPER WILL BE CONTROLLED BY STATIC PRESSURE SENSOR.

OCCUPIED: UNIT FAN WILL CONTINUE TO RUN. O.A. DAMPER WILL OPEN TO MINIMUM. WHEN ANY SENSOR SPACE TEMPERATURE DROPS BELOW 70 DEG. F., THE UNIT IS INDEXED HEATING. WHEN THE AVERAGE SPACE TEMPERATURE IS ABOVE 72 DEG. F., AND NO SENSORS ARE BELOW 70 DEG. F., THE UNIT IS INDEXED COOLING. CONTROL OF THE HEATING AND COOLING WILL BE AS SPECIFIED UNDER WARMUP/COOLDOWN. THE VAV BOX WILL BE CONTROLLED BY THEIR RESPECTIVE ZONE SENSOR. CONTROLLER ACTION WILL BE DICTATED BY THE UNIT STATUS. BYPASS DAMPER WILL BE CONTROLLED BY STATIC PRESSURE SENSOR.

UNOCCUPIED: THE UNIT SHALL CYCLE TO MAINTAIN 60 DEG. F. SPACE TEMPERATURE, WITH O/A DAMPER CLOSED.

COMPUTER ROOM UNIT CONTROL:

UNIT SHALL BE INDEXED OCC/UNOCC AND WARMUP/COOLDOWN BY OPTIMAL START PROGRAM IN THE EMS SYSTEM.

WARMUP/COOLDOWN: UNIT FAN SHALL RUN SUBJECT TO LOW TEMPERATURE THERMOSTAT AND SMOKE DETECTOR. SPACE SENSOR SHALL MODULATE 3-WAY HOT WATER VALVE IN SEQUENCE WITH D/X COOLING. O.A. DAMPER SHALL REMAIN CLOSED.

OCCUPIED: UNIT FAN SHALL CONTINUE TO RUN AND O.A. DAMPER SHALL OPEN TO MINIMUM. SPACE SENSOR SHALL RESET DISCHARGE AIR BY MODULATING 3-WAY VALVE ACCORDING TO THE FOLLOWING SCHEDULE:

SPACE TEMP.	DISCHARGE AIR TEMP.
65	80
75	55

SPACE SENSOR SHALL CYCLE D/X COOLING STAGES TO MAINTAIN SETPOINT. WHEN D/X IS ENERGIZED, HOT WATER VALVE SHALL BYPASS COIL.

UNOCCUPIED: UNIT SHALL CYCLE TO MAINTAIN SETBACK TEMPERATURE WITH VALVE OPEN, DAMPER CLOSED AND D/X COOLING OFF.

SCIENCE ROOM UNIT CONTROL:

UNIT SHALL BE INDEXED OCC/UNOCC AND WARMUP BY OPTIMAL START PROGRAM IN THE EMS SYSTEM.

WARMUP UNIT FAN SHALL RUN SUBJECT TO LOW TEMPERATURE THERMOSTAT AND SMOKE DETECTOR. SPACE SENSOR SHALL MODULATE 3-WAY HOT WATER VALVE. O.A. DAMPER SHALL REMAIN CLOSED.

OCCUPIED: UNIT FAN SHALL CONTINUE TO RUN AND O.A. DAMPER SHALL OPEN TO MINIMUM. SPACE SENSOR SHALL RESET DISCHARGE AIR BY MODULATING 3-WAY VALVE ACCORDING TO THE FOLLOWING SCHEDULE.

SPACE TEMP	DISCHARGE AIR TEMP
65	80
75	55

WHEN FUME HOOD IS ENERGIZED, O.A. DAMPER SHALL POSITION TO ALLOW OUTSIDE AIRFLOW 80% OF FUME HOOD EXHAUST.

UNOCCUPIED: UNIT SHALL CYCLE TO MAINTAIN SETBACK TEMPERATURE WITH VALVE OPEN AND DAMPER CLOSED.

ART ROOM UNIT CONTROL (TYPICAL FOR HIGH TECH., MUSIC ROOM AND MEDIA CENTER):

UNIT SHALL BE INDEXED OCC/UNOC AND WARMUP BY OPTIMAL START PROGRAM IN THE EMS SYSTEM.

WARMUP: UNIT FAN SHALL RUN SUBJECT TO LOW TEMPERATURE THERMOSTAT AND SMOKE DETECTOR. SPACE SENSOR SHALL MODULATE 3-WAY HOT WATER VALVE. O.A. DAMPER SHALL REMAIN CLOSED.

