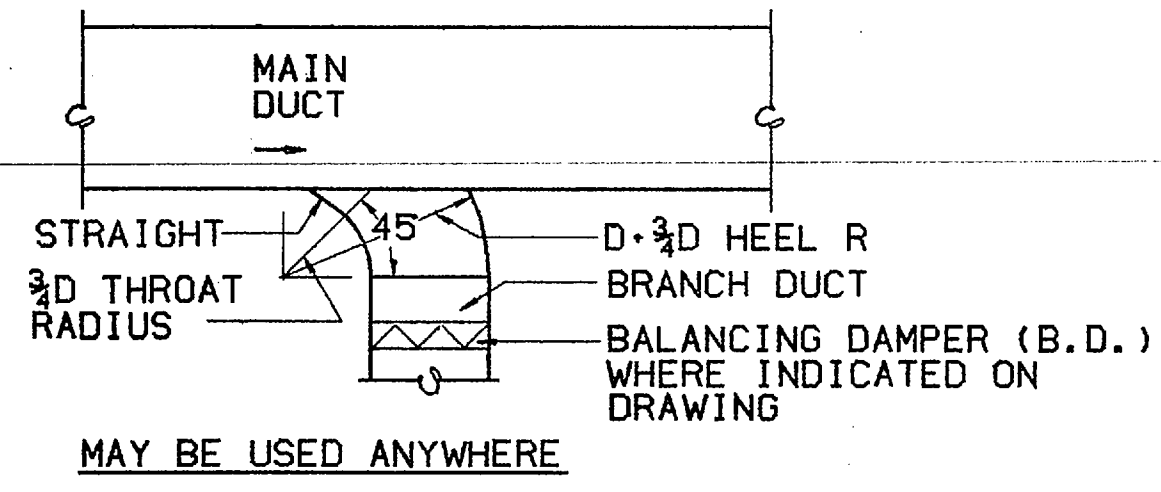
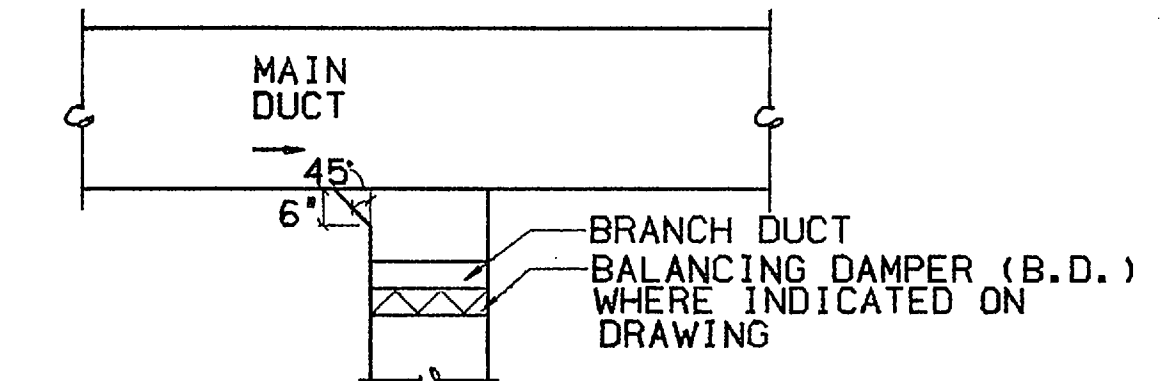


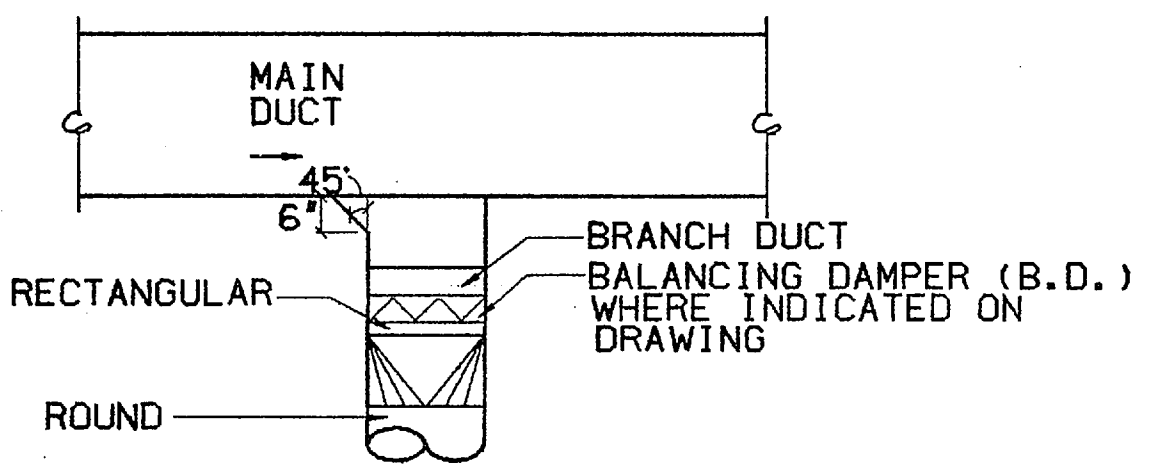
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|-----------|------------------|-----------|---------|----------|
| SYM       | DESCRIPTION      | PREP'D BY | DATE    | APPROVED |
| (A)       | REVISED AS-BUILT | SAH       | 12/5/88 | PH       |



MAY BE USED ANYWHERE

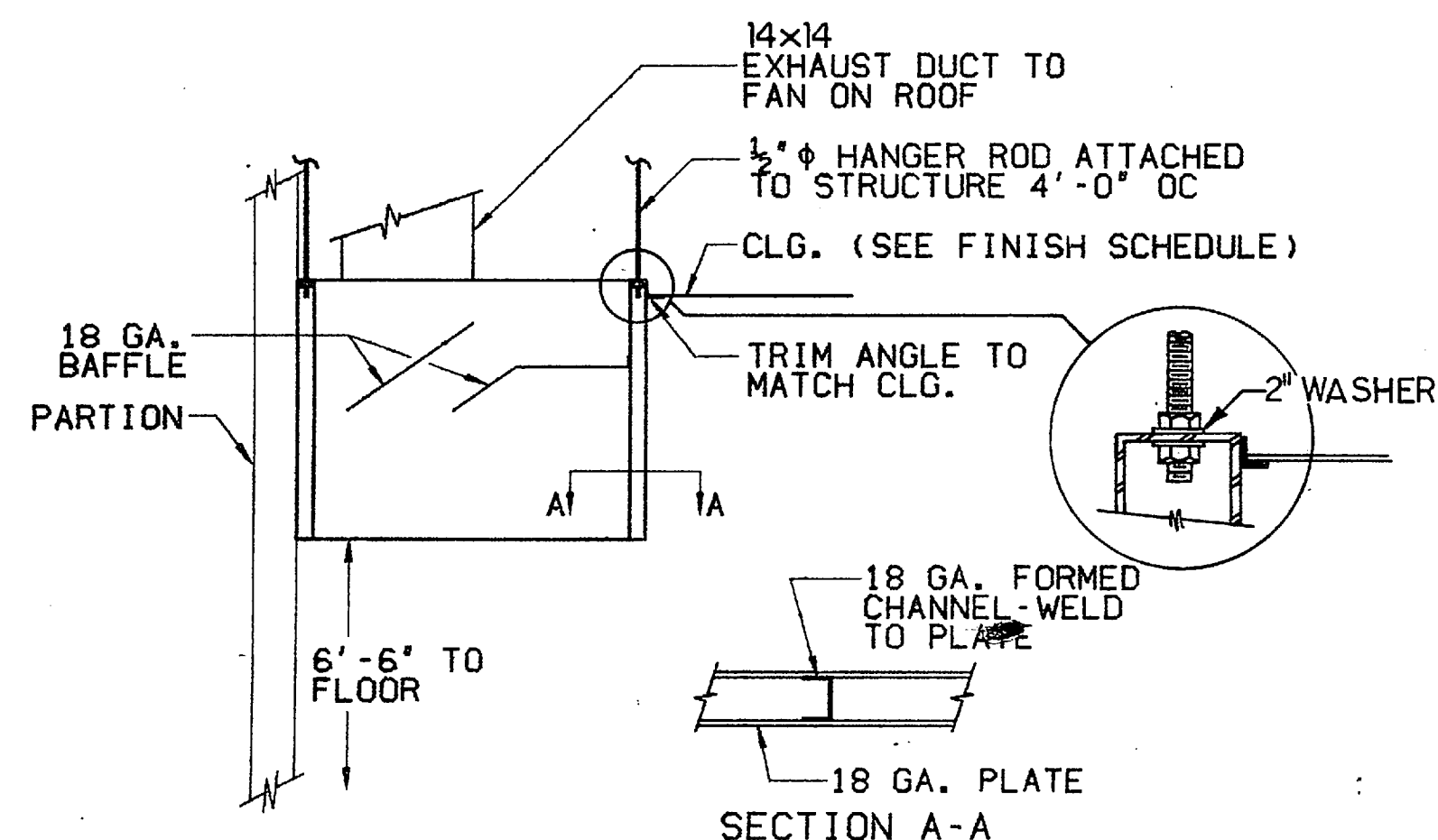


USE ONLY AT LAST TAKEOFF BEFORE OUTLET & THEN ONLY WHERE RECTANGULAR RUNOUTS ARE INDICATED ON DRAWINGS.

