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REPORT

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SOLAR ENERGY FACILITY AT NORTH HAMPTON RECREATION
CENTER, DALLAS, TEXAS - FINAL REPORT

Prepared by

Travis-Braun and Associates, Inc.
4140 Office Parkway
Dallas, Texas 75204

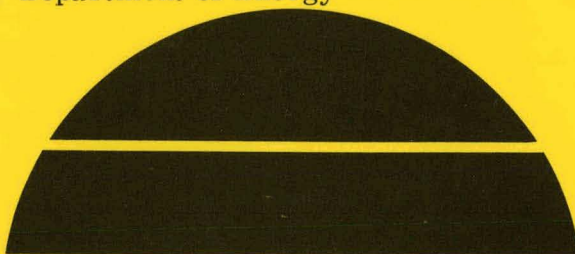
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For the U. S. Department of Energy

MASTER



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Solar Energy

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16. ABSTRACT This Document is the Final Technical Progress Report of the Solar Energy Facility located at the North Hampton Park Recreation and Health Center, 3710 North Hampton, Dallas, Texas. This Document was prepared for the City of Dallas, Building Services Department, Architectural Planning and Design Division, 1500 Marilla, Dallas, Texas 75201. The solar energy system is installed in a single story (two heights), 16,000 sq. ft. building enclosing a gymnasium, locker area, and health care clinic surrounded by a recreational area and athletic field. The solar energy system is designed to provide 80 percent of the annual space heating, 48 percent of the annual space cooling, and 90 percent of the domestic hot water requirements. The solar energy system includes a 238 single glazed flat plate, 3,650 sq. ft. area collector subsystem, a 6,000 gallon hot water storage subsystem, a domestic hot water preheat subsystem, an absorption chiller subsystem with a 2,000 gallon tank chilled water storage subsystem. The auxiliary back up system is a gas-fired boiler and a conventional 100 gallon natural gas water heater provides any additional energy to satisfy hot water load requirements. This report also provides a summary of project information, project chronology, project costs, the five modes of system operation, description of the Site Data Acquisition System (SDAS), system performance summary, experience recommendations, system operational verification, drawings and major component manufacturers information.					
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I. Introduction

In September 1976, the City of Dallas entered into an agreement with the Energy Research and Development Administration (now the U.S. Department of Energy) for a Solar Heating and Cooling Demonstration to be performed on the North Hampton Park Recreation and Health Center. The building is a single story (two heights) enclosing a gymnasium, locker area, and health care clinic surrounded by a recreational area and athletic field. The exterior of the building is brick veneer over masonry block. Total building area is 16,000 square feet, of which 8,000 square feet is for the gymnasium, which is conventionally heated and is not a part of their demonstration. The remaining portion of the building is occupied by the clinic and recreational area. The building is presently owned by the City of Dallas Parks and Recreation Department and operated by the City of Dallas Building Services Department.

The solar energy system is designed to provide 80 percent of the annual space heating, 48 percent of the annual space cooling, and 90 percent of domestic hot water requirements. The solar energy system includes a solar loop system, a hot water storage system, a domestic hot water system, an absorption chiller system, and a chilled water storage system. The solar heat transfer medium is an aqueous solution of 35 percent ethylene glycol.

The solar loop system consists of 238 single glazed flat-plate collectors, by Lennox, Inc., with a gross area of 3,650 square feet. The collectors are roof mounted in 29 arrays facing south. All of the collectors are tilted at a fixed angle of 25 degrees from horizontal. This loop also includes a heat exchanger for transfer of thermal

energy to the hot water storage system, and an over temperature heat rejection fan coil unit.

The hot water storage system includes a 6,000 gallon storage tank, heat exchanger, and a gas-fired boiler for supplemental energy. The storage tank is inside of the mechanical room, and insulated with four inches of urethane. This hot water is the media used for building space heat through the air handling system.

Space cooling is supplied by using solar energy to operate an ARKLA absorption chiller. Chilled water is stored in a 2,000 gallon tank located in the mechanical room and insulated with four inches of urethane. Auxiliary space cooling is provided by two vapor compression units.

Domestic supply water is preheated by heat exchangers on the hot side of the absorption chiller condenser loop and the hot water storage tank loop. A conventional 100 gallon natural gas water heater provides any additional energy to satisfy load requirements.

The system as described is shown schematically in Figure 1, and has five modes of solar operation: (1) Collector to Storage, (2) Space Heating, (3) Space Cooling, (4) Excess Heat Rejection, and (5) Domestic Hot Water Heating.

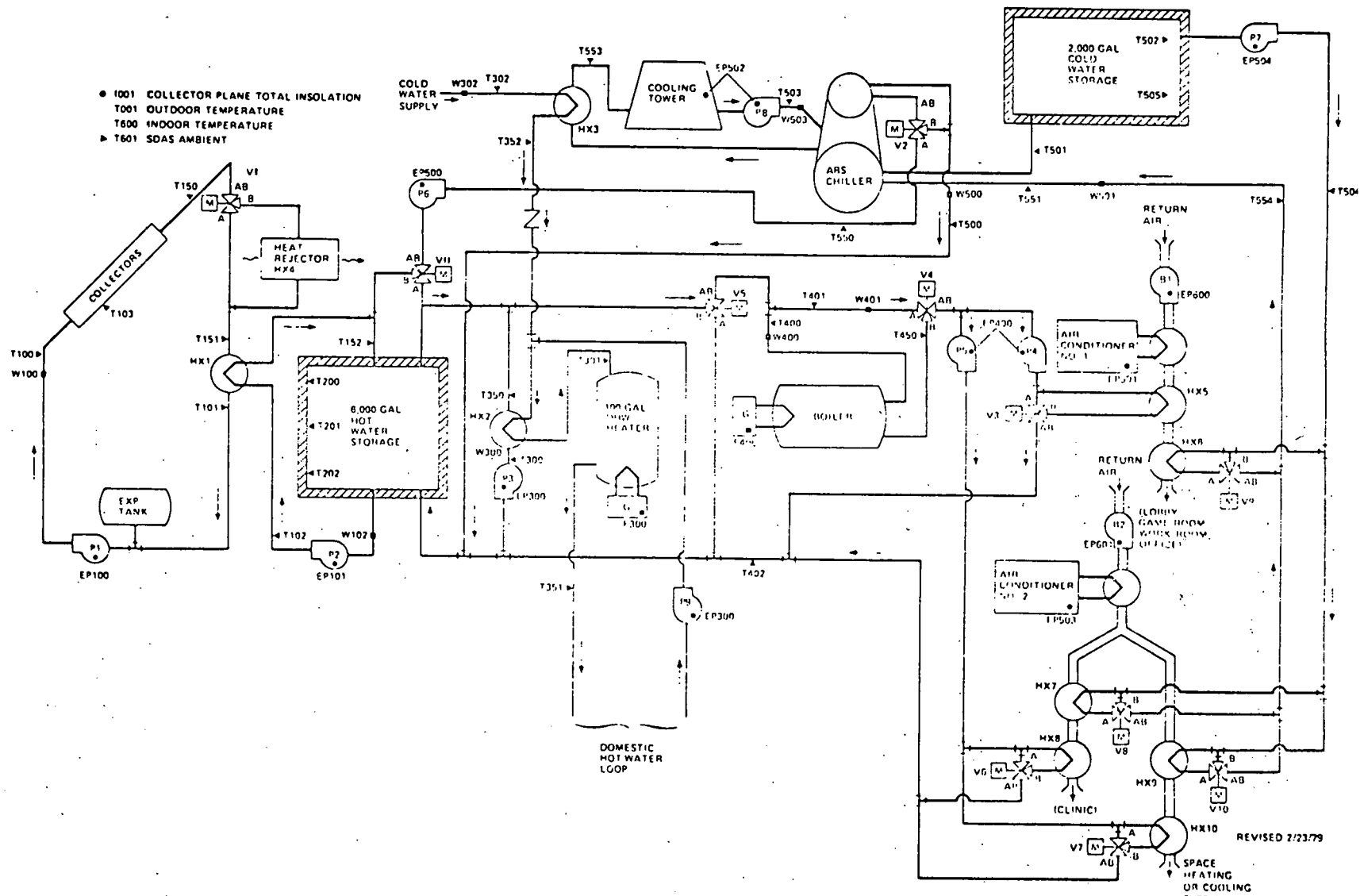


Figure 1. DALLAS RECREATION CENTER SOLAR ENERGY SYSTEM SCHEMATIC

II. Summary of Project Information

General Information

Owner:	City of Dallas
Architect:	City of Dallas
Solar Designer:	General Electric Company
Solar Designer: (Final Design)	Travis-Braun & Associates, Inc.
Mechanical Engineer:	Travis-Braun & Associates, Inc.
Project Manager:	NASA - Thomas O. Davidson/William A. Hagen City of Dallas - Randolph Meyers
General Contractor:	Natkin & Company
Operational Date:	June, 1978
Building:	Health care clinic, locker room, gymnasium - 8,000 square feet conditioned.
Location:	North Hampton Park Recreation and Health Center 3710 North Hampton Dallas, Texas

Climatic Data

Latitude:	32°N
Ambient Temperature:	January - 46°F August - 85°F
Heating Degree Days:	Yearly - 2382 January - 626
Annual Cooling Hours:	1529
Peak Daily Insolation:	2400 BTU/FT ² /Day
Annual Sunshine:	68%

Solar Energy System

Application:

Heating - 80%
Cooling - 48%
Hot Water - 90%

Collector:

Type - Flat Plate, single glazed
Fluid Medium - 35% Etylene Glycol
Manufacturer - Honeywell, Inc.
Gross Area - 3,650 Square Feet
Orientation - 25° from horizon

Hot Water Storage:

Type - Steel Tank
Capacity - 6,000 gallons
Insulation - 4" urethane
Auxiliary - Gas-fired boiler

Space Cooling System:

Type - 25 ton ARKLA absorption chiller
Storage - 2,000 gallon chilled water
Auxiliary - 2 vapor compression units

III. Project Chronology

- November 24, 1975 - General Electric notifies City of Dallas that North Hampton Recreation Center has been selected as one of eight G.E. designed solar demonstration sites.
- December 1, 1975 - Mr. Bob Turbyfill of General Electric is placed in charge of design. General Electric will review and approve all final designs. City will act as Project Architect with outside Structural, Mechanical, and Engineering consultants.
- March 1, 1976 - City of Dallas is notified that solar cooling will be included in project.
- April 13, 1976 - Meeting with General Electric, City of Dallas, and E.R.D.A. representatives to discuss possible General Electric conflict of interest. It is decided that General Electric should not be allowed to provide collectors during phase II implementation. Design should be made without a specific collector being selected.
- June 14, 1976 - City of Dallas enters agreement with Travis-Braun and Associates, Inc. for assistance in preparing technical unsolicited request for cost sharing to E.R.D.A.
- July 14, 1976 - Copies of General Electric's final design report are received by City of Dallas.
- September 30, 1976 - City of Dallas enters into a cost sharing contract with E.R.D.A. for solar implementation at North Hampton Center. City of Dallas also extends agreement with Travis-Braun to prepare final design; assist in technical report preparation, collector selection, and phase II implementation.
- February 1977 - Solar collector manufacturer is selected using an unbiased point rating system. Honeywell, Inc., flat plate collectors are selected.
- March 1977 - Redesign based on additional collector area is completed, finalized, and accepted by E.R.D.A. Project Manager. Honeywell, Inc., is accepted as successful bidder for collectors by City of Dallas. The construction documents package is submitted to City Manager's office to be included on City Council's agenda for approval and advertisement of bids.

- April 1977 - City Council gives approval to advertise for bids on April 18, 1977. The project was advertised for bid on April 21, 1977.

- May 1977 - A Pre-bid Conference was held on May 6, 1977. Bids were opened May 12, 1977 with Natkin and Company being the successful bidder. A Critical Design Review was held May 23, 1977, consisting of a technical presentation of the system design and a revised cost estimate. Representatives of E.R.D.A. and PRC Systems Sciences Company were present.

- June 1977 - Critical Design Response, by PRC Systems Sciences Company, is received June 10, 1977. Final design presentation and cost estimate is given to E.R.D.A. on June 24, 1977.

- July 14, 1977 - Authorization received from E.R.D.A. for implementation of demonstration.

- August 29, 1977 - Construction begins on the solar system and mechanical room addition.

- November 1977 - Plumbing and electrical are 75% complete.

- January -February 1978 - Construction is halted due to extreme weather conditions.

- March 1978 - Storage tanks order is cancelled due to delivery delays. A secondary vendor is chosen and tanks are delivered and in place by end of March. Collector array is put in place and covered for protection during the remainder of construction.

- April 1978 - Masonry work on mechanical room is complete. Collector loop piping is finished and pressure tested. Exterior piping is flashed, insulated, and jacketed; interior piping and storage tanks are finished and insulated. Construction is 85% complete.

- May 1978 - Project is approximately 90% complete. The solar system is operational with storage tank temperatures of 194 degrees F. to 198 degrees F. The ARKLA chiller has successfully cooled the building with solar energy.

- July 1978 - Project is basically complete. Some temperature sensors are relocated at the request of DOE project management and IBM representatives.

September 4, 1978 - Site data acquisition begins.

November 13, 1978 - The dedication ceremony was held with guest speaker Mr. Thomas Davidson of NASA giving a short presentation to City officials and local news media.

IV. Project Costs

<u>Item</u>	<u>Estimated (\$)</u>	<u>Actual (\$)</u>
Collector Array	54,621	62,530
Support Structure	18,700	20,800
Piping	42,456	66,395
Duckwork	4,512	11,220
Insulation	19,665	17,550
Heating/Cooling Equipment	22,068	21,625
Storage	18,000	26,850
Controls	45,825	48,000
Electrical Power	-0-	5,985
General Construction	44,000	42,580
Labor	53,543	*
OH & P and G & A Expenses	115,266	61,145
	<u>438,656</u>	<u>384,680</u>
Less City of Dallas 10% Share	- 43,865	
TOTAL Project Cost	<u>\$394,791</u>	\$384,680

* Labor is included in individual item category.

V. Modes of Operation

The system, shown schematically in Figure 1, has five modes of solar operation.

Mode 1 - Collector-to-Storage: This mode is entered when either of two collector absorber plate thermal switches close and activate pump P-1 at 180°F for cooling and 120°F for heating, respectively. The set points are automatically selected by manual demand switches on the control panel. When the solution temperature leaving the collector system exceeds the hot water storage temperature by 20°F, pump P-2 is energized. This pump continues to operate until the collector-storage temperature difference is less than 3°F.

Mode 2 - Space Heating: This mode is entered when the HEAT AUTO switch on the console switch panel is in the ON position. Pumps P-4 and P-5 are energized when valves V-3, V-6, and V-7 on their respective hot water coils begin to open to the coil. At the same time, the control cycle for valves V-4 and V-5 will be enabled. The signal from an electronic sensor downstream of valve V-4, reset by an outdoor electronic sensor, causes valve V-5 to be positioned to maintain heating water at a selected temperature. The selected temperature is reset inversely to changes in outdoor temperature.

If the solar heated water temperature becomes too low to supply the heating demand, valve V-5 reaches the full open position to storage, a time delay circuit is initiated, valve V-5 closes to the storage tank, and valve V-4 opens so that hot water from the gas-fired boiler may be used to satisfy the heating loads. The control cycle for

valves V-4 and V-5 has a time delay which is adjustable up to a maximum of five hours. The time delay is to prevent valve oscillations. If, during this cycle, heating requirements are satisfied and valve V-4 reaches the fully closed position to the boiler, another time delay cycle is initiated which will cancel the previous time delay cycle and restore space heating to valve V-5 and the solar energy source.

Mode 3 - Space Cooling: When the COOL AUTO switch on the console switch panel is in the ON position, pump P-7 starts if any chilled water valve (V-8, V-9, or V-10) is open to the cooling coil. Pump P-6 is interlocked to start when pump P-7 is started and the absorption chiller control circuit is enabled. Pump P-8 and the cooling tower fan are controlled by the absorption chiller controls. Valve V-11 will attempt to maintain generator water temperature at 170°F. The chilled water inventory will be maintained by energizing the chiller when chilled water return temperature exceeds 50°F and by de-energizing the chiller at 44°F. If, during the cooling portion of the cycle, cooling demands cannot be met by the chilled water system and any chilled water valve reaches full open to the coil position, a time delay cycle is initiated which closes chilled water valves V-8, V-9, and V-10 to the coils, and enables the respective air conditioning unit to allow the chilled water storage to recover. During this cycle, pump P-7 will be locked on to provide required circulation through the chiller. The time delay cycle is adjustable for up to five hours. After the time delay period, the air conditioning unit de-energized and the solar mode re-entered.

Mode 4 - Excess Heat Rejection: The hot water storage is provided with two alarm thermostats. One initiates an alarm at the central control console when the storage temperature reaches a selected low level. The other thermostat indicates an alarm if the hot water storage temperature reaches a selected high level. At the same time a high temperature alarm exists, valve V-1 will be positioned to divert collector solution through heat rejector HX4, where excess energy is dissipated to the outside air.

Mode 5 - Domestic Hot Water: Domestic hot water (DHW) is preheated by heat exchanger HX3 when the cooling tower is active. Energy from the hot water storage is entered at heat exchanger HX2 when pump P-3 is on. Pump P-9 is on continuously.

VI. Description of the Site Data Acquisition System (SDAS)

A complete data acquisition system with 55 sensor points was installed in order to obtain information for performance and operation evaluation of the solar heating and cooling system. The equipment and sensors were furnished at government expense in accordance with "Instrumentation Installation Guidelines for the National Solar Heating and Cooling Demonstration Program". Each sensor is identified by a code number and the parameter measured. Table 1 lists the individual sensors and their measured parameters; the specific location may be found on Figure 1. In the chart below, the number sequence in the code indicates the general data group being measured:

<u>Number Sequence</u>	<u>Data Group</u>
001 to 099	climatological
100 to 199	collector
200 to 299	thermal storage
300 to 399	domestic hot water
400 to 499	space heating
500 to 599	space cooling
600 to 699	building/load

Each sensor provides input to the SDAS module every five minutes, 24 hours per day. The SDAS digitizes the input and stores it on a magnetic cassette tape. Once a day the collected data is transmitted by telephone to an IBM facility in Huntsville, Alabama for reduction. Monthly reports are prepared and distributed from the data collected.

The monitoring system is intended to provide the following information:

- * Energy saving resulting from the use of solar system.
- * Percentage of total building heating and cooling load provided by solar system.
- * Thermal performance and reliability of major components over the demonstration period.

TABLE 1
INSTRUMENTATION FOR NORTH HAMPTON RECREATION CENTER

<u>Designation</u>	<u>Name</u>
A. Temperature	
T001	Outside ambient temperature
T100	Collector inlet temperature
T150	Collector outlet temperature
T101	Heat exchanger #1 outlet (solar loop) temperature
T151	Heat exchanger #1 inlet (solar loop) temperature
T102	Heat exchanger #1 inlet (storage loop) temperature
T152	Heat exchanger #1 outlet (storage loop) temperature
T200	Hot water tank top temperature
T201	Hot water tank center temperature
T202	Hot water tank bottom temperature
T400	Hot water boiler inlet temperature
T450	Hot water boiler outlet temperature
T401	Heating water temperature (bypassing hot water boiler)
T402	Heating water (auxiliary assisted) temperature
T300	Solar hot water outlet heat exchanger #2 temperature
T350	Solar hot water inlet heat exchanger #2 temperature
T301	Existing DHW heater inlet temperature
T351	Existing water heater outlet temperature
T302	City water supply to heat exchanger #3 temperature
T352	Heat exchanger #3 outlet temperature
T500	Absorption chiller solar return temperature
T550	Absorption chiller solar inlet temperature
T501	Chilled water supply to storage temperature
T551	Space cooling chiller return temperature
T502	Cold water storage tank top temperature
T103	Collector absorber temperature
T503	Absorption chiller cooling tower inlet temperature
T553	Absorption chiller cooling tower return temperature
T600	Inside ambient temperature
T504	Chilled water to space cooling temperature
T554	Space cooling return temperature
T505	Cold water storage tank bottom temperature

TABLE 1 (continued)

<u>Designation</u>	<u>Name</u>
B. Flow	
W100	Collector flow (35% Glycol Prestone II)
W102	Heat exchanger #1 (storage side) flow
W300	Hot water to DHW heat exchanger #2 flow
W302	City water inlet to heat exchanger #3
W400	Hot water to heating flow (auxiliary assist)
W401	Hot water to heating flow (solar only)
W500	Solar hot water to absorption chiller
W501	Chill water flow
W503	Cooling tower flow
F300	Gas flow to DHW heater natural gas 270,000 BTU
F400	Gas flow to hot water heating boiler natural gas 525,000 BTU
C. Power	
EP100	Collector pump power P1
EP101	Solar heat exchanger pump power P2
EP300	Hot water circulation pumps P3 & DHW
EP400	Space heating hot water pumps P4 & P5 power
EP500**	Solar heated water to absorption chiller pump P6
EP501	AC 1 direct expansion unit & fans power
EP502	Cooling tower fan & pump P8 power
EP503	AC 2 direct expansion unit & fans power
EP504	Space cooling water pump P7 power
EP600	Air handler 1 blower
EP601	Air handler 2 blower
D. Insolation	
I001	Total insolation S/N 15829F3

** When P6 is running, add 150 watts (ARKLA solution pump)

VII. System Performance

System data acquisition began in September 1978. Initial monitoring identified changes that were needed in instrumentation location and adjustments to the solar mechanical components. System performance to date may be characterized as being very disappointing due to low overall thermal efficiencies. The following is a summary of system performances, by operational modes, for the month of August 1979:

* Collector to Storage Mode:

Insolation, total incident	213.5 MBTU
Collected energy	66.3 MBTU
Efficiency total	31.1 %
Efficiency during collector operation	37.4 %
Electrical operating energy	2.6 MBTU
Solar energy delivered to storage	63.8 MBTU
Storage losses from tank	3.4 MBTU
Storage efficiency	94.7 %

NOTE: 3.4 MBTU loss from storage includes 0.7 MBTU decrease of energy in storage for month.

* Space Heating Mode:

Data on space heating mode is not available although site personnel report system heated the building satisfactorily throughout a below temperature winter in 1978 - 1979.

* Space Cooling Mode:

Cooling load provided by solar	16.9 MBTU
Cooling load provided by auxiliary	<u>68.4</u> MBTU
Total building cooling load	85.3 MBTU
% of cooling load provided by solar	19.8
Total cooling produced by solar	25.4 MBTU
Energy extracted from hot water storage for absorption chiller	60.8 MBTU
Solar chiller COP	0.42

* Excess Heat Rejection Mode:

Heat rejected	13.2 MBTU
---------------	-----------

NOTE: The heat rejection coil operated regularly during August providing assurance that this feature operates properly.

* Domestic Hot Water Mode:

Hot water consumption	2284 gal/mo. 74 gal/day
Average temperature of water delivered	133°F
Incoming water temperature	86°F

NOTE: A malfunction of the automatic controls for the DHW subsystem has resulted in fossil fuel supplied energy being transferred to the hot water storage for the solar system, which is the reverse of design plan. At present time this is being prevented by turning off the natural gas to the boiler.

For the month summarized the Dallas Recreation Center solar energy system resulted in a negative savings of 0.03 MBTU of fossil fuel and 5.97 MBTU of electrical energy. The negative value was due to (1) the reverse flow of energy from the DHW tank to the thermal storage tank and (2) the cooling load supplied by the absorption chiller required more electricity than would have been required had a conventional air conditioner supplied the load. This level of efficiency is representative of the system's performance during May, June, July, August, September, and October of 1979.

VIII. Recommendations

Experience to date indicates that this concept has promise of acceptable performance. All of the system's individual components function, but their control and sequencing have not been properly adjusted. On site personnel do not have the expertise or capability of making the needed changes. As a result, many simple adjustments and/or modifications that could improve performance have not been made.

The suggested changes that would improve this system's performance and improve future designs are as follows:

Maintenance Personnel - Since on-site and City of Dallas, Building Services maintenance personnel do not have expertise necessary to adequately maintain the solar system, a knowledgeable outside contractor should be procured to maintain the system. NOTE: This has very recently been accomplished and improved performance should be forthcoming.

Automatic Controls (General) - All known malfunctioning controls should be repaired or adjusted as necessary. It would probably be useful to perform a thorough "System Operational Check" similar to an "Acceptance Test" to identify any hidden control problems.

Installations being made in locations with untrained on-site personnel, should have a minimum of manual override control capability. In many cases, this system's low thermal performance has been due to manual override of the solar system and use of auxiliary energy, with the underlying problem receiving no attention for long periods of time. This problem might be overcome by using lock-out type control panel switches.

Future installations of this level of complexity, should seriously consider use of micro processor control now available, in lieu of conventional electronics. For a new design this method of control can be very cost effective with today's technological advances in this area.

Space Cooling Automatic Controls - The absorption chiller control circuit should be adjusted to de-energize the chiller when chilled returned water is less than 44°F. At present the chiller is operating when the system should be using the available chilled water storage.

The chilled water tank temperature is being maintained too low and should be allowed to increase to improve overall system efficiency.

Auxilliary air conditioners are operating concurrently with the absorption chiller and the chilled water circulation pumps.

This mode of operation persists even when sufficient chilled water is available to handle building cooling load. The controls must be adjusted to prevent this from occurring.

Leaking Three-Way Valves - Leaking 3-way valves have been a source of unwanted energy transfer in many areas. As with any mechanical system, the components must be maintained and operated as intended to achieve the desired results.

Site Data Acquisition System (SDAS) - Has been very beneficial in identifying system malfunctions. It could, however, be more useful if information were more immediately available, in the area of major component failure. Recently this has improved with the remote data collection personnel notifying City of Dallas personnel of system failures, such as none functioning pumps.

It is felt that the system can achieve its design potential if the necessary adjustments are made as needed. The system has never had its control system de-bugged adequately, and as a result been unable to demonstrate the true potential of solar heating and cooling.

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A. System Operational Verification

In order to verify that the system was operational and free of any irregularities that would prevent its intended operation, system components were individually tested. Representatives from manufacturers of major system components were brought in to assist in their equipment start-up. The system was verified as operational in this manner.

Subsequent installations funded and managed by the Department of Energy require formal acceptance test plans with documented results. A formal acceptance test as described was not a part of this project, but certainly would have been useful.

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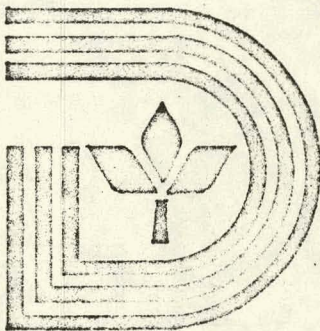
NORTH HAMPTON PARK RECREATION AND HEALTH CENTER

3700 NORTH HAMPTON ROAD DALLAS , TEXAS

APPROVED FOR
CONSTRUCTION

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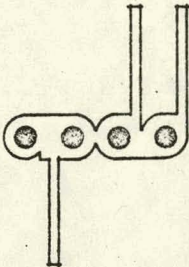


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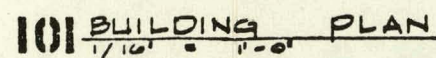
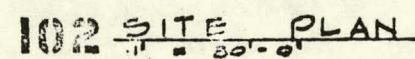
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1500 WEST MOCKINGBIRD LANE

DALLAS TEXAS 75235



ARCHITECTURAL PLANNING
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103 SECTION @ EXP. JANT
12-1-01

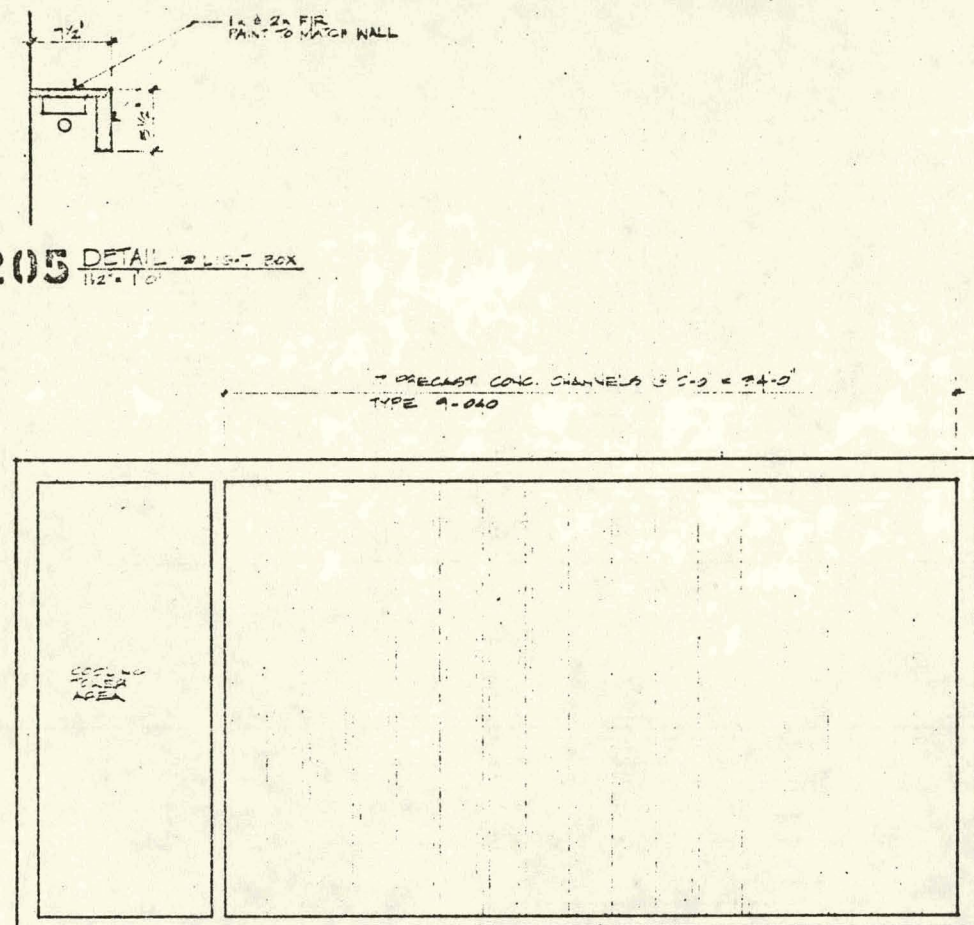
653:21022-2 2007-08-08

THIS APPLICANT IS REQUESTED TO BE KEPT IN THE REMOVAL LINE
OF THE LINE OF REMOVAL LINE UNTIL THE REMOVAL LINE
REMOVES AND REMOVAL LINE

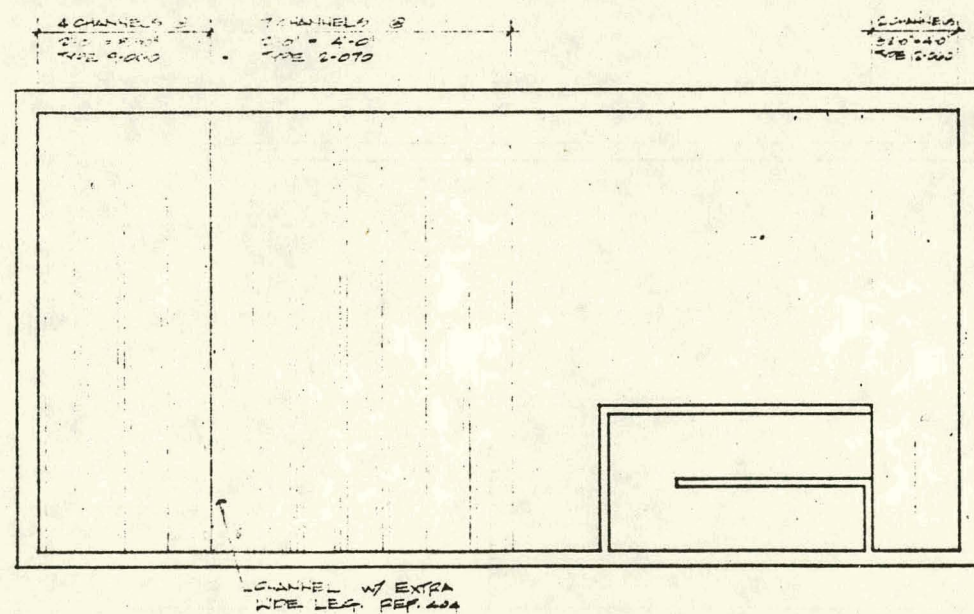
ELECTRICAL WORK PERFORMED 70 PER
 25 PER HOUR (100 PER HOUR)
 10 PER HOUR (100 PER HOUR)

[illegible]

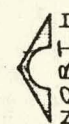
205 DETAIL - LIGHT BOX
1/2" = 1'-0"