OCCUPIED: UNIT FAN SHALL CONTINUE TO RUN AND O.A. DAMPER SHALL OPEN TO MINIMUM. SPACE SENSOR SHALL RESET DISCHARGE AIR BY MODULATING 3-WAY VALVE ACCORDING TO THE FOLLOWING SCHEDULE:

SPACE TEMP	DISCHARGE AIR TEMP
65	80
75	55

UNOCCUPIED: UNIT SHALL CYCLE TO MAINTAIN SETBACK TEMPERATURE WITH VALVE OPEN AND DAMPER CLOSED.

H.W. RADATION CONTROL (TYPICAL):

SYSTEM SHALL BE INDEXED WARMUP/UNOCCUPIED BY OPTIMAL START PROGRAM IN THE EMS SYSTEM. IN WARMUP AND OCCUPIED PERIODS, SPACE SENSOR SHALL MODULATE 2-WAY N.O. CONTROL VALVE TO MAINTAIN OCCUPIED SETPOINT. IN THE UNOCCUPIED MODE, SPACE SENSOR SHALL MODULATE VALVE TO MAINTAIN SETBACK TEMPERATURE. PROVIDE RJ-11 JACK (1 PER CLASSROOM WING) TO ALLOW FOR ACCESS TO SYSTEM NETWORK, INCLUDING CAPABILITY TO ACCESS SPECIFIC DDC PANELS, BY THE USE OF THE PORTABLE OPERATOR TOOL. PROVIDE PUSHBUTTON FOR INDEXING EACH CLASSROOM TO OCCUPIED DURING PROGRAM UNOCCUPIED MODES THROUGH THE EMS SYSTEM. ALL CLASSROOM SENSORS SHALL BE BUTTON TYPE.

EXHAUST FAN CONTROL (TYPICAL):

REFER TO EXHAUST FAN SCHEDULE. ATC CONTRACTOR TO PROVIDE SEPARATE AND DISCRETE FAN START POINT FOR EACH FAN UNDER EMS CONTROL.

CABINET AND UNIT HEATER CONTROL:

SPACE OR RETURN AIR STAT (AS SHOWN) SHALL CYCLE FAN THROUGH RETURN LINE AQUASTAT.

HOME ECONOMICS ROOM UNIT CONTROL (ADD ALTERNATE #1)

UNIT SHALL BE INDEXED OCC/UNOC AND WARMUP BY OPTIMAL START PROGRAM IN THE EMS SYSTEM.

WARMUP: UNIT FAN SHALL RUN SUBJECT TO LOW TEMPERATURE THERMOSTAT AND SMOKE DETECTOR. SPACE SENSOR SHALL MODULATE 3-WAY HOT WATER VALVE. O.A. DAMPER SHALL REMAIN CLOSED.

OCCUPIED: UNIT FAN SHALL CONTINUE TO RUN AND O.A. DAMPER SHALL OPEN TO MINIMUM. SPACE SENSOR SHALL RESET DISCHARGE AIR BY MODULATING 3-WAY VALVE ACCORDING TO THE FOLLOWING SCHEDULE:

SPACE TEMP	DISCHARGE AIR TEMP
65	80
75	55

UNOCCUPIED: UNIT SHALL CYCLE TO MAINTAIN SETBACK TEMPERATURE WITH VALVE OPEN AND DAMPER CLOSED.

GENERAL:

THE HOST COMPUTER SHALL BE LOCATED OFF SITE WHERE DIRECTED BY THE OWNER. THE HOST COMPUTER SHALL COMMUNICATE WITH THE DDC SYSTEMS IN THIS PROJECT AND BOLTON HIGH SCHOOL.

ALARM FAX MESSAGES SHALL ORIGINATE AT EITHER SCHOOL AND SHALL COMMUNICATE THROUGH AUTO-DIAL MODEMS TO THE HOST COMPUTER, WHICH WILL DIAL OUT FAX MESSAGES AS SPECIFIED.

A COMPLETE SYSTEM OF COMMUNICATION WIRING SHALL BE PROVIDED FOR INTEGRATING THE DDC PANELS WITH RESPECTIVE GCMS. THE MODEMS ARE FURNISHED AND INSTALLED BY THE ATC CONTRACTOR. TELEPHONE LINE INSTALLATION AND CHARGES ARE BY THE OWNER.

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REVISIONS

NO	DATE	DESCRIPTION

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ALTERATIONS AND ADDITIONS TO :
BOLTON ELEMENTARY SCHOOL
NOTCH ROAD
BOLTON, CONNECTICUT

DRAWING TITLE
TEMPERATURE CONTROL DETAILS

SCALE NO SCALE | DATE 8/7/92

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DRAWING 69 OF 89