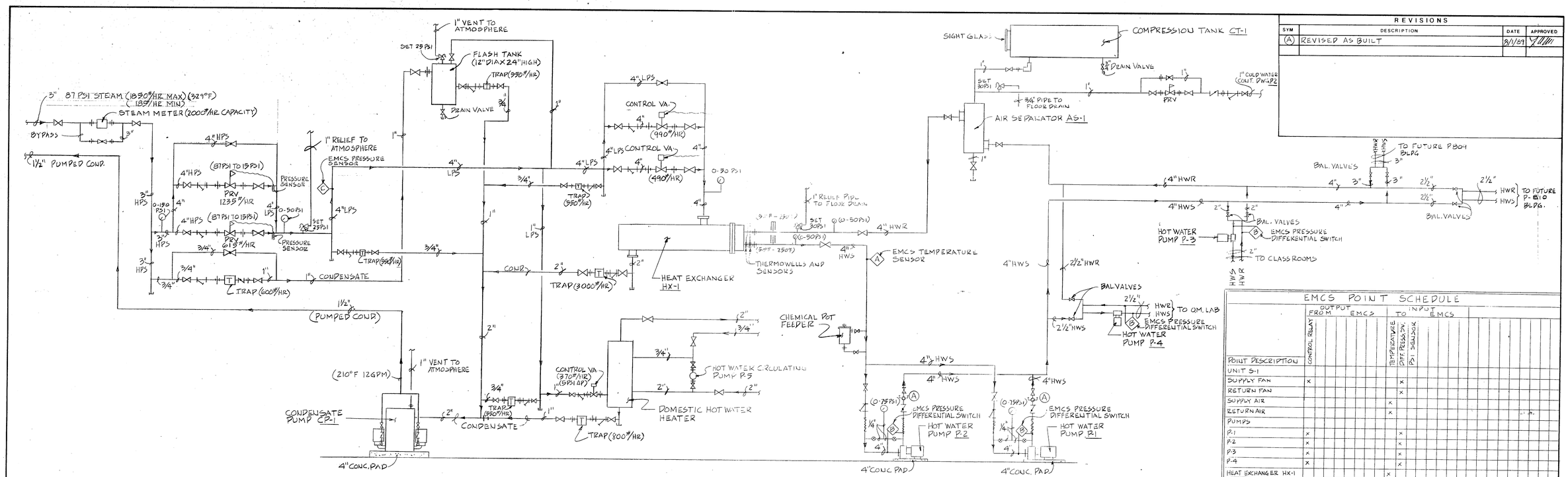
REVISIONS			
SYM	DESCRIPTION	DATE	APPROVED
(A)	REVISED AS BUILT	8/1/89	

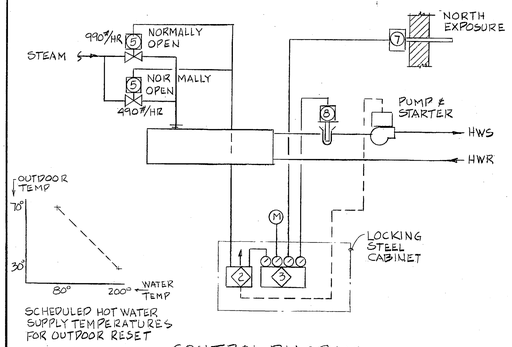


STEAM AND HOT WATER FLOW DIAGRAM

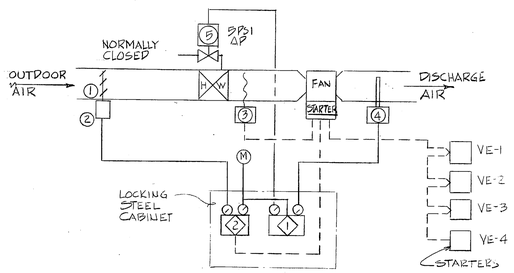
NO SCALE

EMCS POINT SCHEDULE

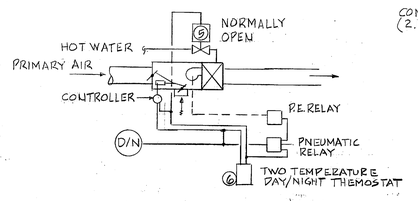
POINT DESCRIPTION	OUTPUT FROM EMCS: CONTROL RELAY	INPUT TO EMCS: TEMPERATURE	DIFF. PRESS. SW.	PSI SENSOR
UNIT S-1				
SUPPLY FAN	×		×	
RETURN FAN			×	
SUPPLY AIR		×		
RETURN AIR		×		
PUMPS				
P-1	×		×	
P-2	×		×	
P-3	×		×	
P-4	×		×	
HEAT EXCHANGER HX-1		×		
ROOM TEMP.				
CLASSROOM 109		×		
O.M. LAB 123		×		
WARM UP	×			
LOW PRESS. LEAVING STEAM PRV STATION				×