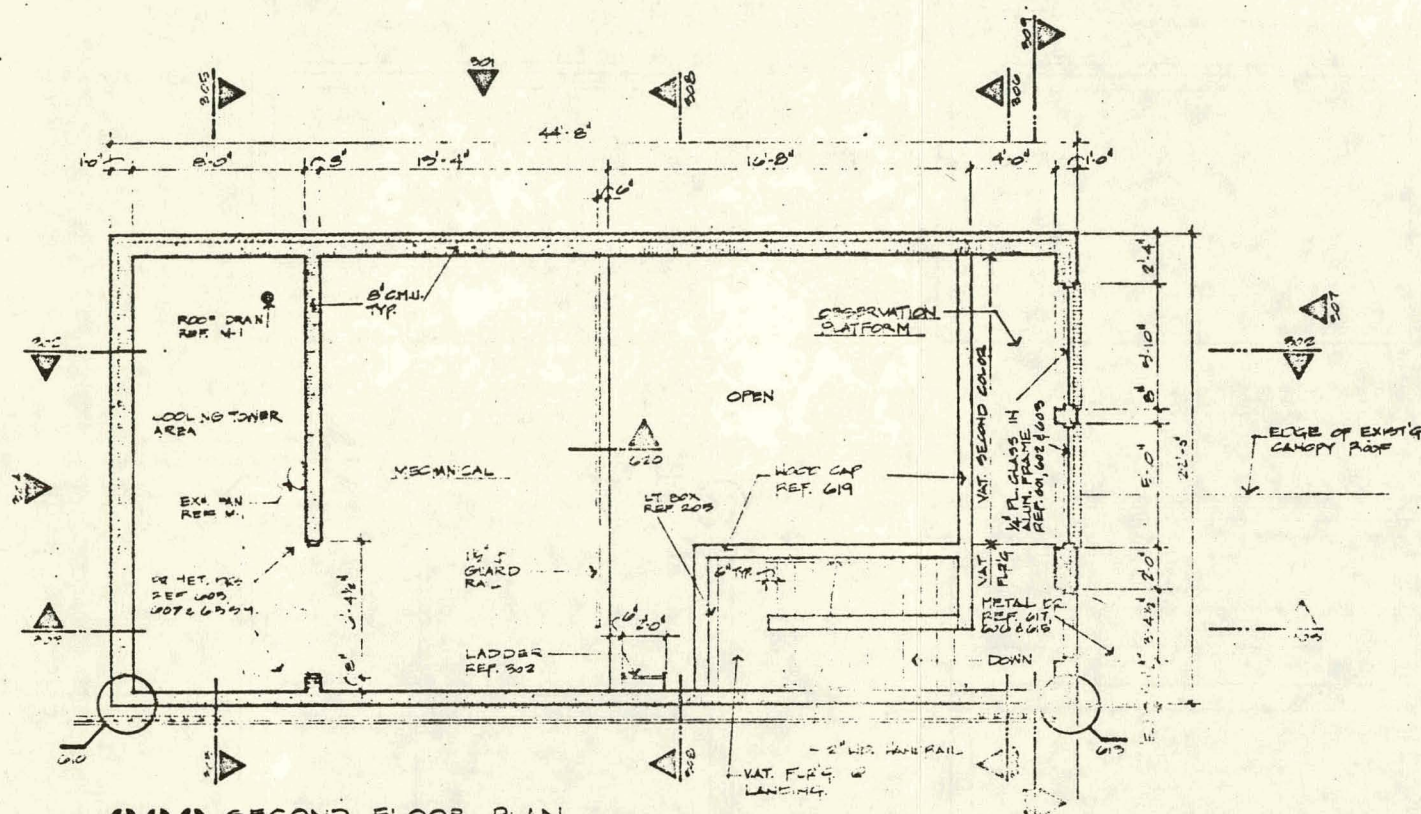
204 SECOND FLOOR REFLECTED CEILING PLAN
1/4" = 1'-0"



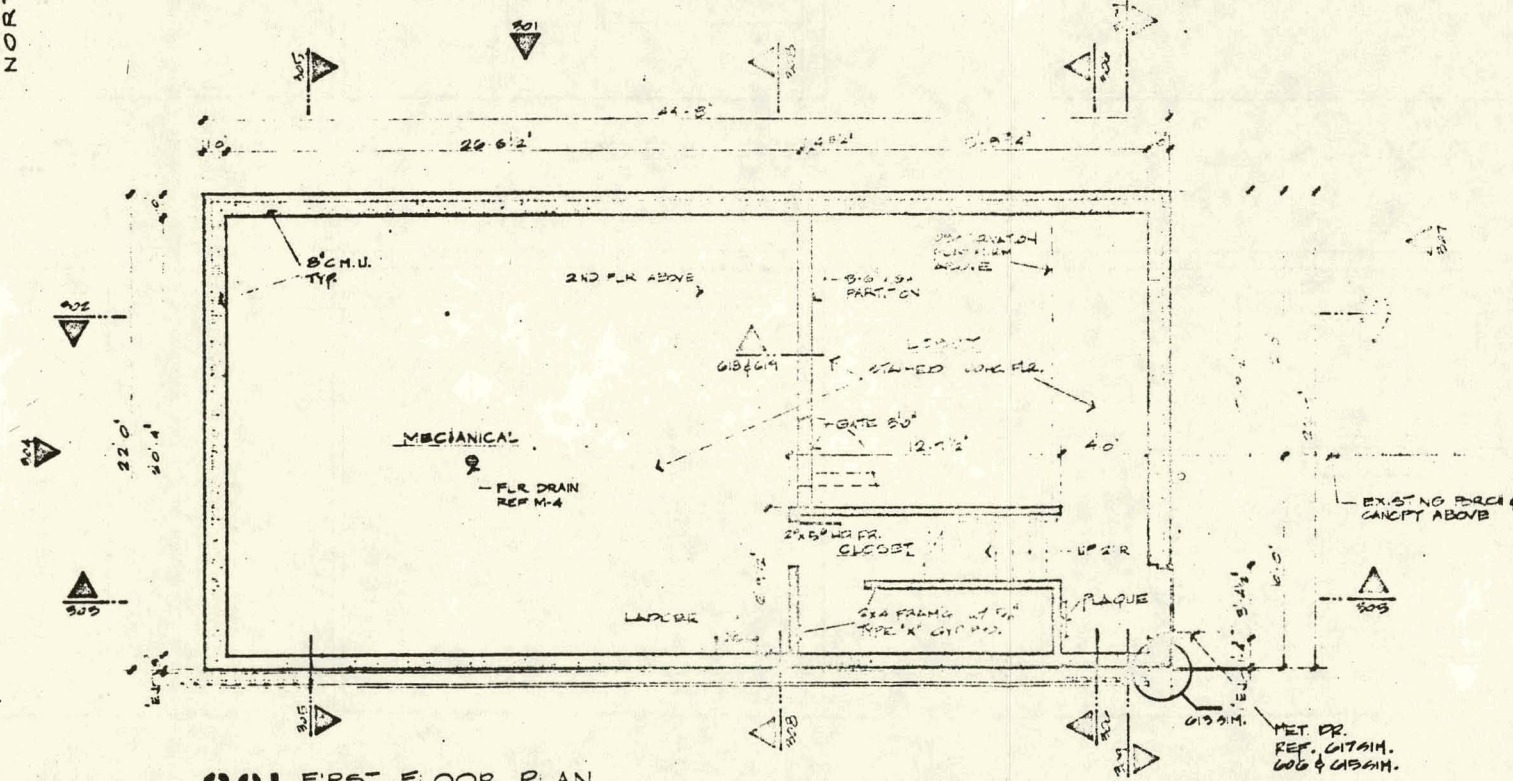
203 FIRST FLOOR REFLECTED CEILING PLAN
1/4" = 1'-0"



202 SECOND FLOOR PLAN
1/4" = 1'-0"



201 FIRST FLOOR PLAN
1/4" = 1'-0"



ARCHITECT OF RECORD
CITY OF DALLAS
BUILDING SERVICES DEPARTMENT
ARCHITECTURAL DESIGN DIVISION
1600 WEST MOCKINGBIRD LANE

NO.	DATE	ITEM
1		
2		
3		
4		

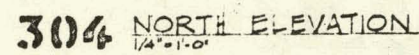
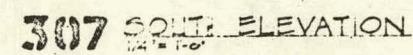
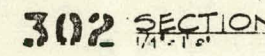
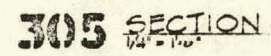
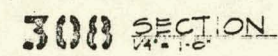
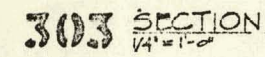
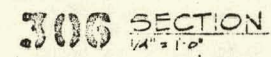
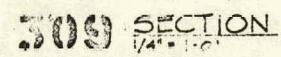
DATE: 12/1/77
PROJ. MGR. J. J. JONES
JOB CAPT. J. J. JONES
DRAWN BY: J. J. JONES

PROJECT NUMBER
77000

SHEET CONTENTS
FLOOR PLAN
REFLECTED
CEILING PLAN

SHEET NUMBER
A-2

OF 18 SHEETS






1-21-54

U.S. DEPARTMENT OF DEFENSE

OFFICE OF THE SECRETARY

ATTENTION: CHIEF OF BUREAU

1000 WEST 100TH STREET

LANE

DATE RECEIVED

RECEIVED BY

PROJECT NUMBER

DATE RECEIVED

RECEIVED BY

PROJECT NUMBER

NO.	DATE	ITEM
1		
2		
3		
4		

DATE RECEIVED

RECEIVED BY

PROJECT NUMBER

DATE RECEIVED

RECEIVED BY

PROJECT NUMBER

DATE RECEIVED

RECEIVED BY

PROJECT NUMBER

DATE RECEIVED

RECEIVED BY

PROJECT NUMBER

DATE RECEIVED

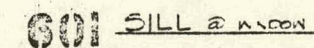
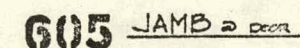
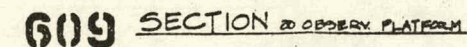
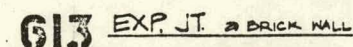
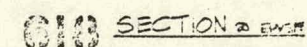
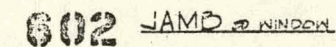
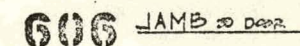
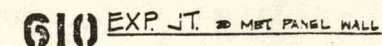
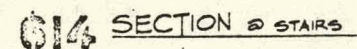
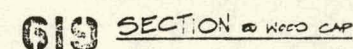
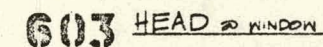
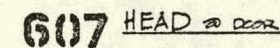
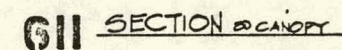
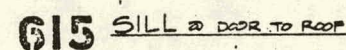
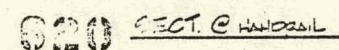
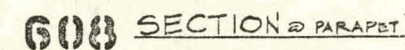
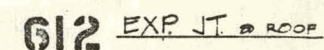
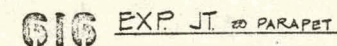
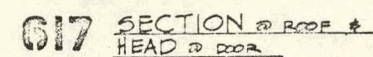
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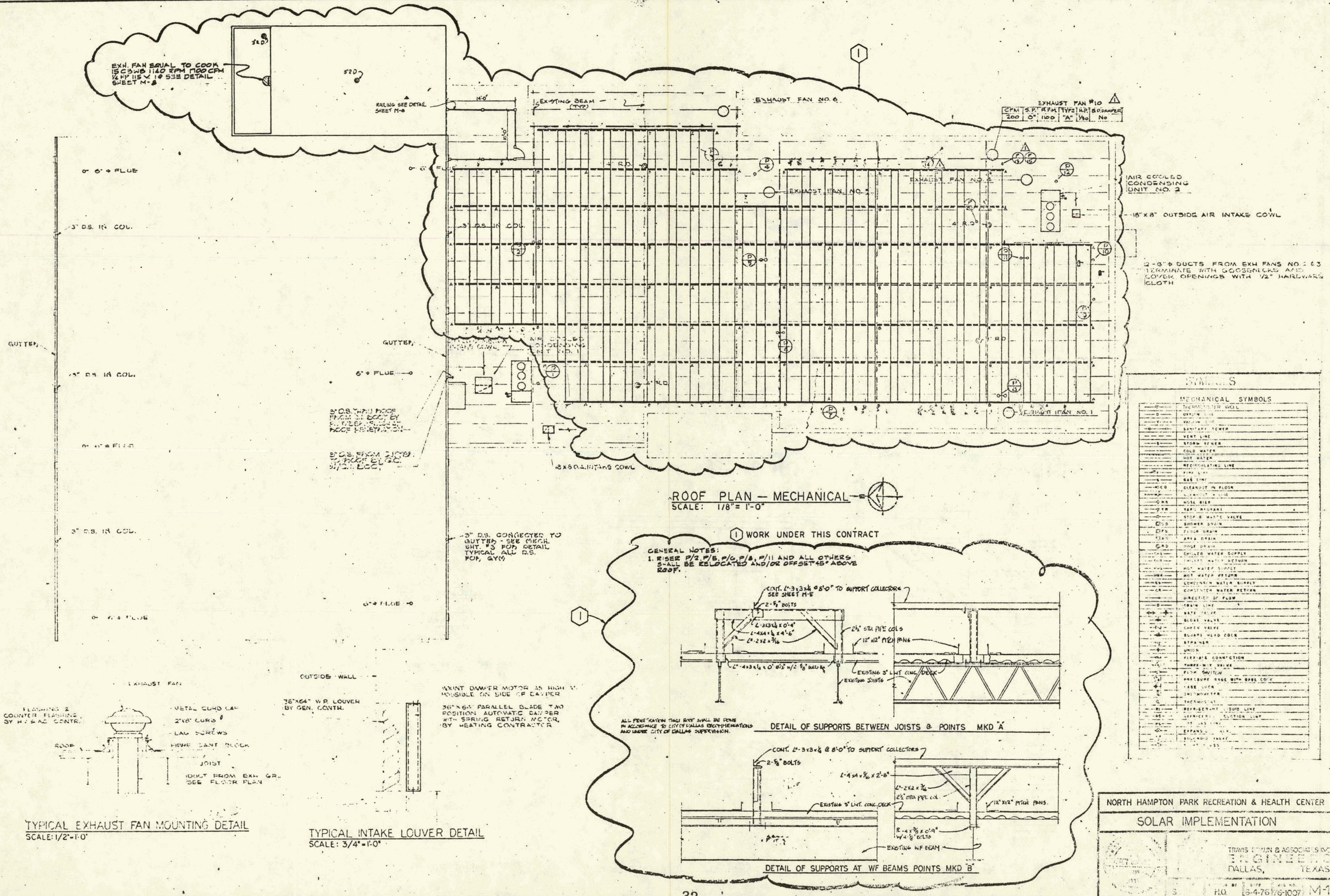
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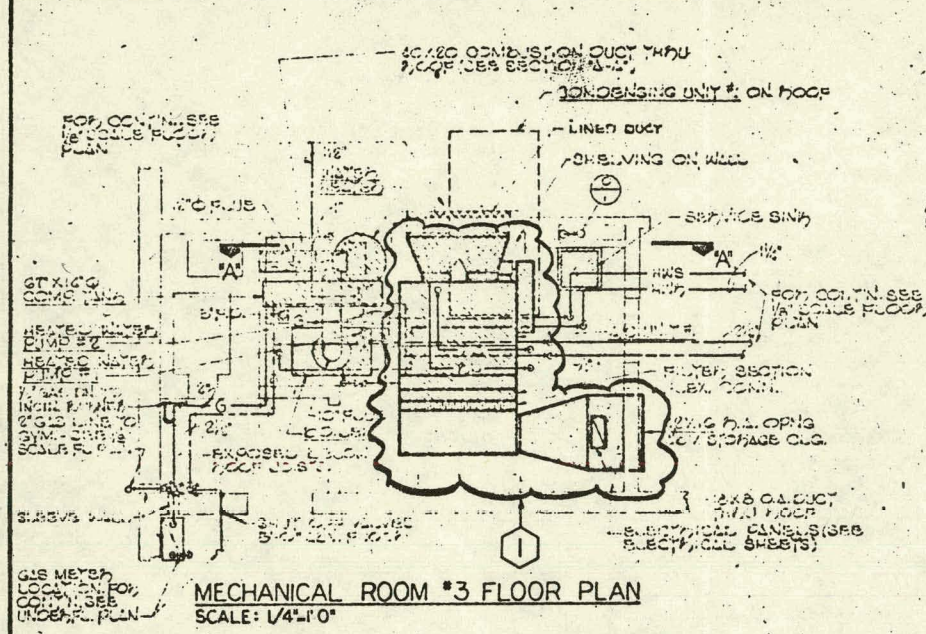
DATE RECEIVED

RECEIVED BY

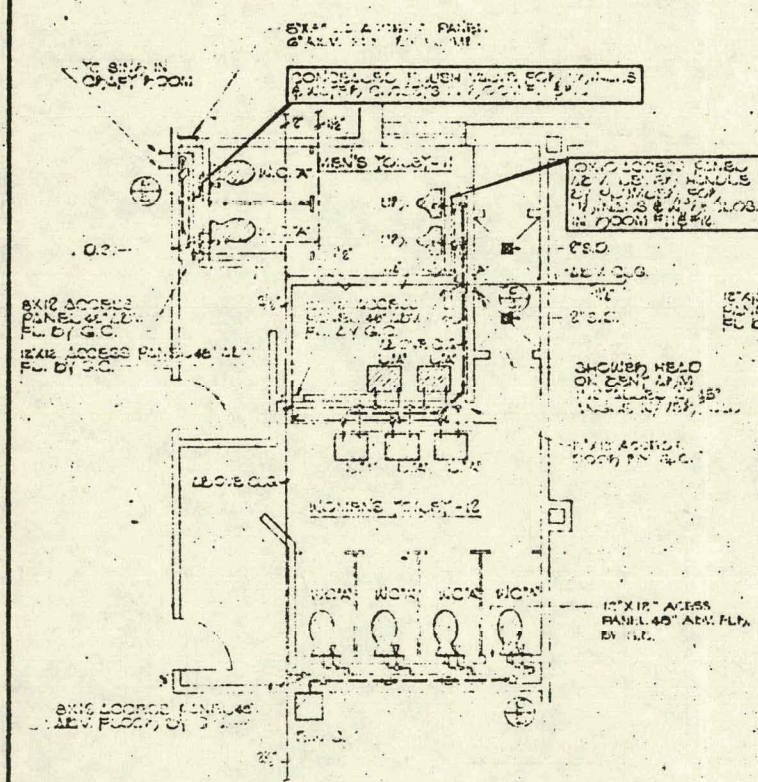
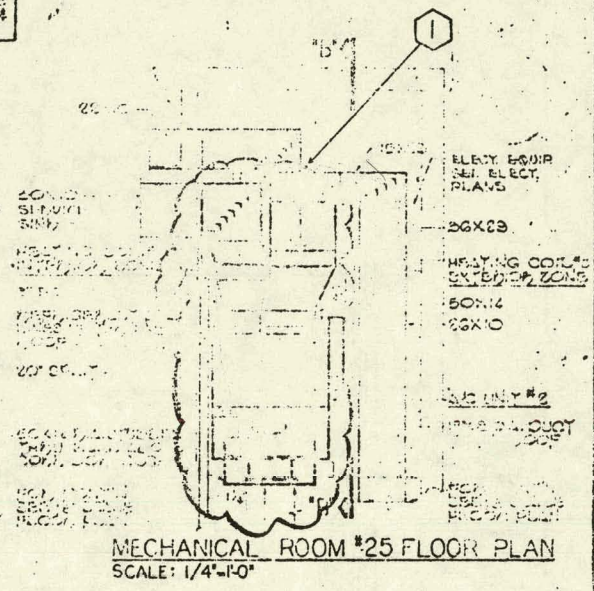
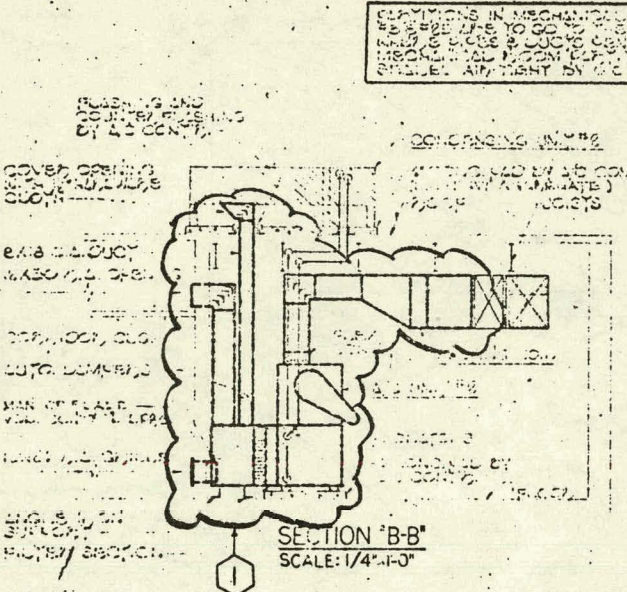
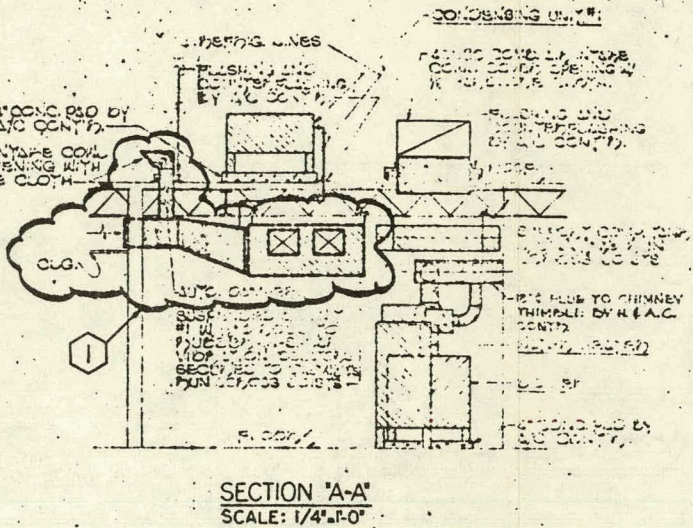
PROJECT NUMBER



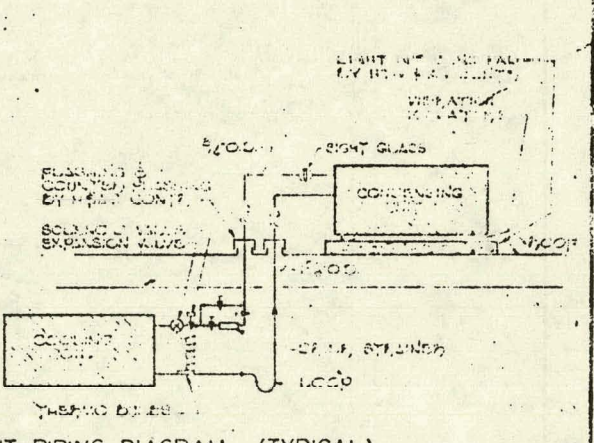
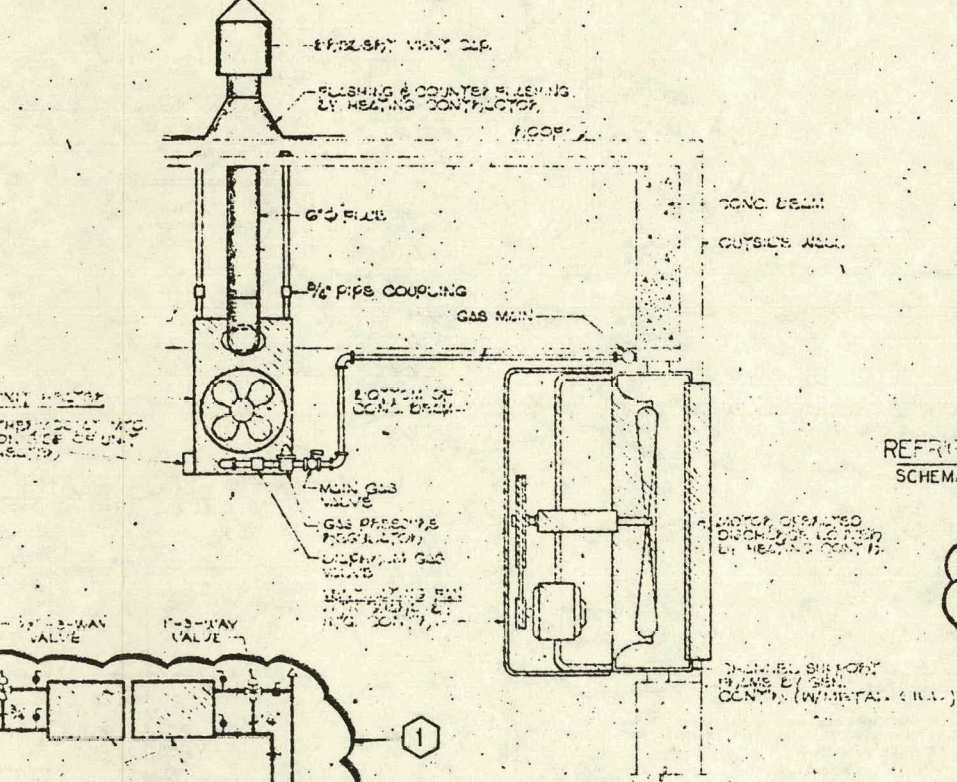
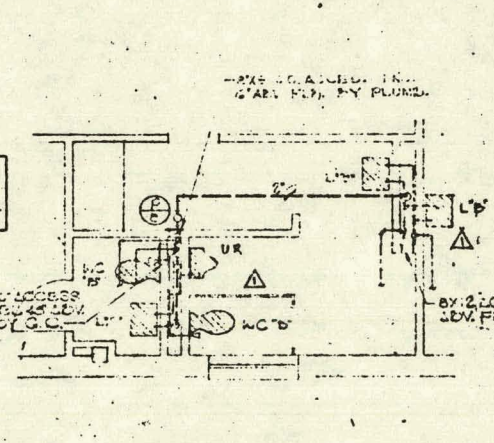




① WORK UNDER THIS CONTRACT

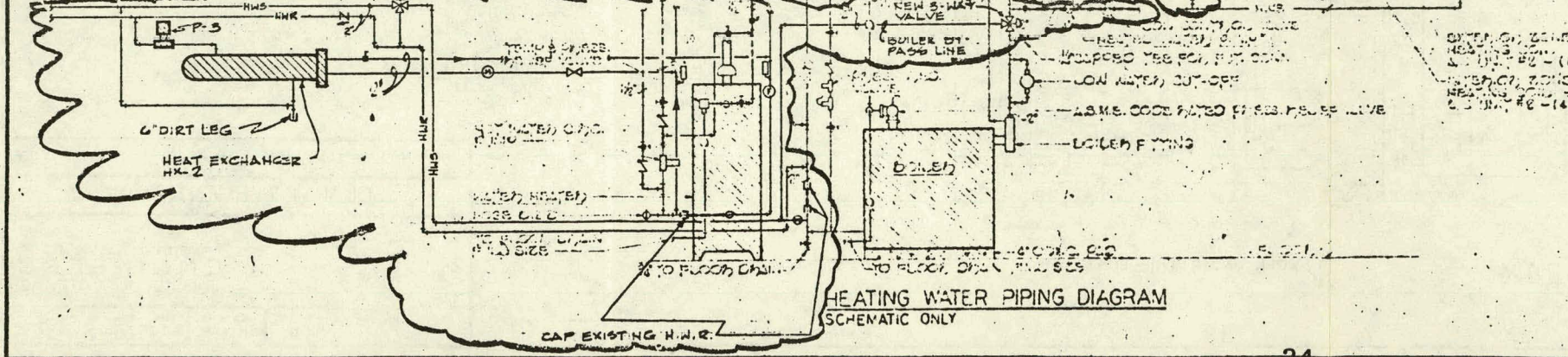


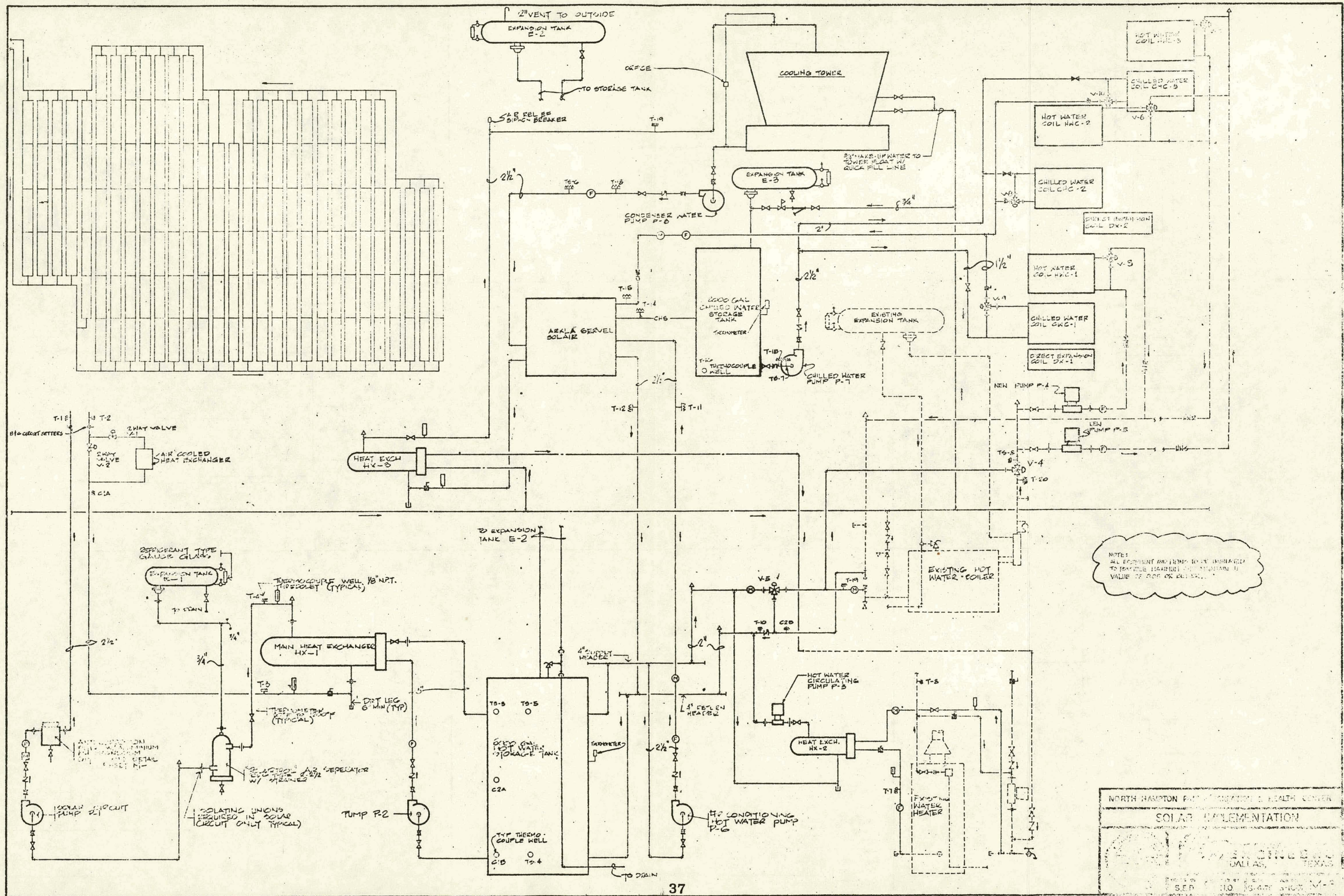
TOILET ROOM FLOOR PLAN #33 & #34
SCALE: 1/4"=1'-0"



GENERAL NOTES:
1. ALL EXISTING 3-WAY VALVES TO BE RE-USED IF CONDITION OF THE VALVE IS SATISFACTORY.
2. EXISTING 3-WAY VALVES IN ROOMS 2, 3, & 4 ARE TO BE RE-USED IF CONDITION OF THE VALVE IS SATISFACTORY.
3. EXISTING 3-WAY VALVES IN ROOMS 5, 6, & 7 ARE TO BE RE-USED IF CONDITION OF THE VALVE IS SATISFACTORY.

MEN & WOMEN TOILET ROOM FLOOR PLANS #11 & #12
SCALE: 1/4"=1'-0"





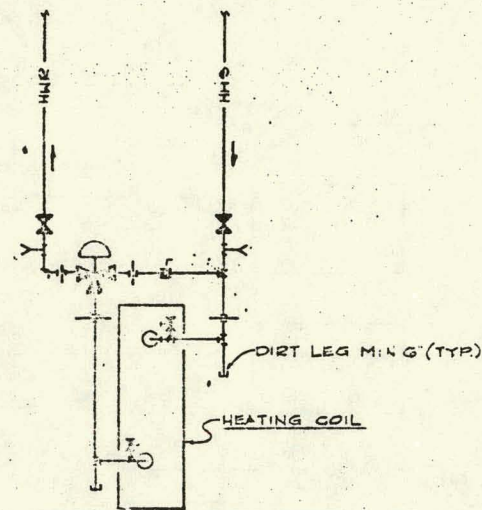
NOTE:
ALL EQUIPMENT AND PIPING TO BE INSTALLED
TO MAINTAIN TEMPERATURES AS SHOWN IN
VALUE OF 200 OR LESS.