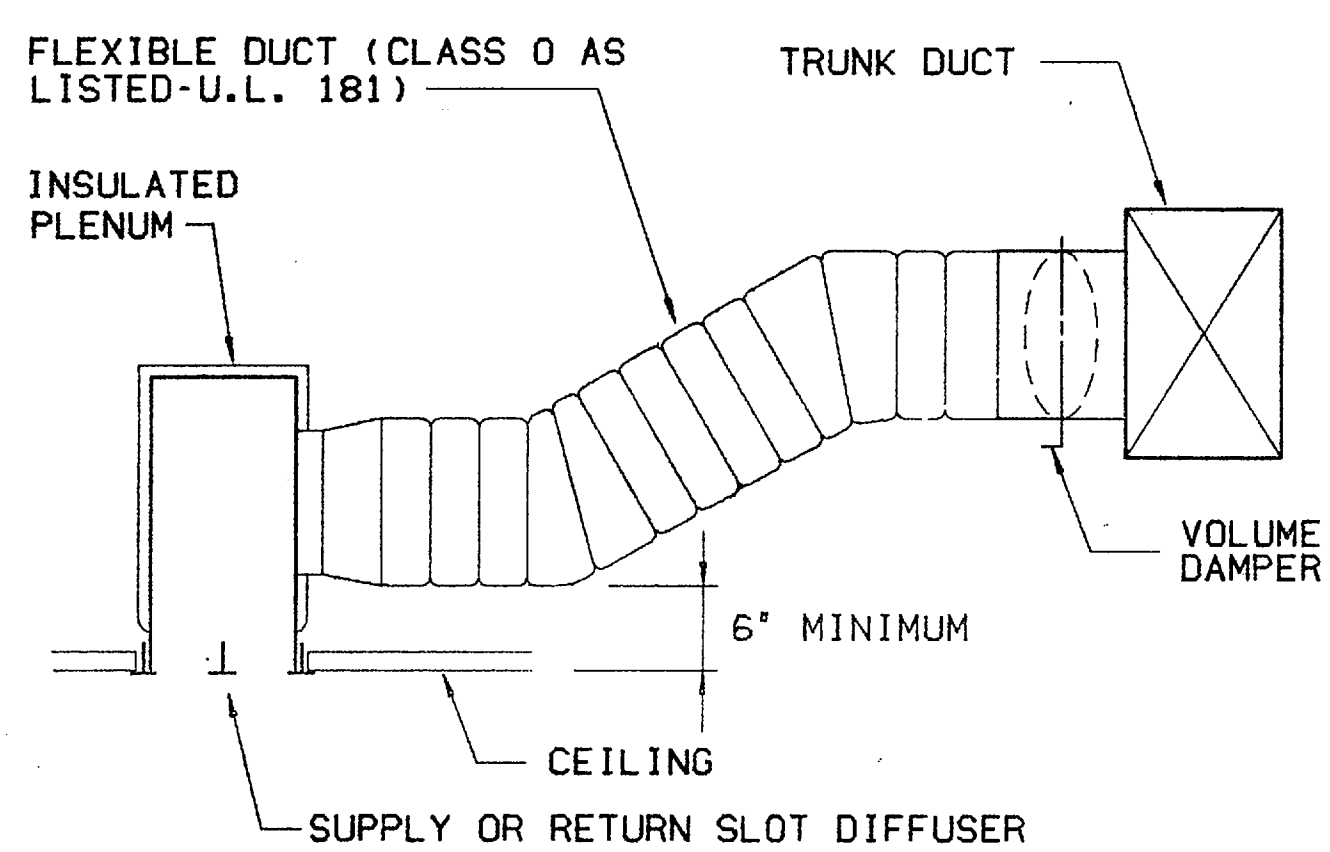


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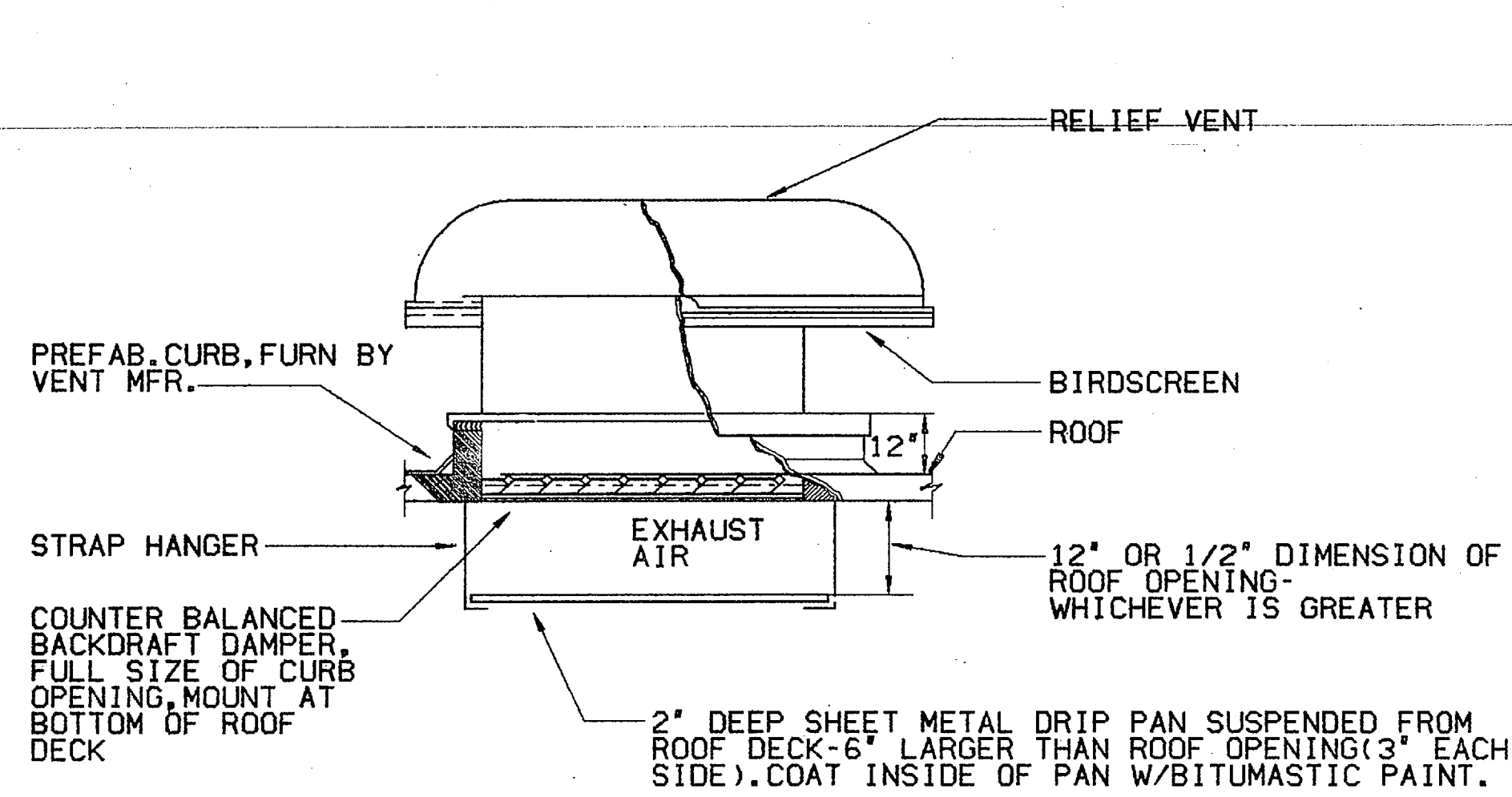
1 TYP BRANCH CONNECTION  
M1/M6 SCALE NO SCALE



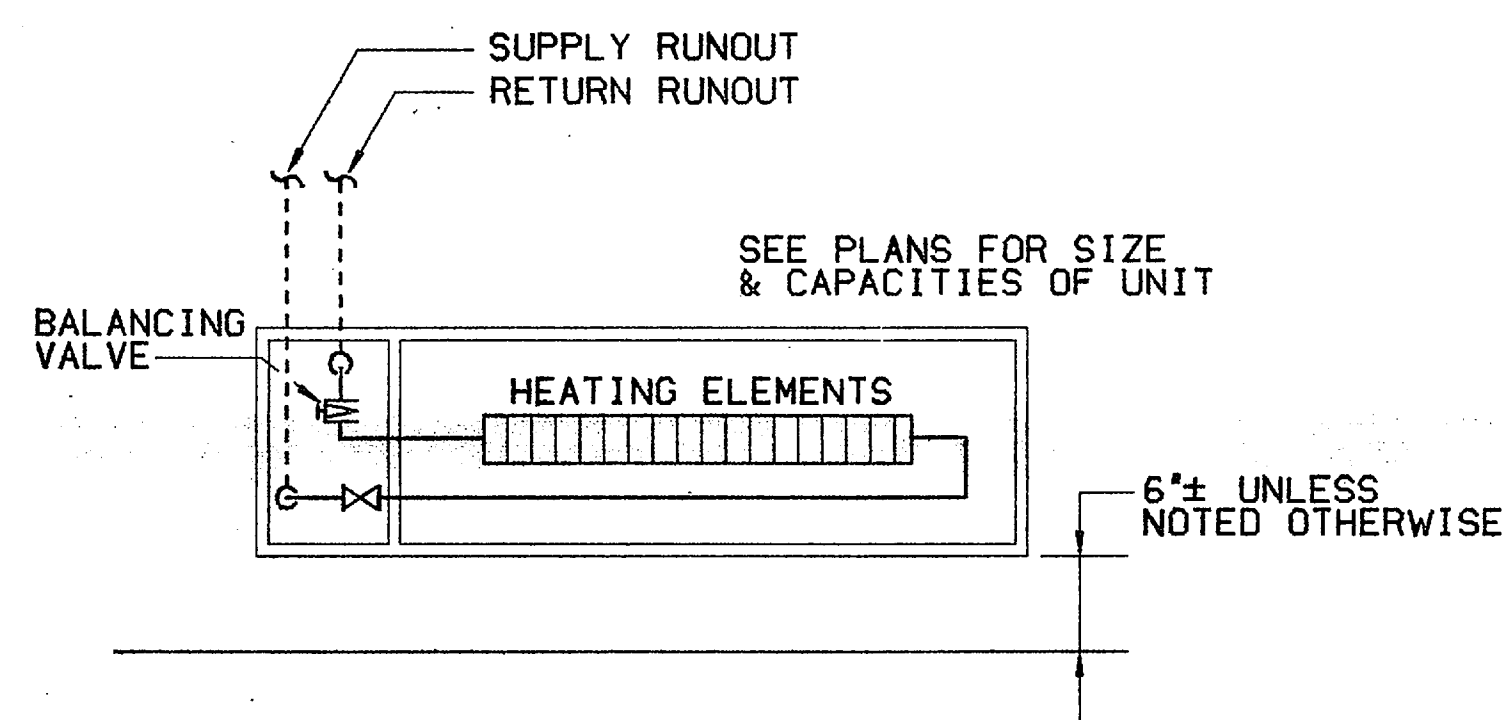
2 EXHAUST HOOD DETAIL  
M2/M6 SCALE NO SCALE



