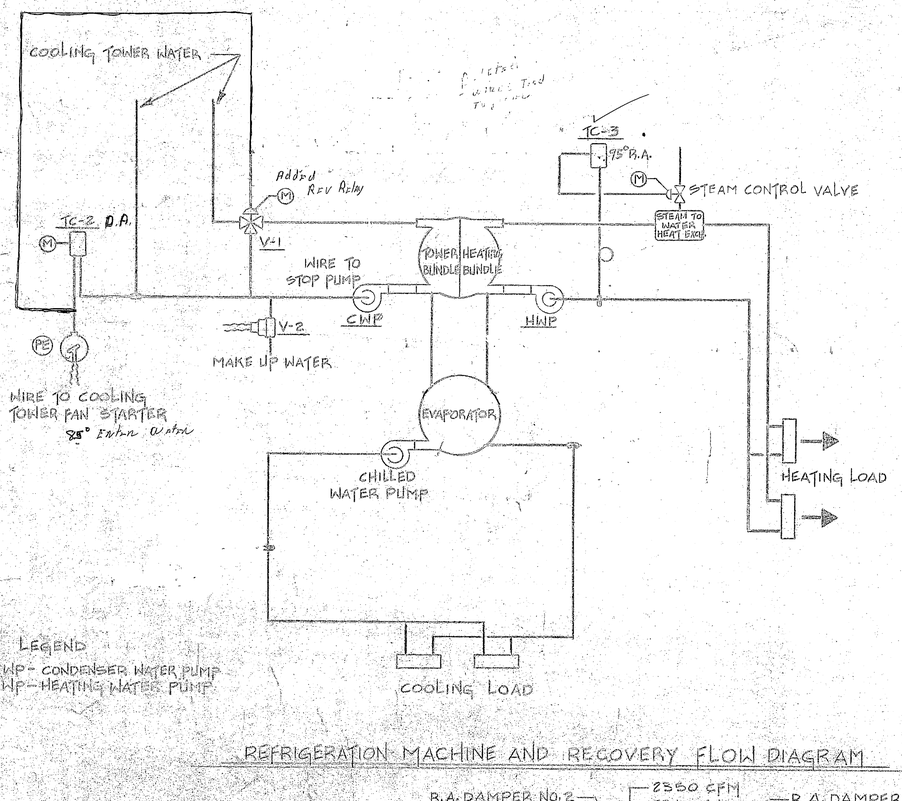
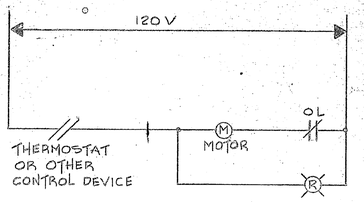
REVISIONS			
SYM.	DESCRIPTION	DATE	APPROVED

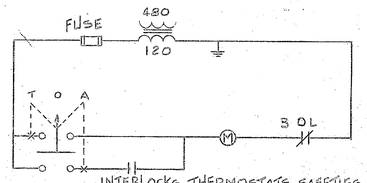


LEGEND
CWP - CONDENSER WATER PUMP
HWP - HEATING WATER PUMP

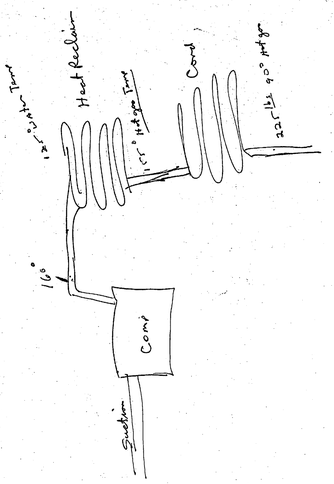
REFRIGERATION MACHINE AND RECOVERY FLOW DIAGRAM



ELEMENTARY DIAGRAM
SINGLE PHASE MOTORS



TYPICAL MOTOR STARTER CONTROL DIAGRAM
(THREE PHASE)



CENTRIFUGAL REFRIGERATION MACHINE

(HEAT PUMP AND AUXILIARY STEAM TO WATER HEAT EXCHANGER)