NORTH HAMPTON PARK ORIGINATOR & HEALTH CENTER

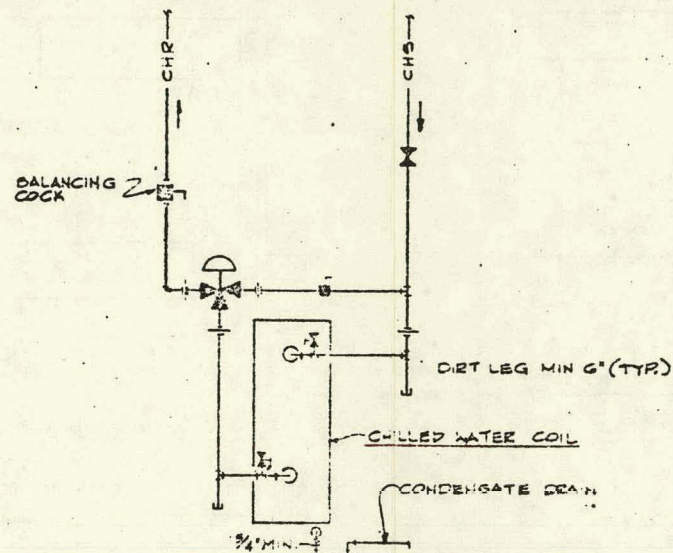
SOLAR IMPLEMENTATION

SEP 10 1967

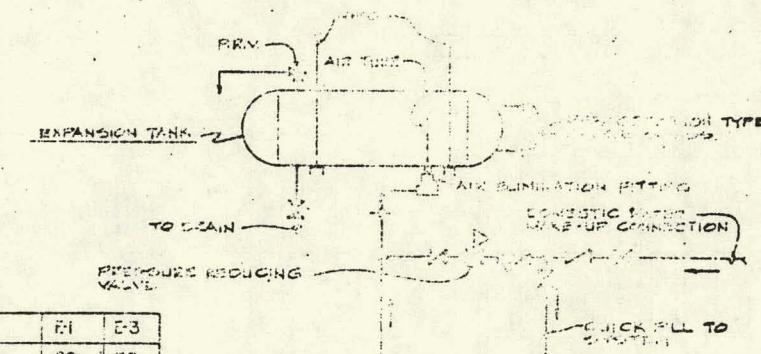
DALLAS, TEXAS



TYPICAL HEATING WATER COIL PIPING DIAGRAM

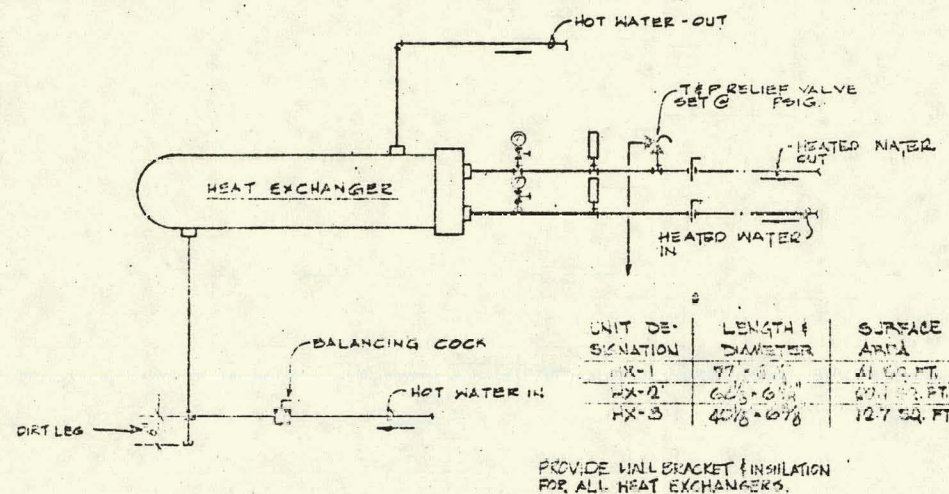


TYPICAL CHILLED WATER COIL PIPING DIAGRAM

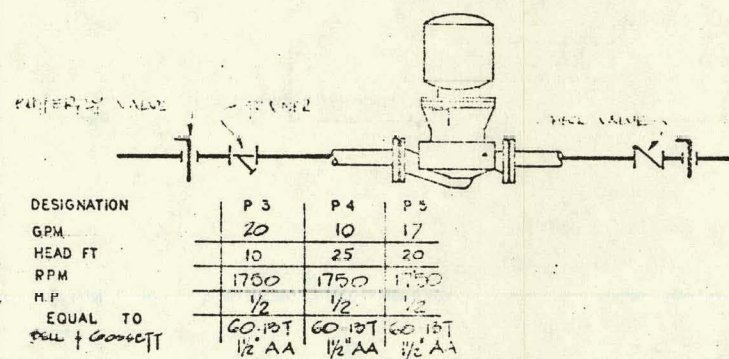


DESIGNATION	E1	E3
SIZE - GALS.	80	30
PRESSURE RELIEF VALVE SETTING	30	30
PRESSURE REDUCING VALVE SETTING	12	12

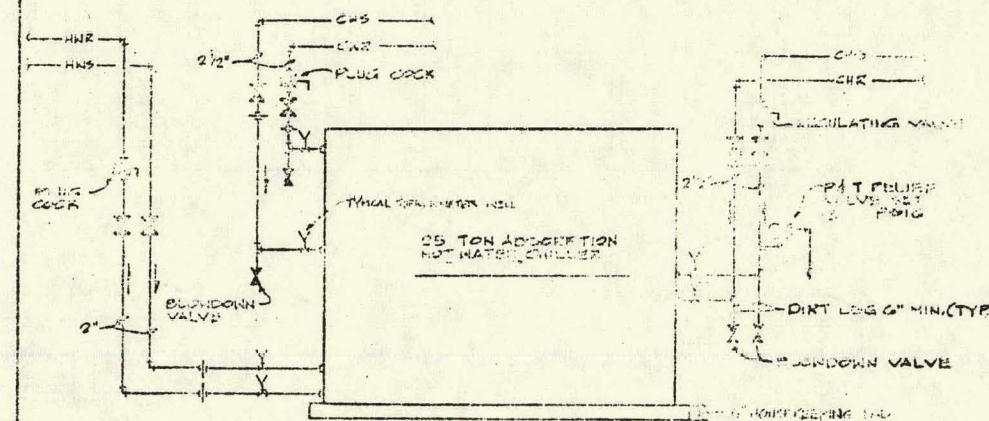
CLOSED SYSTEM EXPANSION TANK PIPING DIAGRAM



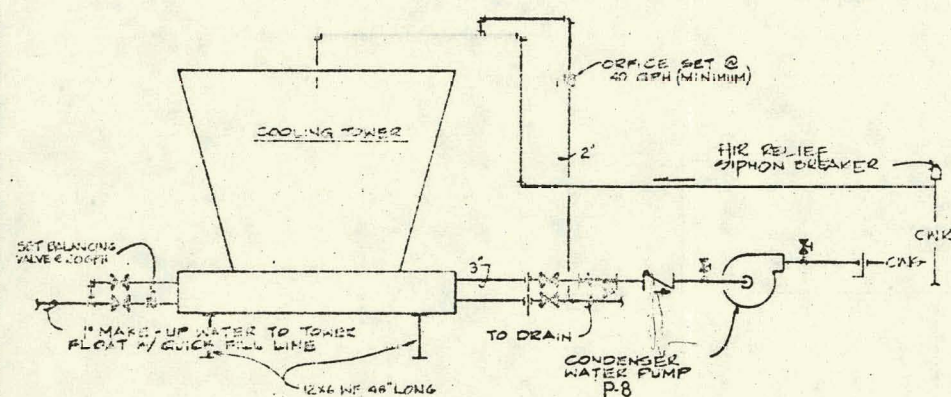
WATER TO WATER HEAT EXCHANGER PIPING DIAGRAM (TYPICAL)



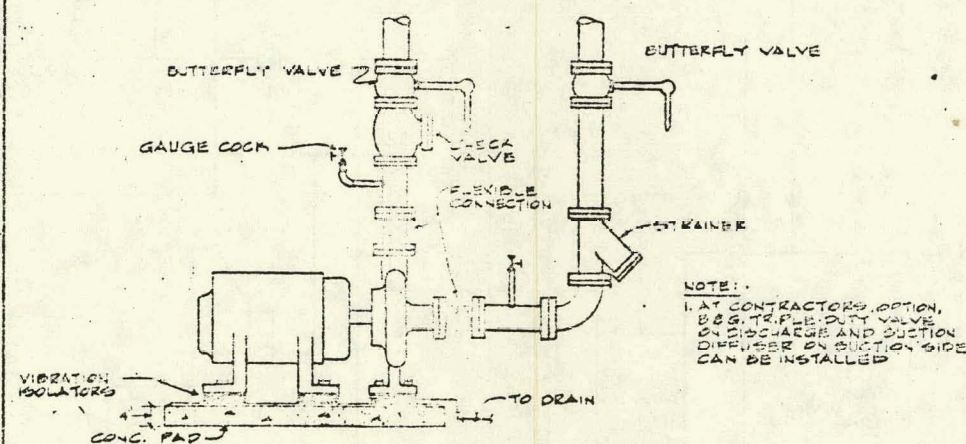
IN-LINE PUMP PIPING DIAGRAM



ABSORPTION CHILLER PIPING DIAGRAM

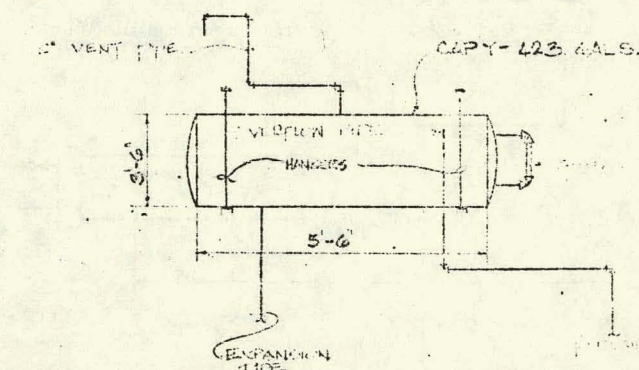


COOLING TOWER PIPING DIAGRAM



DESIGNATION	P1	P2	P6	P7	P8
GPM	80	120	90	90	90
HEAD FT	60	15	15	15	15
RPM	1750	1750	1750	1750	1750
HP	5	1/2	1/2	1/2	1/2
EQUAL TO	1/2 B8	1/2 A8	1/2 A8	1/2 B8	1/2 A8
BELL & GOSSETT	1510	1510	1510	1510	1510

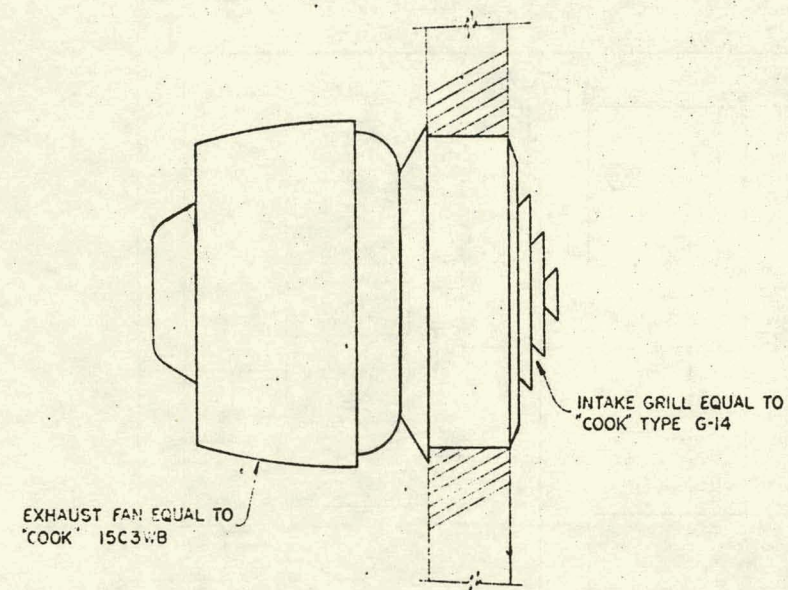
TYPICAL PUMP PIPING DIAGRAM



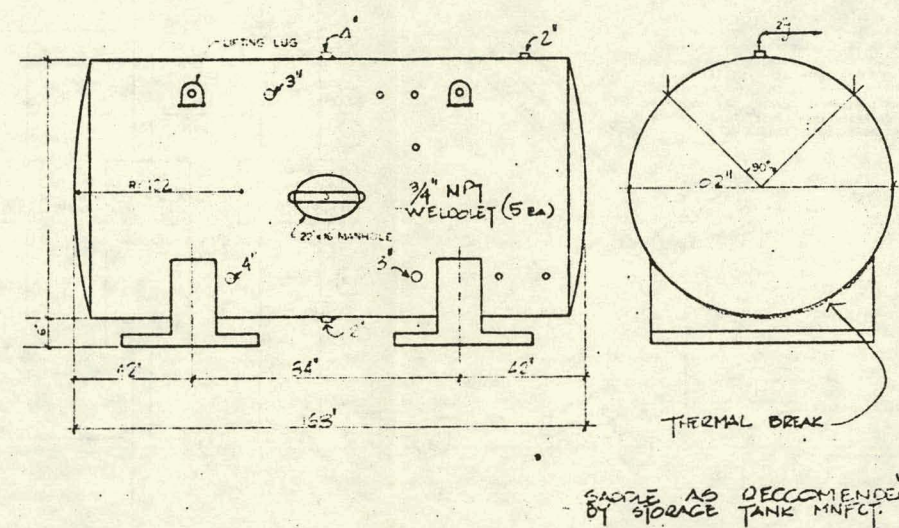
OPEN SYSTEM EXPANSION TANK PIPING DETAIL

NORTH HAMPTON PARK RECREATION & HEALTH CENTER
SOLAR IMPLEMENTATION

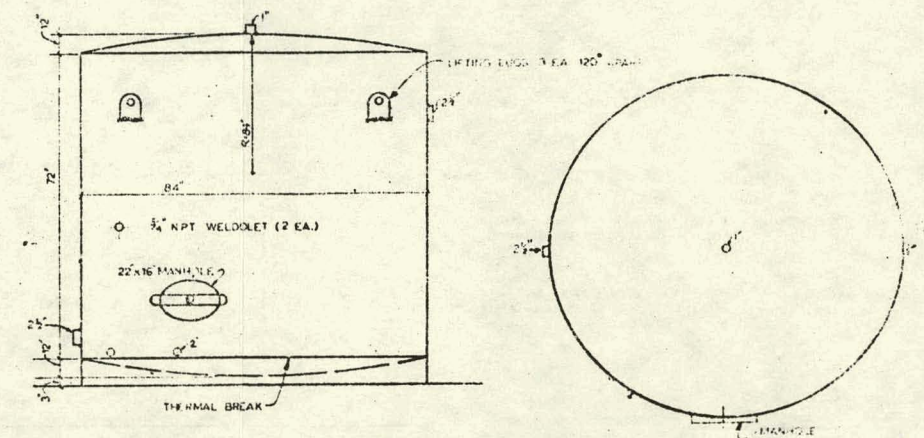
DESIGNED BY: [Signature]
CHECKED BY: [Signature]
DATE: 10/4/00



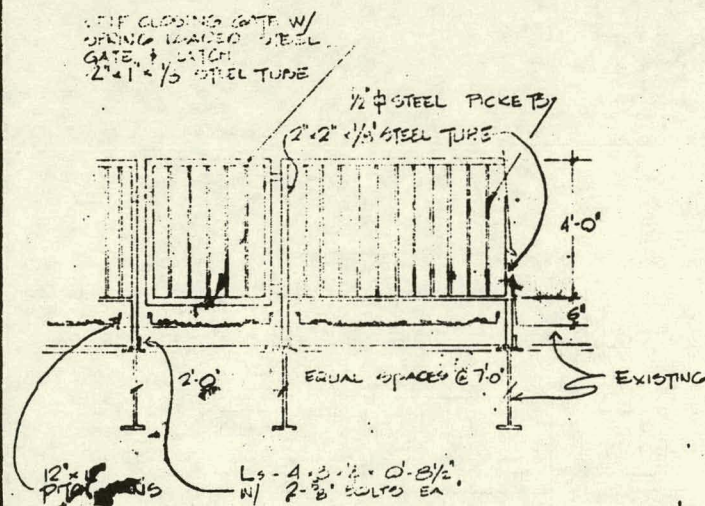
WALL MOUNTED EXHAUST FAN



HOT WATER STORAGE TANK 6000 GAL.

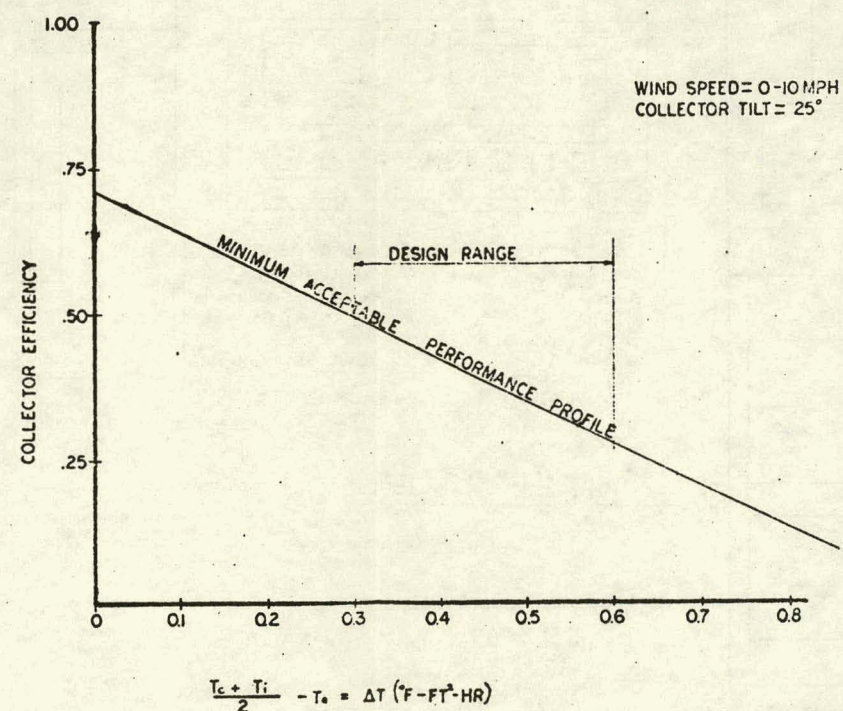


CHILLED WATER STORAGE TANK 2000 GAL.



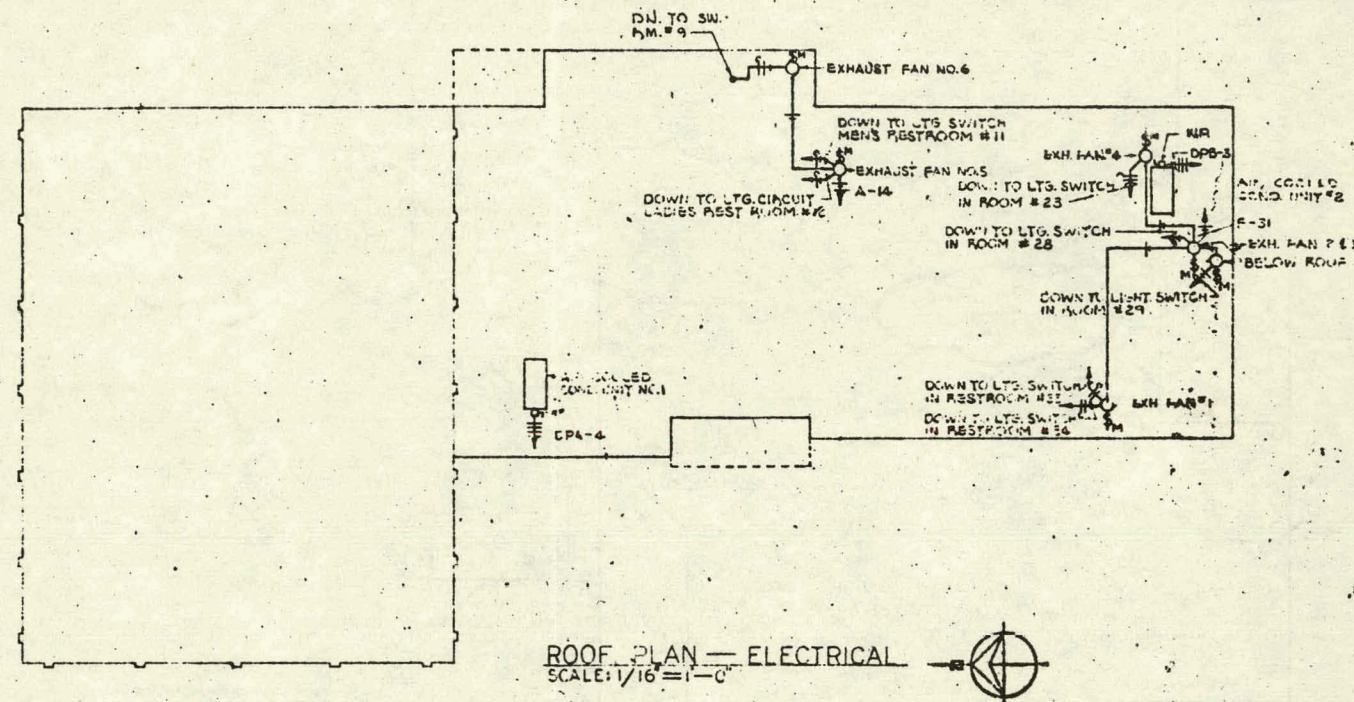
ROOF RAILING DETAIL

Steel Pipe Railings: Fabricate pipe railings to dimensions and details shown, with smooth bends and welded joints ground smooth and flush. Adjust railings prior to mounting to ensure matching alignment at butt joint. Space posts not more than 7' on centers, unless otherwise noted. Finish per code in each direction. Secure posts and rail ends to building construction as follows: Secure railing ends to existing walls or wall brackets at handrail ends. Provide surface to bottom of pipe handrail, and with wall plate. Posts and brackets drilled to receive only 3/8" bolts. Provide flush-type wall return fittings with one projection on that side for wall brackets. Secure wall brackets and wall return fittings to building construction with toggle bolts to not interfere with railing.

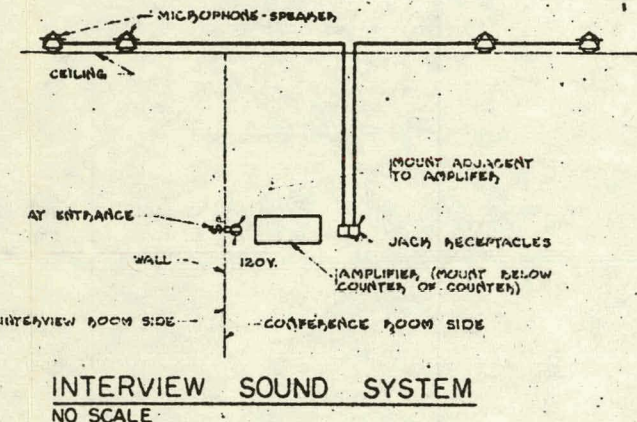


T_c - TEMPERATURE ° COLLECTOR OUTLET °F
 T_i - TEMPERATURE ° COLLECTOR INLET °F
 T - AMBIENT TEMPERATURE

NORTH HAMPTON PARK RECREATION & HEALTH CENTER	
SOLAR IMPLEMENTATION	
	TEXAS DESIGN & ASSOCIATES ENGINEERS DALLAS, TEXAS
DRAWN BY: [Signature] S.E.D. HO. 16-47075-1001 M.B.	DATE: [Blank] SCALE: [Blank]



ROOF PLAN - ELECTRICAL
SCALE: 1/16" = 1'-0"



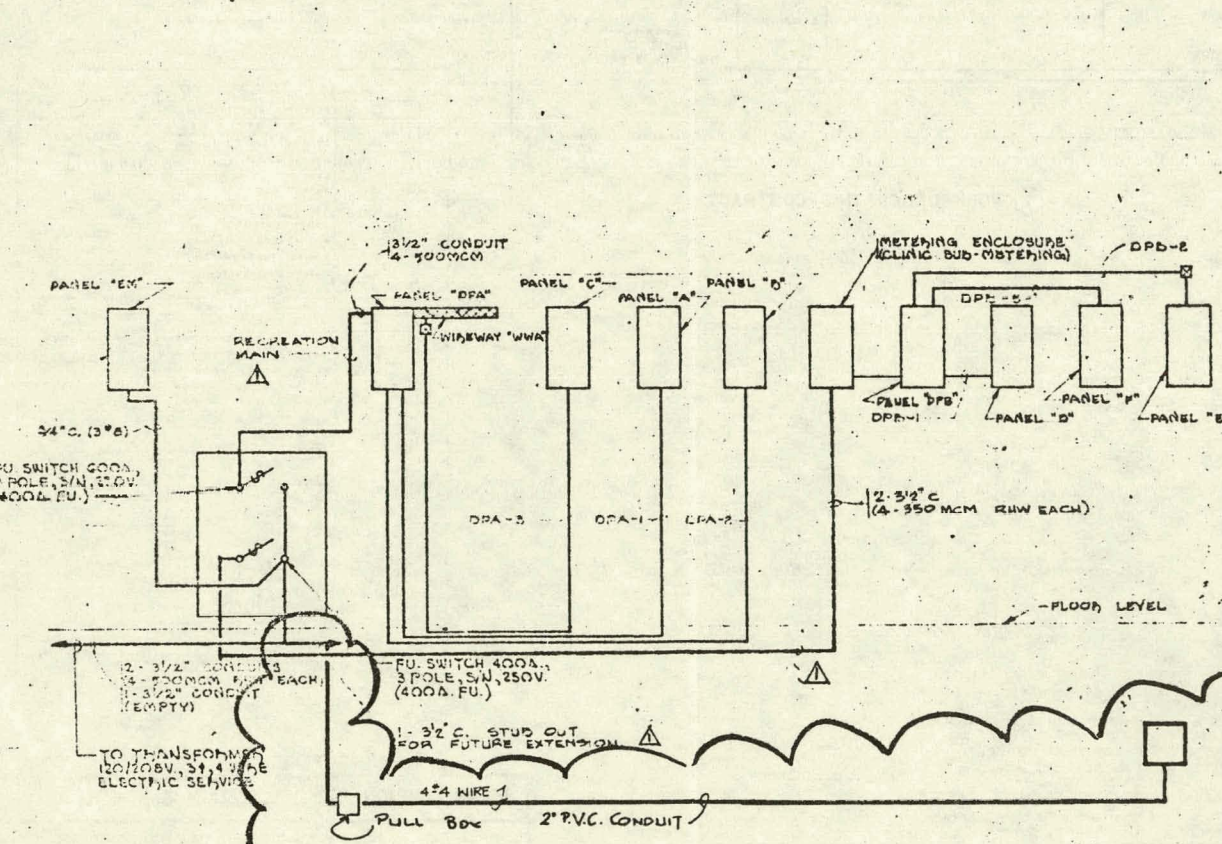
INTERVIEW SOUND SYSTEM
NO SCALE

PANEL "DPB"									
120/208 VOLT 3 Ø 4 WIRE 400 AMP BUS 400 AMP NEUT. BUS									
CAT.	SERVICES	H.P.	START	LOAD	POLE	FUSE	SWITCH	CONDUIT	WIRE SIZE
1	PANEL "D"	—	—	—	3	70	100	1 1/2"	4 #2
2	" " "E"	—	—	—	3	40	60	1"	4 #4
3	COND. UNIT #2	—	—	—	3	40	60	1 1/4"	3 #2
4	AIR HAND. #2	2	—	—	3	40	60	3/4"	3 #12
5	PANEL "F"	—	—	—	3	80	100	1 1/2"	4 #4
6	AUTO CLAYS	—	—	—	3	30	40	3/4"	4 #10
7	SPACE	—	—	—	3	—	100	—	—

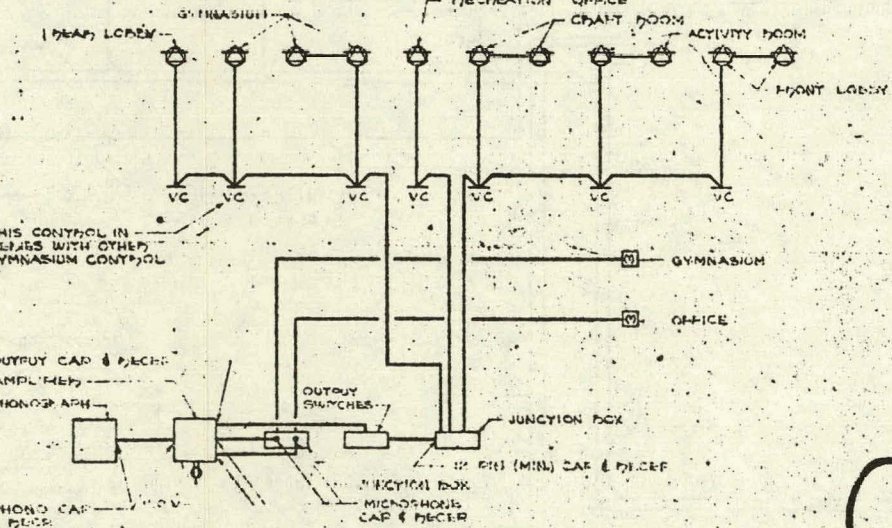
* STARTERS ARE IN SEPARATE, INDIVIDUAL ENCLOSURES
** 30A., 3 POLE, MECHANICALLY HELD CONTACTOR

PANEL "DPA"									
120/208 VOLT 3 Ø 4 WIRE 400 AMP BUS 400 AMP NEUT. BUS									
CAT.	SERVICES	H.P.	START	LOAD	POLE	FUSE	SWITCH	CONDUIT	WIRE SIZE
1	PANEL "A"	—	—	—	3	100	200	2"	4 #2
2	" " "B"	—	—	—	3	125	—	—	4 #10
3	" " "C"	—	—	—	3	40	60	1"	4 #6
4	COND. UNIT #1	—	—	200W	3	80	100	1 1/4"	3 #2
5	AIR HAND. #1	2	—	—	3	40	60	3/4"	3 #12
6	PANEL "T"	1	—	—	3	40	60	1"	4 #6
7	" " "S"	1	—	—	3	40	60	1"	4 #6
8	" " "R"	1	—	—	3	40	60	1"	4 #6
9	" " "Q"	1	—	—	3	40	60	1"	4 #6
10	SPACE	—	—	—	3	—	100	—	—

* STARTERS ARE IN SEPARATE, INDIVIDUAL ENCLOSURES
** 30A., 3 POLE, MECHANICALLY HELD CONTACTOR



ONE LINE ELECTRICAL DIAGRAM



RECREATION SOUND SYSTEM
NO SCALE

LIGHTING PANEL SCHEDULE VOLTAGE SYSTEM									
PANEL	MAINS	AMP	TYPE	1P-20A.	1P-20A.	1P-20A.	OTHER BREAKERS	ENCLOSURE	REMARKS
A	100	MLO	3	19	5	—	—	FLUSH	RED. BRCK. COUPLING
B	225	—	—	12	3	—	—	FLUSH	RED. BRCK. COUPLING
C	100	—	—	4	8	—	—	FLUSH	RED. BRCK. COUPLING
D	—	—	—	19	4	—	—	FLUSH	RED. BRCK. COUPLING
E	—	—	—	5	8	—	—	FLUSH	RED. BRCK. COUPLING
F	—	—	—	3	4	—	—	FLUSH	RED. BRCK. COUPLING
EM	100	MLO	1	2	2	2P-50A.-MLO	—	SURFACE	—

*** ELECTRICAL SUB-CONTRACTOR TO DISCONNECT EXISTING AIR HAND. #2 AND PROVIDE 30A-3P BREAKER AND CONNECT NEW AIR HANDLER IN SPACE.
ELECTRICAL SUB-CONTRACTOR TO DISCONNECT EXISTING AIR HAND. #1 AND PROVIDE 40A-3P BREAKER AND CONNECT NEW AIR HANDLER IN SPACE.
VERIFY WIRE SIZE TO BE USED IN CONNECTING AIR HANDLERS WITH UNIT SUPPLIER.

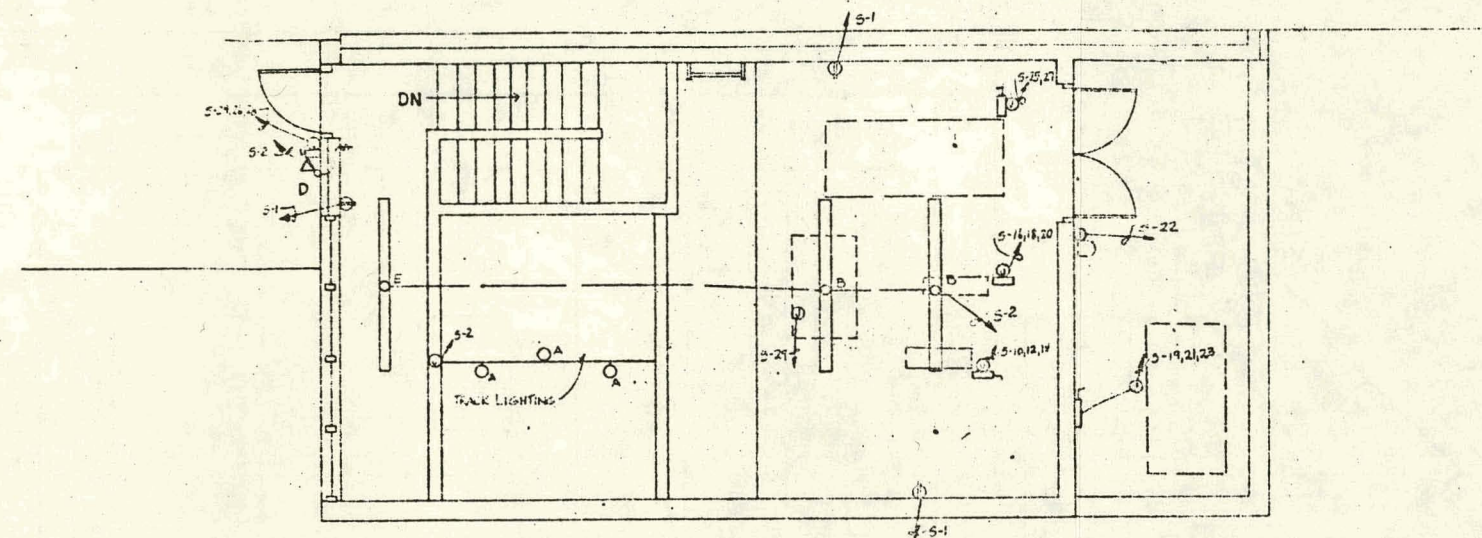
NORTH HAMPTON PARK RECREATION & HEALTH CENTER
SOLAR IMPLEMENTATION

TRAVIS BRAUN & ASSOCIATES INC
ENGINEERS
DALLAS, TEXAS

DRAWN BY S.E.D. CHECKED BY H.O. DATE 6-4-76 JOB NO. 76-1007 E1

LIGHT FIXTURE SCHEDULE

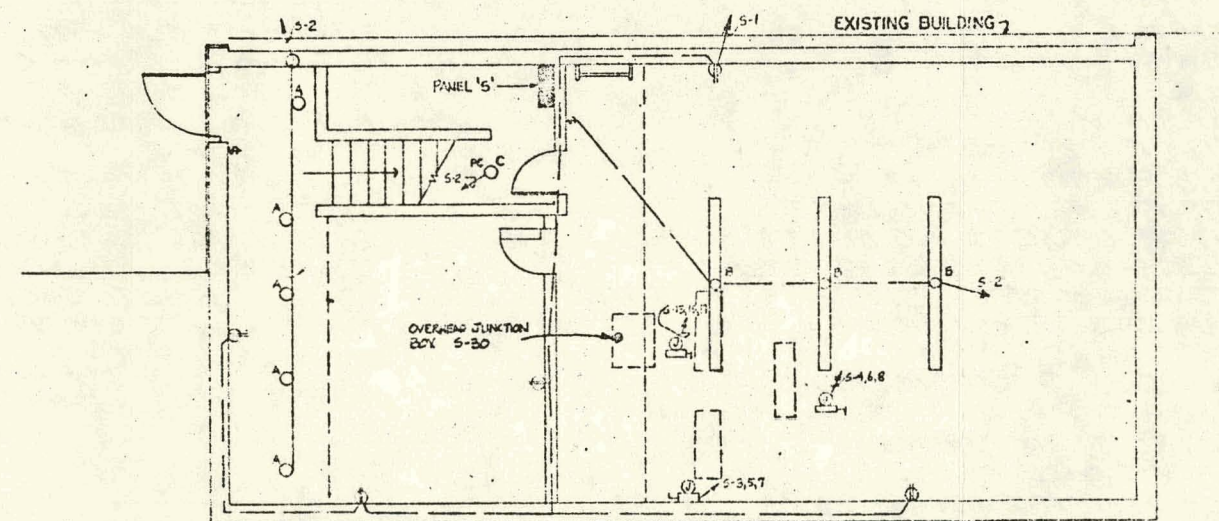
DES	MANUFACTURER	CAT. NO.	TYPE	FINISH	LENS	MOUNTING	LAMP	REMARKS
A	PROGRESS		INCAND.	WHITE		TRACK	PAR 38	PENDANT MTD.
B	LITHONIA		FLOUR.	"		SURFACE	"	"
C	PASS & SEYMOUR	35	INCAND.	PORCELAIN		SURFACE	100 W.I.F.	PULL CHAIN
D	STONCO	150-L	INCAND.	ALUM.	207	WALL	PAR-38	
E	LITHONIA		FLOUR	WHITE	ACRYLIC	SURFACE	2-40W	



SECOND FLOOR PLAN
1/4" = 1'-0"

PANEL 'S' 100A M.L.O.				
CKT	BREAKER	MOTOR STARTER	WIRE SIZE	SERVING
35-1	30A	NEMA 1	3"10-1/2" C	PUMP P-1
4-1	30A	NEMA 0	3"12-1/2" C	PUMP P-3
10-1	30A	NEMA 0	3"12-1/2" C	PUMP P-5
11-1,2	30A	NEMA 1	3"10-1/2" C	DRIVE OPER.
2-1,2	30A	NEMA 1	3"10-1/2" C	DRIVE OPER.
4-2	30A	NEMA 0	3"12-1/2" C	PUMP P-2
11-4	30A	NEMA 0	3"12-1/2" C	PUMP P-6
11-5	30A	NEMA 0	3"12-1/2" C	PUMP P-8
11-6,8	30A	NEMA 0	3"12-1/2" C	OUTC.