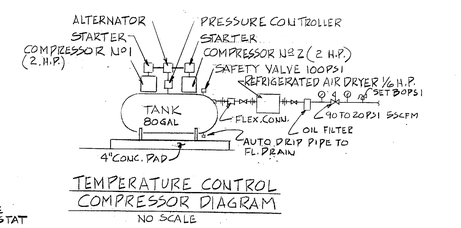
CONTROL DIAGRAM
STEAM TO HOT WATER HEAT EXCHANGER
NO SCALE



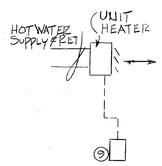
CONTROL DIAGRAM
MAKE UP AIR UNIT
NO SCALE



CONTROL DIAGRAM
SERIES FAN POWERED VARIABLE VOLUME UNITS
NO SCALE



TEMPERATURE CONTROL
COMPRESSOR DIAGRAM
NO SCALE



CONTROL DIAGRAM
UNIT HEATER
NO SCALE

SEQUENCES OF OPERATION

MAKEUP AIR UNIT

A. WHEN ANY ONE OR MORE OF THE CARBON MONOXIDE EXHAUST FANS IS ENERGIZED, THE MAKEUP AIR FAN SHALL BE ENERGIZED.
   1. OUTDOOR AIR DAMPER SHALL OPEN.
   2. DISCHARGE AIR TEMPERATURE SENSOR/CONTROLLER SHALL MODULATE THE HOT WATER COIL VALVE TO MAINTAIN 65°F.
   3. LOW TEMPERATURE DUCTSTAT SHALL STOP THE FAN ON A FALL IN TEMPERATURE TO 38°F.

B. WHEN ALL OF THE CARBON MONOXIDE EXHAUST FANS ARE DE-ENERGIZED THE MAKEUP AIR UNIT SHALL BE DE-ENERGIZED.
   1. THE OUTDOOR DAMPER SHALL CLOSE.

C. THE MAKEUP AIR FAN MAY BE ENERGIZED USING THE "HAND" POSITION ON THE STARTER. (H.O.A.)

UNIT HEATER

A. THE SPACE THERMOSTAT SHALL CYCLE THE UNIT HEATER FAN TO MAINTAIN TEMPERATURE (70°F NOM.).

B. THE MANUAL SWITCH BUILT INTO THE THERMOSTAT ALLOWS THE FAN TO BE ENERGIZED FOR AIR CIRCULATION PURPOSES.

FAN POWERED VARIABLE VOLUME UNITS

A. SPACE THERMOSTAT SHALL PROVIDE A 3 TO 13 PSIG SIGNAL TO THE UNIT AND THE HOT WATER COIL VALVE TO MAINTAIN TEMPERATURE (70°F). ALL CONTROLS, SEQUENCING DEVICES, PNEUMATIC-ELECTRIC RELAYS, ETC., SHALL BE PROVIDED WITH THE UNIT. THE TEMPERATURE CONTROL CONTRACTOR SHALL FURNISH THE VALVE WITH A SPRING RANGE CORRESPONSING TO THE UNIT CONTROL SEQUENCE.

B. DURING THE NIGHT OR UNOCCUPIED CYCLE, WHICH IS ESTABLISHED WHENEVER THE SUPPLY FAN IS DE-ENERGIZED, THE BOX FAN SHALL BE DE-ENERGIZED. ON A FALL IN TEMPERATURE, THE FAN SHALL BE ENERGIZED AND THE VALVE SHALL BE OPEN. ON A RISE IN TEMPERATURE, THE FAN SHALL BE DE-ENERGIZED AND THE VALVE SHALL BE CLOSED.

C. NIGHT SET BACK TEMPERATURE 55°F.

STEAM-TO-HOT WATER CONVERTOR

A. HOT WATER PUMP ENERGIZED.
   1. TEMPERATURE CONTROLLER SHALL MODULATE IN SEQUENCE THE ONE THIRD CAPACITY STEAM VALVE (FIRST) AND THE TWO THIRDS CAPACITY STEAM VALVE (SECOND). THE CONTROLLER'S PROPORTIONAL PLUS INTEGRAL CONTROL MODE SHALL FUNCTION TO PROVIDE AN ESSENTIALLY CONSTANT HOT WATER SUPPLY TEMPERATURE AT ANY GIVEN TEMPERATURE SETPOINT. THE SUPPLY TEMPERATURE SHALL BE VARIED FROM OUTSIDE TEMPERATURE ACCORDING TO THE SCHEDULE.