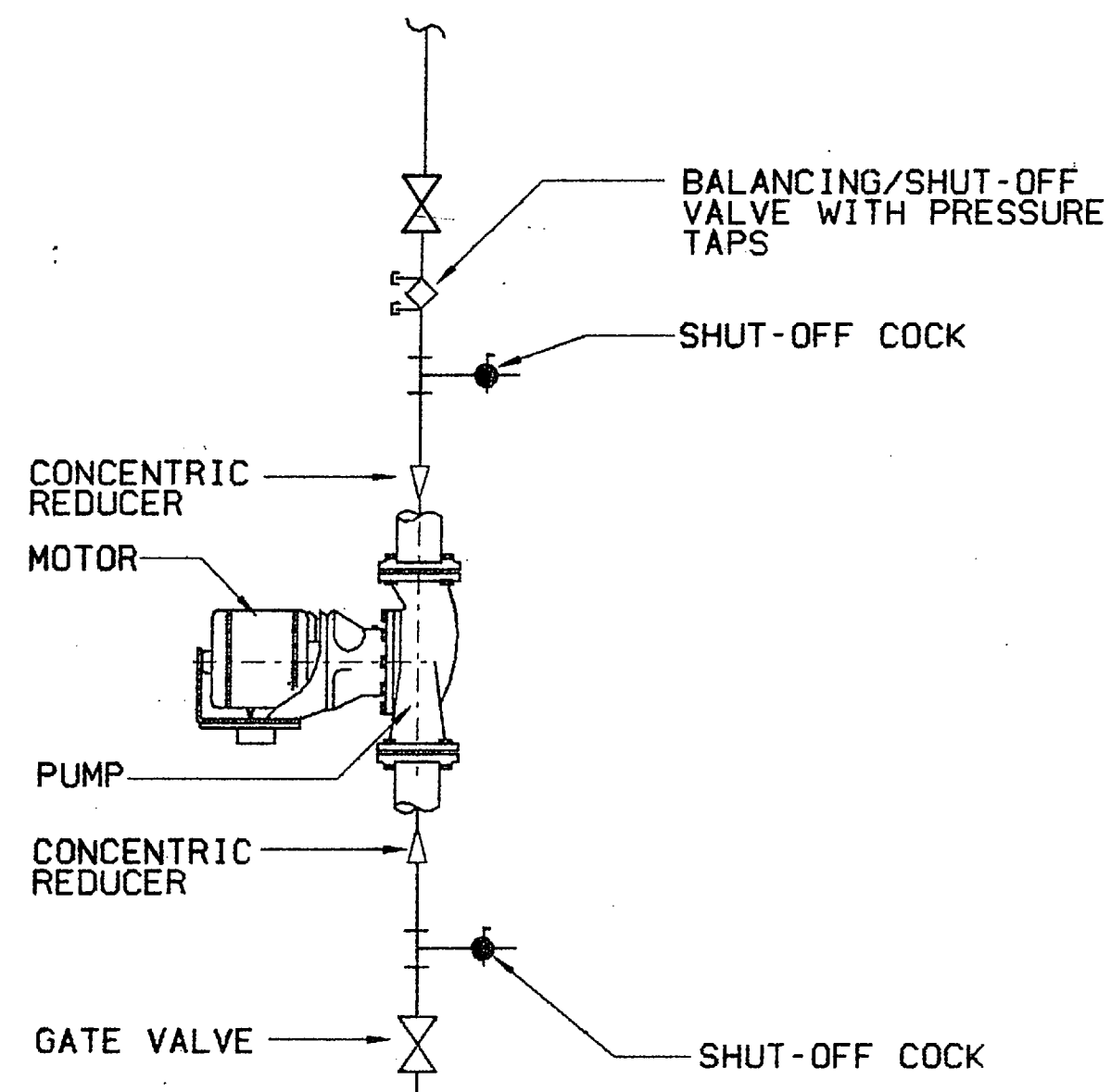
3 SLOT DIFFUSER  
M1/M6 SCALE NO SCALE



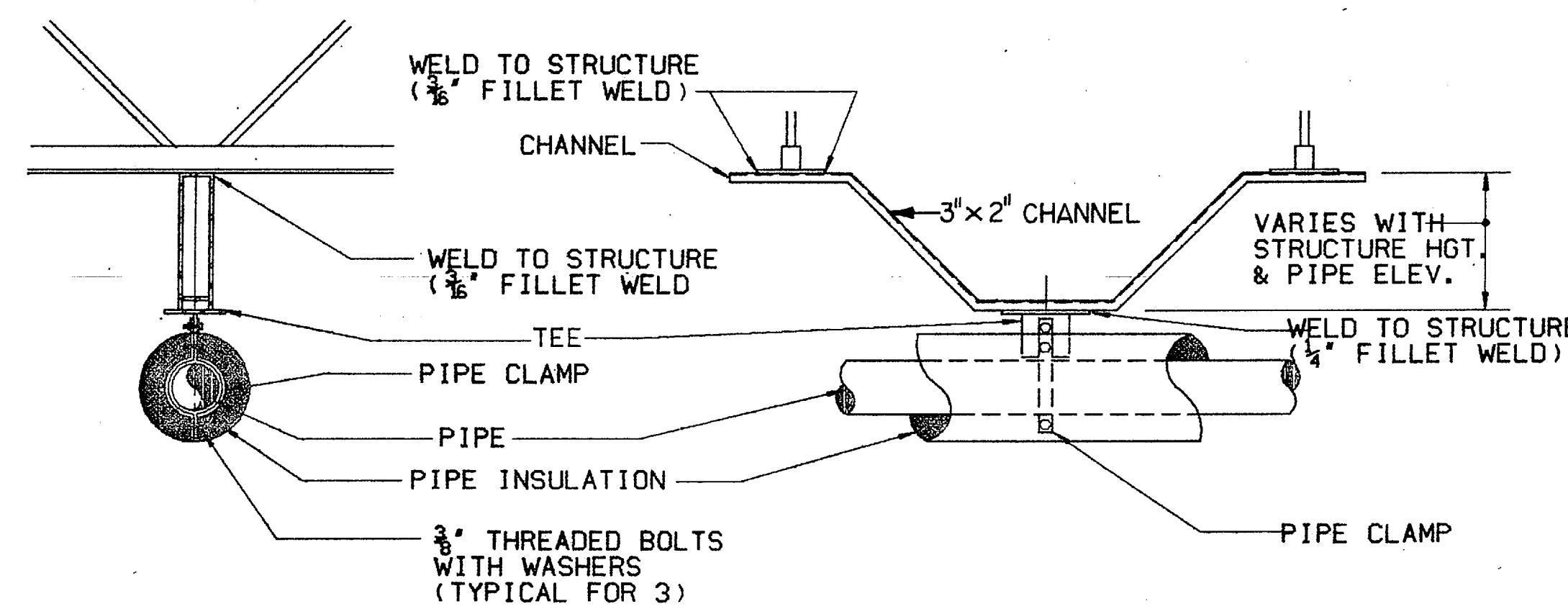
4 TYPICAL ROOF HOOD DETAIL  
M1/M6 SCALE NO SCALE



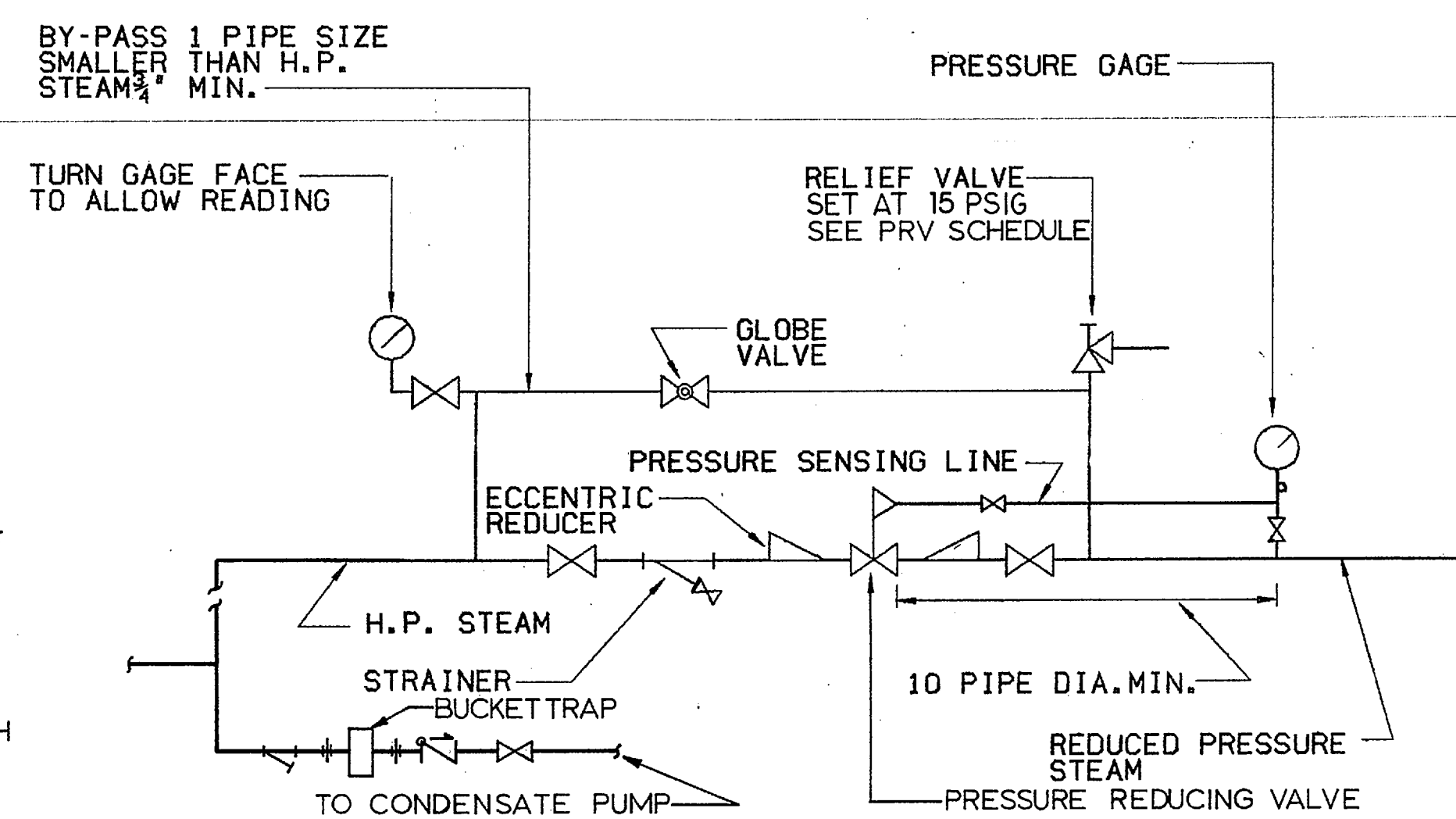
5 CONVACTOR CABINET & PIPING  
M4/M6 SCALE NO SCALE



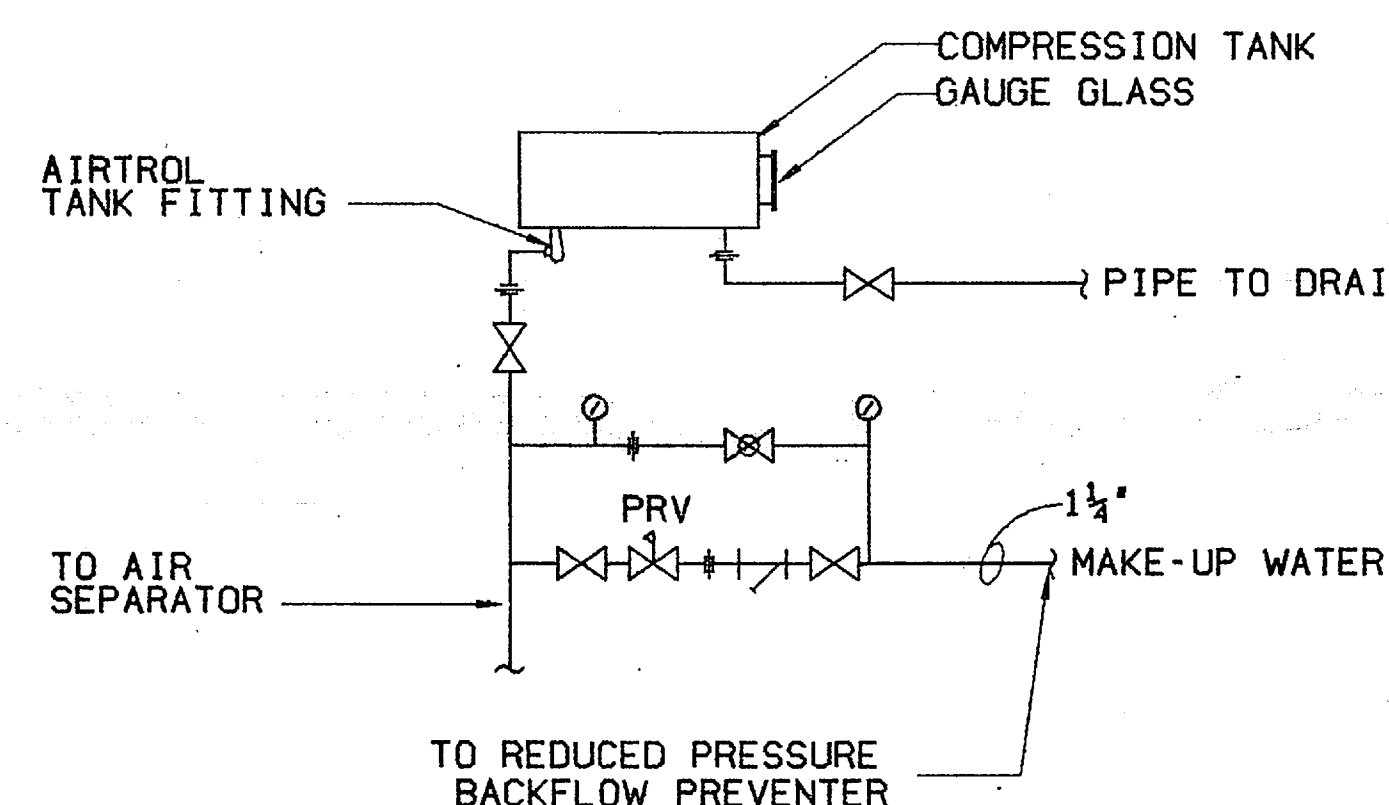
6 IN-LINE CENTRIFUGAL PUMP  
M4/M6 SCALE NO SCALE



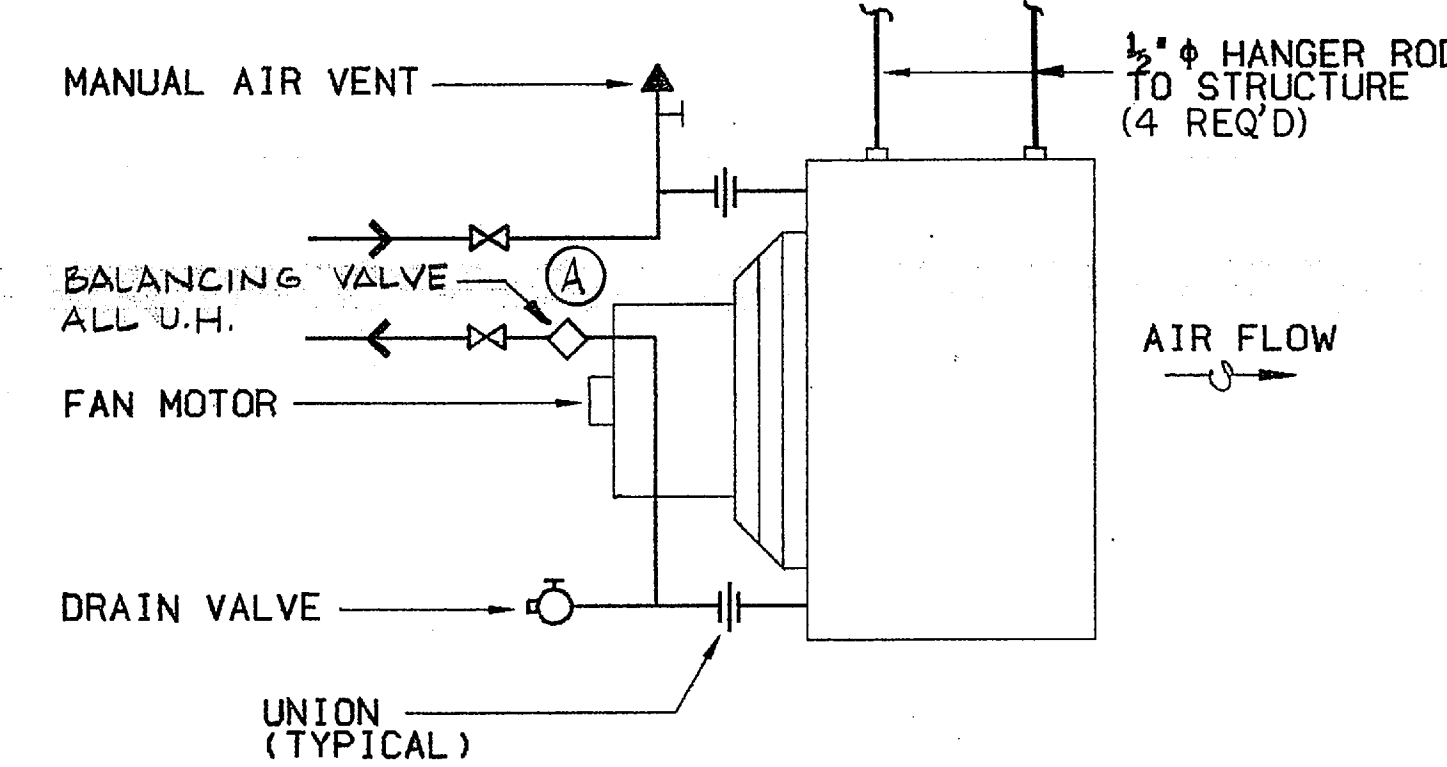
9 PIPE ANCHOR DETAIL  
M1/M6 SCALE NTS



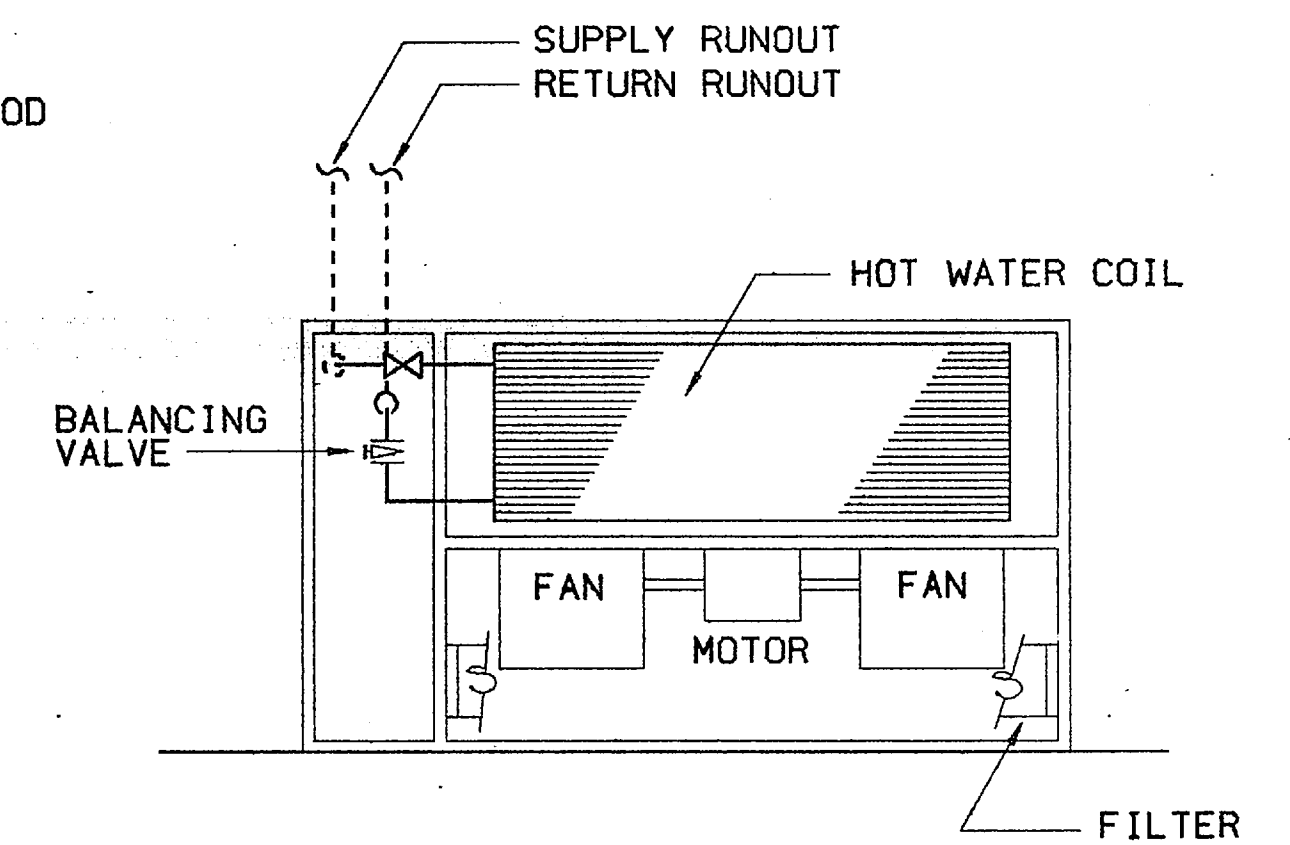
7 SINGLE STEAM PRV STATION  
M4/M6 SCALE NO SCALE



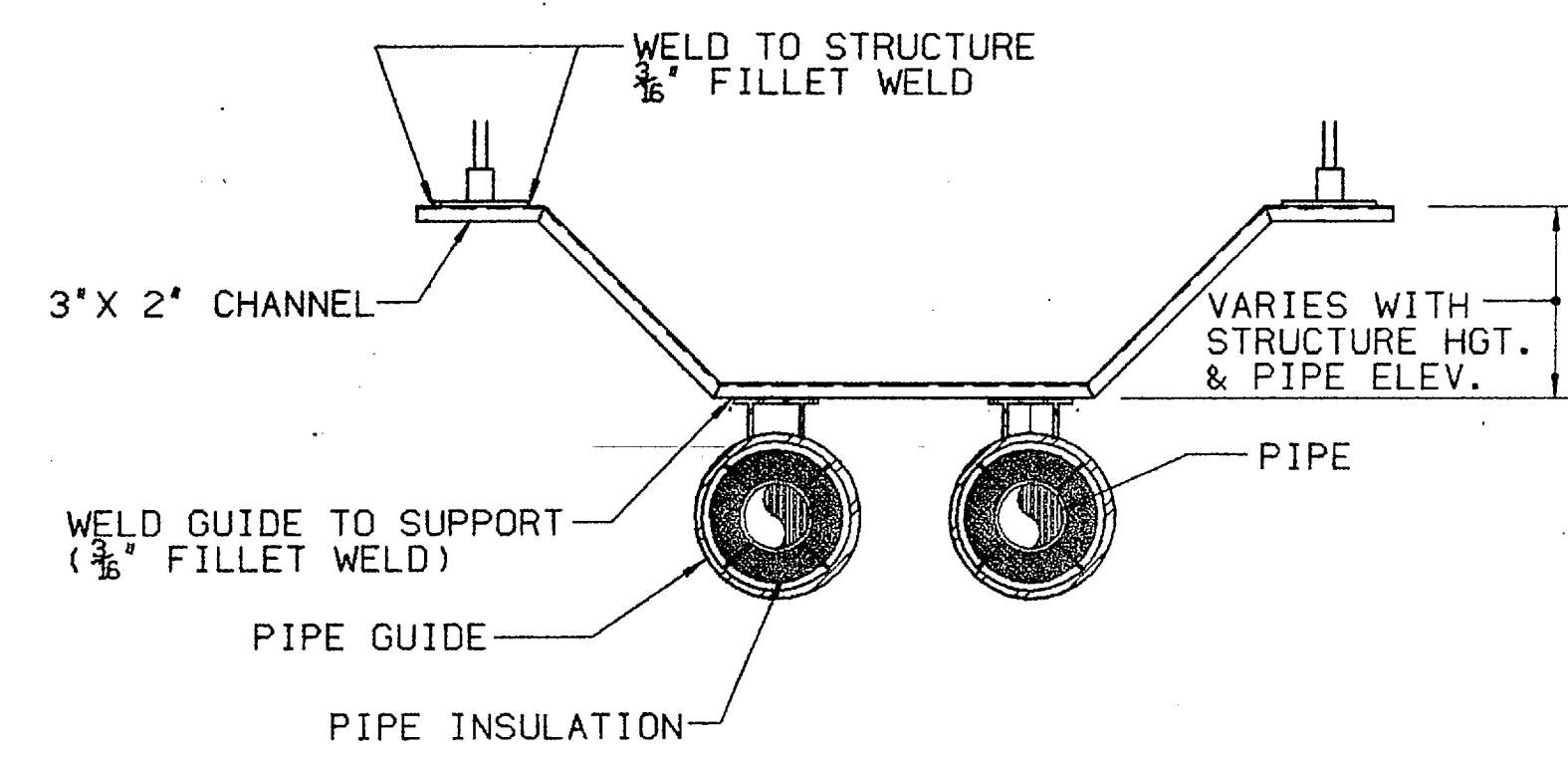
8 TYPICAL COMPRESSION TANK  
M4/M6 SCALE NO SCALE



10 HORIZONTAL HOT WATER UNIT HEATER  
M1/M6 SCALE NO SCALE



11 HOT WATER CABINET UNIT HEATER  
M1/M6 SCALE NO SCALE



12 PIPE GUIDE DETAIL  
M1/M6 SCALE NTS

RECORD DRAWING  
LETTER DATED 5 DEC 88

M6

|   |  |
|---|--|