* ALL BREAKERS NOT SHOWN, SHALL BE 20A-1P
FOLLOWING PANEL 'S' TO BE 1"4-1/2" C.
2 CHARGES FOR 1A B.V. SHD. TO BE FURNISHED
BY ELECTRICAL SUBCONTRACTOR.



FIRST FLOOR PLAN
1/4" = 1'-0"

NORTH HAMPTON RAIL STATION & MARTIN CENTER
SOLAR IMPLEMENTATION
1981
MAY 1981
E-2

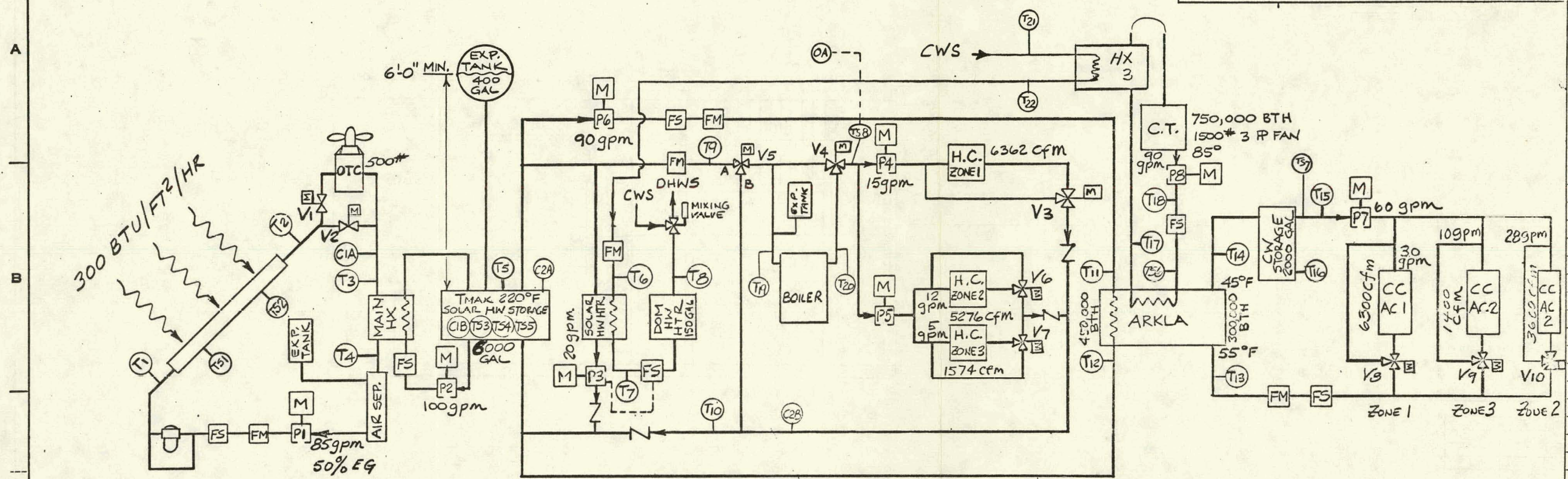
163C5292

GENERAL ELECTRIC

163C5292

UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING:			
APPLIED PRACTICES	SURFACES	TOLERANCES ON MACHINED DIMENSIONS	
	✓	FRACTIONS	DECIMALS
		+	+
		+	+
		+	+

TITLE
FLUID FLOW SYSTEM SCHEMATIC
NORTH HAMPTON RECREATION CENTER
FIRST MADE FOR



LEGEND

CONTROL

TS = THERMAL SWITCH
FS = FLOW SWITCH
FM = FLOW METER
TS1 = COR 120°/110°F P1 (HEATING)
TS2 = COR 180°/170°F P2 (COOLING)
TS3 = COR 220°/218°F OTC FAN, V1 & V2
TS4 = COR 80°/78°F L.T. HEATING LIMIT
TS5 = COR 175°/170°F L.T. COOLING LIMIT
TS6 = COR 80°/55°F CONDENSER WATER TEMP.
CIA/CIB = DIFF'L THERMOSTAT +12°F ON/+3°F OFF - P2
OTC = OVERTEMPERATURE CONTROL
C.T. = COOLING TOWER
V4 & V5 = CONTROLLED BY OPERATING MODE AND RESET BY O.A. TEMP.
V3 & V6 & V7 - MODULATES THRU RM T/S
V10 & V8 & V9 - MODULATES THRU RM T/S
P4 - CONTROLLED LIMIT SWITCHES IN V3
P5 - CONTROLLED LIMIT SWITCHES IN V6 & V7
P6/PB - CONTROLLED BY C.W. STORAGE TEMP. (DEMAND)
P7 - CONTINUOUS DURING COOLING SEASON
C2A/C2B DIFF. TS C2A > C2B - V5 MODULATES
TS#7 CHILLED WATER DIFF'L T/S 55° ON/44° OFF
TS#8 H.W. TEMP. CONTROL RESET BY OA (160/20°) (100/60°)
CONTROLS EITHER V4 OR V5
C2A/C2B DIFF. TS C2A < C2B - V5 = 'B' FLOW

INSTRUMENTATION

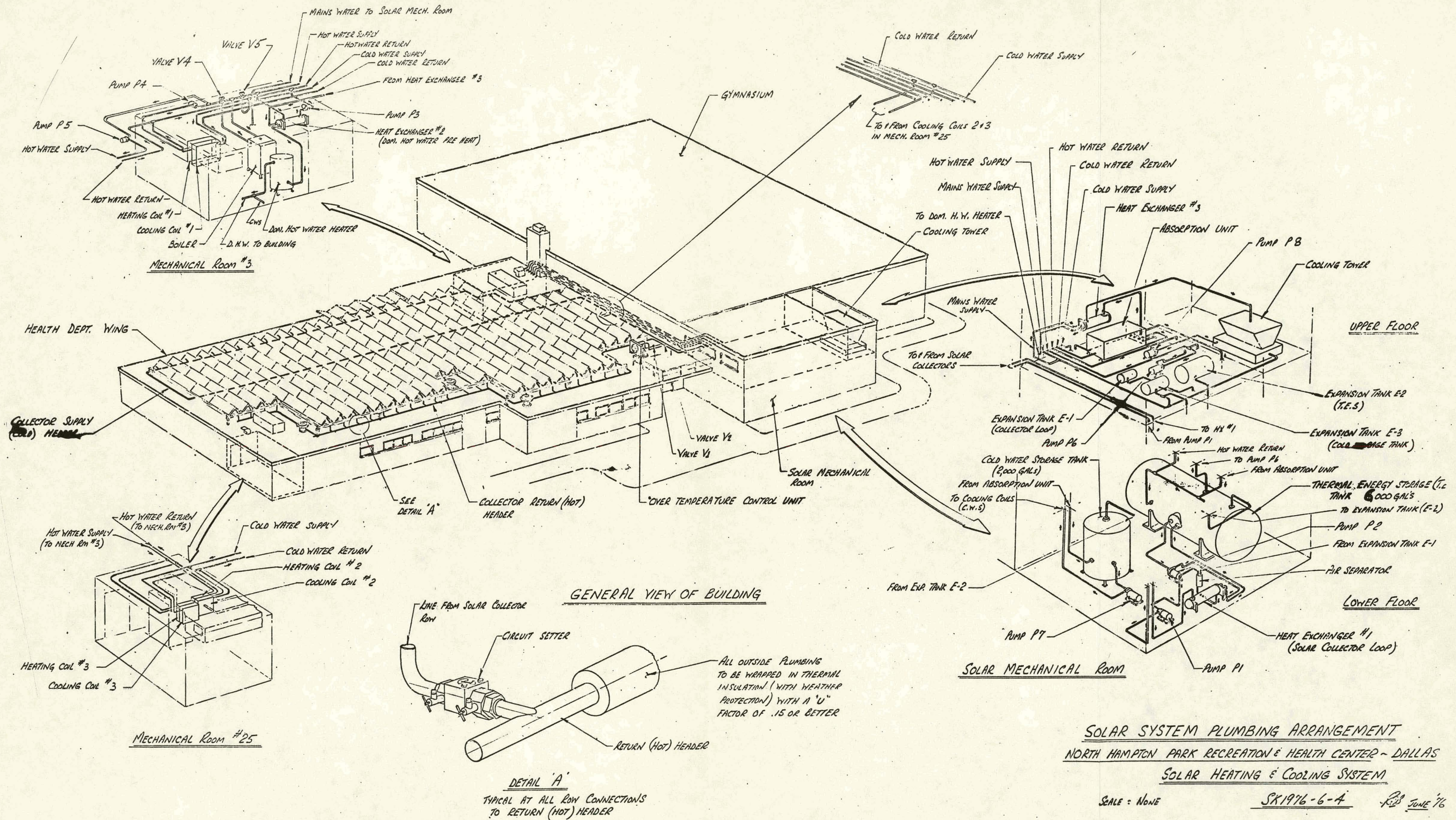
T1/T2 - ΔT COLLECTORS
T3/T4 - ΔT MAIN HX
T5 - TES STORAGE TEMP.
T6/T7 - ΔT SOLAR DHW
T8 - DHWS
T9/T10 - ΔT HEATING SYSTEM SOLAR
T11/T12 - ΔT ARKLA HWS
T13/T15 - ΔT CHILLED WATER SYSTEM
T14 - ARKLA CW OUTLET
T16 - CW STORAGE TEMP.
T17/T18 - ΔT COOLING TOWER
T19/T20 - ΔT CONVEN. BOILER HEATING INPUT
T21/T22 - ΔT D.H.W. HEAT EXCHANGE

FLOW METERS

COLLECTOR LOOP
CONV. HEATING HWS EXT. RANGE
SOLAR HEATING HWS EXT. RANGE
COOLING HWS
COOLING CWS
DOMESTIC H.W. EXT. RANGE

REVISIONS	PRINTS TO

MADE BY G.V.S
ISSUED APR. '76
APPROVALS A.E.S.Y.S
BLO #7, V.F. LOCATION
163C5292
PA.



Appendix C
Major Component Manufacturers Information

Collectors

**operation
maintenance
and
installation
instructions**

SOLAR
501,368M
2/79

**RETAIN THESE INSTRUCTIONS
FOR FUTURE REFERENCE**

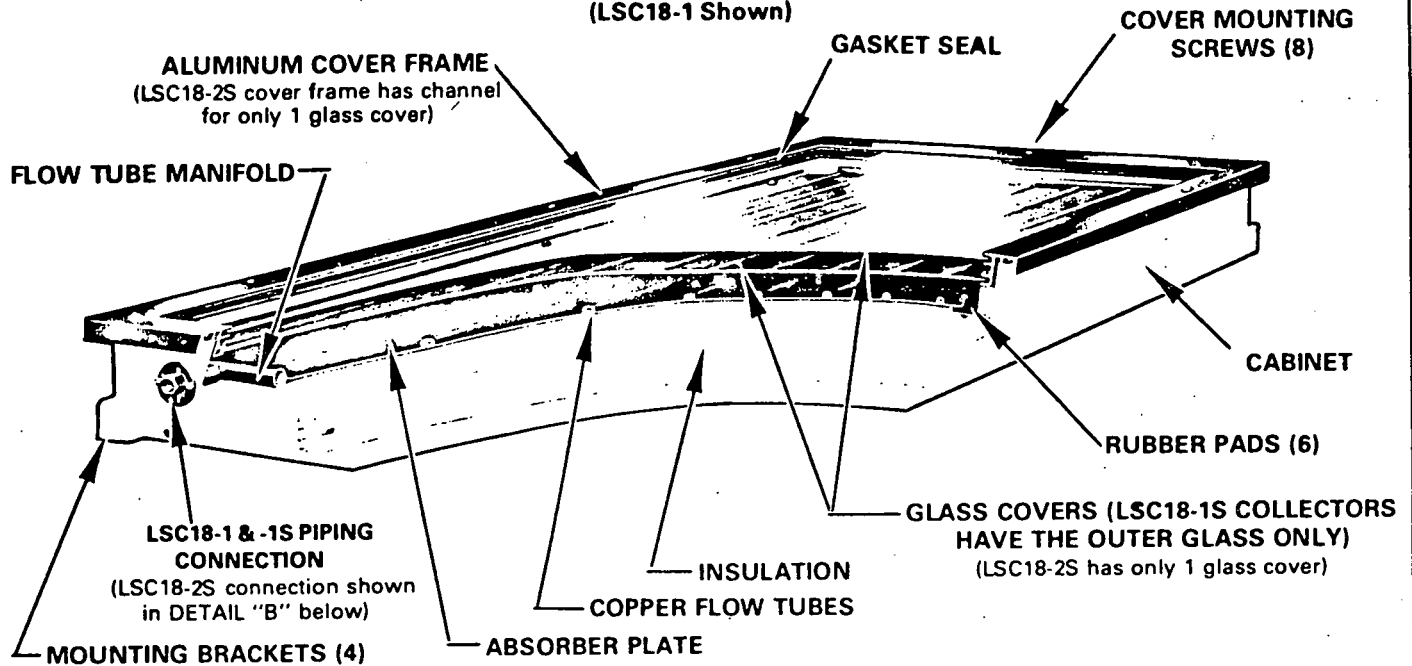
Supersedes 9/78

LENNOX Industries Inc.

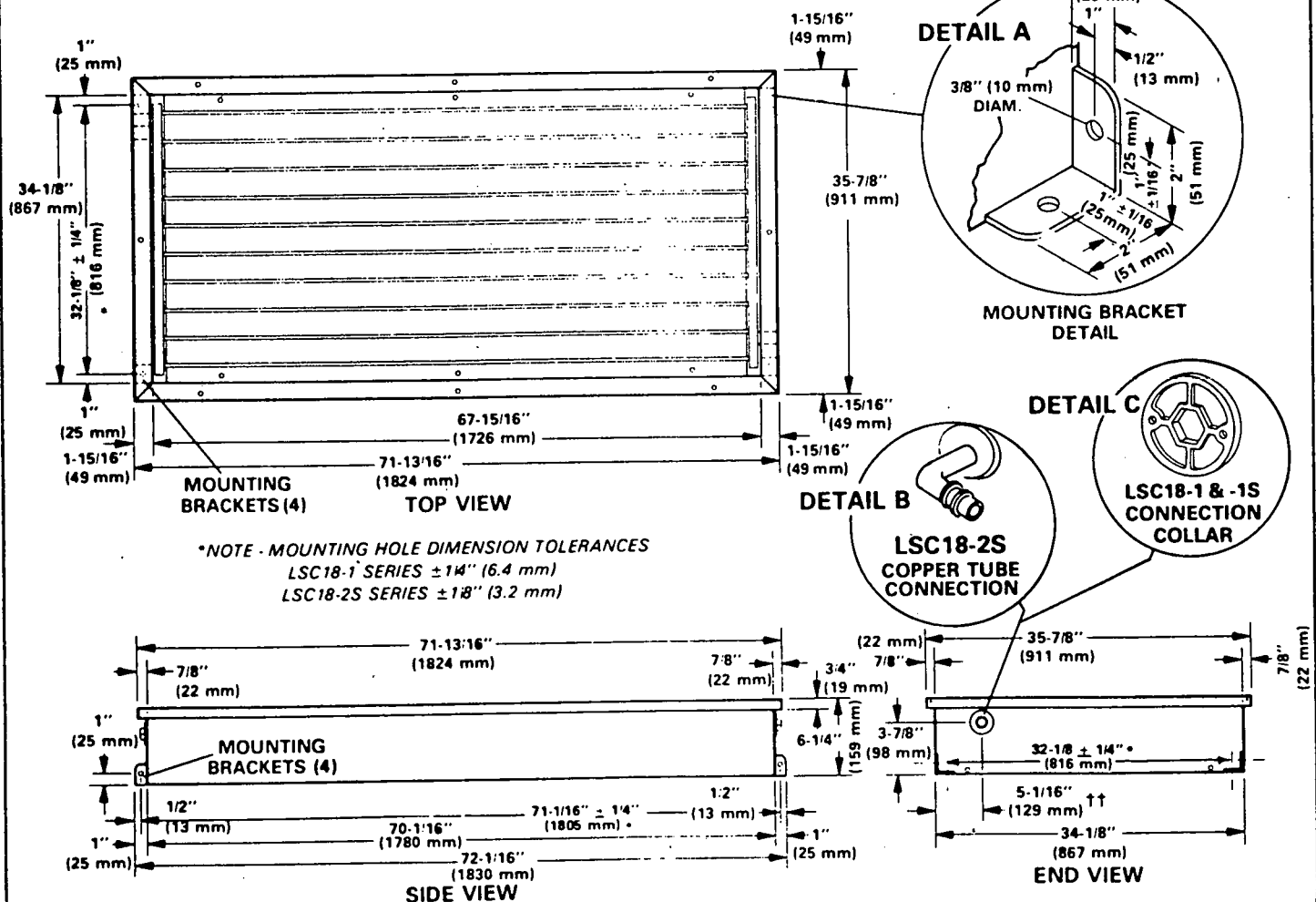
Columbus, Ohio/Decatur, Georgia/Fort Worth, Texas/Sacramento, California/Marshalltown, Iowa/Lennox Industries (Canada) LTD - Calgary, Toronto

PARTS ARRANGEMENT

(LSC18-1 Shown)



SOLAR COLLECTOR DIMENSIONS



FRAMING - FLASHING - COLLECTOR MOUNTING

I - SHIPPING AND PACKING LIST

Package 1 of 1 Contains

1 - Assembled solar collector

II - SHIPPING DAMAGE

Check unit for shipping damage. Contact the last carrier immediately if any damage is found.

III - GENERAL

These instructions are intended as a general guide and do not supersede local codes. Authorities having jurisdiction should be consulted before installation.

IV - APPLICATION

The consulting engineer, architect or Lennox dealer must determine the solar collector application including desired number of collec-

tors, placement, mounting angle and plumbing sequence. Generally the collectors should face South and be placed at an incline angle as follows:

Space heating — angle equals latitude of installation minus 10°

Space cooling — angle equals latitude plus 15°

Water heating — angle equals latitude

Specifics of the structure and surrounding environment must be considered in the detailed design of the collector array.

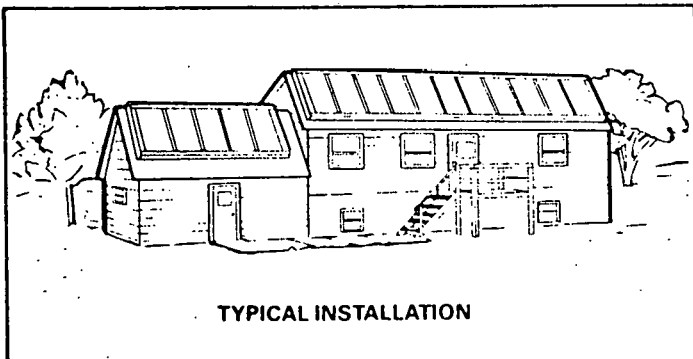


FIGURE 1

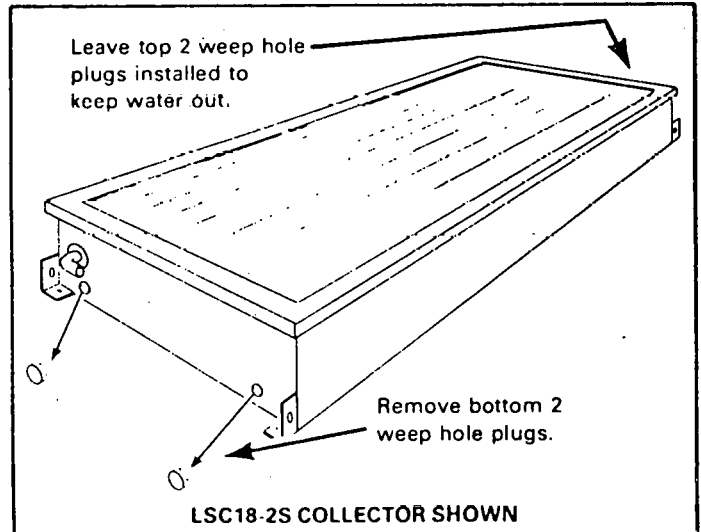


FIGURE 2

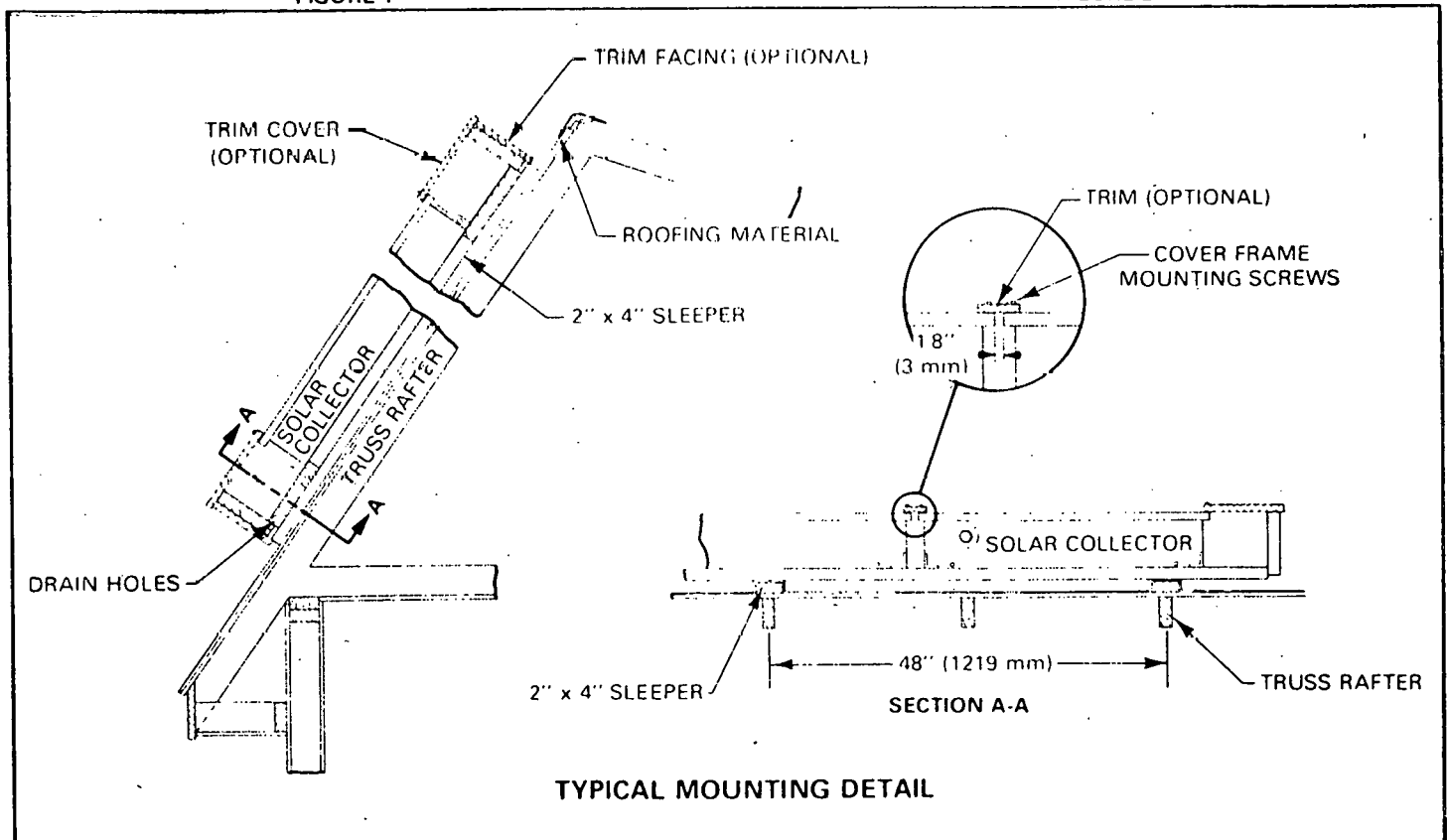


FIGURE 3

This instruction outlines one typical method of framing and installing the solar collectors. Other designs may be substituted if the basic guidelines within the instruction are followed. Figure 1 illustrates a typical residential application.

V - OPERATIONAL NOTES

Performance and operating characteristics vary with most solar installations. Design information regarding an installation will provide operating temperature ranges, fluid flow rates, capacities and other pertinent specifics. Several general performance characteristics should be noted as follows:

1 - WEEP HOLES

Two weep holes with plugs installed are located on each end of the collector pan. Plugs should be removed from the bottom (2) weep holes to allow any moisture to drain from the collector. The top 2 plugs should remain installed.

2 - CONDENSATION

Specific climatic conditions may result in the formation of condensation inside the collector, particularly when the glass cover is cold. As the collector is exposed to the sun and the glass cover warms, the condensation will evaporate.

3 - GLASS COVER PLATE

Any accumulation of dirt, soot, or other debris must be cleaned from the collector panel for proper transmission of solar energy to the absorber plate. Refer to collector maintenance.

V - SOLAR COLLECTOR

The collectors must mount on a watertight roof. Roof construction must be adequate to support the collectors and mounting frame. Solar collectors must be installed with the flow tubes in the vertical position. Figure 3 illustrates details for a typical mounting frame. Install the frame and solar collectors as follows:

1 - Center sleepers over trusses and secure to roof. Figure 4 shows the sleeper flashed into the roof.

a - Length of sleepers required for a single row of collectors is 86-1/2 inches.

b - Length of sleepers required for two rows of collectors is 162-5/8 inches.

2 - Figure 5 illustrates typical framing construction for one row of collectors. Figure 6 illustrates construction for two rows of collectors. 2" x 8" dimensional lumber is utilized.

3 - Position first collector 4-7/8 inches from end of frame and then maintain 1/8 inch between remainder of collectors. Refer to Figure 7. Secure collectors to frame with lag bolts (4 per collector). If desired the inside spacing could enclose the supply and return header runs where they penetrate through the roof.

NOTE - Solar collectors can be piped individually as they are set or if working area permits, piped after all collectors are set.

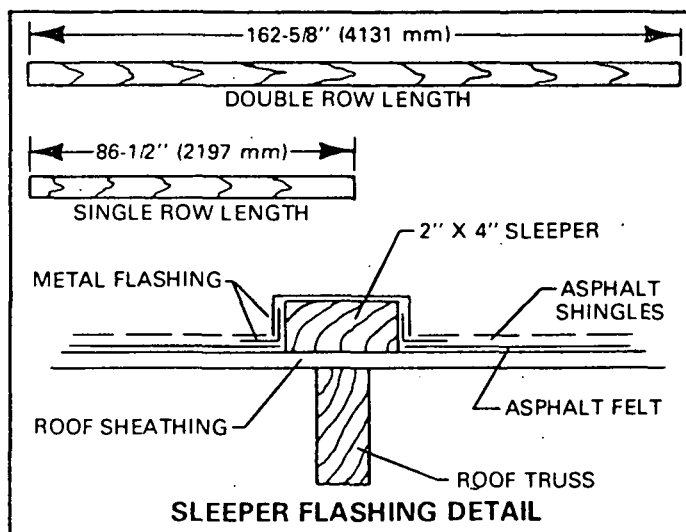


FIGURE 4

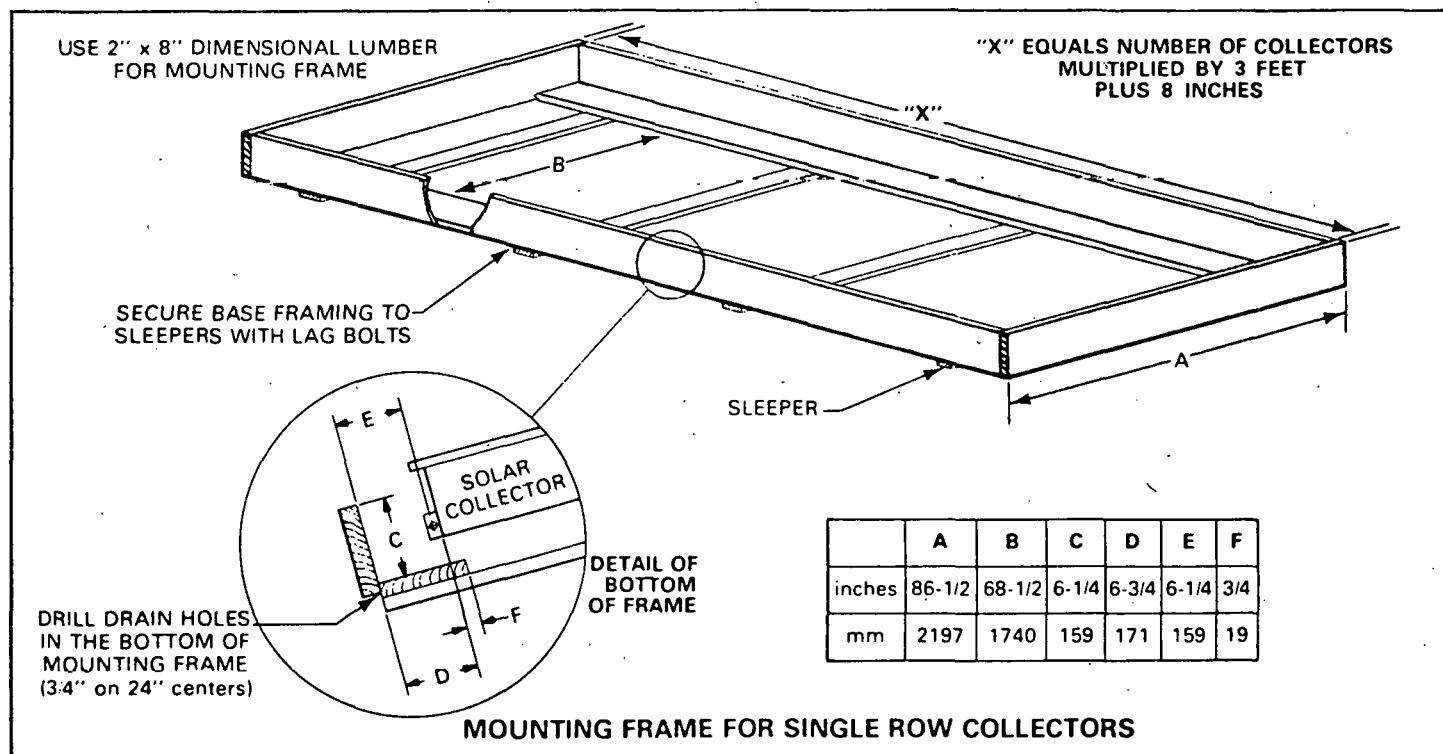
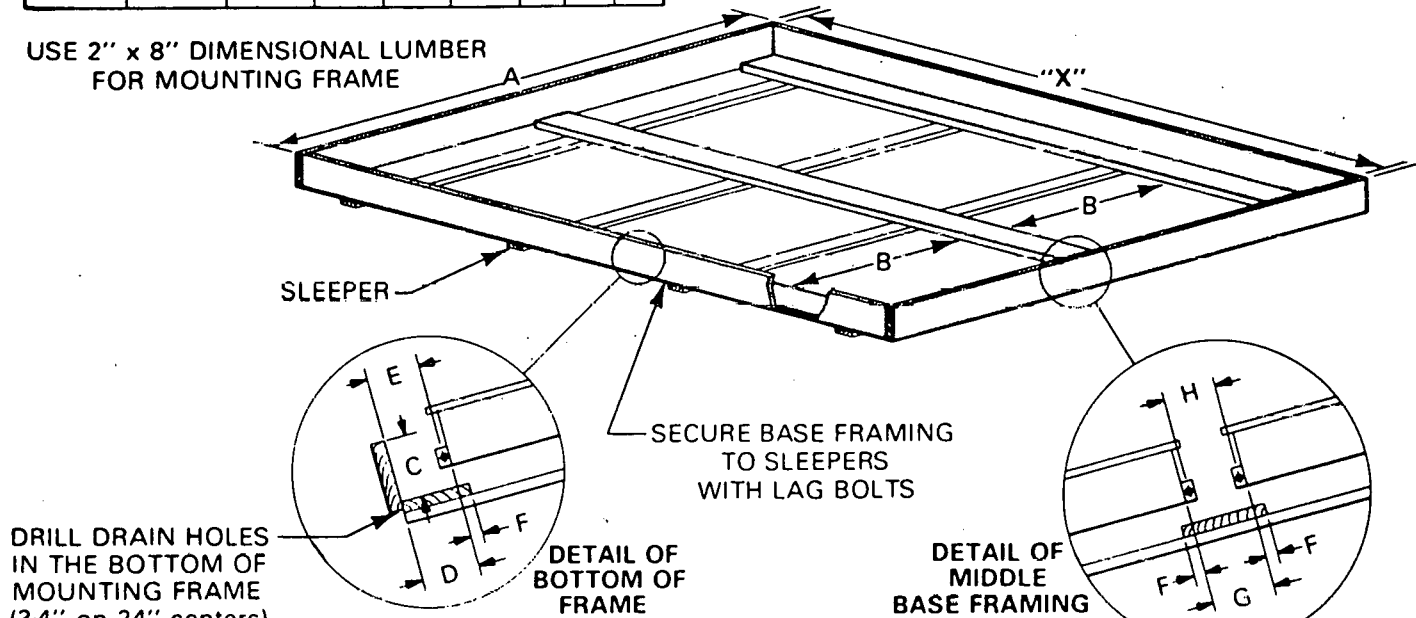