THE CHILLED WATER PUMP SHALL BE STARTED BY A HAND/OFF/AUTOMATIC SWITCH WHICH CAN BE OVERRIDDEN BY THE BASE ENGINEERING MANAGEMENT CENTER FOR REMOTE SHUTDOWN AND RESTART CAPABILITY. WHEN THE CHILLED WATER PUMP STARTER IS CLOSED, SOLENOID SV-1 WILL PASS CONTROL AIR TO THE SYSTEM. WHEN CHILLED WATER AND HEATING WATER FLOW IS PROVEN AND ALL THE CONTROL AND SAFETY DEVICES ARE CLOSED, THE REFRIGERATION MACHINE SHALL START. TEMPERATURE CONTROL (TC-1) SHALL MODULATE THE REFRIGERATION MACHINE INLET VANE CONTROLLER TO MAINTAIN 42°F. LEAVING WATER. WHEN LOAD IS REDUCED TO APPROXIMATELY 50 PERCENT, A HOT GAS BYPASS SHALL OPEN TO MAINTAIN STABLE MACHINE OPERATION. UPON UNLOADING TO A 44°F. RETURN WATER TEMPERATURE, TEMPERATURE CONTROLLER (TC-4) SHALL STOP THE MACHINE.

THE HOT WATER PUMP SHALL BE CONTROLLED BY A MANUAL OFF/ON SWITCH. TEMPERATURE CONTROLLER TC-3, UPON A RISE IN HOT WATER RETURN TEMPERATURE ABOVE 95°, SHALL MODULATE WATER BYPASS VALVE (V-1) TO MAINTAIN A HOT WATER RETURN TEMPERATURE OF 95°F. A P.E. SWITCH SHALL START THE CONDENSER WATER PUMP WHEN C-1 IS ENERGIZED. UPON A CONTINUED RISE IN CONDENSER WATER TEMPERATURE, TEMPERATURE CONTROLLER (TC-2) THRU A PE SWITCH SHALL CYCLE THE COOLING TOWER FAN TO MAINTAIN 95° CONDENSER WATER TO THE TOWER BUNDLE. WHEN THE RETURN HOT WATER TEMPERATURE DROPS BELOW 95°F. THE TEMPERATURE CONTROLLER (TC-3) SHALL CAUSE THE STEAM VALVE CONTROLLER TO MODULATE STEAM TO MAINTAIN 95°F. RETURN WATER TEMPERATURE. WHEN THE REFRIGERATION MACHINE IS OFF THE LINE THE STEAM CONTROL VALVE SHALL MAINTAIN THE 95°F. RETURN WATER TEMPERATURE.

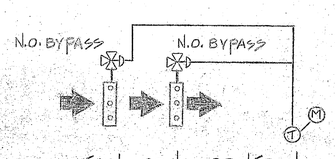
SOLENOID SV-2 SHALL BE ACTIVATED BY AN ELECTRIC FLOAT SWITCH IN THE COOLING TOWER BASIN UPON DEMAND FOR CONDENSER MAKE-UP WATER. SOLENOID SV-3 SHALL OPEN WHEN CONDENSER WATER PUMP IS OPERATING FOR CONDENSER WATER BLEED OFF.

SEQUENCE OF OPERATION AHU-4 AND AHU-5. THESE FAN COIL UNIT FANS SHALL BE STARTED BY A MANUAL STARTER IN THE ROOMS SERVED. A SOLENOID SHALL PASS CONTROL AIR TO A COMBINATION HEATING AND COOLING THERMOSTAT MOUNTED IN THE AREAS SERVED. THE THERMOSTAT SHALL MODULATE THE HOT WATER CONTROL VALVE OR THE CHILLED WATER CONTROL VALVE FROM THE BYPASS POSITION TO THE COIL POSITION TO MAINTAIN SPACE CONDITIONS. THE VALVES SPRING RANGE SHALL BE SET TO MAINTAIN CONDITIONS WITH A SUFFICIENT VOID BETWEEN HEATING AND COOLING TO PREVENT SHORT CYCLING UPON CHANGEOVER.