| Clark Tribble Harris & L. ARCHITECTS<br>Charlotte, North Carolina<br>ARCHITECTS - ENGINEERS | DEPT. OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND<br>ATLANTIC DIVISION<br>NAVAL STATION NORFOLK, VIRGINIA |
| EFO DWG NO. 238503  | MARINE CORPS BASE CAMP LEJUNE, N.C.  |
| JOB ORDER NO. 5F-4095   | STATION PROJECT NO. P-527  |
| DES. J.V. DRWG. J.P.  | ELECTRONICS/COMMUNICATIONS<br>MAINTENANCE SHOP (P-527)   |
| PROJ. MGR. R.D. CH. ARCH/ENGR/K.H.  | MECHANICAL DETAILS   |
| APPROVED BY: [Signature] DATE: 12/5/88  | SIZE: CODE IDENT NO. NAVFAC DRAWING NO. 4138503  |
| APPROVED BY: [Signature] DATE: 12/5/88  | ACTIVITY: SATISFACTORY TO DIRECTOR NAVEX REF DWG NO. 986,742 B   |
| APPROVED BY: [Signature] DATE: 12/5/88  | CONSTR. CONTR. NO. N62470-B4-B-4095  |
| FOR FED. FOR. COMMANDER NAVEX   | SCALE NOTED   SPEC. 06-84-4095   SHEET 54 OF 69  |