FIGURE 5

	A	B	C	D	E	F	G	H
inches	162-5/8	68-1/2	6-1/4	6-3/4	6-1/4	3/4	6	5
mm	4131	1740	159	171	159	19	152	127

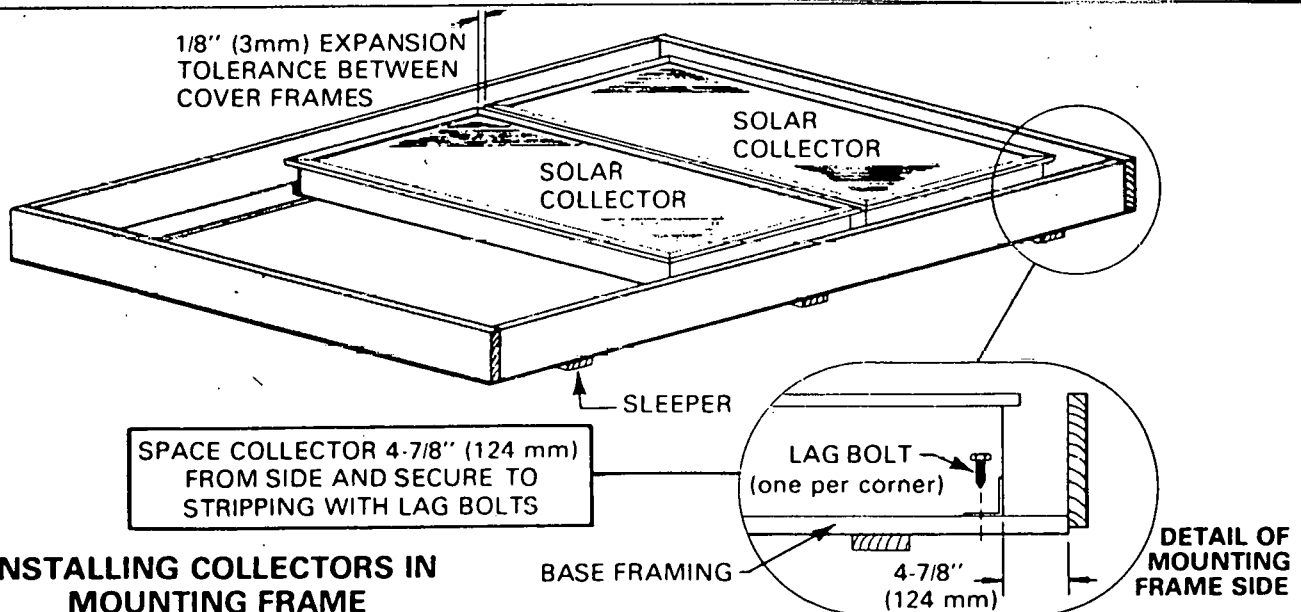
"X" EQUALS NUMBER OF COLLECTORS
MULTIPLIED BY 3 FEET
PLUS 8 INCHES

USE 2" x 8" DIMENSIONAL LUMBER
FOR MOUNTING FRAME



MOUNTING FRAME FOR DOUBLE ROW COLLECTORS

FIGURE 6



INSTALLING COLLECTORS IN
MOUNTING FRAME

FIGURE 7

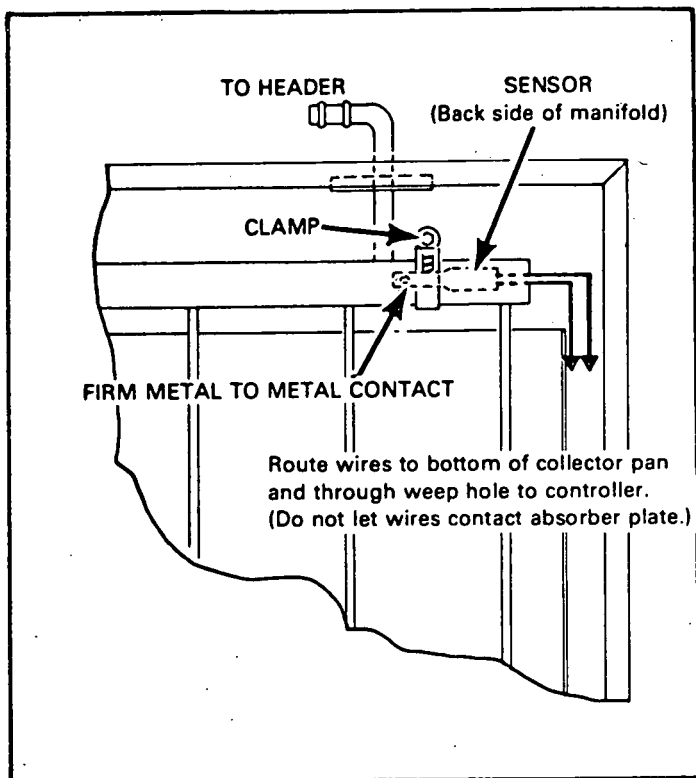


FIGURE 8

- 4 - The temperature control system (not provided with collectors) includes a temperature sensor which is to be installed in one collector. Install sensor in desired collector before hoisting collector to mounting position. Remove collector cover frame/glass assembly and install sensor on what will be the top (outlet) manifold of the absorber plate. Refer to Figure 8 and the sensor manufacturer's instructions to properly secure the sensor. Secure sensor to manifold, route wires to the outside of collector pan and reinstall cover frame/glass assembly.

CAUTION!!

When reinstalling glass cover and frame **DO NOT** overtighten screws. If collector cabinet is twisted even a slight amount and the glass cover is secured too tightly the glass cover will break.

- 5 - After the system has been leak tested and the insulation has been installed on outdoor piping, flash the frame and solar collectors as illustrated in Figure 9. This flashing prevents air flow around collectors minimizing convection losses. This trim can bolt directly to the collector frame.

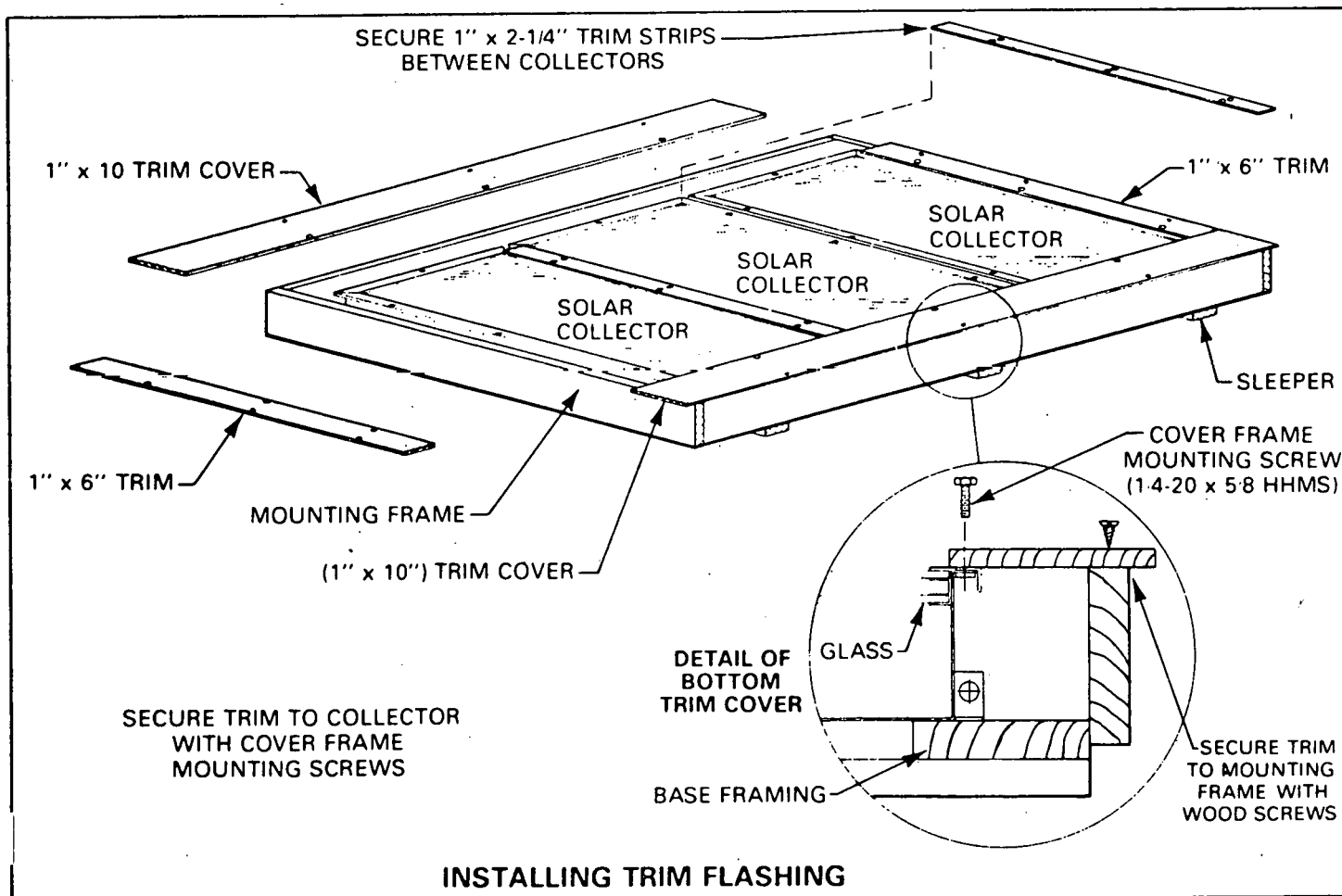


FIGURE 9

PIPING

VI - PIPING FOR SOLAR COLLECTORS

A - Basic Piping Fundamentals

1 - Flared Connections

a - Cut pipe to size with a roller type tubing cutter. See Figure 10.

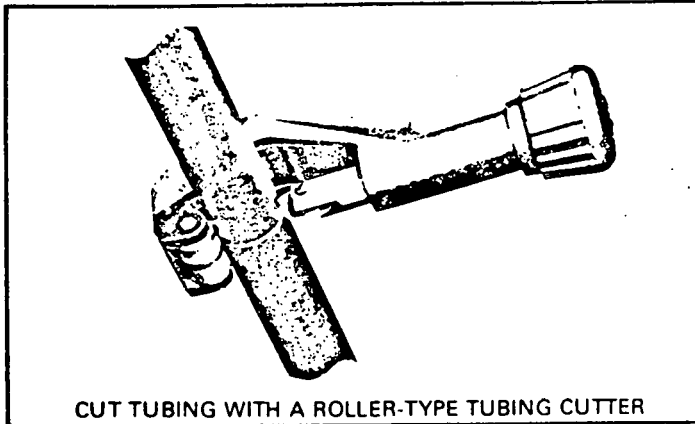


FIGURE 10

b - Remove any burrs with knife or reaming tool as shown in Figure 11.

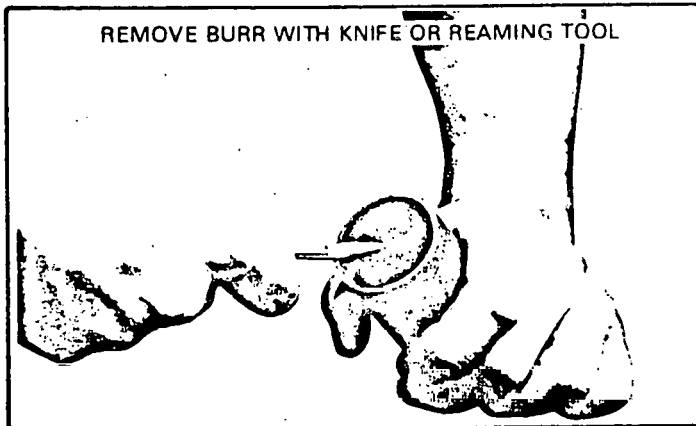


FIGURE 11

c - Flare tubing with a flaring tool as illustrated in Figure 12.

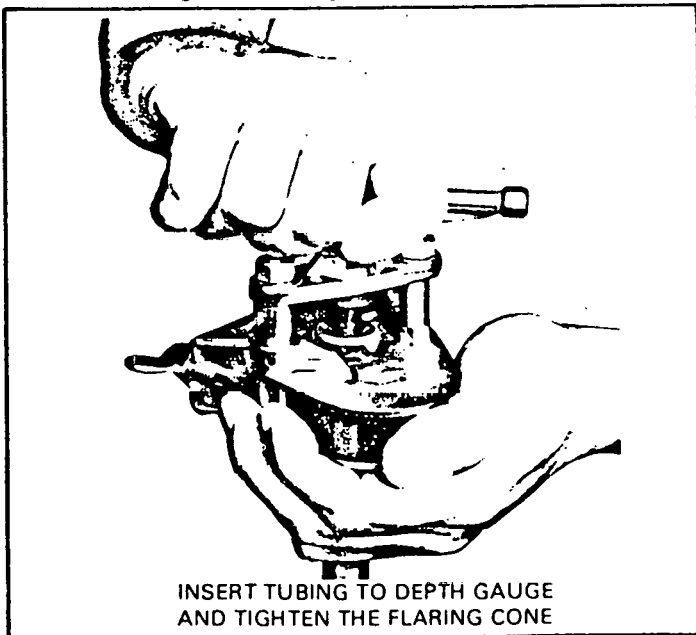


FIGURE 12

d - Align parts as shown in Figure 13 and tighten using two wrenches to prevent twisting lines. Figure 14 shows cutaway of flared connections.

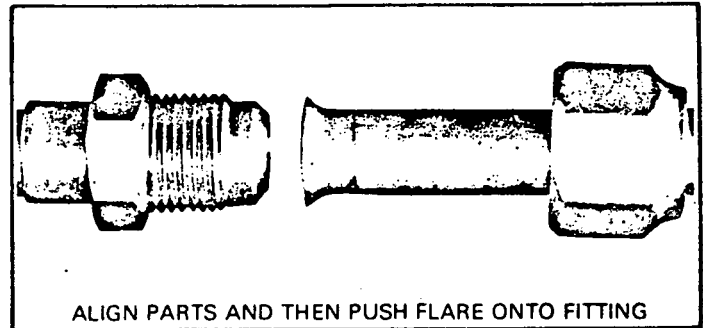


FIGURE 13

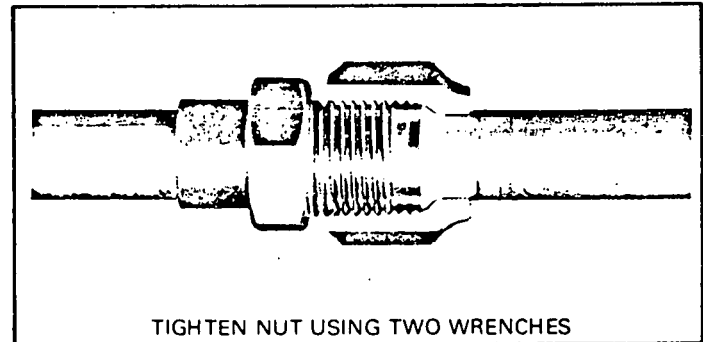


FIGURE 14

2 - Soldered Connections

a - Cut the pipe to size.

b - Remove burr.

c - Fit tubing into coupling maintaining a tight and proper clearance. See Figure 15.

d - Use *minimum* 95-5 rated solder.

e - Make joint using proper amount of heat to draw solder in joint.

f - Cool and clean the joint with wet cloth.

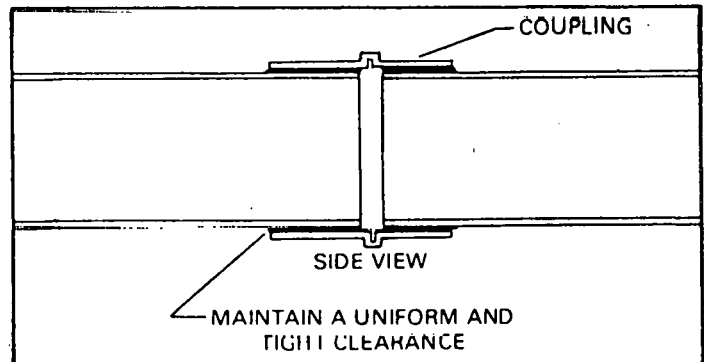


FIGURE 15

B - General Guidelines

1 - The solar collectors can be assembled in parallel, series or series-parallel combinations. Figure 16 illustrates various sequencing arrangements. The supply header is always positioned at the bottom side of collectors while the return header is on the top.

NOTE - For residential applications, no more than two collectors should be connected in series.

TABLE 1

APPLICATION	SIZE
Single family heating and heating/cooling	1-1/8" (38 mm)
Multi-family heating and heating/cooling	3" (76 mm)
Commercial heating and heating/cooling	4" (102 mm)

2 - Table 1 lists information for sizing headers.

3 - Avoid direct connection of dissimilar metals. Where copper pip-

ing connects to different piping materials, dielectric insulating couplers should be used to prevent corrosion.

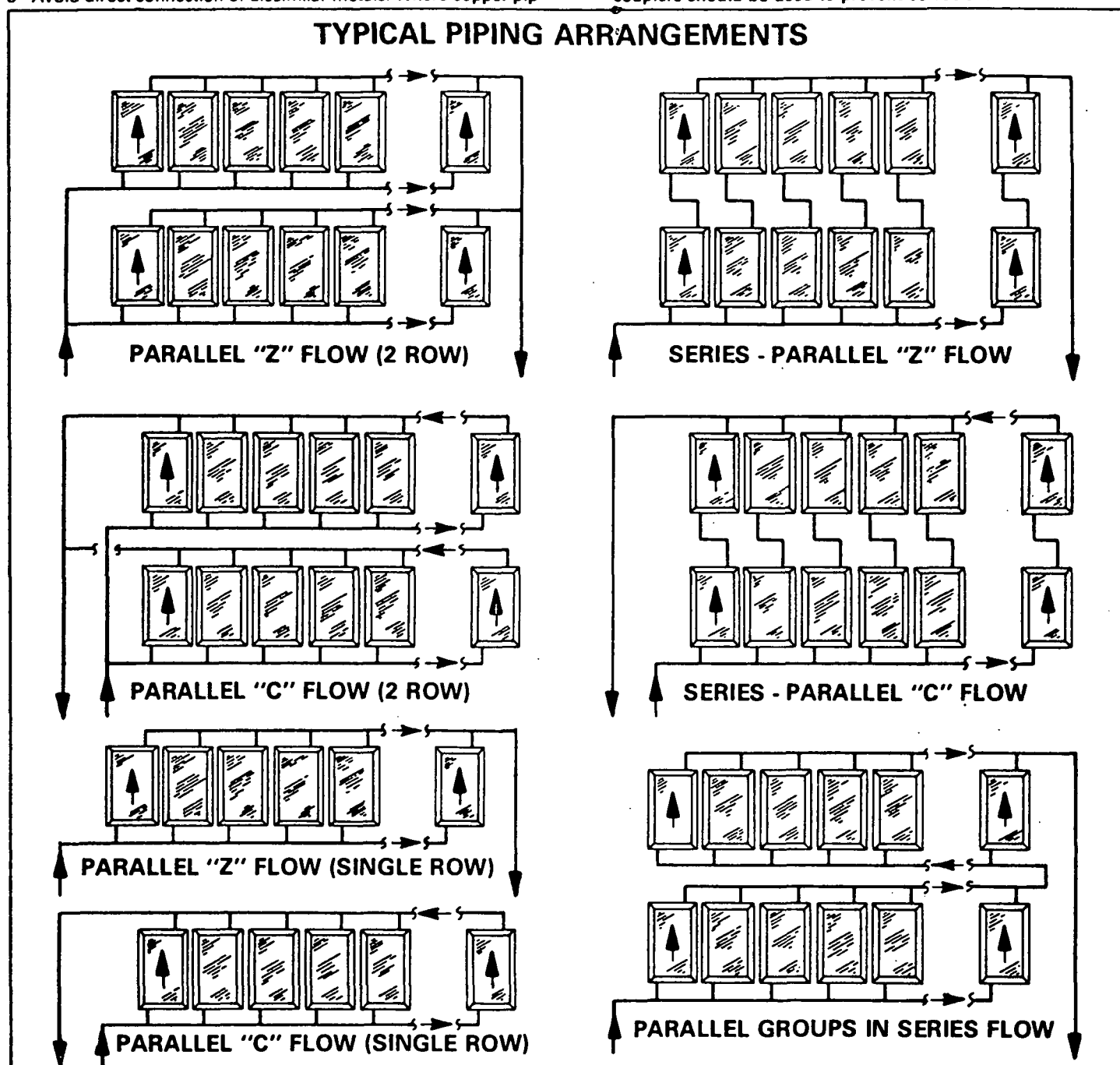


FIGURE 16

C - Header and Collector Piping

Once the collector array is in place, the collectors are joined with a header pipe and silicone connector hoses. The Lennox Manifold Kit (ordered separately) contains pre-fabricated headers with hose connectors welded in place. Also included are hose clamps, copper header couplings, header end caps and silicone hose. Figure 17 shows the arrangement of seven collectors, the header and the connecting silicone hoses. The collector array shown in Figure 17 requires cutting the header pipe.

The following steps provide a general assembly format.

NOTE - LSC18-1 Series collectors have threaded inlet and outlet connections. The necessary 90° elbow thread to hose adaptor (Lennox part number 15B8101) must be ordered separately. Figure 18 details this thread to hose adaptor.

- 1 - Install collector array per the system design specifications.
- 2 - Lengthen header pipes if necessary by joining additional header sections with the provided couplings. All hose connector must be aligned properly.
- 3 - Shorten header by cutting with a tubing cutter. Cut at increments to allow proper spacing of collectors.
- 4 - Weld end caps on one end of each supply and return header (the end depends on the flow pattern of system design.)
- 5 - Provide fittings at outlet end of the return header (top header) for installation of an air vent valve. The air vent valve must be positioned vertically at the highest point in the system to function properly. See Figure 19.
- 6 - Install heads at proper ends of collector array and clamp 12 in. (30 mm) sections of silicone hose onto the header and collector fittings. See Figures 20 and 21.

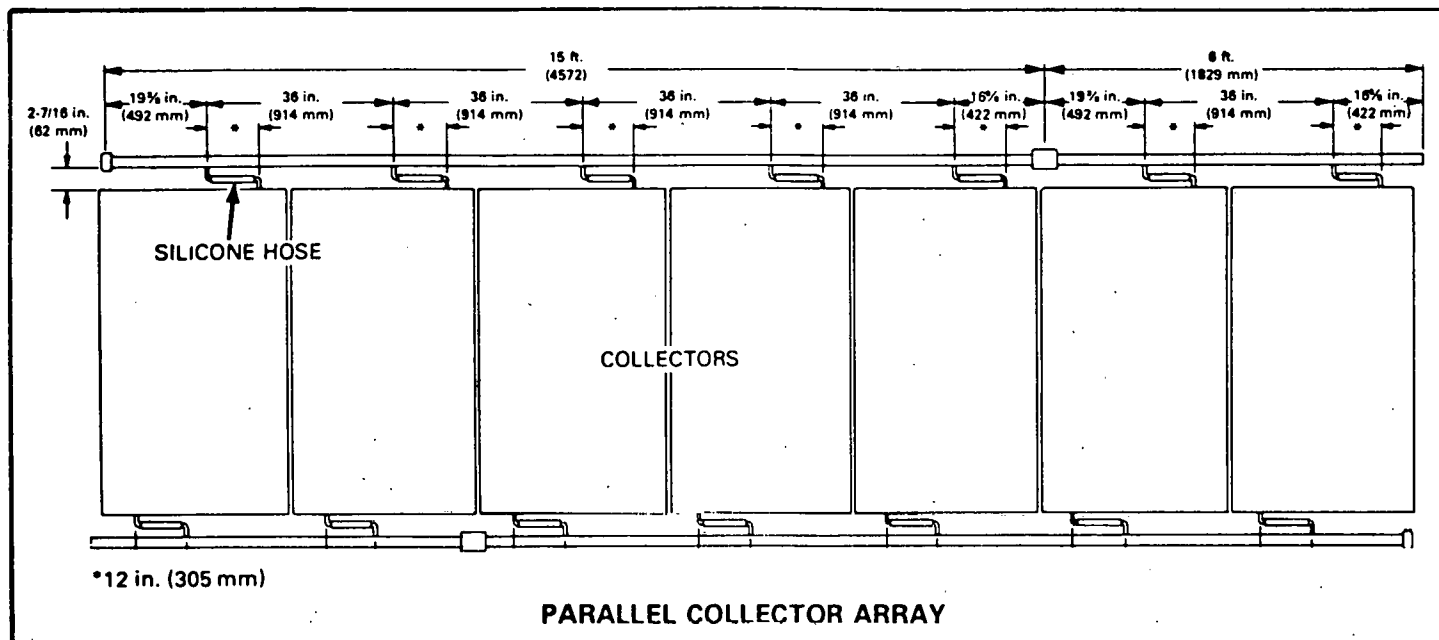


FIGURE 17

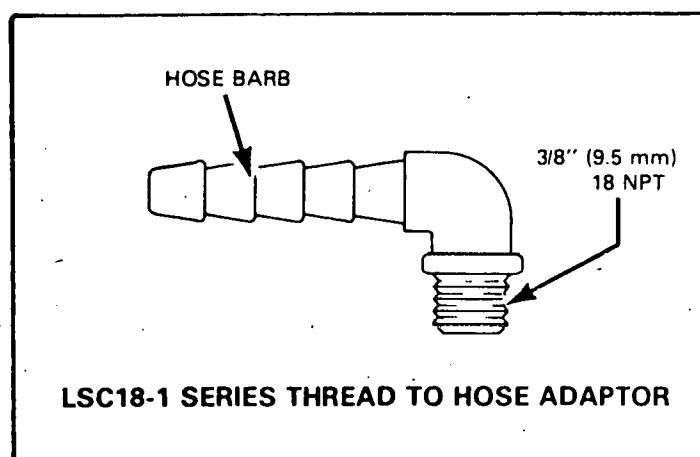


FIGURE 18

- 7 - Connect supply plumbing line to the bottom (supply) header and the return plumbing line to the top (return) header.
- 8 - Leak test the installation thoroughly at a test pressure of at least 50 psi (345 kPa) and make any needed repairs. Insulate all outdoor piping with 3/4 inch (19 mm) thick foamed plastic insulation. Waterproof outdoor pipe insulation with two coats of plastic finish reinforced with glass mesh. Install per manufacturer's recommendations.

VIII - INSULATION

Adequate insulation of all system piping is important for maximum efficiency.

A - Indoor Plumbing —

All interior piping, including solar collection, solar heating, and domestic hot and cold piping, shall be insulated with 1" (25 mm) thick split, preformed glass fiber pipe insulation, 3-1/2 lb. (1.56 kg.) minimum density, with pre-sized glass cloth secured with adhesive and staples. Fittings and valves shall be insulated with preformed glass fiber fittings or by wrapping with glass fiber blanket to meet thickness of adjacent insulation, coating with insulating cement and covering with pre-sized glass cloth secured with adhesive. Flanges and unions shall not be insulated.

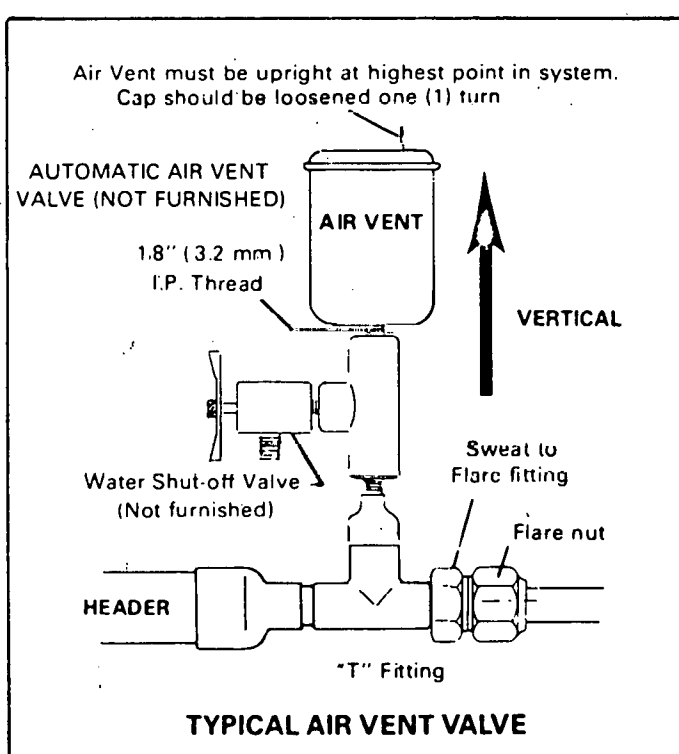


FIGURE 19

B - Outdoor Plumbing —

Insulate all outdoor piping with at least 3/4 in. (19 mm) thick foam plastic insulation equal to "Armaflex". All piping must be protected from the environment to avoid diminished efficiencies. Waterproof outdoor pipe insulation with two coats of plastic finish reinforced with glass mesh. Install per manufacturer's recommendation. Insulate valves, flexible pipe fittings, and unions.

IMPORTANT

Insulation of the system plumbing, headers and connecting hoses is essential to avoid heat losses.

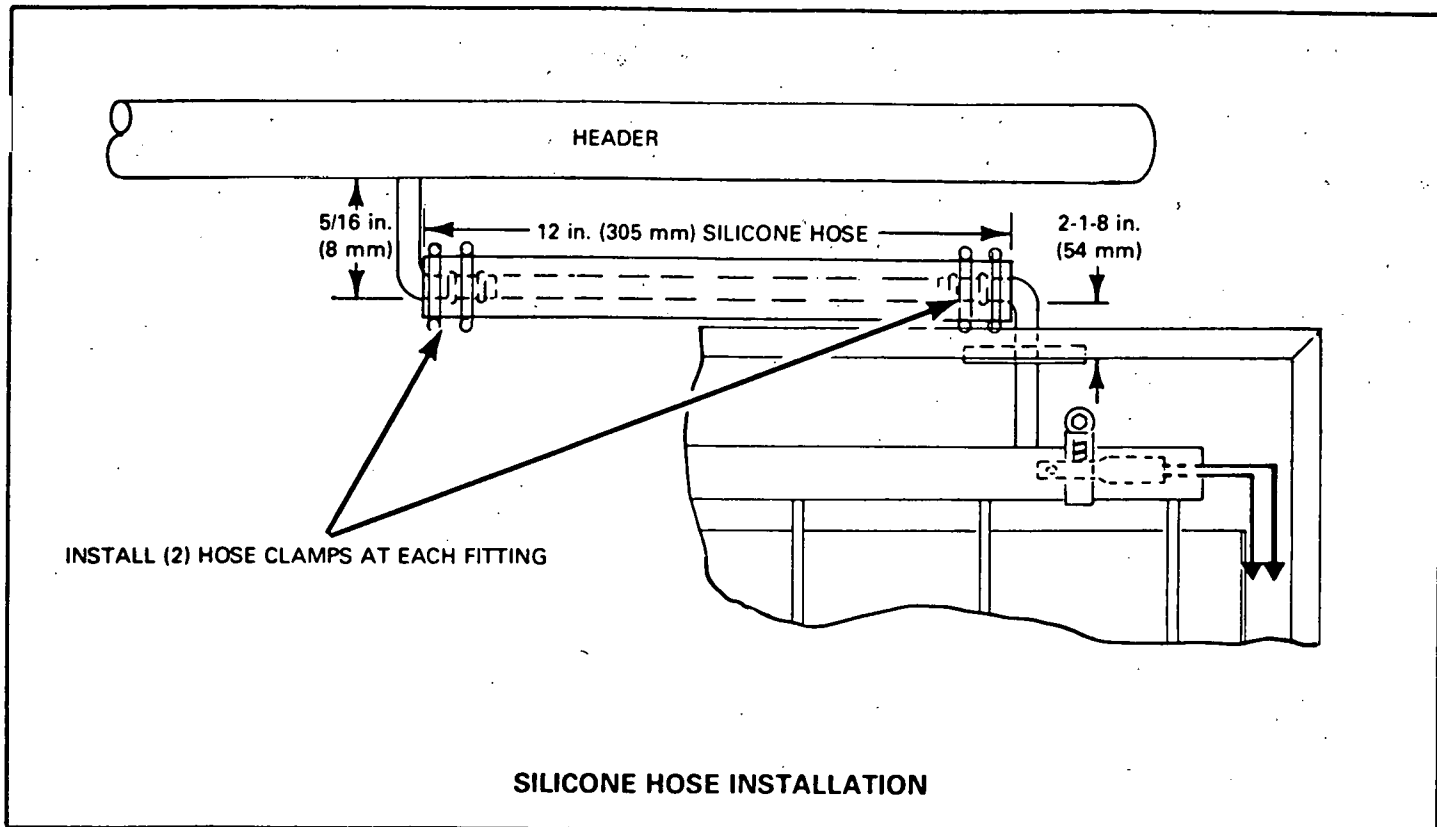


FIGURE 20

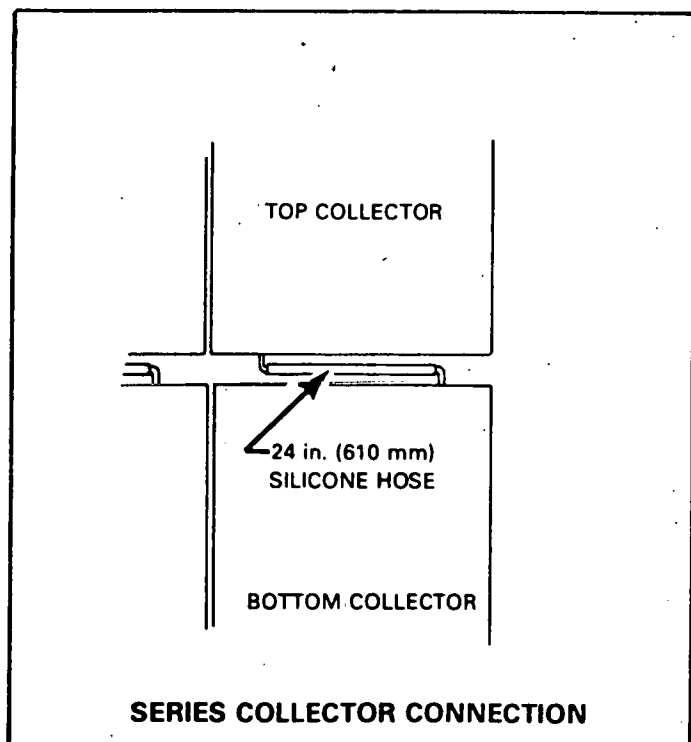


FIGURE 21

MAINTENANCE

XI - MAINTENANCE

1 - If the glass cover becomes dirty, clean the glass using a soft clean cloth, mild soap or detergent and clean rinse water. Alkalies can stain the glass if allowed to remain in contact too long. Careful, thorough cleaning of collectors should be undertaken periodically. A quick rinsing of the collector covers with a garden hose is recommended if the glass covers collect dirt. Wash with the garden hose only in the morning or evening when the collectors are not exposed to direct sunlight.