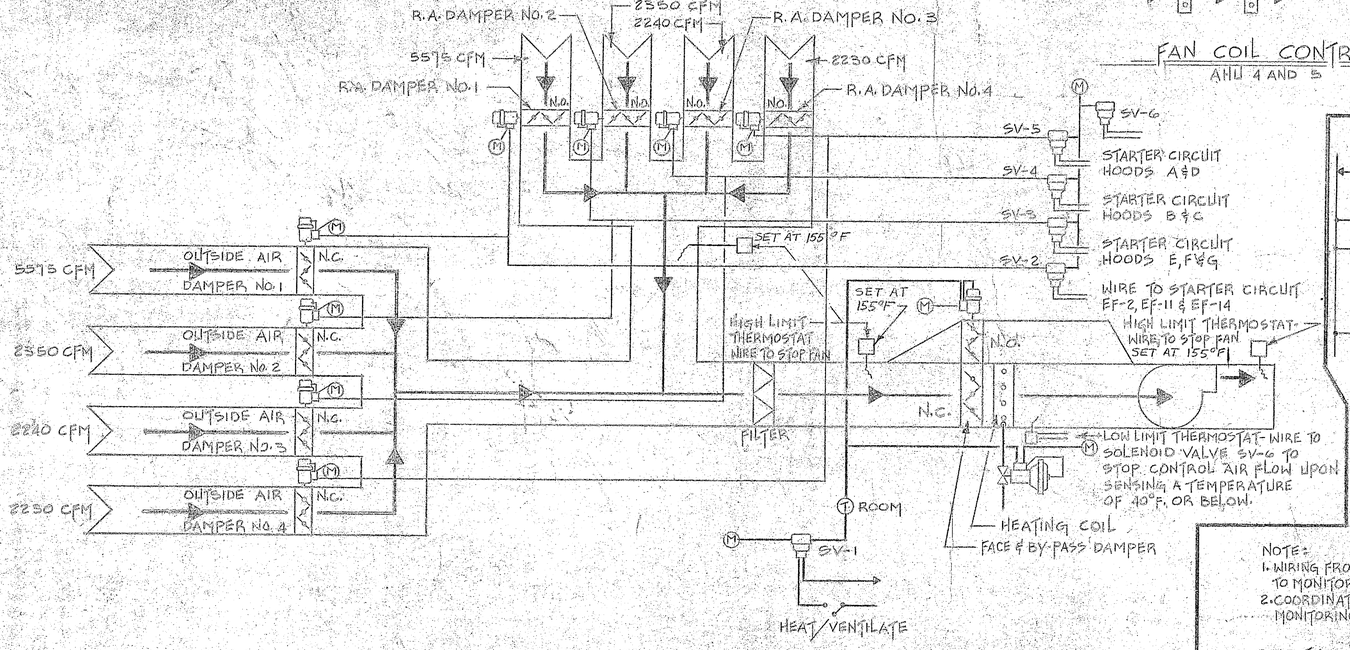
SEQUENCE OF OPERATION AHU-2

AHU-2 SHALL BE STARTED BY A HAND/OFF/AUTOMATIC SWITCH. WHEN SUPPLY FAN IS STARTED, A SOLENOID (S-1) SHALL OPEN TO PASS CONTROL AIR TO THE SYSTEM. WITH THE ROOM MOUNTED SELECTOR IN THE HEATING POSITION, A ROOM THERMOSTAT SHALL MODULATE THE FACE AND BYPASS DAMPERS TO MAINTAIN ROOM TEMPERATURE. THE SELECTOR, IN THE HEATING POSITION, SHALL ALSO CAUSE THE TWO POSITION STEAM VALVE TO OPEN. WHEN EXHAUST FANS NO. EF-2, EF-11, EF-12 AND EF-14 ARE STARTED BY A SINGLE SWITCH LOCATED IN THE BUILDING MANAGER'S OFFICE, RETURN AIR DAMPER NO. 1 SHALL MODULATE CLOSED AND OUTSIDE AIR DAMPER NO. 1 SHALL MODULATE OPEN. THE KITCHEN AND BAKERY VENTILATION UNITS SHALL BE STARTED BY MANUAL STOP START SWITCHES (PROVIDED AS A COMPONENT OF THE VENTILATION UNIT). THESE UNIT STARTERS SHALL BE SEQUENCED SO THAT MULTIPLE SYSTEMS WILL START SIMULTANEOUSLY. WHEN HOODS NUMBER G, F, AND E START, A SOLENOID (SV-3) SHALL ALLOW CONTROL AIR TO REPOSITION OUTSIDE AIR DAMPER NO. 2 AND RETURN AIR DAMPER NO. 2 TO THE FULLY OPEN AND CLOSED POSITION RESPECTIVELY. WHEN HOODS NUMBER B AND C ARE STARTED, A SOLENOID (SV-4) SHALL ALLOW CONTROL AIR TO REPOSITION OUTSIDE AIR DAMPER NO. 3 AND RETURN AIR DAMPER NO. 3 TO THE FULLY CLOSED POSITION RESPECTIVELY. WHEN HOODS NUMBER A AND D ARE STARTED, A SOLENOID (SV-5) SHALL ALLOW CONTROL AIR TO REPOSITION OUTSIDE AIR DAMPER