B. HOT WATER PUMP DE-ENERGIZED.
   1. STEAM VALVES CLOSE.

ROOF TOP UNIT

A. REFER TO SPECIFICATION SECTION 15971 FOR SEQUENCE OF OPERATION.

WARMUP CYCLE

A. THE WARMUP CYCLE SHALL BE INITIATED BY THE TIME CLOCK ONE HOUR PRIOR TO OCCUPANCY TIME. AN ELECTRIC-PNEUMATIC RELAY CONNECTED TO THE TIME CLOCK SHALL TRIGGER THE DAY-NIGHT SIGNAL LINE. ALL OF THE SPACE THERMOSTATS ARE RESTORED TO THE DAY TEMPERATURE SETPOINT, WHICH CAUSES THE FANS IN THE TERMINAL UNITS TO RUN WITH THE HEATING COIL VALVES OPEN, UNTIL EACH THERMOSTAT IS SATISFIED.

TEMPERATURE CONTROL LEGEND

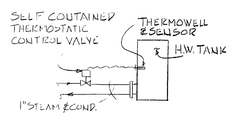
1. DAMPER, LOW LEAKAGE
2. DAMPER, ACTUATOR
3. LOW TEMPERATURE PROTECTION DUCTSTAT; 20 FT CAPILARY; MANUAL RESET
4. DUCT TEMPERATURE SENSOR
5. VALVE, TWO WAY CONTROL
6. SPACE THERMOSTAT; DIRECT ACTING
7. OUTDOOR TEMPERATURE SENSOR
8. IMMERSION TEMPERATURE SENSOR; STAINLESS STEEL WELL
9. SPACE THERMOSTAT; ELECTRIC, TWO POSITION; MANUAL FAN AUTO/FAN ON SWITCH
10. TEMPERATURE SENSOR
11. REMOTE STATIC PRESSURE/TRANSDUCER
12. LOW TEMPERATURE SAFETY DUCTSTAT; MANUAL RESET
13. HIGH STATIC PRESSURE SAFETY SWITCH
14. DUCT SMOKE DETECTOR-CONNECT TO CONTROLS AND TO FIRE ALARM

CABINET MOUNTED EQUIPMENT

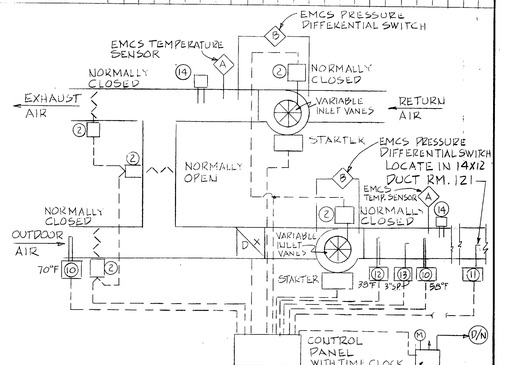
1. CONTROLLER
2. ELECTRIC-PNEUMATIC RELAY
3. CONTROLLER; DUAL INPUT; PROPORTIONAL PLUS INTEGRAL CONTROL

M. 20 PSIG (NOM.) AIR MAIN

D/N. NIGHT CYCLE CONTROL AIR



CONTROL DIAGRAM
HOT WATER HEATER
NO SCALE



CONTROL DIAGRAM ROOFTOP A.C. UNIT
NO SCALE

EMCS LEGEND

SYMBOL	DESCRIPTION
A	TEMPERATURE SENSOR
B	PRESSURE DIFFERENTIAL SWITCH
C	PRESSURE SENSOR

FILE M-107 P1 AUG 01 1989

M-5

Nakazawa Corporation Architects & Planners 212 South Tryon Street Charlotte, North Carolina 28281 Telephone: (704) 335-1184	DEPARTMENT OF THE NAVY · NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC DIVISION NAVAL STATION NORFOLK, VIRGINIA
EFD DWG NO. 246168 JOB ORDER NO. 5F4087 STA. PROJ. NO. P-808 DES. JM DRWN. PN PROJ. MGR. CH CH. ARCH/ENGR. JM EFD RVD FP EDIS BR. MGR. DES. DIR	MARINE CORPS BASE, CAMP LEJEUNE, N.C. APPLIED INSTRUCTION BUILDING P-808 TEMP. CONTROLS, SEQ. OF OPERATION, FLOW DIAGRAM
APPROVED DATE 5/22/84 ACTIVITY - SATISFACTORY TO APPROVED DATE FOR EFD FOR COMMANDER NAVFAC	SIZE F · CODE IDENT. NO. 80091 · NAVFAC DRAWING NUMBER 4146168 CONSTR. CONTR. NO. N62470-84-B-4087 SCALE: AS NOTED · SPEC. 05-84-4087 · SHEET 34 OF 45

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