HP104

5019H

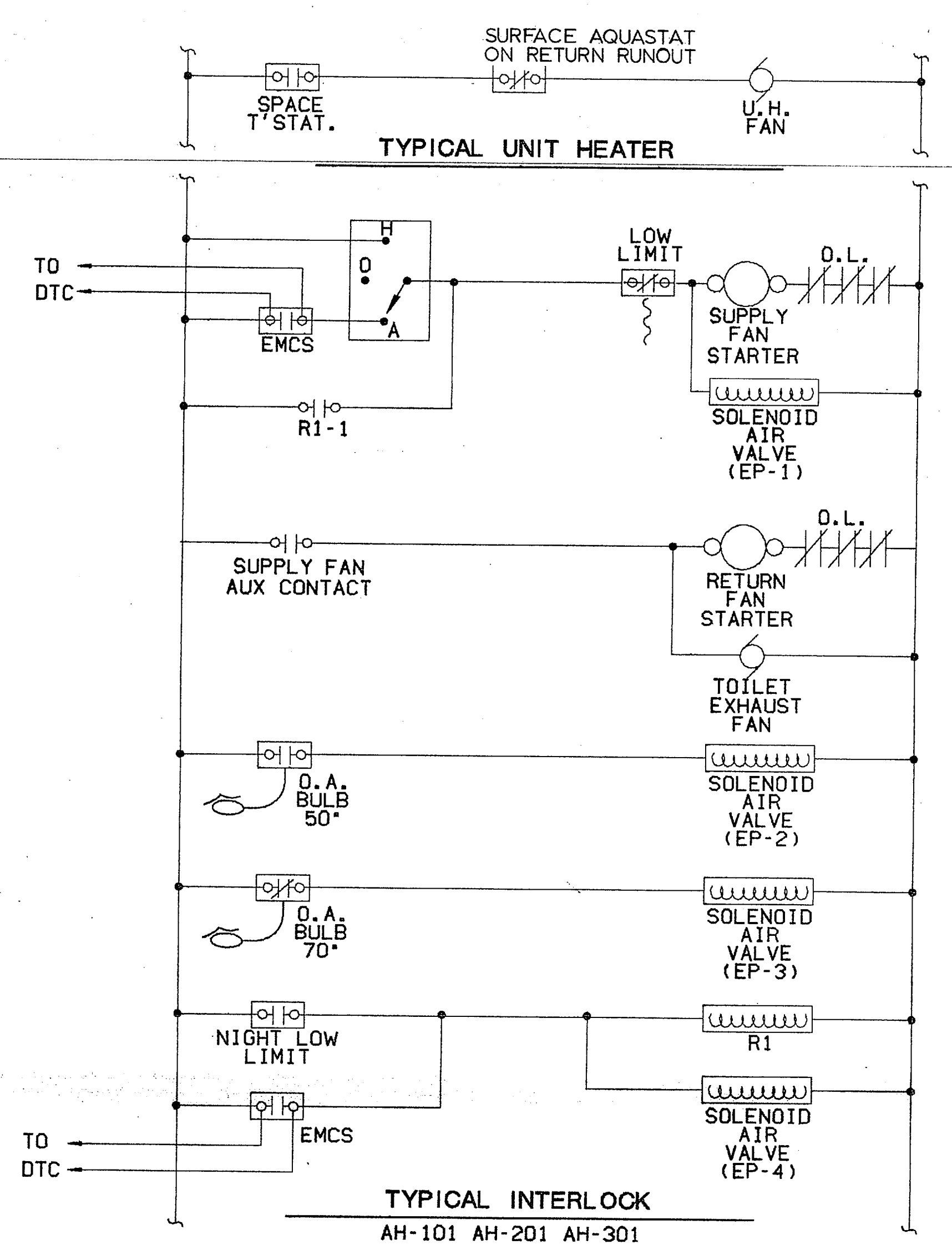


4019H

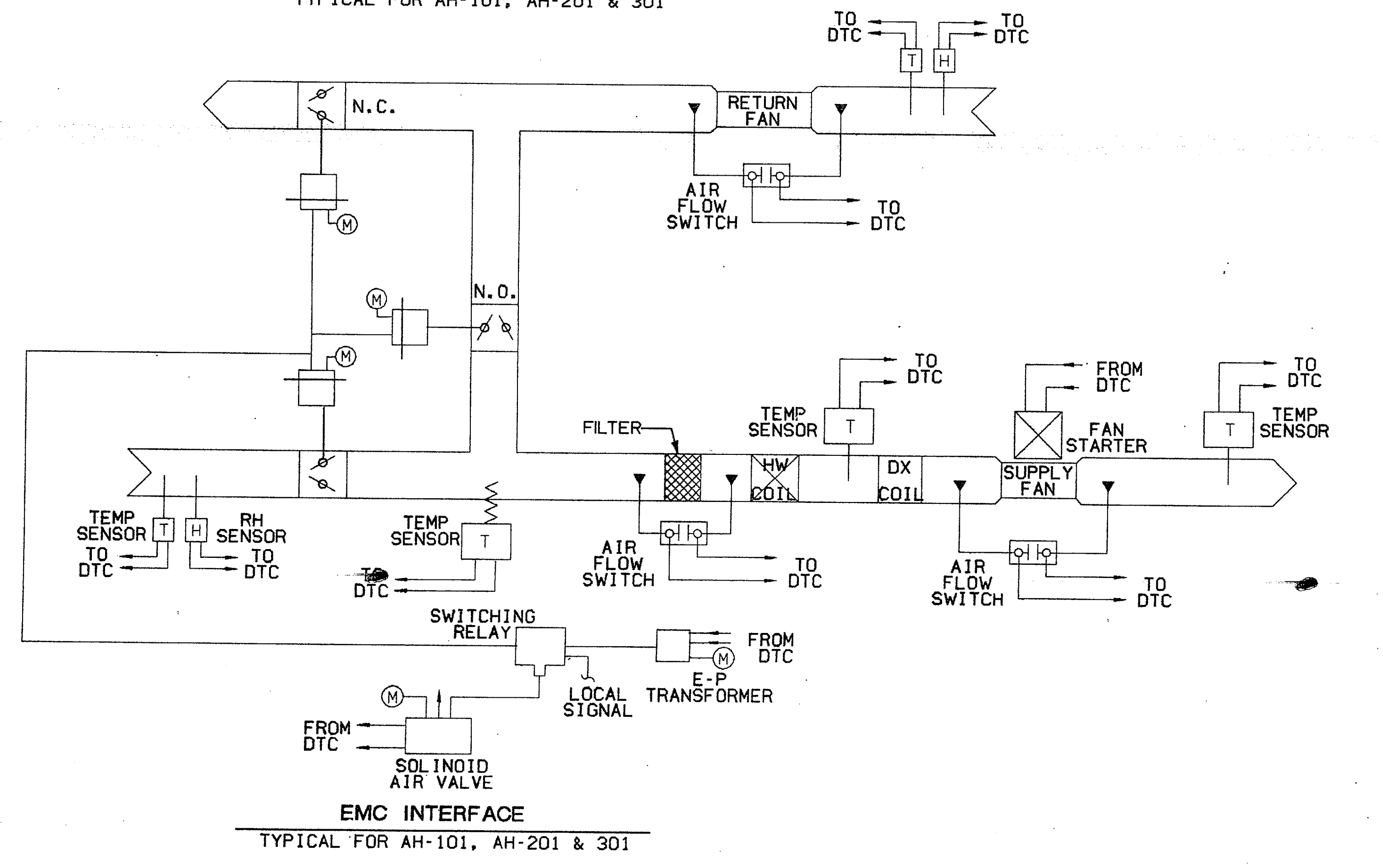
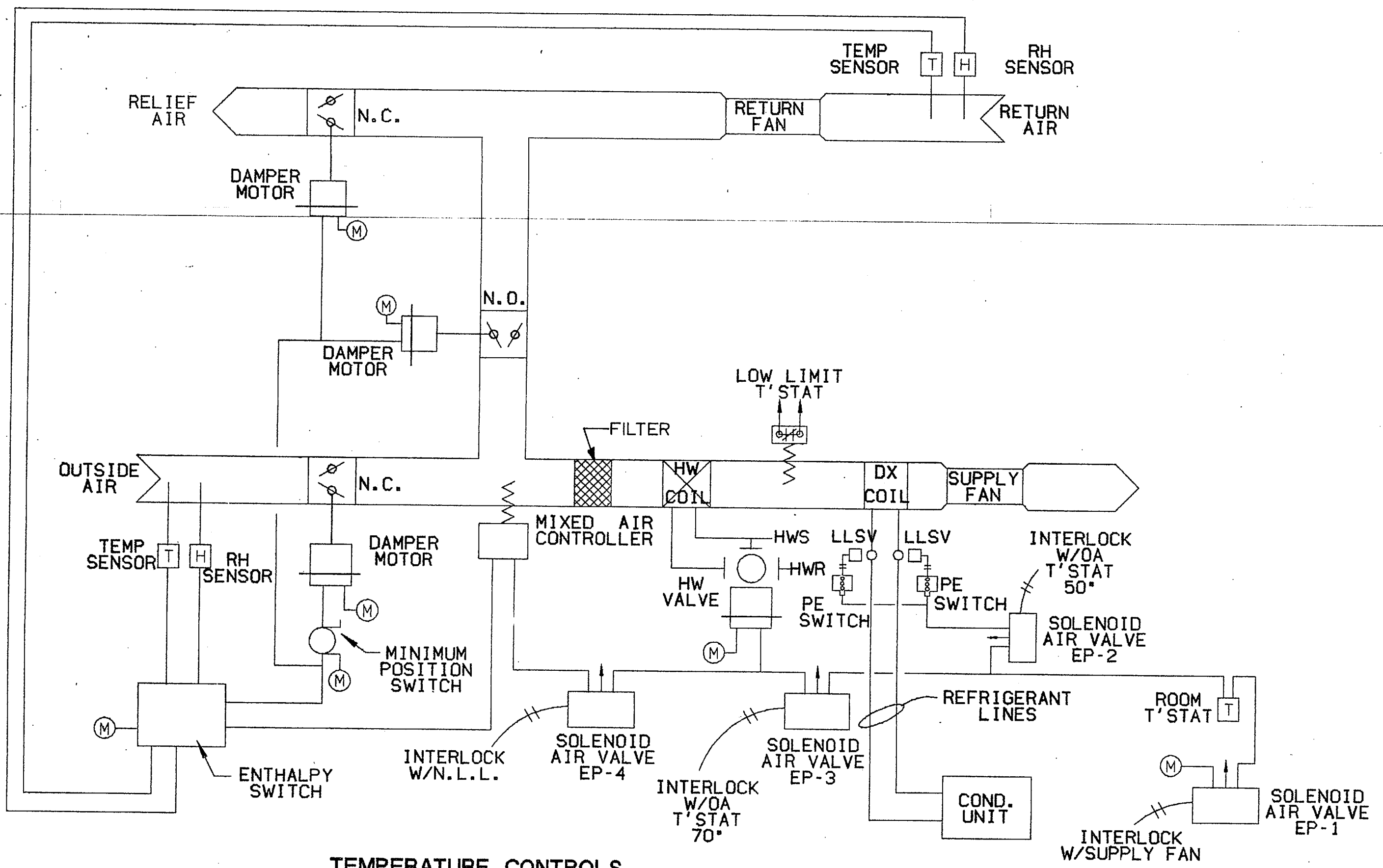


HB 104

| REVISIONS |             |           |      |          |
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| SYM       | DESCRIPTION | PREP'D BY | DATE | APPROVED |
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| ABBREVIATIONS |                          |
|---------------|--------------------------|
| LLSV          | LOW LIMIT SOLENOID VALVE |
| NLL           | NIGHT LOW LIMIT          |
| DTC           | DATA TERMINAL CABINET    |
| NO            | NORMALLY OPEN            |
| NC            | NORMALLY CLOSED          |



**SEQUENCE OF OPERATION:**

**AIR HANDLING UNITS 101, 201 AND 301 CONTROL**

PROVIDE FOR EACH UNIT MANUAL AND EMCS STARTING CONTROLS FOR ITS RETURN FAN AND SUPPLY FAN.

THE RETURN AIR FAN WILL RUN WHEN THE SUPPLY FAN RUNS. THE RETURN AIR DAMPER SHALL BE IN FULL OPEN POSITION, THE OUTSIDE AIR DAMPER IN MINIMUM OPEN POSITION AND THE RELIEF AIR DAMPER SHALL BE IN FULL CLOSED POSITION BEFORE FANS CAN START.

PROVIDE MANUAL AND EMCS STARTING CONTROLLERS ARRANGED TO ENERGIZE THE AIR CONDITIONING.

PROVIDE A THREE-WAY VALVE IN THE HOT WATER RETURN PIPING FROM THE PREHEAT COIL, ARRANGED TO VARY THE VOLUME OF WATER FLOWING THROUGH THE COIL. THIS VALVE SHALL BE ARRANGED TO ALLOW FULL FLOW OF HOT WATER THROUGH THE PREHEAT COIL WHEN THE AIR HANDLING UNIT IS DI-ENERGIZED.