2 - Use rubber gloves when handling solar collector to avoid finger prints on glass.

NOTE - The collector surface temperature can burn. Handle solar collector with caution.

3 - To replace the glass, remove the collector as shown in Figure 22 and dismantle according to Figure 23. To re-assemble frame, insert the glass sheets and new gaskets into side pieces making sure the glass is centered and the ends are even. Next insert the glass into the end pieces and secure with existing screws. Use sealer compound on corner joints.

CAUTION!!

When reinstalling glass cover and frame **DO NOT** overtighten screws. If collector cabinet is twisted even a slight amount and the glass cover is secured too tightly the glass cover will break.

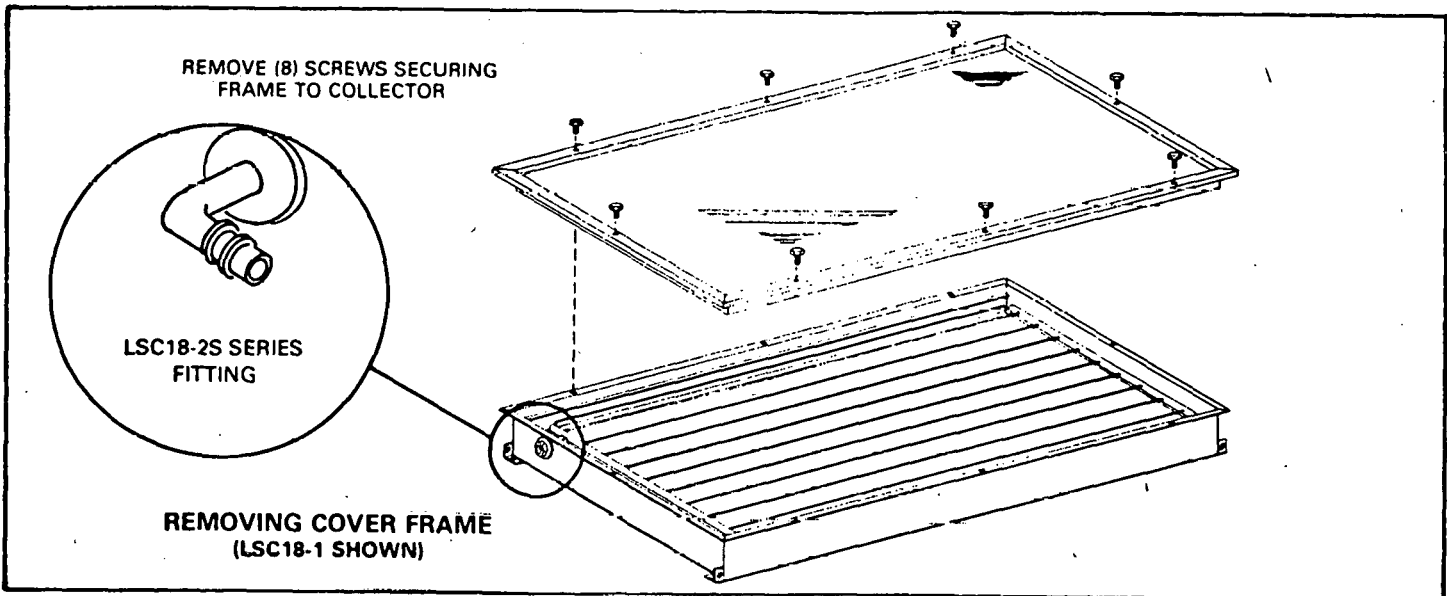


FIGURE 22

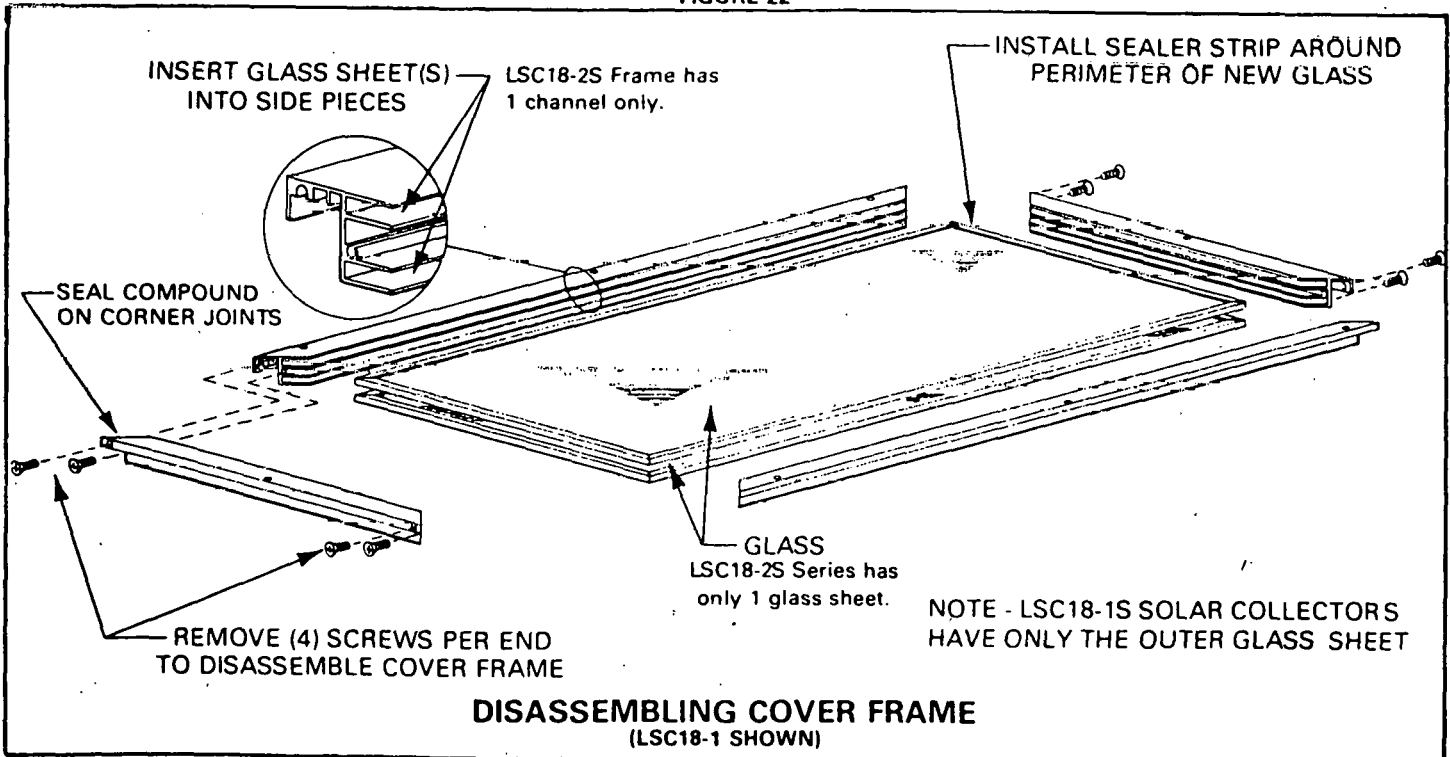


FIGURE 23

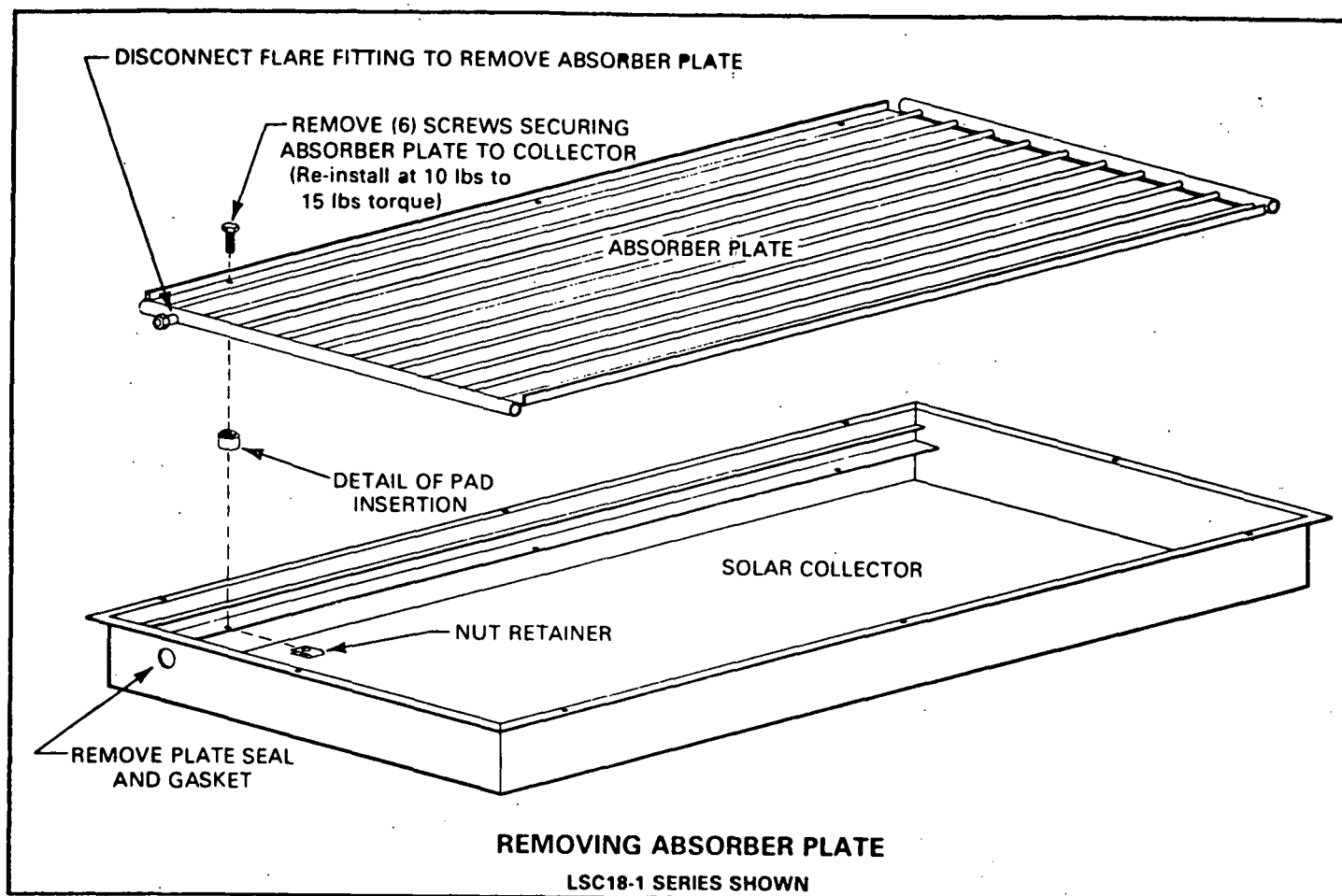


FIGURE 24

4 - To replace an LSC18-1 Series absorber plate refer to following sequence and Figure 24.

- a - Drain Collector.
- b - Remove collector frame.
- c - Remove plate seal and gasket on each end of collector.
- d - Disconnect flare fitting on each end of collector.
- e - Remove 6 screws securing absorber and left plate from cabinet. Avoid touching coating on plate.
- f - When re-assembling absorber plate, tighten screws between 10 lbs. and 15 lbs. torque.

5 - To replace an LSC18-2 Series absorber plate, refer to the following sequence and Figure 24.

- a - Drain Collector.
- b - Remove collector frame.
- c - Remove grommet at each end of collector.
- d - Remove six screws securing absorber plate.
- e - Remove the metal insulation retaining angle from each end of the collector.
- f - Slide absorber plate first to one end to remove. Lift absorber plate from cabinet being careful not to touch the black coating on absorber plate face.
- g - When re-assembling absorber plate, tighten screws with between 10 lbs. and 15 lbs. torque.

6 - The propylene glycol/distilled water fluid should be tested annually by a Lennox serviceman for proper freeze protection and inhibitor level. Lennox recommends Dow Chemicals DOWFROST (Catalogue no. 12B63)

to insure that the propylene glycol contains the proper inhibitors. The installer should premix and keep on hand a quantity of proper propylene glycol and distilled water Solar Transfer Fluid in a covered container.

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DESIGN DELIVERED CAPACITY, Btu/h..... 306,000¹

DESIGN DELIVERED CAPACITY, Tons I.M.E..... 25.5¹

ENERGY REQUIREMENTS

Design Hot Water Input, Btu/h..... 447,000
 Design Hot Water Inlet Temperature, °F..... 195
 Design Hot Water Outlet Temperature, °F..... 184.8
 Permissible Range of Inlet Temp..... 160 to 200
 Design Hot Water Flow, gpm..... 90
 Pressure Drop, Feet of Water, at 90 gpm..... 20.7
 Permissible Range of Flow, gpm..... 50 to 100
 Pressure Drop, Feet of Water, at 100 gpm..... 25.6
 Maximum Working Pressure, psig..... 100
 Electrical Voltage, 60 Hz, 1 Phase..... 115²
 Maximum Wattage Draw..... 150

CHILLED WATER DATA

Design Inlet Temperature, °F..... 55
 Design Outlet Temperature, °F..... 45
 Design Flow, gpm..... 60
 Pressure Drop, Feet of Water, at 60 gpm..... 9.8
 Permissible Range of Flow, gpm..... 30 to 100
 Pressure Drop, Feet of Water, at 100 gpm..... 26.9
 Maximum Working Pressure, psig..... 100
 Unit Water Volume, Gallons, Approx..... 12
 Fouling Factor..... .0005

CONDENSING WATER DATA

Design Heat Rejection, Btu/h..... 753,000
 Design Inlet Temperature, °F..... 85
 Design Outlet Temperature, °F..... 101.7
 Permissible Range of Inlet Temp..... 75 to 90
 Design Flow, gpm..... 90
 Pressure Drop, Feet of Water, at 90 gpm..... 22.9
 Permissible Range of Flow, gpm..... 50 to 110
 Pressure Drop, Feet of Water, at 110 gpm..... 33.5
 Maximum Working Pressure, psig..... 100
 Unit Water Volume, Gallons, Approx..... 20
 Fouling Factor..... .001

FOR COOLING TOWER SELECTION

Maximum Heat Rejection, Btu/h..... 853,000
 Range, °F..... 16 to 17
 Minimum Permissible Sump Temperature, °F..... 75³

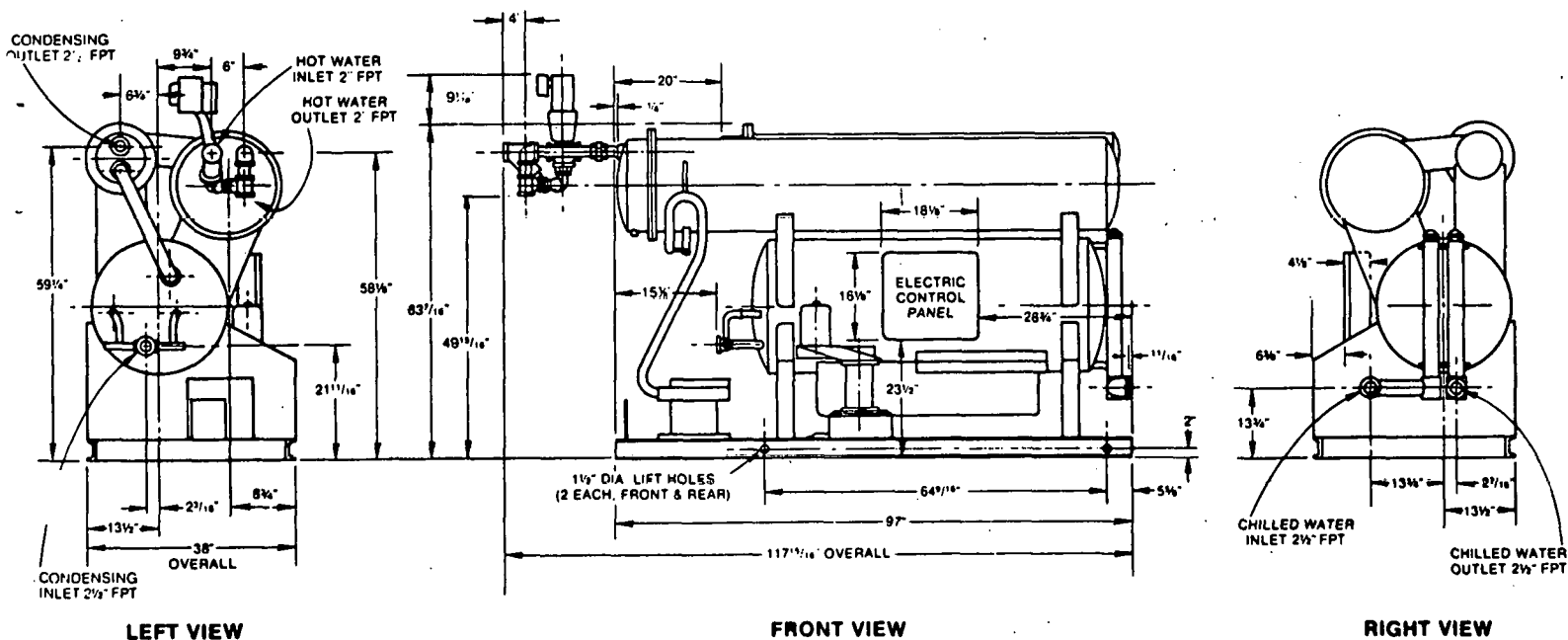
SERVICE CONNECTIONS

Hot Water Inlet and Outlet..... 2" FPT
 Chilled Water Inlet and Outlet..... 2½" FPT
 Condensing Water Inlet and Outlet..... 2½" FPT

PHYSICAL DATA, APPROXIMATES

Operating Weight, Pounds..... 3,420⁴
 Shipping Weight, Pounds..... 3,145⁵
 Crated Size, Inches..... 114 W, 45 D, 69 H

- NOTES:** 1. Capacity at design conditions. For capacities at other conditions, see Page 4.
 2. Units equipped for operation on 230V-50Hz-1Ph available on special order.
 3. Thermostatic switch to control tower fan MUST be used. Set to "cut out" at 75°F.
 4. Includes circulating water weights.
 5. Units as shipped contain Lithium Bromide charge.



Condensing Water Flow: 90 gpm Chilled Water Flow: 60 gpm Hot Water Flow: 90 gpm Temperatures in Degrees Fahrenheit						
	Hot Water Inlet Temp.	Hot Water Outlet Temp.	Energy Input Btu/h	Leaving Chilled Water Temp.	DELIVERED CAPACITY Btu/h Tons	Heat to be Rejected Btu/h
85° Inlet Condensing Water	160	157.0	132,000	40	66,000 5.5	198,000
		156.6	149,200	45	88,800 7.4	238,000
		156.0	175,900	50	102,000 8.5	277,900
	165	161.1	172,600	40	98,400 8.2	271,000
		160.5	197,900	45	129,600 10.8	347,500
		159.9	227,600	50	145,000 12.1	372,600
	170	165.1	214,300	40	132,000 11.0	346,300
		164.5	240,700	45	166,800 13.9	407,500
		164.0	262,400	50	180,000 15.0	442,400
	175	169.1	257,000	40	163,200 13.6	420,200
		168.7	277,600	45	196,800 16.4	474,400
		168.2	297,500	50	213,600 17.8	511,100
	180	173.1	302,400	40	192,000 16.0	494,400
		172.9	313,800	45	224,400 18.7	538,200
		172.2	341,200	50	246,000 20.5	587,200
	185	176.9	352,300	40	218,400 18.2	570,700
		176.8	354,900	45	252,000 21.0	606,900
		176.3	380,700	50	276,000 23.0	656,700
	190	180.9	396,000	40	237,600 19.8	633,600
		180.8	400,000	45	276,000 23.4	676,000
		180.4	421,500	50	306,000 25.5	727,500
	195	184.7	448,700	40	258,000 21.5	706,700
		184.8	446,700	45	306,000 25.5	752,700
		184.6	451,600	50	322,800 27.4	780,400
	200	188.7	490,900	40	270,000 22.5	760,900
		189.0	481,800	45	318,000 26.5	799,800
		188.6	493,200	50	360,000 30.0	853,200

90° Inlet Condensing Water	165	162.8	96,600	45	60,000 5.0	156,600
	170	166.9	139,100	45	90,000 8.0	235,100
	175	170.7	188,000	45	134,000 11.2	322,400
	180	174.7	234,000	45	168,000 14.0	402,000
	185	178.7	274,000	45	195,600 16.3	469,600
	190	182.5	327,900	45	225,600 18.8	553,400
	195	186.6	365,500	45	237,600 19.8	603,100
	200	190.4	414,500	45	252,000 21.0	666,500

Condensing Water Flow: 90 gpm Chilled Water Flow: 60 gpm Hot Water Flow: 90 gpm Temperatures in Degrees Fahrenheit						
	Hot Water Inlet Temp.	Hot Water Outlet Temp.	Energy Input Btu/h	Leaving Chilled Water Temp.	DELIVERED CAPACITY Btu/h Tons	Heat to be Rejected Btu/h
85° Inlet Condensing Water	160	156.1	174,200	40	108,000 9.0	282,200
		155.9	180,000	45	115,200 9.6	295,200
	165	160.3	210,000	40	138,000 11.5	348,000
		159.9	227,500	45	152,400 12.7	379,900
	170	164.1	259,000	40	174,000 14.5	432,900
		163.8	270,900	45	189,600 15.8	460,500
	175	168.0	306,700	40	206,400 17.2	513,100
		167.7	321,100	45	228,000 19.0	549,100
	180	172.0	351,800	40	236,400 19.7	588,200
		171.8	357,500	45	259,200 21.6	616,700
	185	176.0	395,700	40	260,400 21.7	656,100
		175.7	405,000	45	291,600 24.3	696,600
	190	179.8	446,200	40	282,000 23.5	728,200
		179.7	449,800	45	321,600 26.8	771,400
	195	183.6	500,000	40	300,000 25.0	800,000
		183.7	492,000	45	344,400 28.7	836,400
	200	187.3	547,400	40	312,000 26.0	859,400
		187.8	527,900	45	360,000 30.0	887,900

FOR 15 TON OPERATION						
Data in following table are with flows adjusted for 15 ton operation						
Condensing Water Flow: 54 gpm Hot Water Flow: 54 gpm						
Chilled Water Flow: 36 gpm Temperatures in Degrees Fahrenheit						
85° Inlet Condensing Water	165	160.4	122,000	45	72,000 6.0	194,000
	170	164.3	151,400	45	98,000 8.2	249,400
	175	167.9	186,600	45	128,400 10.7	315,000
	180	171.6	220,800	45	157,200 13.1	378,000
	185	175.4	253,300	45	182,400 15.2	435,700
	190	179.2	284,100	45	204,000 17.0	488,100
	195	183.1	312,700	45	222,000 18.5	534,700
	200	187.1	334,300	45	234,000 19.0	568,300

PRESSURE DROP for Pump Sizing In Feet of Water at Flow Rate, Gallons per Minute									
Flows gpm	30	40	50	60	70	80	90	100	110
Hot Water Circuit	NA	NA	6.0	9.4	12.7	16.7	20.7	25.6	NA
Chilled Water Circuit	2.5	4.4	6.8	9.8	13.4	17.4	21.8	26.9	NA
Condensing Water Circuit	NA	NA	7.4	10.5	14.1	18.3	22.9	27.8	33.5

Where Progress Is Built On Quality

Arkla Industries Inc.
P.O. Box 534
Evansville, IN 47704

FORM NO. SP 6101-1 OCT 1976

ARKLA INDUSTRIES, INC.
1001 N. 10TH ST.
DALLAS, TEXAS 75218
PHONE: 416-27-4345

Heat Exchangers HX1, HX2, HX3



Oslin Nation Co.

Manufacturers Representatives

September 23, 1977

(214) 631-5650
2532 IRVING BLVD.
DALLAS, TEXAS 75207

JOB: North Hampton Recreation Center
Dallas, Texas

ENGINEER: Travis, Braun & Associates
Dallas, Texas

CONTRACTOR: Natkin & Company
Dallas, Texas

H V A C

HEAT EXCHANGERS

- 1 Bell & Gossett Model WU-148-24 with 234 sq. ft. of heating surface. To be marked HX-1.
- 1 Bell & Gossett Model WU-65-23 with 22.1 sq. ft. of heating surface. To be marked HX-2
- 1 Bell & Gossett Model WU-63-23 with 12.7 sq. ft. of heating surface. To be marked HX-3

TYPE "WU" HEAT EXCHANGERS ("U" Tube Design)

OK

"WU" type "U" tube
Shell diameter in inches
Tube bundle length in feet
Number of tube passes
Tube spacing in inches

DIMENSIONS (Continued)

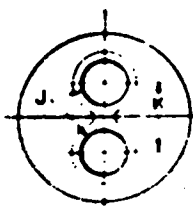
Complete sales number consists of example: WU86-44

UNIT NUMBER		DIMENSIONS IN INCHES												HEATING SURFACE SQ. FT.		Approx. Shpg. Wt. (Lbs.)
		2 Pass		4 Pass				2, 4 and 6 Pass						2 Pass	4 Pass	
2 Pass	4 Pass	J	K	H	L	M	N	A	B	C	D	E	F			
WU144-24	WU144-44	6 NPT	8	4 NPT	3 ⁵ / ₁₆	6 ⁹ / ₁₆	5 ⁷ / ₈	57 ¹ / ₈	17 ⁷ / ₈	36 ⁷ / ₈	12	14	4 FLG	116	111	635
WU145-24	WU145-44	6 NPT	8	4 NPT	3 ⁵ / ₁₆	6 ⁹ / ₁₆	5 ⁷ / ₈	69 ¹ / ₈	17 ⁷ / ₈	48 ⁷ / ₈	12	14	4 FLG	146	139	720
WU146-24	WU146-44	6 NPT	8	4 NPT	3 ⁵ / ₁₆	6 ⁹ / ₁₆	5 ⁷ / ₈	81 ¹ / ₈	17 ⁷ / ₈	60 ⁷ / ₈	12	14	4 FLG	175	167	805
WU147-24	WU147-44	6 NPT	8	4 NPT	3 ⁵ / ₁₆	6 ⁹ / ₁₆	5 ⁷ / ₈	93 ¹ / ₈	17 ⁷ / ₈	72 ⁷ / ₈	12	14	4 FLG	204	196	890
WU148-24	WU148-44	6 NPT	8	4 NPT	3 ⁵ / ₁₆	6 ⁹ / ₁₆	5 ⁷ / ₈	105 ¹ / ₈	17 ⁷ / ₈	84 ⁷ / ₈	12	14	4 FLG	234	224	975
WU149-24	WU149-44	6 NPT	8	4 NPT	3 ⁵ / ₁₆	6 ⁹ / ₁₆	5 ⁷ / ₈	117 ¹ / ₈	17 ⁷ / ₈	96 ⁷ / ₈	12	14	4 FLG	263	252	1060
WU144-28	WU144-48	6 NPT	8	4 NPT	3 ⁵ / ₁₆	6 ⁹ / ₁₆	5 ⁷ / ₈	57 ¹ / ₈	17 ⁷ / ₈	34 ⁷ / ₈	13	14	6 FLG	116	111	635
WU145-28	WU145-48	6 NPT	8	4 NPT	3 ⁵ / ₁₆	6 ⁹ / ₁₆	5 ⁷ / ₈	69 ¹ / ₈	17 ⁷ / ₈	46 ⁷ / ₈	13	14	6 FLG	146	139	720
WU146-28	WU146-48	6 NPT	8	4 NPT	3 ⁵ / ₁₆	6 ⁹ / ₁₆	5 ⁷ / ₈	81 ¹ / ₈	17 ⁷ / ₈	58 ⁷ / ₈	13	14	6 FLG	175	167	805
WU147-28	WU147-48	6 NPT	8	4 NPT	3 ⁵ / ₁₆	6 ⁹ / ₁₆	5 ⁷ / ₈	93 ¹ / ₈	17 ⁷ / ₈	70 ⁷ / ₈	13	14	6 FLG	204	196	890
WU148-28	WU148-48	6 NPT	8	4 NPT	3 ⁵ / ₁₆	6 ⁹ / ₁₆	5 ⁷ / ₈	105 ¹ / ₈	17 ⁷ / ₈	82 ⁷ / ₈	13	14	6 FLG	234	224	975
WU149-28	WU149-48	6 NPT	8	4 NPT	3 ⁵ / ₁₆	6 ⁹ / ₁₆	5 ⁷ / ₈	117 ¹ / ₈	17 ⁷ / ₈	94 ⁷ / ₈	13	14	6 FLG	263	252	1060
WU164-25	WU164-45	6 NPT	9 ¹ / ₈	4 NPT	4	7 ⁹ / ₁₆	8	57 ³ / ₄	19 ⁷ / ₈	34	14	16	6 FLG	150	143	787
WU165-25	WU165-45	6 NPT	9 ¹ / ₈	4 NPT	4	7 ⁹ / ₁₆	8	69 ³ / ₄	19 ⁷ / ₈	46	14	16	6 FLG	188	180	892
WU166-25	WU166-45	6 NPT	9 ¹ / ₈	4 NPT	4	7 ⁹ / ₁₆	8	81 ³ / ₄	19 ⁷ / ₈	58	14	16	6 FLG	227	217	997
WU167-25	WU167-45	6 NPT	9 ¹ / ₈	4 NPT	4	7 ⁹ / ₁₆	8	93 ³ / ₄	19 ⁷ / ₈	70	14	16	6 FLG	265	254	1102
WU168-25	WU168-45	6 NPT	9 ¹ / ₈	4 NPT	4	7 ⁹ / ₁₆	8	105 ³ / ₄	19 ⁷ / ₈	82	14	16	6 FLG	304	291	1207
WU169-25	WU169-45	6 NPT	9 ¹ / ₈	4 NPT	4	7 ⁹ / ₁₆	8	117 ³ / ₄	19 ⁷ / ₈	94	14	16	6 FLG	342	327	1312
WU164-210	WU164-410	6 NPT	9 ¹ / ₈	4 NPT	4	7 ⁹ / ₁₆	8	57 ³ / ₄	19 ⁷ / ₈	31 ³ / ₄	16	16	8 FLG	150	143	787
WU165-210	WU165-410	6 NPT	9 ¹ / ₈	4 NPT	4	7 ⁹ / ₁₆	8	69 ³ / ₄	19 ⁷ / ₈	43 ³ / ₄	16	16	8 FLG	188	180	892
WU166-210	WU166-410	6 NPT	9 ¹ / ₈	4 NPT	4	7 ⁹ / ₁₆	8	81 ³ / ₄	19 ⁷ / ₈	55 ³ / ₄	16	16	8 FLG	227	217	997
WU167-210	WU167-410	6 NPT	9 ¹ / ₈	4 NPT	4	7 ⁹ / ₁₆	8	93 ³ / ₄	19 ⁷ / ₈	67 ³ / ₄	16	16	8 FLG	265	254	1102
WU168-210	WU168-410	6 NPT	9 ¹ / ₈	4 NPT	4	7 ⁹ / ₁₆	8	105 ³ / ₄	19 ⁷ / ₈	79 ³ / ₄	16	16	8 FLG	304	291	1207
WU169-210	WU169-410	6 NPT	9 ¹ / ₈	4 NPT	4	7 ⁹ / ₁₆	8	117 ³ / ₄	19 ⁷ / ₈	91 ³ / ₄	16	16	8 FLG	342	327	1312
WU184-26	WU184-46	6 NPT	11	4 NPT	4 ⁵ / ₈	8 ³ / ₈	9 ¹ / ₄	63 ¹ / ₂	22	39 ¹ / ₂	13 ³ / ₄	18	6 FLG	195	195	1015
WU185-26	WU185-46	6 NPT	11	4 NPT	4 ⁵ / ₈	8 ³ / ₈	9 ¹ / ₄	75 ¹ / ₂	22	51 ¹ / ₂	13 ³ / ₄	18	6 FLG	242	242	1139
WU186-26	WU186-46	6 NPT	11	4 NPT	4 ⁵ / ₈	8 ³ / ₈	9 ¹ / ₄	87 ¹ / ₂	22	63 ¹ / ₂	13 ³ / ₄	18	6 FLG	290	290	1263
WU187-26	WU187-46	6 NPT	11	4 NPT	4 ⁵ / ₈	8 ³ / ₈	9 ¹ / ₄	99 ¹ / ₂	22	75 ¹ / ₂	13 ³ / ₄	18	6 FLG	339	339	1387
WU188-26	WU188-46	6 NPT	11	4 NPT	4 ⁵ / ₈	8 ³ / ₈	9 ¹ / ₄	111 ¹ / ₂	22	87 ¹ / ₂	13 ³ / ₄	18	6 FLG	387	387	1511
WU189-26	WU189-46	6 NPT	11	4 NPT	4 ⁵ / ₈	8 ³ / ₈	9 ¹ / ₄	123 ¹ / ₂	22	99 ¹ / ₂	13 ³ / ₄	18	6 FLG	435	435	1635
WU184-212	WU184-412	6 NPT	11	4 NPT	4 ⁵ / ₈	8 ³ / ₈	9 ¹ / ₄	65 ¹ / ₂	22	39 ¹ / ₄	15	18	8 FLG	195	195	1015
WU185-212	WU185-412	6 NPT	11	4 NPT	4 ⁵ / ₈	8 ³ / ₈	9 ¹ / ₄	77 ¹ / ₂	22	51 ¹ / ₄	15	18	8 FLG	242	242	1139
WU186-212	WU186-412	6 NPT	11	4 NPT	4 ⁵ / ₈	8 ³ / ₈	9 ¹ / ₄	89 ¹ / ₂	22	63 ¹ / ₄	15	18	8 FLG	290	290	1263
WU187-212	WU187-412	6 NPT	11	4 NPT	4 ⁵ / ₈	8 ³ / ₈	9 ¹ / ₄	101 ¹ / ₂	22	75 ¹ / ₄	15	18	8 FLG	339	339	1387
WU188-212	WU188-412	6 NPT	11	4 NPT	4 ⁵ / ₈	8 ³ / ₈	9 ¹ / ₄	113 ¹ / ₂	22	87 ¹ / ₄	15	18	8 FLG	387	387	1511
WU189-212	WU189-412	6 NPT	11	4 NPT	4 ⁵ / ₈	8 ³ / ₈	9 ¹ / ₄	125 ¹ / ₂	22	99 ¹ / ₄	15	18	8 FLG	435	435	1635
WU204-28	WU204-48	8 NPT	10 ⁵ / ₈	6 NPT	4 ³ / ₈	9 ¹ / ₂	8 ³ / ₄	65 ¹ / ₈	24	39 ¹ / ₂	15	20	6 FLG	259	251	1402
WU205-28	WU205-48	8 NPT	10 ⁵ / ₈	6 NPT	4 ³ / ₈	9 ¹ / ₂	8 ³ / ₄	77 ¹ / ₈	24	51 ¹ / ₂	15	20	6 FLG	324	314	1560
WU206-28	WU206-48	8 NPT	10 ⁵ / ₈	6 NPT	4 ³ / ₈	9 ¹ / ₂	8 ³ / ₄	89 ¹ / ₈	24	63 ¹ / ₂	15	20	6 FLG	388	377	1716
WU207-28	WU207-48	8 NPT	10 ⁵ / ₈	6 NPT	4 ³ / ₈	9 ¹ / ₂	8 ³ / ₄	101 ¹ / ₈	24	75 ¹ / ₂	15	20	6 FLG	453	439	1873
WU208-28	WU208-48	8 NPT	10 ⁵ / ₈	6 NPT	4 ³ / ₈	9 ¹ / ₂	8 ³ / ₄	113 ¹ / ₈	24	87 ¹ / ₂	15	20	6 FLG	517	502	2030
WU209-28	WU209-48	8 NPT	10 ⁵ / ₈	6 NPT	4 ³ / ₈	9 ¹ / ₂	8 ³ / ₄	125 ¹ / ₈	24	99 ¹ / ₂	15	20	6 FLG	582	565	2187
WU204-210	WU204-410	8 NPT	10 ⁵ / ₈	6 NPT	4 ³ / ₈	9 ¹ / ₂	8 ³ / ₄	69 ¹ / ₈	24	41 ¹ / ₄	16 ¹ / ₄	20	8 FLG	259	251	1402
WU205-213	WU205-413	8 NPT	10 ⁵ / ₈	6 NPT	4 ³ / ₈	9 ¹ / ₂	8 ³ / ₄	81 ¹ / ₈	24	51	17 ¹ / ₂	20	10 FLG	324	314	1560
WU206-216	WU206-416	8 NPT	10 ⁵ / ₈	6 NPT	4 ³ / ₈	9 ¹ / ₂	8 ³ / ₄	93 ¹ / ₈	24	63	17 ¹ / ₂	20	10 FLG	388	377	1716
WU207-216	WU207-416	8 NPT	10 ⁵ / ₈	6 NPT	4 ³ / ₈	9 ¹ / ₂	8 ³ / ₄	105 ¹ / ₈	24	75	17 ¹ / ₂	20	10 FLG	453	439	1873
WU208-216	WU208-416	8 NPT	10 ⁵ / ₈	6 NPT	4 ³ / ₈	9 ¹ / ₂	8 ³ / ₄	117 ¹ / ₈	24	87	17 ¹ / ₂	20	10 FLG	517	502	2030
WU209-216	WU209-416	8 NPT	10 ⁵ / ₈	6 NPT	4 ³ / ₈	9 ¹ / ₂	8 ³ / ₄	129 ¹ / ₈	24	99	17 ¹ / ₂	20	10 FLG	582	565	2187