NUMBER 4 AND RETURN AIR DAMPER NUMBER 4 TO THE FULLY OPEN AND CLOSED POSITION RESPECTIVELY. WHEN THE ROOM MOUNTED SELECTOR IS IN THE SUMMER POSITION, THE DESCRIBED FUNCTION IS CONTINUED EXCEPT THE TWO POSITION STEAM VALVE IS CLOSED AND THE FACE AND BYPASS DAMPERS ARE IN FULL BYPASS POSITION.

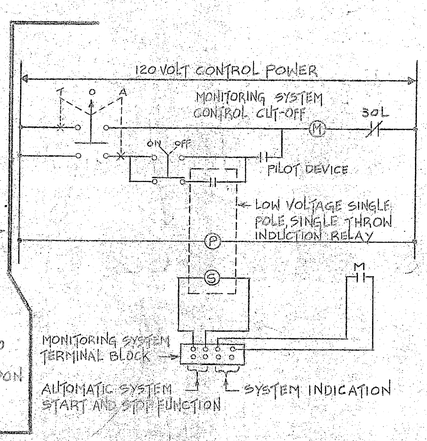
LOW LIMIT THERMOSTATS, IN THE SYSTEM LOCATIONS SHOWN ON THE FLOW AND CONTROL DIAGRAM, SHALL UPON SENSING A TEMPERATURE OF 155°F, STOP THE UNIT FAN. THIS CIRCUIT SHALL BE INTERLOCKED WITH THE BUILDING ALARM CONDITION. A LOW LIMIT THERMOSTAT, UPON SENSING A TEMPERATURE OF 40°F, OR BELOW, SHALL ACT TO DE-ENERGIZE SV-6 AND STOP CONTROL AIR FLOW TO DAMPERS.



FAN COIL CONTROL
AHU 4 AND 5



AHU-2 FLOW AND CONTROL DIAGRAM



NOTE:
1. WIRING FROM TERMINAL BLOCK TO MONITOR FUTURE
2. COORDINATE REQUIREMENTS FOR MONITORING SYSTEM WITH ROICC
3. SEE EQUIPMENT SEQUENCE FOR DESCRIPTION OF FUNCTION.

SYSTEM SCHEMATIC FOR UNITS WITH CENTRAL MONITORING
TYPICAL FOR CHILLED WATER PUMP & AHU -1, 2 & 3

RECORD DRAWING
DATE 1-18-80

BLDG 1220

M-9

LOCKWOOD GREENE ENG., INC. SPARTANBURG, S. C. 29301 ARCHITECTS & ENGINEERS	DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND ATLANTIC DIVISION NAVAL STATION NORFOLK, VIRGINIA
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APPROVED DATE EFD FOR COMMANDER, NAVFAC	SCALE AS NOTED SPEC. 05-75-5328 SHEET 19 OF 60 LANT DWG. NO.