PROVIDE A ROOM THERMOSTAT WHICH SHALL MAINTAIN ITS SETTING BY MODULATING THE PREHEAT COIL VALVE AND THE COOLING IN SEQUENCE. ON A FALL IN ROOM TEMPERATURE, THE COOLING SHALL BE DI-ENERGIZED BEFORE THE HEATING VALVE ALLOWS HOT WATER TO ENTER THE COIL. ON A RISE IN ROOM TEMPERATURE, THE HEATING COIL VALVE SHALL BE CLOSED TO THE FLOW OF HOT WATER BEFORE THE COOLING IS ENERGIZED.

PROVIDE FOR EACH UNIT A MIXED AIR THERMOSTAT WITH ITS AVERAGING BULB IN FRONT OF THE PREHEAT COIL. THE MIXED AIR CONTROLLER SHALL MAINTAIN ITS SETTING BY MODULATING THE OUTDOOR AIR DAMPERS, RETURN AIR DAMPERS AND RELIEF AIR DAMPERS. PROVIDE MIXED AIR THERMOSTAT OVERRIDE FOR ENTHALPY CONTROL AND EMCS CONTROLS.

PROVIDE FOR EACH UNIT OUTDOOR AIR CONTROL WITH EMCS OVERRIDE WHICH SHALL CONTROL THE UNIT AS FOLLOWS:

- O. A. TEMPERATURE BELOW 50 DEGREES:  
COOLING DE-ENERGIZED.  
HEATING COIL VALVE UNDER CONTROL OF ROOM THERMOSTAT.
- O. A. DAMPERS, R. A. DAMPERS AND RELIEF DAMPERS UNDER MIXED AIR THERMOSTAT ECONOMIZER CONTROL AND EMCS CONTROL.
- O. A. TEMPERATURE ABOVE 50 DEGREES AND BELOW 70 DEGREES:  
COOLING UNDER CONTROL OF ROOM THERMOSTAT.  
HEATING COIL VALVE UNDER CONTROL OF ROOM THERMOSTAT.
- O. A. DAMPERS, R. A. DAMPERS AND RELIEF DAMPERS UNDER MIXED AIR THERMOSTAT ECONOMIZER CONTROL AND EMCS CONTROLS.
- O. A. TEMPERATURE ABOVE 70 DEGREES:  
COOLING UNDER CONTROL OF ROOM THERMOSTAT.  
HEATING COIL VALVE IN FULL BY-PASS POSITION.
- O. A. DAMPER, R. A. DAMPER, AND RELIEF DAMPERS IN MINIMUM O. A. POSITION.

**EMCS CONTROL FOR OCCUPIED AND UNOCCUPIED TIMES:**

OCCUPIED TIME; THE UNITS SHALL OPERATE AS INDICATED ABOVE.  
UNOCCUPIED TIME; THE UNIT SHALL OPERATE WITH O. A. DAMPERS AND RELIEF AIR DAMPER IN FULL CLOSED POSITION.

PROVIDE FOR EACH UNIT A FREEZESTAT WITH ITS AVERAGING BULB LOCATED ON DISCHARGE SIDE OF HEATING COIL. FREEZESTAT SHALL BE WIRED TO STOP THE SUPPLY FAN IF ITS SETTING OF 35 DEGREES IS REACHED.

PROVIDE AN OVERRIDING NIGHT THERMOSTAT AS DESCRIBED UNDER SEQUENCE OF CONTROL FOR HEATING-VENTILATING UNITS.

EMCS DIFFERENTIAL PRESSURE INDICATION:

PROVIDE DIFFERENTIAL PRESSURE INDICATORS FOR FILTERS, SUPPLY AND RETURN FANS.

**RECORD DRAWING**  
**LETTER DATED** 5 DEC 88

**HP104**  
**M9**

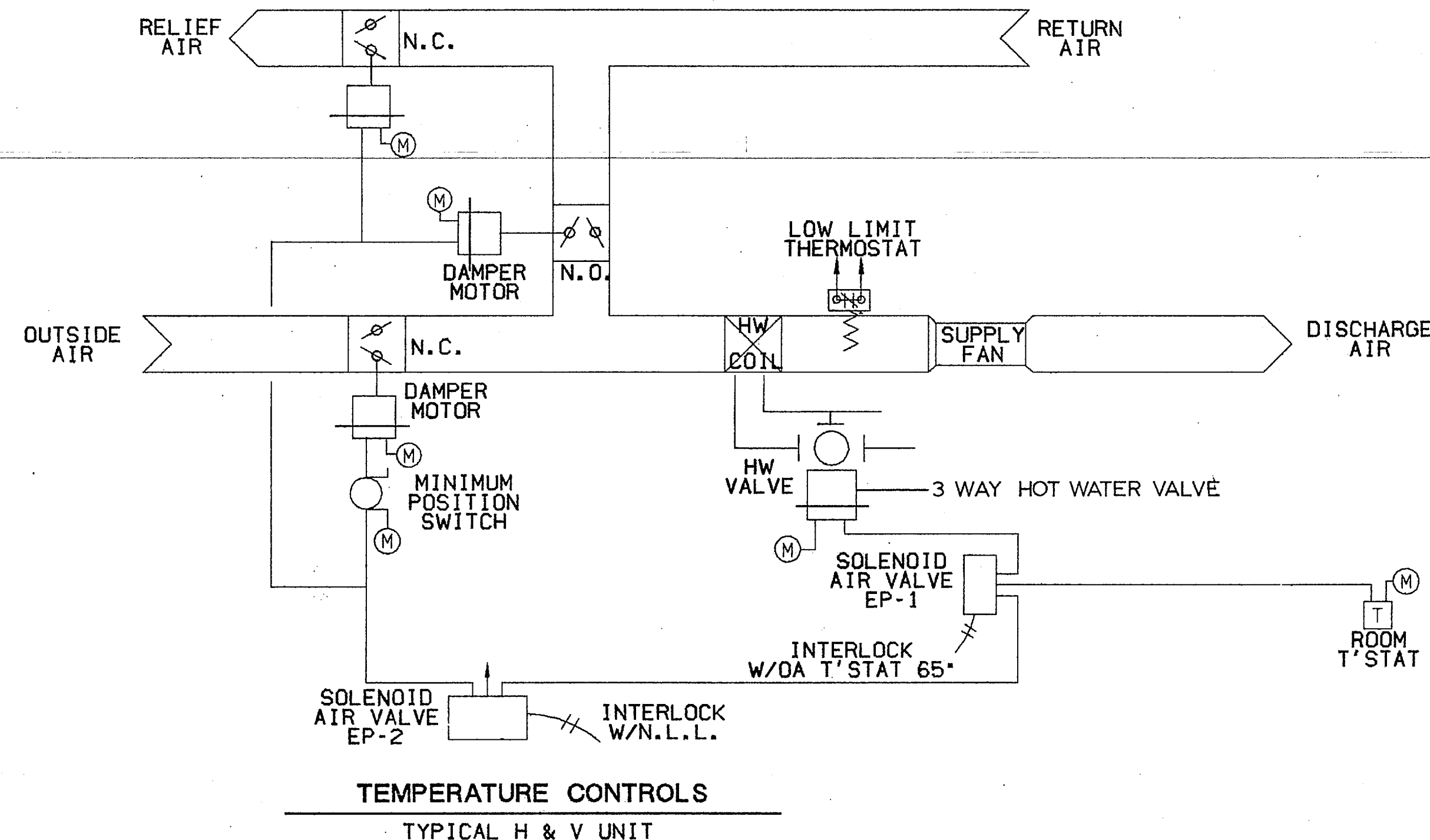
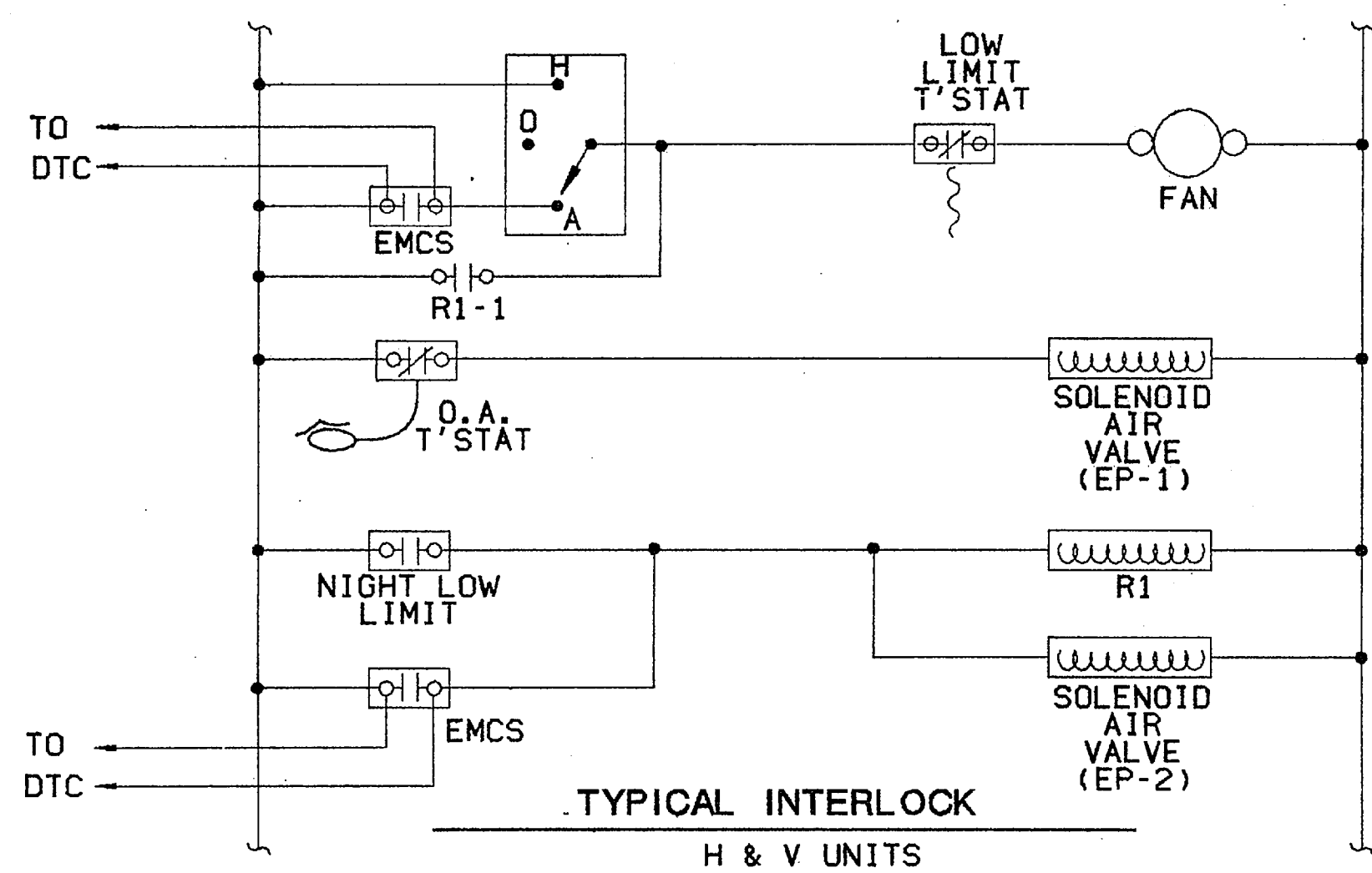
|   |  |
|---|--|
| Clerk Tribble Harris & Li ARCHITECTS<br>Charlotte, North Carolina<br>ARCHITECTS - ENGINEERS                                 | DEPT. OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND<br>CHARLOTTE, NORTH CAROLINA<br>ATLANTIC DIVISION<br>NAVAL STATION<br>NORFOLK, VIRGINIA |
| EFD DWG NO. 239856<br>JOB ORDER NO. SF4095<br>STA. PROJ. NO. P-527<br>DES. JY DRWG. JF<br>PROJ. MGR. R.D. CH. ARCH/ENGR. KJ | MARINE CORPS BASE<br>CAMP LEJEUNE, N.C.<br><b>ELECTRONICS/COMMUNICATIONS</b><br><b>MAINTENANCE SHOP (P-527)</b><br>MECHANICAL CONTROLS         |
| APPROVED: [Signature] DATE: 1/6/88<br>ACTIVITY - SATISFACTORY TO [Signature] DATE: 1/6/88                                   | NAVFAC DRAWING NO. 4138506<br>F 80091<br>CONSTR. CONTR. NO. N62470-84-B-4095<br>SCALE NOTED SPEC. 05-84-4095 SHEET 57 OF 69                    |

SATISFACTORY TO NAVELEX SYSTEM COMMAND SEASAT DIV. DIRECTOR NAVELEX REF DWG NO. 886,742 B

10194



| REVISIONS |             |           |      |          |
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| SYM       | DESCRIPTION | PREP'D BY | DATE | APPROVED |
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**SEQUENCE OF CONTROL:**

**HEATING-VENTILATION UNITS CONTROL:**

PROVIDE FOR EACH UNIT MANUAL AND EMCS STARTING CONTROLS FOR ITS SUPPLY FAN.