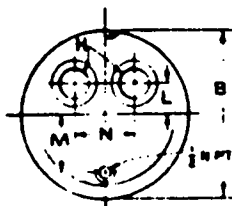
Dimensions are subject to change. If exact dimensions are needed for layout, write for certified prints.

TYPE "WU" HEAT EXCHANGERS ("U" Tube Design)

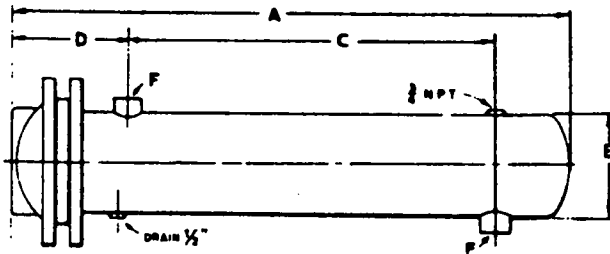
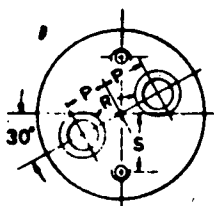
2 PASS HEAD



4 PASS HEAD



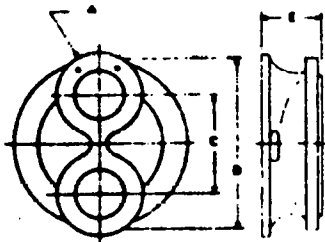
6 PASS HEAD



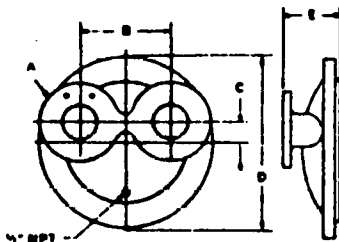
Cast iron or bolted steel legs can be supplied when specified.

Room for removal of tube bundle, equal to or greater than "A", should be provided.

150 PSI WORKING PRESSURE CAST IRON HEADS Available only on the following units.



2 PASS HEAD



4 PASS HEAD

Flange connections for field piping drilled and faced per 150# ANSI standards.

DIMENSIONS 4" THRU 20" DIAMETER

2-PASS

SHELL DIA.	A	C	D	E	2-PASS	4-PASS
10"	4	8%	14%	5%	10"	NOT AVAILABLE
12"	4	8%	16%	5%	12"	NOT AVAILABLE
14"	5	10%	17%	6%	14"	4 8% 2% 17% 6%
16"	6	11%	18%	6%	16"	4 8% 2% 18% 6%
18"	6	11%	22	7%	18"	4 8% 4% 22 7%
20"	8	13%	24	8	20"	8 11% 3% 24 7%

4-PASS

Complete sales number consists of example: WU86-44

"WU" type "U" tube
Shell diameter in inches
Tube bundle length in feet
Number of tube passes
Baffle spacing in inches

UNIT NUMBER			DIMENSIONS IN INCHES														HEATING SURFACE (SQ. FT.)			APPROX. SHIPPING WT. (LBS.)	
			2 PASS		4 PASS			6 PASS			2, 4, AND 6 PASS										
2 PASS	4 PASS	6 PASS	J	K	N	L	M	P	R	S	A	B	C	D	E	F	2 Pass	4 Pass	6 Pass		
WU43-35	WU43-40	-	1 1/4 NPT	2 1/2	1 NPT	1	1 1/2	2 1/2	-	-	-	40 1/2	7 1/2	29	6 1/2	4 1/2	2 1/2" NPT	4.1	4.1	-	78
WU44-35	WU44-40	-	1 1/4 NPT	2 1/2	1 NPT	1	1 1/2	2 1/2	-	-	-	52 1/2	7 1/2	41	6 1/2	4 1/2	2 1/2" NPT	5.7	5.7	-	92
WU45-35	WU45-40	-	1 1/4 NPT	2 1/2	1 NPT	1	1 1/2	2 1/2	-	-	-	64 1/2	7 1/2	53	6 1/2	4 1/2	2 1/2" NPT	7.2	7.2	-	106
WU46-35	WU46-40	-	1 1/4 NPT	2 1/2	1 NPT	1	1 1/2	2 1/2	-	-	-	76 1/2	7 1/2	65	6 1/2	4 1/2	2 1/2" NPT	8.8	8.8	-	120
WU47-35	WU47-40	-	1 1/4 NPT	2 1/2	1 NPT	1	1 1/2	2 1/2	-	-	-	88 1/2	7 1/2	77	6 1/2	4 1/2	2 1/2" NPT	10.4	10.4	-	134
WU48-35	WU48-40	WU48-45	2 NPT	3 1/2	1 1/2 NPT	1 1/2	2 1/2	3 1/2	2 1/2	1 1/2 NPT	40 1/2	10 1/2	27 1/2	6 1/2	6 1/2	2 1/2" NPT	12.7	12.7	9.6	125	
WU49-35	WU49-40	WU49-45	2 NPT	3 1/2	1 1/2 NPT	1 1/2	2 1/2	3 1/2	2 1/2	1 1/2 NPT	52 1/2	10 1/2	39 1/2	6 1/2	6 1/2	2 1/2" NPT	17.4	17.4	13.1	150	
WU50-35	WU50-40	WU50-45	2 NPT	3 1/2	1 1/2 NPT	1 1/2	2 1/2	3 1/2	2 1/2	1 1/2 NPT	64 1/2	10 1/2	51 1/2	6 1/2	6 1/2	2 1/2" NPT	22.1	22.1	16.7	175	
WU51-35	WU51-40	WU51-45	2 NPT	3 1/2	1 1/2 NPT	1 1/2	2 1/2	3 1/2	2 1/2	1 1/2 NPT	76 1/2	10 1/2	63 1/2	6 1/2	6 1/2	2 1/2" NPT	26.8	26.8	20.2	200	
WU52-35	WU52-40	WU52-45	2 NPT	3 1/2	1 1/2 NPT	1 1/2	2 1/2	3 1/2	2 1/2	1 1/2 NPT	88 1/2	10 1/2	75 1/2	6 1/2	6 1/2	2 1/2" NPT	31.5	31.5	23.8	225	
WU53-35	WU53-40	WU53-45	2 NPT	3 1/2	1 1/2 NPT	1 1/2	2 1/2	3 1/2	2 1/2	1 1/2 NPT	100 1/2	10 1/2	87 1/2	6 1/2	6 1/2	2 1/2" NPT	36.2	36.2	27.3	250	
WU54-35	WU54-40	WU54-45	3 NPT	5	2 NPT	2	3 1/2	4	3	2 NPT	53	12 1/2	37	8 1/2	8 1/2	4" FLG	32	32	26	222	
WU55-35	WU55-40	WU55-45	3 NPT	5	2 NPT	2	3 1/2	4	3	2 NPT	65	12 1/2	49	8 1/2	8 1/2	4" FLG	41	41	33	258	
WU56-35	WU56-40	WU56-45	3 NPT	5	2 NPT	2	3 1/2	4	3	2 NPT	77	12 1/2	61	8 1/2	8 1/2	4" FLG	49	49	41	294	
WU57-35	WU57-40	WU57-45	3 NPT	5	2 NPT	2	3 1/2	4	3	2 NPT	89	12 1/2	73	8 1/2	8 1/2	4" FLG	58	58	48	330	
WU58-35	WU58-40	WU58-45	3 NPT	5	2 NPT	2	3 1/2	4	3	2 NPT	101	12 1/2	85	8 1/2	8 1/2	4" FLG	67	67	56	368	
WU59-35	WU59-40	WU59-45	3 NPT	5	2 NPT	2	3 1/2	4	3	2 NPT	113	12 1/2	97	8 1/2	8 1/2	4" FLG	75	75	62	402	
WU60-35	WU60-40	WU60-45	4 NPT	5 1/2	3 NPT	2 1/2	4 1/2	4 1/2	3 1/2	2 1/2 NPT	53	14 1/2	38 1/2	9	10 1/2	4" FLG	56	53	45	331	
WU61-35	WU61-40	WU61-45	4 NPT	5 1/2	3 NPT	2 1/2	4 1/2	4 1/2	3 1/2	2 1/2 NPT	65	14 1/2	48 1/2	9	10 1/2	4" FLG	71	68	56	384	
WU62-35	WU62-40	WU62-45	4 NPT	5 1/2	3 NPT	2 1/2	4 1/2	4 1/2	3 1/2	2 1/2 NPT	77	14 1/2	60 1/2	9	10 1/2	4" FLG	86	82	68	437	
WU63-35	WU63-40	WU63-45	4 NPT	5 1/2	3 NPT	2 1/2	4 1/2	4 1/2	3 1/2	2 1/2 NPT	89	14 1/2	72 1/2	9	10 1/2	4" FLG	101	96	80	490	
WU64-35	WU64-40	WU64-45	4 NPT	5 1/2	3 NPT	2 1/2	4 1/2	4 1/2	3 1/2	2 1/2 NPT	101	14 1/2	84 1/2	9	10 1/2	4" FLG	116	110	92	543	
WU65-35	WU65-40	WU65-45	4 NPT	5 1/2	3 NPT	2 1/2	4 1/2	4 1/2	3 1/2	2 1/2 NPT	113	14 1/2	96 1/2	9	10 1/2	4" FLG	131	124	104	598	
WU66-35	WU66-40	WU66-45	4 NPT	5 1/2	3 NPT	2 1/2	4 1/2	4 1/2	3 1/2	2 1/2 NPT	125	14 1/2	108 1/2	9	10 1/2	4" FLG	146	138	116	650	
WU67-35	WU67-40	WU67-45	4 NPT	7 1/2	4 NPT	2 1/2	5 1/2	5 1/2	4 1/2	3 NPT	56 1/2	16 1/2	37 1/2	10 1/2	12 1/2	5" FLG	83	78	68	458	
WU68-35	WU68-40	WU68-45	4 NPT	7 1/2	4 NPT	2 1/2	5 1/2	5 1/2	4 1/2	3 NPT	68 1/2	16 1/2	49 1/2	10 1/2	12 1/2	5" FLG	104	98	85	525	
WU69-35	WU69-40	WU69-45	4 NPT	7 1/2	4 NPT	2 1/2	5 1/2	5 1/2	4 1/2	3 NPT	80 1/2	16 1/2	61 1/2	10 1/2	12 1/2	5" FLG	126	119	103	584	
WU70-35	WU70-40	WU70-45	4 NPT	7 1/2	4 NPT	2 1/2	5 1/2	5 1/2	4 1/2	3 NPT	92 1/2	16 1/2	73 1/2	10 1/2	12 1/2	5" FLG	148	139	121	663	
WU71-35	WU71-40	WU71-45	4 NPT	7 1/2	4 NPT	2 1/2	5 1/2	5 1/2	4 1/2	3 NPT	104 1/2	16 1/2	85 1/2	10 1/2	12 1/2	5" FLG	169	160	139	732	
WU72-35	WU72-40	WU72-45	4 NPT	7 1/2	4 NPT	2 1/2	5 1/2	5 1/2	4 1/2	3 NPT	116 1/2	16 1/2	97 1/2	10 1/2	12 1/2	5" FLG	191	180	156	801	

TYPE "WU" HEAT EXCHANGERS ("U" Tube Design)

DESIGN PRESSURES—A.S.M.E. CONSTRUCTION CAST IRON & BRASS UNITS

SHELL DIAMETER	DESIGN PRESSURES				MAX. TEMP. AV. OF TUBE & SHELL SIDE	
	TUBE SIDE*		SHELL SIDE			
	WORKING	TEST	WORKING	TEST	CAST IRON	BRASS
4"	150 psi	300 psi	150 psi	300 psi	375 F	300 F
6"	150 psi	300 psi	150 psi	300 psi	375 F	300 F
8"	150 psi	300 psi	150 psi	300 psi	375 F	300 F
10" 4 & 6 Pass	150 psi	300 psi	150 psi	300 psi	375 F	300 F
10" 2 Pass	125 psi	250 psi	150 psi	300 psi	375 F	300 F
12" 6 Pass	150 psi	300 psi	150 psi	300 psi	375 F	—
12" 2 & 4 Pass	125 psi	250 psi	150 psi	300 psi	375 F	300 F
14"	125 psi	250 psi	150 psi	300 psi	375 F	300 F
16"	125 psi	250 psi	150 psi	300 psi	375 F	300 F
18"	125 psi	250 psi	150 psi	300 psi	375 F	300 F
20"	125 psi	250 psi	150 psi	300 psi	375 F	300 F

* For tube side pressure higher than shown, special heads are required. Consult B & G Representative for specifications and dimensions.

CONSTRUCTION

Standard "WU" Heat Exchangers are constructed according to A.S.M.E. requirements for pressures and temperature noted in table above. A Manufacturers' Data Report for Unfired Pressure Vessels, Form No. U-1 as required by the provisions of the A.S.M.E. Code Rules is furnished with each unit.

This form is signed by a qualified inspector, holding a National Board Commission, and is certified by the Mutual Boiler and Machinery Insurance Company, Factory Mutual Group of Insurance Companies, that construction conforms to the latest A.S.M.E. Code for unfired pressure vessels. The A.S.M.E. "U" symbol is stamped on each vessel.

MATERIALS

PART	STANDARD CAST IRON UNIT	BRASS UNIT
	2, 4 & 6 Pass	2 & 4 Pass
Shell	Steel	Steel
Head	Cast Iron	Cast Brass
Tubes ¾" O.D.	Copper	Copper
Tube Sheet	Steel	Rolled Naval Brass
Baffles	Steel	Steel
Nuts & Bolts	Steel	Steel

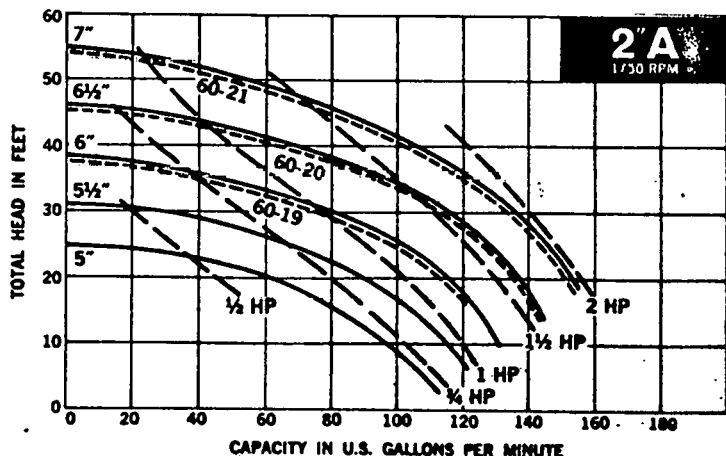
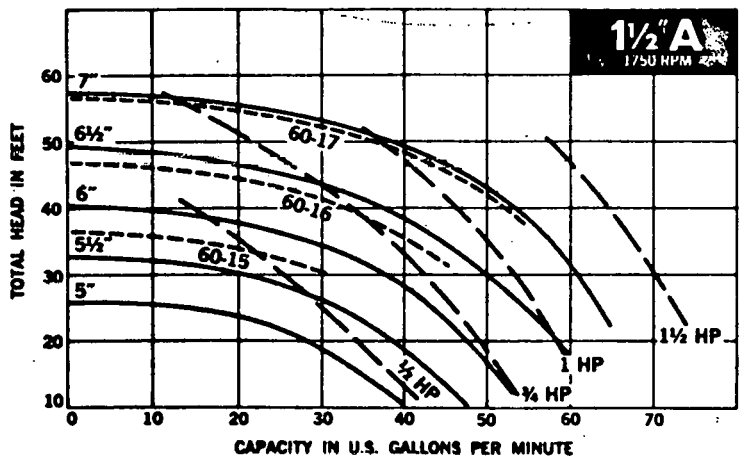
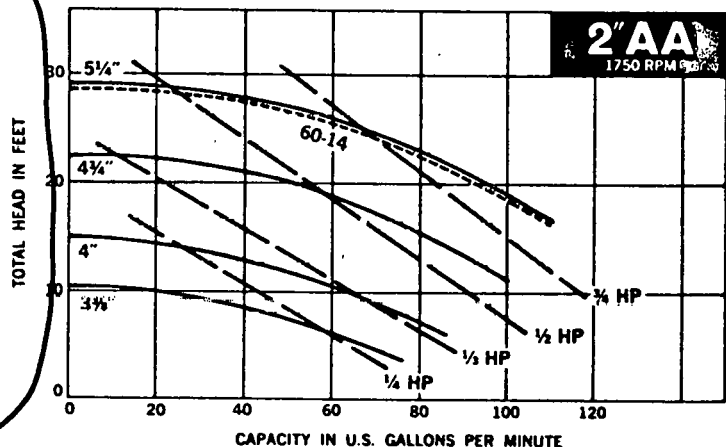
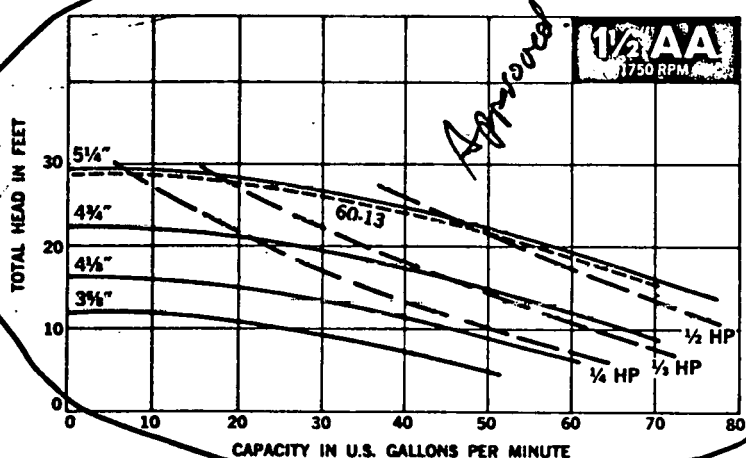
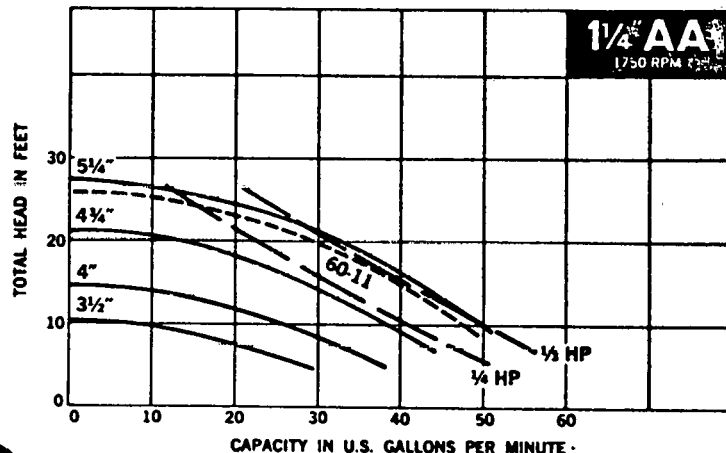
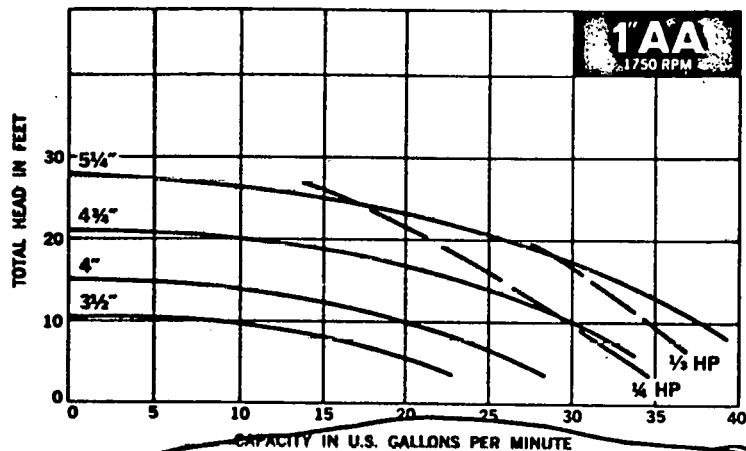
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This page has been deleted because of copyright information. For information on Bell and Gossett, series 60 in-line pumps, contact Bell and Gossett (ITT), B200N Austin Ave., Morton Grove, Ill. 60053.

Series 60 Pumps can be furnished in
bronze-fitted, all iron, or all bronze construction
to suit your application

P3, P4, P5

DOTTED-IN CURVES REPRESENT STOCK PUMP SELECTIONS



Curves based upon shop test using clear cold water
at a temperature of not over 85° F.
Horsepower curves do not include motor service factor.

Dimensions

FIG. 1 AA SIZES

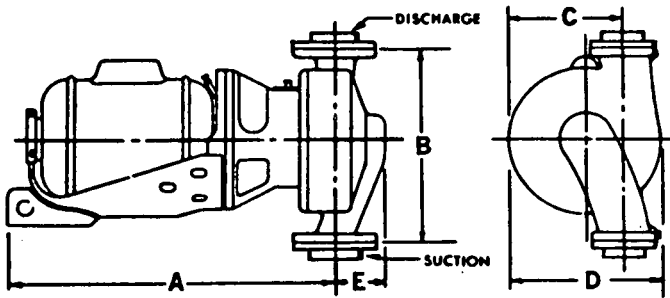
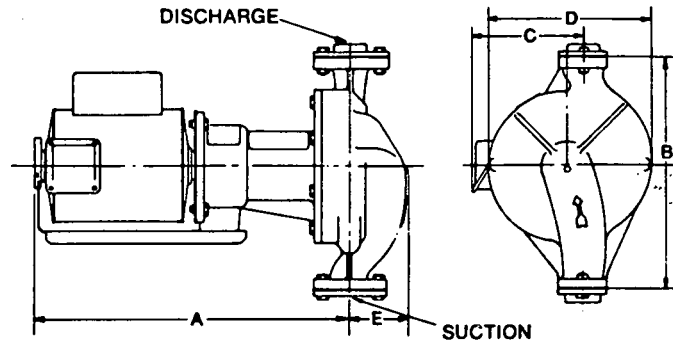


FIG. 2 A SIZES



STANDARD VOLTAGES

¼ HP, 1 PH, 115 Volts. ½ to 1½ HP, 1 PH, 115/230 Volts. ¼ to ¾ HP, 3 PH, 200-230/460 Volts. 1 to 2 HP, 208 or 230/460 Volts. All single phase motors have built-in overload protection.

Companion flanges furnished for suction and discharge

STOCK PUMP MODEL	PUMP SIZE	DRIppROOF MOTOR HP	SUCTION & DISCHARGE SIZE (NPT)	DIMENSIONS IN INCHES				
				A	B	C	D	E
—	1AA	¼	1	15½	11	4¾	6½	3⅞
—	1AA	⅓	1	16½	11	4¾	6½	3⅞
60-11	1¼AA	¼	1¼	15½	11	5	7½	3⅞
—	1¼AA	⅓	1¼	16½	11	5	7½	3⅞
—	1¼AA	½	1¼	17¾	11	5	7½	3⅞
—	1½AA	¼	1½	16	11½	5½	7⅞	3⅞
—	1½AA	⅓	1½	17	11½	5½	7⅞	3⅞
60-13	1½AA	½	1½	17½	11½	5½	7⅞	3⅞
—	1½AA	¾	1½	18	11½	5½	7⅞	3⅞
—	2AA	¼	2	16½	11½	5½	8	3¾
—	2AA	⅓	2	17½	11½	5½	8	3¾
—	2AA	½	2	17¾	11½	5½	8	3¾
60-14	2AA	¾	2	18½	11½	5½	8	3¾
60-15	1½A	½	1½	20¼	13½	5½	9½	3¼
60-16	1½A	¾	1½	21¾	13½	5½	9½	3¼
60-17	1½A	1	1½	19¾	13½	5½	9½	3¼
—	1½A	1½	1½	20⅝	13½	5½	9½	3¼
—	2A	½	2	21¼	14	5¾	9⅞	3½
—	2A	¾	2	21¾	14	5¾	9⅞	3½
60-19	2A	1	2	19¾	14	5¾	9⅞	3½
60-20	2A	1½	2	20⅝	14	5¾	9⅞	3½
60-21**	2A	2**	2	21¾	14	5¾	9⅞	3½

**Not available in single phase.

Dimensions are approximate and not to be used for construction purposes.

Construction Materials

FOR PARTS IN CONTACT WITH FLUID PUMPED

DESCRIPTION	BRONZE FITTED PUMP	ALL IRON PUMP	ALL BRONZE PUMP
Volute	Cast Iron	Cast Iron	Bronze
Bearing Bracket	Cast Iron	Cast Iron	Iron with Brass Face Plate
Impeller	Brass	Steel (AA)/Cast Iron (A)	Brass
Impeller Key	Steel	Steel	Steel
Impeller Lock Washer	Steel	Steel	Brass
Impeller Lock Nut	Brass (AA) Steel (A)	Plated Steel	Brass
Pump Shaft	Steel	Steel	Steel
Shaft Sleeve	Copper	Stainless Steel	Copper
Seal Assembly	Carbon Seal Ring, Remite Seat, Synthetic Rubber Bellows and Stainless Steel Spring		

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AURORA PUMP
A UNIT OF GENERAL SIGNAL
800 AIRPORT ROAD • NORTH AURORA, ILLINOIS • 60542

NO. OF PRINTS	
13	FOR APPROVAL
FINAL	

Sales Office: AURORA PUMP - DALLAS, T. **PO #** 860-93-7-1A
FACTORY ORDER NUMBER: 987-12491
JOB: _____
SERVICE: _____
ENGINEER: _____
CONTRACTOR: _____
OLD TO: NATKIN & G. **PO #** 7449-1007
REFERENCE: P-1 HAMPTON SOLAR

PUMP

ONE NUMBER OF UNITS 1 1/2 x 2 x 9A SIZE 344 MODEL 1 POWER SERIES _____ PUMP ONLY ☐
120 GPM 60 TDH 1750 RPM ROTATION: RH ☒ LH ☐

BASE:	CONSTRUCTION:	COUPLING:	STUFFING BOX:	CONNECTIONS	LUBRICATION
☐ STEEL DRIP RIM	☒ STANDARD FITTED	☒ STANDARD	☒ MECHANICAL SEAL	☒ THREADED	☒ GREASE
		☐ SPACER	☒ STANDARD	☐ FLANGE	☐ OIL
☒ STEEL	☐ _____	☒ GUARD	☐ _____	☐ 125 #	
☐ FABRICATED STEEL			☐ PACKING	☐ 250 #	
			☐ LANTERN RING	☐ _____	

MOTOR

5 HP. 3 PHASE 60 HERTZ 208 VOLTS 1750 RPM 184-T FRAME

BY: ☒ AURORA ☐ OTHERS ☒ ODP ☐ TEFC ☐ XPROOF ☐ VERTICAL ☒ HORIZONTAL ☐ PART WINDING

NOTE: MOTOR NOT MOUNTED AT FACTORY ON VERTICAL UNITS.