THE RETURN AIR DAMPER SHALL BE IN THE FULL OPEN POSITION, THE OUTSIDE AIR DAMPER IN MINIMUM OPEN POSITION AND THE RELIEF AIR DAMPER SHALL BE IN THE FULL CLOSED POSITION BEFORE THE FAN CAN START.

PROVIDE A THREE-WAY VALVE IN THE HOT WATER RETURN PIPING FROM THE HEATING COIL, ARRANGED TO VARY THE VOLUME OF WATER FLOWING THROUGH THE COIL. THIS VALVE SHALL BE ARRANGED TO ALLOW FULL FLOW OF HOT WATER THROUGH THE COIL WHEN THE UNIT IS DE-ENERGIZED.

PROVIDE A ROOM THERMOSTAT WHICH SHALL MAINTAIN ITS SETTING BY MODULATING THE HEATING COIL VALVE AND THE OUTSIDE AIR QUANTITY IN SEQUENCE. ON A FALL IN ROOM TEMPERATURE THE OUTSIDE AIR SHALL BE AT MINIMUM POSITION BEFORE THE HEATING VALVE ALLOWS HOT WATER TO ENTER THE COIL.

PROVIDE FOR EACH UNIT OUTDOOR AIR CONTROL WITH EMCS OVERRIDE WHICH SHALL CONTROL THE UNIT AS FOLLOWS:

O.A. TEMPERATURE BELOW 65 DEGREES:  
HEATING COIL VALVE UNDER CONTROL OF ROOM THERMOSTAT.  
O.A. DAMPERS, R.A. DAMPERS AND RELIEF DAMPERS AT MINIMUM OUTSIDE AIR CONDITIONS.

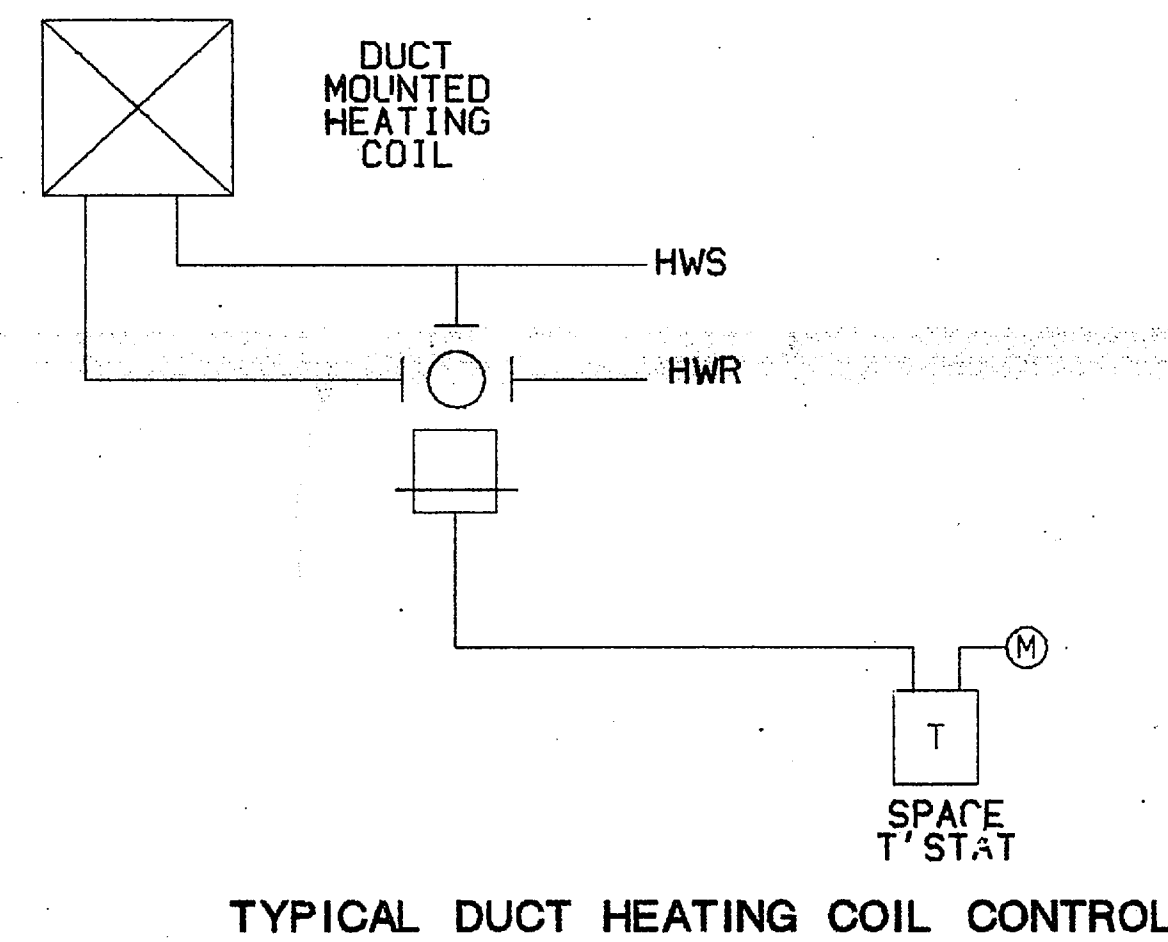
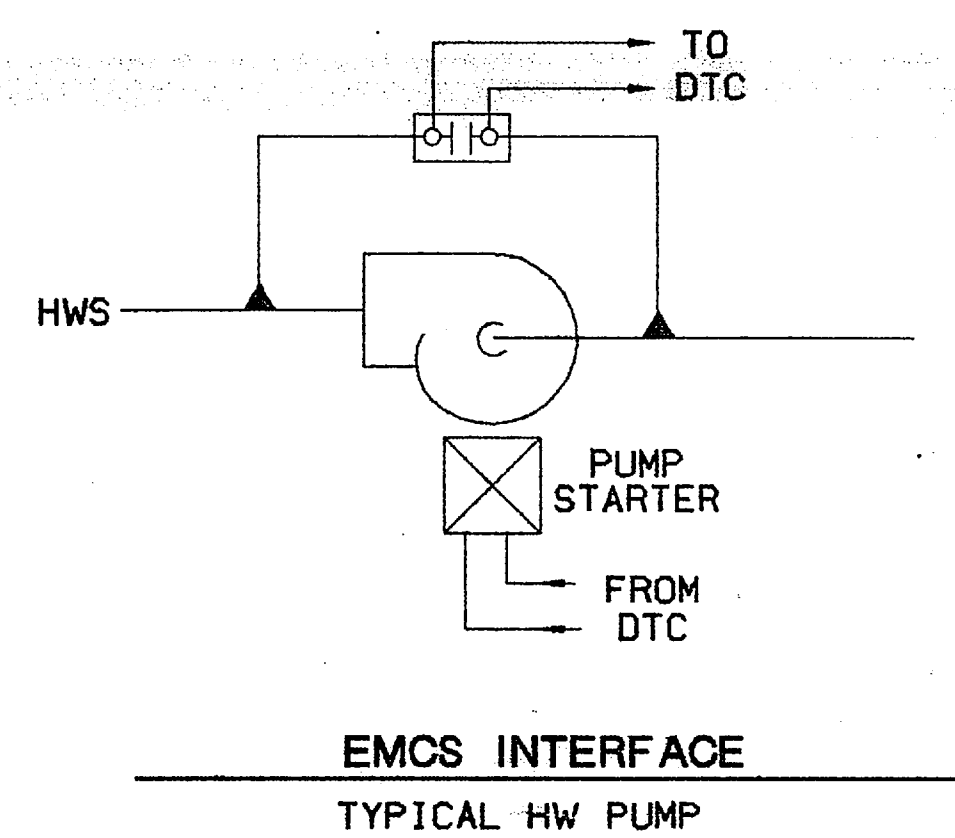
O.A. TEMPERATURE ABOVE 65 DEGREES:  
HEATING COIL VALVE IN FULL BY-PASS POSITION.  
O.A. DAMPERS, R.A. DAMPERS, AND RELIEF DAMPERS UNDER CONTROL OF ROOM THERMOSTAT.

**EMCS CONTROL FOR OCCUPIED AND UNOCCUPIED TIMES:**

OCCUPIED TIME THE UNITS SHALL OPERATE AS INDICATED ABOVE. UNOCCUPIED TIME THE UNITS SHALL OPERATE WITH O.A. DAMPERS AND RELIEF AIR DAMPERS IN FULL CLOSED POSITION.

PROVIDE FOR EACH UNIT A FREEZESTAT WITH ITS AVERAGING B LOCATED ON A DISCHARGE SIDE OF HEATING COIL. FREEZESTAT SHALL BE WIRED TO STOP THE SUPPLY FAN IF ITS SETTING OF 35 DEGREES IS REACHED.

PROVIDE AN OVERRIDING NIGHT THERMOSTAT LOCATED IN A PERIMETER SPACE SERVED BY THE UNIT WHICH SHALL ENERGIZE THE SUPPLY FAN TO MAINTAIN ITS SETTING OF 65 DEGREES.



**DUCT HEATING COILS CONTROL:**

PROVIDE A THREE-WAY VALVE IN THE HOT WATER RETURN PIPING FROM THE COIL, ARRANGED TO VARY THE VOLUME OF WATER FLOWING THROUGH THE COIL. PROVIDE A ROOM THERMOSTAT WHICH SHALL MAINTAIN ITS SETTING BY MODULATING THE COIL VALVE.

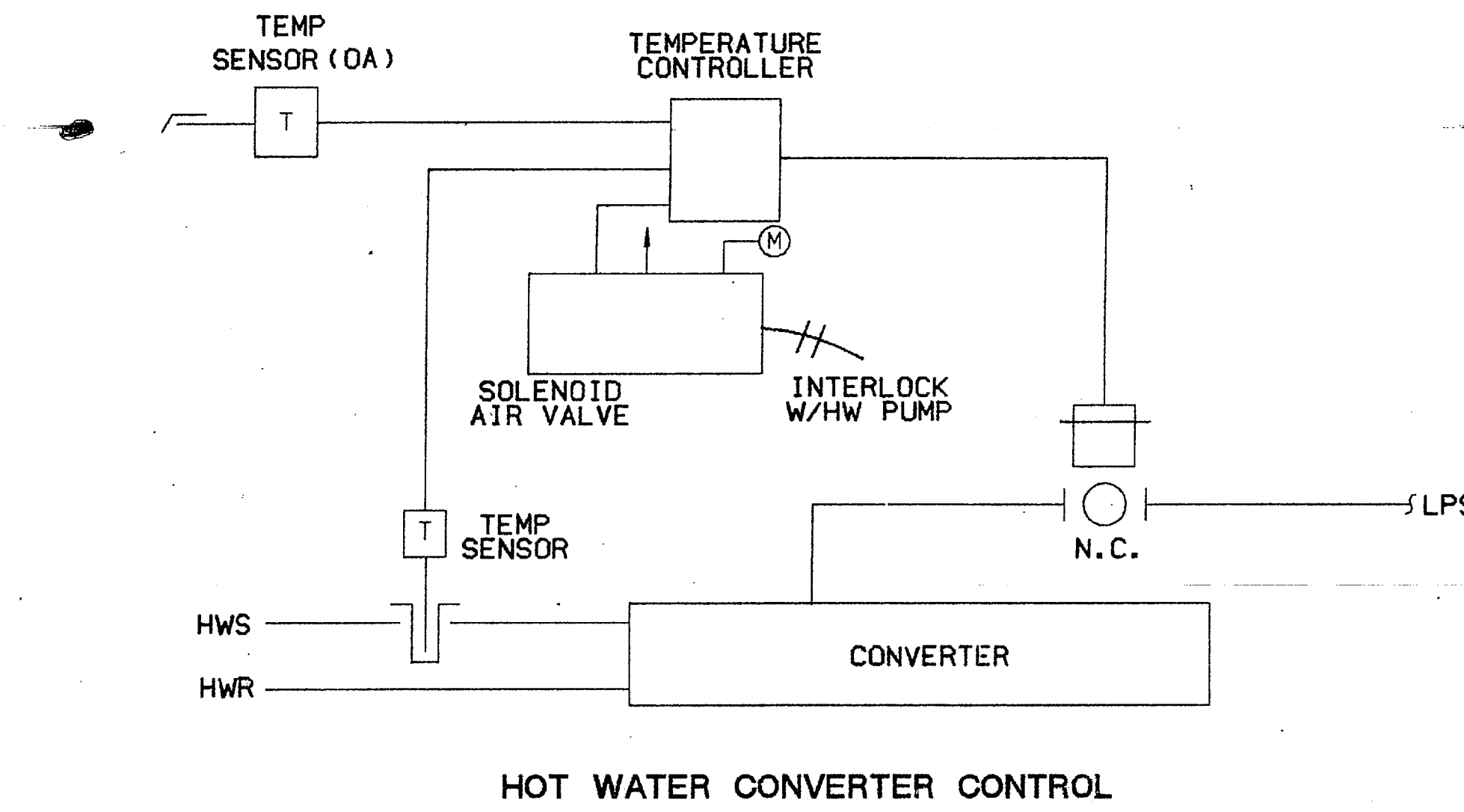
**UNIT HEATER CONTROL:**

FOR EACH UNIT HEATER PROVIDE THERMOSTAT TO START AND STOP FAN AND CONTROL SPACE TEMPERATURE. PROVIDE METAL GUARD TO PROTECT THERMOSTATS IN EQUIPMENT ROOM.

**HOT WATER CONVERTER CONTROL:**

FOR EACH CONVERTER PROVIDE THE FOLLOWING: MASTER OUTSIDE THERMOSTAT WHICH SHALL INVERSELY RESET THE CONTROL POINT OF DISCHARGE THERMOSTAT WITH CHANGES IN OUTSIDE AIR TEMPERATURE. DISCHARGE THERMOSTAT SHALL MODULATE STEAM VALVES, CLOSED ON A RISE TO MAINTAIN THE DESIRED HOT WATER SUPPLY TEMPERATURE AS RESET BY THE CHANGES IN OUTSIDE TEMPERATURE. STEAM VALVES SHALL NOT OPEN UNLESS H.W. PUMP IS OPERATING.

RESET SCHEDULE UNLESS OTHERWISE INDICATED SHALL BE SUCH THAT AT 20 DEGREE OUTSIDE TEMPERATURE, WATER TEMPERATURE SHALL BE 180 DEGREES AND AT 80 DEGREE OUTSIDE TEMPERATURE, WATER TEMPERATURE TO BE 100 DEGREES.



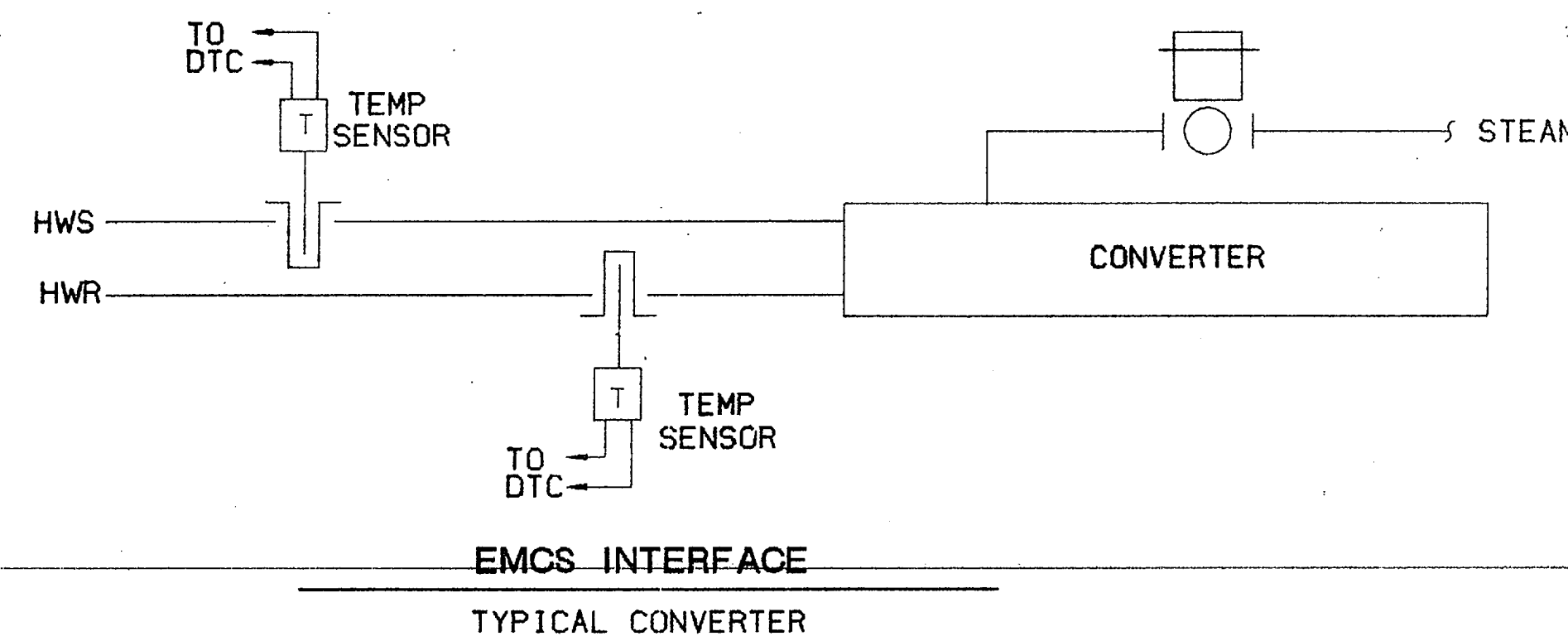
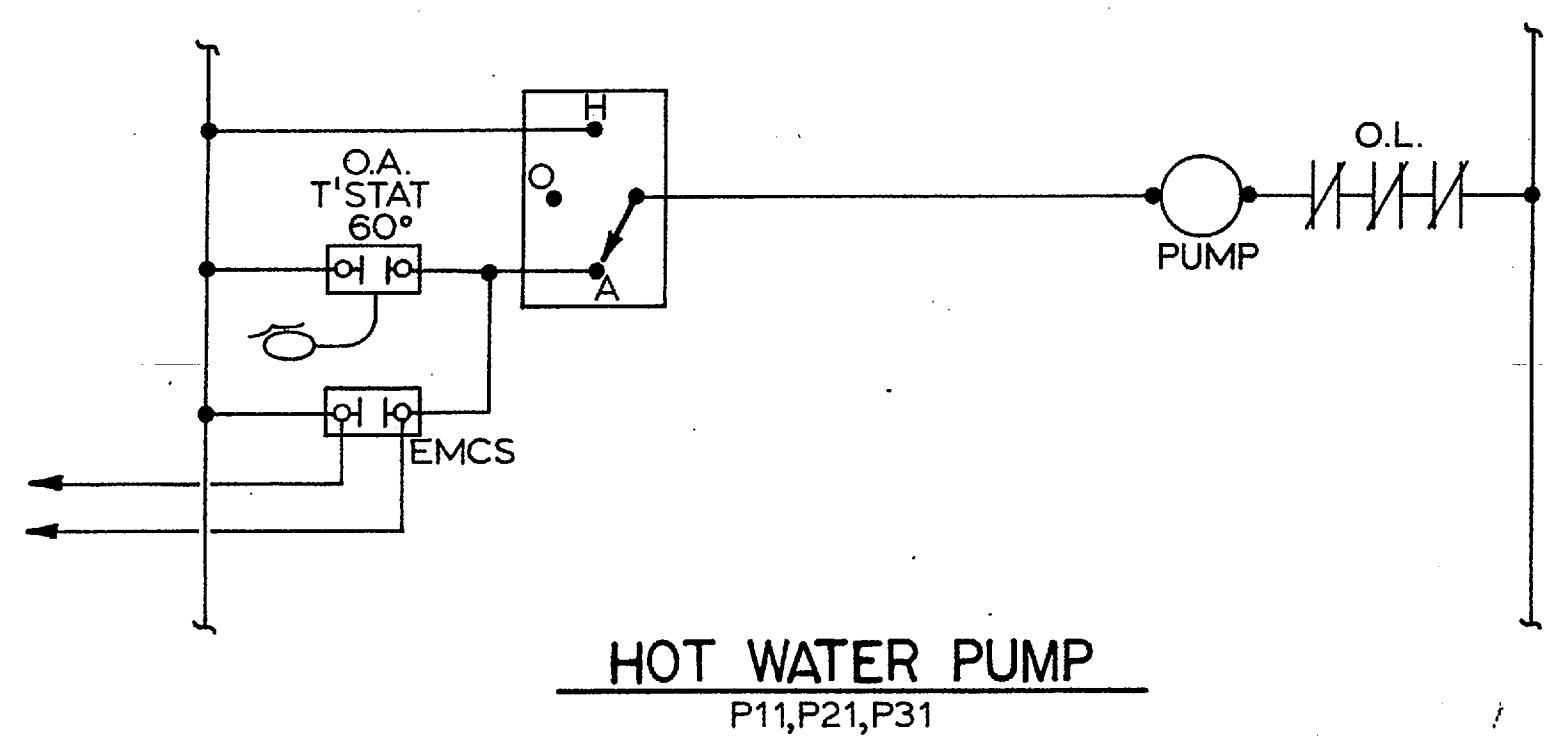
FOR EACH CONVERTER PROVIDE EMCS READING THERMOMETER ON TEMPERATURE CONTROL PANEL TO READ THE DISCHARGE AND RETURN WATER TEMPERATURE FROM CONVERTER.

**FANS AND DAMPER MOTOR CONTROL:**

PROVIDE THERMOSTAT TO START FANS IN EQUIPMENT ROOMS AND OTHER AREAS INDICATED AND OPEN DAMPERS TO MAINTAIN VENTILATION WHEN TEMPERATURE RISES ABOVE THE THERMOSTAT SETTING. THERMOSTAT SHALL ON A RISE IN SPACE TEMPERATURE OPEN DAMPERS AND START FANS. PROVIDE METAL GUARD TO PROTECT THERMOSTAT IN EQUIPMENT ROOMS.

**HEATING PUMP CONTROL:**

PROVIDE AN O.A. THERMOSTAT AND EMCS CONTROL WHICH SHALL ENERGIZE THE PUMPS WHEN THE TEMPERATURE FALLS BELOW 60 DEGREES AND DE-ENERGIZE THE PUMPS WHEN THE TEMPERATURE RISES ABOVE 70 DEGREES. PROVIDE EMCS DIFFERENTIAL PRESSURE INDICATORS FOR EACH PUMP.



**RECORD DRAWING LETTER DATED 5 DEC 88**

**HP 104 M10**

|   |  |
|---|--|
| Clark Tribble Harris & Li ARCHITECTS<br>Charlotte, North Carolina<br>ARCHITECTS - ENGINEERS | DEPT. OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND<br>NAVAL STATION ATLANTIC DIVISION<br>NORFOLK, VIRGINIA |
| EFD DWG NO. 238507  | MARINE CORPS BASE CAMP LEJEUNE, N.C.   |
| JOB ORDER NO. 5F4095  | PROJECT NO. P-527  |
| STA. PROJ. NO. P-527  | DES. OF. DATE 1/8/88   |
| DES. OF. DATE 1/8/88  | DES. OF. DATE 1/8/88   |
| APPROVED BY DATE 1/8/88   | APPROVED BY DATE 1/8/88  |
| DIRECTOR NAVELEX REF DWG NO. 986,742 B  | ACTIVITY - SATISFACTORY TO DATE 1/8/88   |
|   | MECHANICAL CONTROL   |
|   | SIZE CODE IDENT NO. 80091  |
|   | NAVAFAC DRAWING NO. 4138507  |
|   | CONSTR. CONTR. NO. NS2470-84-B-4095  |
|   | SHEET 58 OF 69   |

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