FACTORY CHOICE MANUFACTURER

SPECIAL REQUIREMENTS

UMP: _____
DRIVE: _____
ELECTRICAL: _____

CERTIFIED PRINT: SECTION: 340 PAGE: 251 CURVE NUMBER: 3PC-116 331
SPECIAL: _____ MAINTENANCE: _____
BY: BB DATE: 9/29/77 OFFICE: AURORA

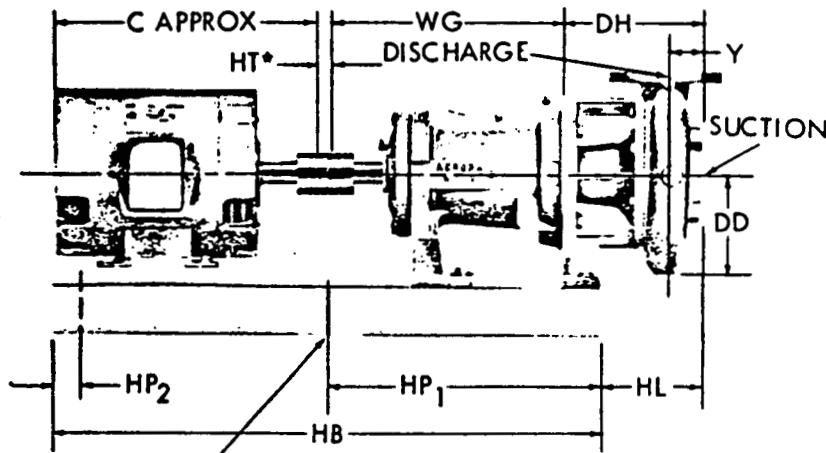
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RELEASE FOR MANUFACTURING PER ATTACHED CHANGE ORDER: ☐
AUTHORITY: _____
OFFICE: _____
DATE: _____

ON STEEL BASES

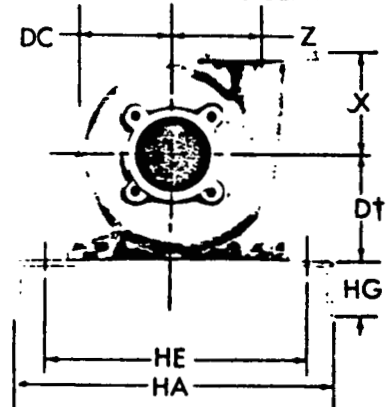
DATED MARCH 1975

SUPERSEDES PAGE 251
DATED NOVEMBER 1970

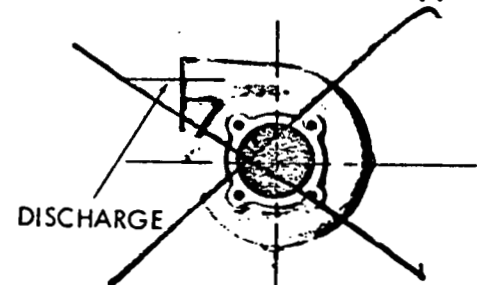


HH FOUNDATION BOLTS

← ROTATION
CCW



STANDARD POSITION (1)



POSITION (4)

NOTES

1. ALL DIMENSIONS IN INCHES.
 2. DIMENSIONS MAY VARY $\pm 1/4$.
 3. NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
 4. NA = NOT APPLICABLE.
 5. CHECK DISCHARGE POSITION, CASING DIMENSIONS WHICH EXCEED DIMENSION "D" MAY REQUIRE PADS FOR THE PUMP AND/OR MOTOR.
 6. CONDUIT BOX IS SHOWN IN APPROXIMATE LOCATION. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.
- * DIM "HT" MAY VARY 1/8" TO 1".
† D DIMENSIONS OF 6 x 6 x 12 PUMP WITH 254T THRU 326T MOTOR IS 8".

BASE	SIZE	HA	HB	HE	HG	MH		HP	HP
						QTY	SIZE		
1	12 x 30	12	30	9	3	2		15	-
2	17 x 34	17	34	15	3	4		1	1
3	18 x 38	18	38	16	4	4		1	1
4	18 x 42	18	42	16	4	4		1	1
5	18 x 44	18	44	15	4	4		1	1
6	18 x 48	18	48	15	4	4		1	1

PUMPS WITH THREADED CONNECTIONS											
PUMP SIZE			X	Y	Z	DC	DD	UH		HL	
DISCHARGE	SUCTION	CASE BORE						FRAME 1	FRAME 2 & 3	FRAME 1	FRAME 2
1"	1"	7	5"	2"	4"	4"	5"	7"	NA	4"	NA
1"	1"	9	6"	2"	5"	6"	6"	7"	NA	4"	NA
1"	2"	7	5"	2"	4"	5"	5"	7"	NA	4"	NA
1"	2"	9	6"	2"	5"	6"	6"	7"	8"	4"	6"
1"	2"	12	7"	2"	7"	8"	8"	NA	8"	NA	6"
PUMPS WITH AM. STD. 125 LB. FLANGED CONNECTIONS											
2"	2"	7	5"	1"	4"	5"	5"	6"	7"	4"	5"
2"	2"	9	7"	1"	5"	6"	6"	7"	8"	4"	5"
2"	2"	12	8"	1"	7"	8"	8"	NA	7"	NA	5"
2"	3"	7	5"	2"	4"	5"	6"	7"	8"	4"	6"
2"	3"	9	7"	2"	5"	6"	7"	7"	8"	4"	6"
2"	3"	12	8"	2"	7"	8"	8"	NA	8"	NA	6"
3"	4"	9	7"	2"	6"	6"	7"	7"	8"	4"	6"
3"	4"	12	8"	2"	7"	8"	8"	NA	8"	NA	6"
4"	4"	7	6"	2"	5"	6"	7"	7"	8"	5"	6"
4"	5"	9A	7"	3"	5"	6"	7"	NA	9"	NA	7"
4"	5"	9B	7"	2"	6"	8"	8"	NA	9"	NA	7"
4"	5"	12	8"	2"	7"	8"	9"	NA	9"	NA	7"
5"	6"	12	9"	2"	8"	9"	10"	NA	9"	NA	7"
6"	6"	9	8"	2"	7"	8"	9"	NA	9"	NA	7"
6"	6"	12	9"	3"	8"	9"	10"	NA	10"	NA	8"

NOTE: WHEN TWO "D" DIMENSIONS ARE INDICATED ALWAYS USE THE LARGER FIGURE.

MOTOR FRAME	C APPROX.	POWER FRAME		
		1	2	3
CASE BORE	WG	10 1/2	13 1/2	13 1/2
		7	5 1/2	6 1/2
		9	6 1/2	7
BASE NUMBER	DT	12	7	7
		1	NA	NA
		1	3	NA
56	12		1	NA
143T	11		1	NA
145T	12		1	3
182T	13		1	3
184T	14		1	3
213T	16	5 1/2	2	3
215T	18	5 1/2	2	3
254T	21	6 1/2	3	4
256T	23	6 1/2	NA	4
284T	24	7	NA	5
284TS	22	7	NA	5
286T	25	7	NA	5
286TS	24	7	NA	5
324T	26	8	NA	6
324TS	25	8	NA	6
326T	28	8	NA	6
326TS	26	8	NA	6
364T	29	9	NA	6
364TS	27	9	NA	6

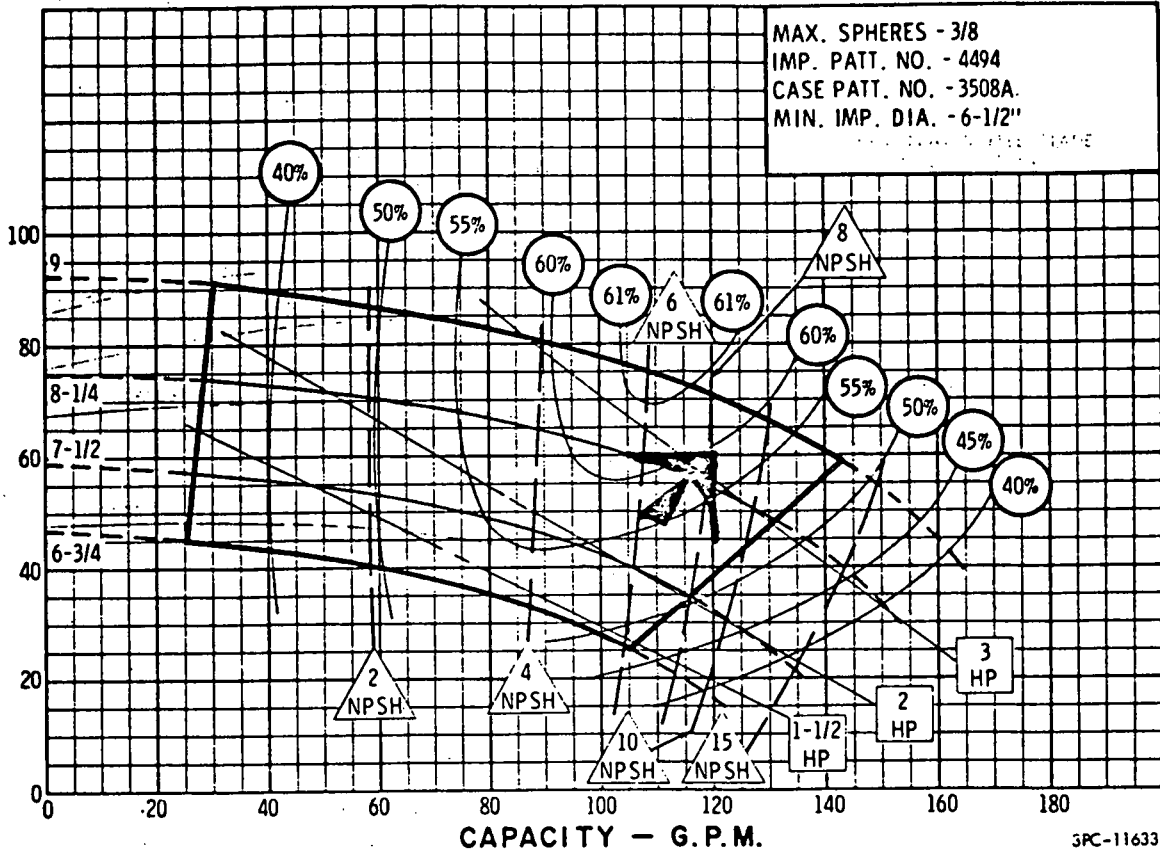


AURORA PUMP
A UNIT OF GENERAL SIGNAL
800 AIRPORT ROAD · NORTH AURORA ILLINOIS · 60542

1-1/2 x 2 x 9A SERIES 340 OR 3-J
 ENCLOSED IMPELLER

TOTAL DYNAMIC HEAD - FEET

1750
R.P.M.



AURORA PUMP
 A UNIT OF GENERAL SIGNAL CORPORATION
 AURORA - ILLINOIS



AURORA PUMP

A UNIT OF GENERAL SIGNAL

800 AIRPORT ROAD-NORTH AURORA, ILLINOIS-60542

NO. OF PRINTS

13

FOR APPROVAL

FINAL

SALES OFFICE: AURORA PUMP - DALLAS

PO # 952-93-7

FACTORY ORDER NUMBER: 9K7-12488

JOB: _____

SERVICE: _____

ENGINEER: _____

CONTRACTOR: _____

SOLD TO: NATKIN CO.

PO # 7449-1007

REFERENCE: P-2 HAMILTON SOLAR

PUMP

ONE NUMBER OF UNITS 2x2 1/2x6 SIZE 324 MODEL _____ POWER SERIES _____ PUMP ONLY ☐
100 GPM 15 TDH 1750 RPM ROTATION: RH ☒ LH ☐

BASE: _____ CONSTRUCTION: _____ COUPLING: _____ STUFFING BOX: _____ CONNECTIONS: _____ LUBRICATION: _____
☐ STEEL DRIP RIM ☒ STANDARD FITTED ☒ STANDARD ☒ MECHANICAL SEAL ☒ THREADED ☒ GREASE
☒ STEEL ☐ _____ ☐ SPACER ☒ STANDARD ☐ FLANGE ☐ OIL
☐ FABRICATED STEEL ☐ PACKING ☐ 125 #
☐ LANTERN RING ☐ 250 #

MOTOR

1 HP. 3 PHASE 60 HERTZ 208 VOLTS 1750 RPM 143-T FRAME

Y: ☒ AURORA
☐ OTHERS

☒ ODP
☐ TEFC
☐ XPROOF

☐ VERTICAL
☒ HORIZONTAL
☐ PART WINDING

NOTE: MOTOR NOT MOUNTED
AT FACTORY ON
VERTICAL UNITS.

FACTORY CHOICE
MANUFACTURER

SPECIAL REQUIREMENTS

IMP: _____

RIVE: _____

ELECTRICAL: _____

CERTIFIED SECTION: 320 PAGE: 251 CURVE NUMBER: 31PC-10926

PRINT: SPECIAL: _____ MAINTENANCE: _____

BY: BB DATE: 9/29/77 OFFICE: AURORA

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THIS ORDER CAN BE RELEASED FOR MANUFACTURING AS SHOWN: ☐

RELEASE FOR MANUFACTURING PER ATTACHED CHANGE ORDER: ☐

AUTHORITY: _____

OFFICE: _____

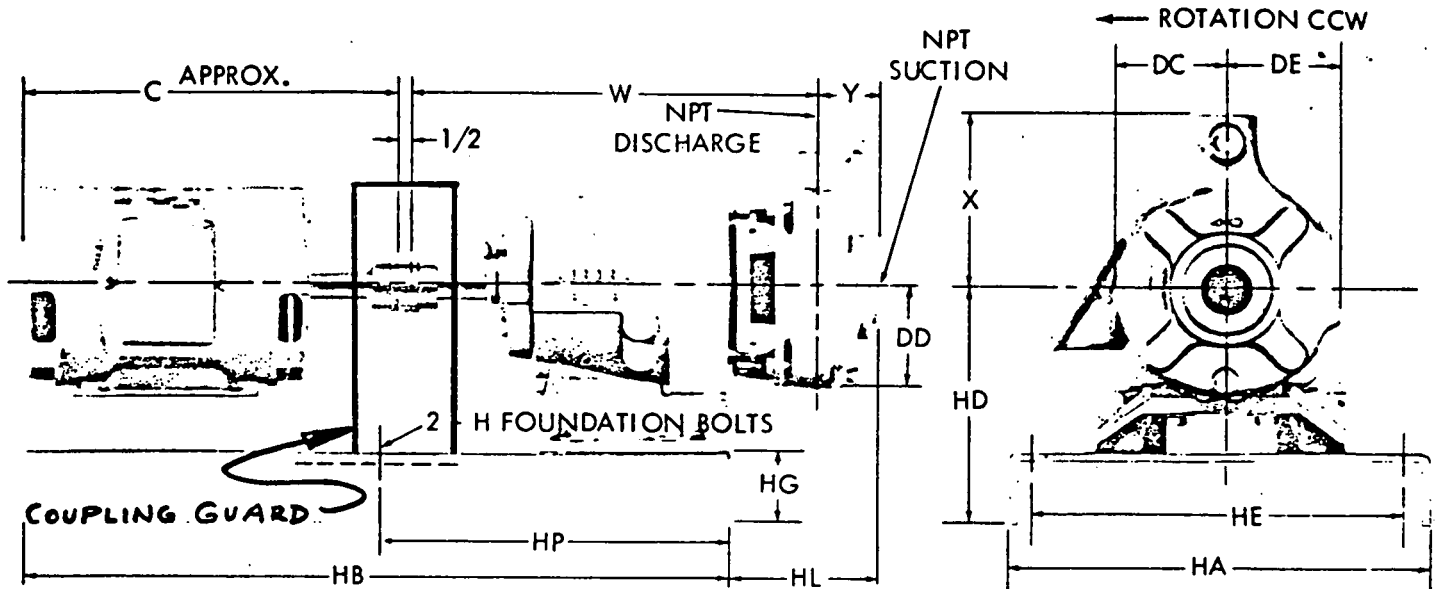
DATE: _____

AURORA MODEL 324A PUL S ON STEEL BASES

SECTION 320 PAGE 251

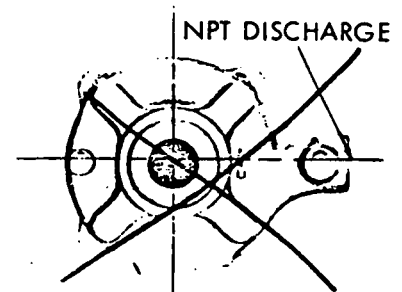
DATED OCTOBER 1974

SUPERSEDES PAGE 251
DATED APRIL 1973

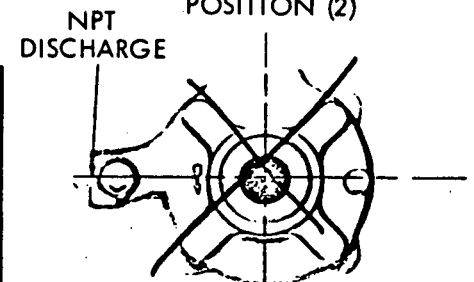


STANDARD POSITION (1)

FRAME	C APPROX.	H	HA	HB	HD	HE	HG	HP
48	10	3/8	9	21	7 11/16	7	2 7/16	10 1/2
56	12	3/8	9	21	7 11/16	7	2 7/16	10 1/2
143T	11	3/8	9	21	7 11/16	7	2 7/16	10 1/2
145T	12	3/8	9	21	7 11/16	7	2 7/16	10 1/2
182T	13	1/2	10	24	7 7/8	7	2 3/8	12
184T	14	1/2	10	24	7 7/8	7	2 3/8	12
213T	16	1/2	12	27	8 1/4	9	3	13 1/2



POSITION (2)



POSITION (4)

PUMP SIZE			W	X	Y	DC	DD	DE	HL
DISCHARGE	SUCTION	CASE BORE							
1/2	1	6	13 1/8	5 1/2	1 1/4	3 3/8	3 3/8	3 3/8	4 9/16
1/2	1	7	13 1/8	6 1/4	1 1/4	3 13/16	4	4 1/8	4 11/16
1	1 1/4	4	13 1/8	4 1/4	1 11/16	2 3/8	2 3/8	2 7/8	4 3/8
1	1 1/4	5	13 3/8	5	2	2 13/16	2 3/8	3	4 1/8
1	1 1/4	6	13 3/8	5 1/2	1 15/16	3 3/8	3 3/8	3 3/8	4 13/16
1 1/4	1 1/2	5	13 1/8	5	1 15/16	2 3/8	2 13/16	3 7/8	4 1/8
1 1/4	1 1/2	7A	13 1/8	6 1/4	2	4	4 1/8	4 1/2	4 13/16
1 1/4	1 1/2	7B	13 3/8	6 1/4	2 7/8	4	4 1/8	4 3/8	5 3/8
1 1/4	1 1/2	9	13 3/8	8	2 1/4	5 13/16	5 3/8	5 13/16	5 1/8
1 1/2	2	4	13 3/8	5	2 3/8	2 1/2	3	2 3/8	5 3/8
1 1/2	2	7	13 3/8	7	2 3/8	4 1/8	4 1/8	4 1/8	5 3/8
2	2 1/2	4	13 1/2	5	3 1/8	2 1/2	3	2 13/16	6 1/2
2	2 1/2	5	13 3/8	6	2 11/16	3	3 3/8	3 7/8	5 3/8
2	2 1/2	6	13 3/8	6	2 3/8	3 3/8	3 11/16	4 3/8	5 3/8
2	2 1/2	7	13 3/8	7	2 13/16	4 1/8	4 3/8	4 3/8	6
3	3	6	13 1/2	8	3 3/8	3 1/2	4 1/8	5 3/8	6 13/16

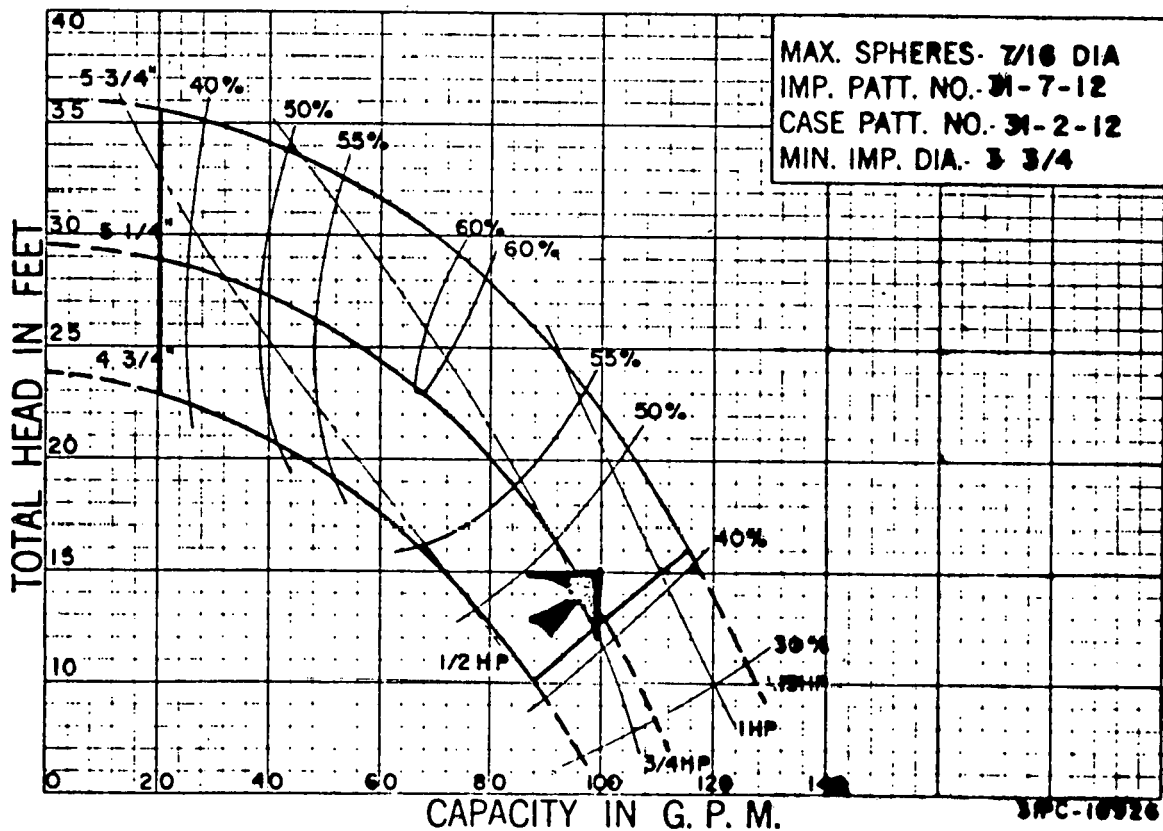
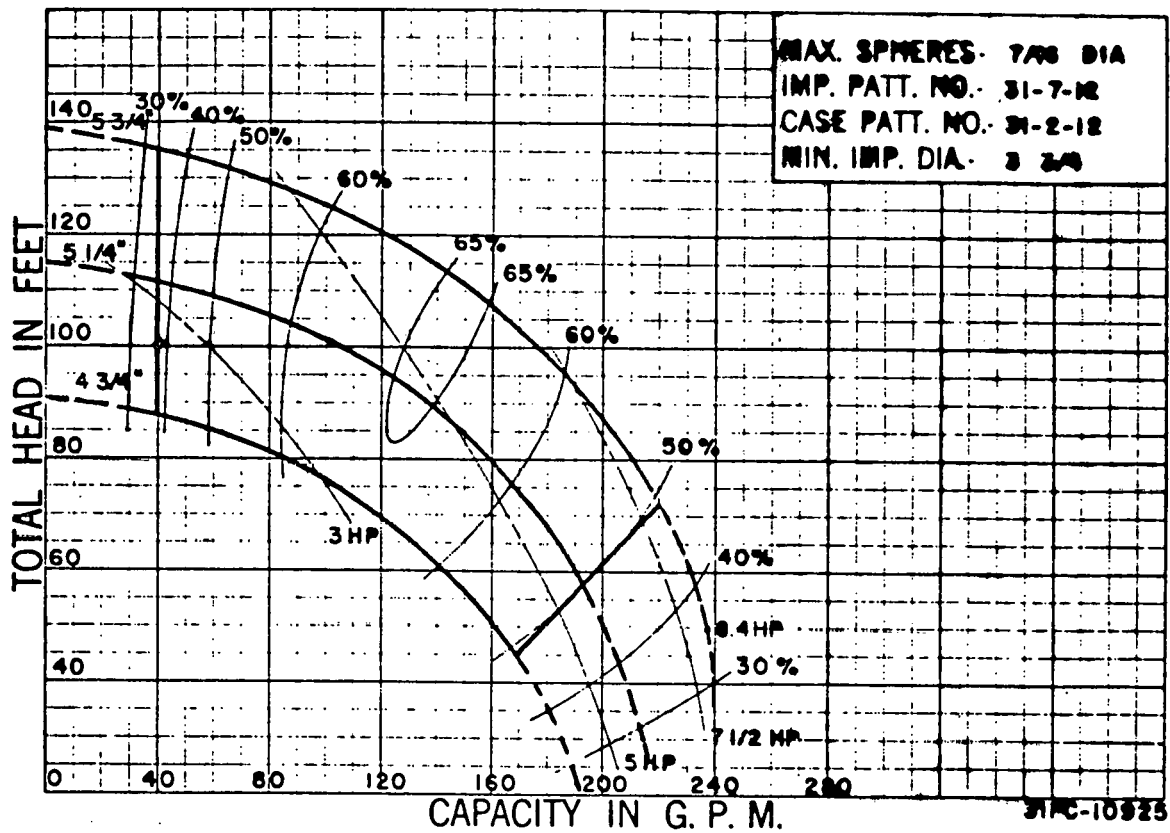
NOTES

1. ALL DIMENSIONS IN INCHES.
2. DIMENSIONS MAY VARY $\pm 3/8$.
3. NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4. CONDUIT BOX SHOWN IN APPROXIMATE LOCATION. CAPACITOR, WHEN FURNISHED, NORMALLY APPEARS ON TOP OF MOTOR. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.



AURORA PUMP
A UNIT OF GENERAL SIGNAL

800 AIRPORT ROAD • NORTH AURORA ILLINOIS • 60542



AURORA PUMP
 A UNIT OF GENERAL SIGNAL CORPORATION
 AURORA - ILLINOIS

**AURORA PUMP**

A UNIT OF GENERAL SIGNAL

800 AIRPORT ROAD • NORTH AURORA, ILLINOIS • 60542

NO. OF PRINTS

13

FOR APPROVAL

FINAL

SALES OFFICE: AURORA PUMP-DALLAS, T PO# 849-93-7-1AFACTORY ORDER NUMBER: 9K7-12485

JOB: _____

SERVICE: _____

ENGINEER: _____

CONTRACTOR: _____

OLD TO: NATKIN & CO.PO# 7449-1007REFERENCE: P-6 HAMPTON SOLAR**PUMP**ONE NUMBER OF UNITS 2 x 2 1/2 x 6 SIZE 324 MODEL _____ POWER SERIES _____ PUMP ONLY ☐
90 GPM 15 FT TDH 1750 RPM ROTATION: RH ☒ LH ☐

BASE:	CONSTRUCTION:	COUPLING:	STUFFING BOX:	CONNECTIONS	LUBRICATION
☐ STEEL DRIP RIM	☒ STANDARD FITTED	☒ STANDARD	☒ MECHANICAL SEAL	☒ THREADED	☒ GREASE
		☐ SPACER	☒ STANDARD	☐ FLANGE	☐ OIL
☒ STEEL	☐ _____	☒ GUARD	☐ _____	☐ 125 #	
☐ FABRICATED STEEL			☐ PACKING	☐ 250 #	
			☐ LANTERN RING	☐ _____	

MOTOR3/4 HP. 3 PHASE 60 HERTZ 208 VOLTS 1750 RPM 56 FRAMEBY: ☒ AURORA
☐ OTHERS☒ ODP
☐ TEFC
☐ XPROOF☐ VERTICAL
☒ HORIZONTAL
☐ PART WINDINGNOTE: MOTOR NOT MOUNTED
AT FACTORY ON
VERTICAL UNITS.
FACTORY CHOICE
MANUFACTURER**SPECIAL REQUIREMENTS**

PUMP: _____

DRIVE: _____

ELECTRICAL: _____

CERTIFIED SECTION: 320 PAGE: 251 CURVE NUMBER: 31PC-10926
PRINT: SPECIAL: _____ MAINTENANCE: _____BY: BB DATE: 9/29/77 OFFICE: AURORATHIS ORDER WILL NOT BE PROCESSED FOR MANUFACTURING UNTIL APPROVAL IS RECEIVED.
PRINTS ARE NOT TO SCALE AND ARE CERTIFIED CORRECT ONLY FOR THIS ORDER. ALL
ORDERS SUBJECT TO ACCEPTANCE AT AURORA PUMP, NORTH AURORA, ILLINOIS.THIS ORDER CAN BE RELEASED FOR MANUFACTURING AS SHOWN: ☐
RELEASE FOR MANUFACTURING PER ATTACHED CHANGE ORDER: ☐

AUTHORITY: _____

OFFICE: _____

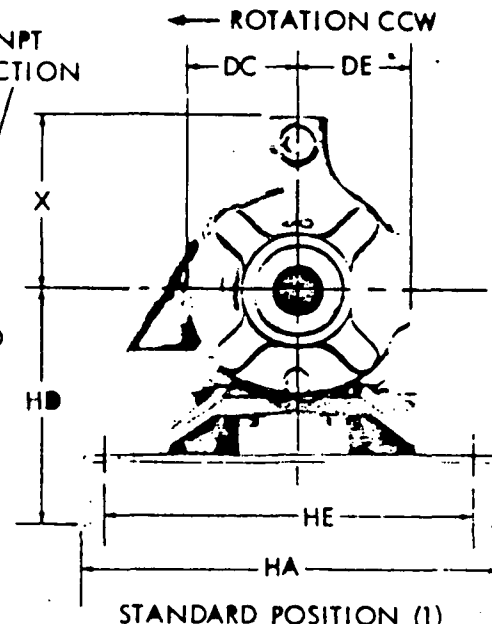
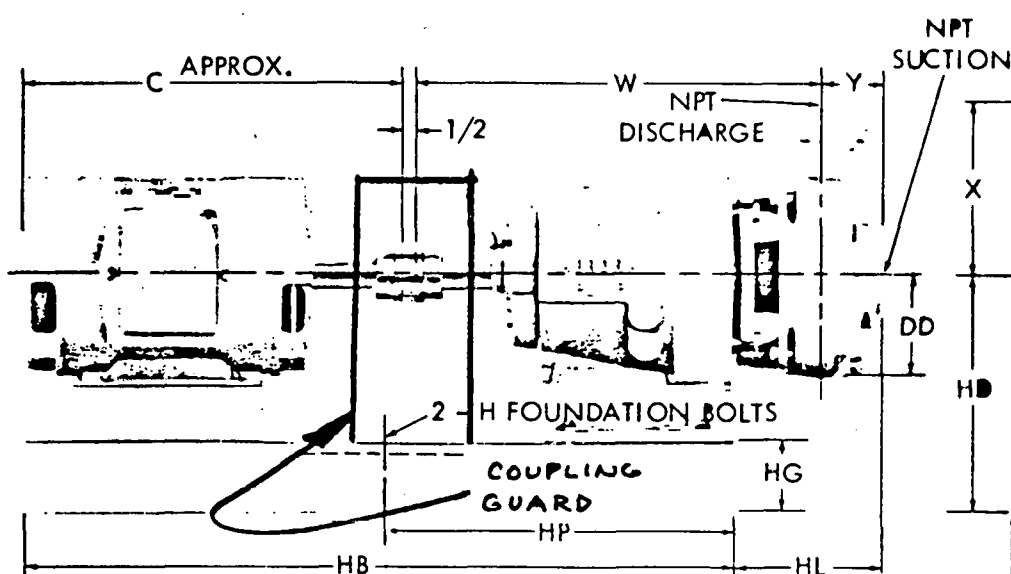
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AURORA MODEL 324A PUMPS ON STEEL BASES

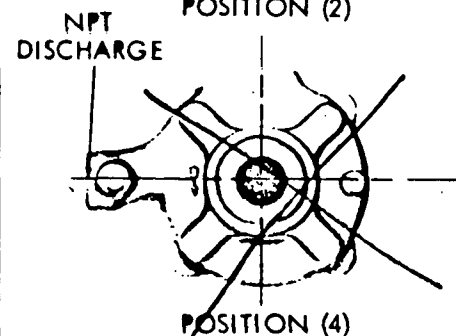
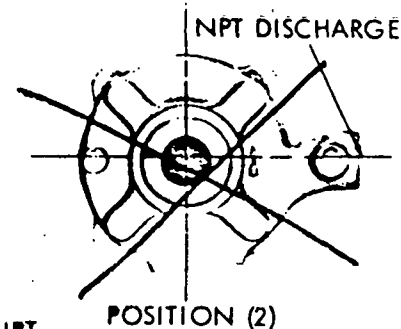
SECTION 320 PAGE 251

DATED OCTOBER 1, 74

SUPERSEDES PAGE 251
DATED APRIL 1973



FRAME	C APPROX.	H	HA	HB	HD	HE	HG	HP
48	10	3 1/2	9	21	7 11/16	7	2 7/16	10 1/2
56	12	3 1/2	9	21	7 11/16	7	2 7/16	10 1/2
143T	11	3 1/2	9	21	7 11/16	7	2 7/16	10 1/2
145T	12	3 1/2	9	21	7 11/16	7	2 7/16	10 1/2
182T	13	3 1/2	10	24	7 7/8	7	2 3/8	12
184T	14	3 1/2	10	24	7 7/8	7	2 3/8	12
213T	16	3 1/2	12	27	8 1/4	9	3	13 1/2



PUMP SIZE			W	X	Y	DC	DD	DE	HL
DISCHARGE	SUCTION	CASE BORE							
3/4	1	6	13 1/4	5 1/2	1 1/4	3 3/4	3 7/8	3 3/4	4 1/4
3/4	1	7	13 1/4	6 1/4	1 1/4	3 15/16	4	4 7/8	4 11/16
1	1 1/2	4	13 1/4	4 1/4	1 11/16	2 3/4	2 3/4	2 3/4	4 1/4
1	1 1/2	5	13 3/4	5	2	2 13/16	2 1/2	3	4 1/4
1	1 1/2	6	13 3/4	5 1/2	1 15/16	3 3/4	3 3/4	3 3/4	4 13/16
1 1/4	1 1/2	5	13 3/4	5	1 15/16	2 3/4	2 15/16	3 7/8	4 1/4
1 1/4	1 1/2	7A	13 3/4	6 1/4	2	4	4 1/4	4 1/2	4 15/16
1 1/4	1 1/2	7B	13 3/4	6 1/4	2 1/4	4	4 1/4	4 1/4	5 1/4
1 1/4	1 1/2	9	13 3/4	8	2 1/4	5 13/16	5 3/4	5 13/16	5 1/4
1 1/2	2	4	13 3/4	5	2 1/4	2 1/2	3	2 3/4	5 1/4
1 1/2	2	7	13 3/4	7	2 1/4	4 1/4	4 1/4	4 1/4	5 1/4
2	2 1/2	4	13 3/4	5	3 1/4	2 1/2	3	2 13/16	6 1/4
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2	2 1/2	6	13 3/4	6	2 3/4	3 1/2	3 11/16	4 1/4	5 1/4
2	2 1/2	7	13 3/4	7	2 15/16	4 1/4	4 3/4	4 1/4	6
3	3	6	13 1/2	8	3 3/4	3 1/2	4 7/8	5 1/4	6 13/16

NOTES

1. ALL DIMENSIONS IN INCHES.
2. DIMENSIONS MAY VARY $\pm 3/8$.
3. NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4. CONDUIT BOX SHOWN IN APPROXIMATE LOCATION. CAPACITOR, WHEN FURNISHED, NORMALLY APPEARS ON TOP OF MOTOR. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.



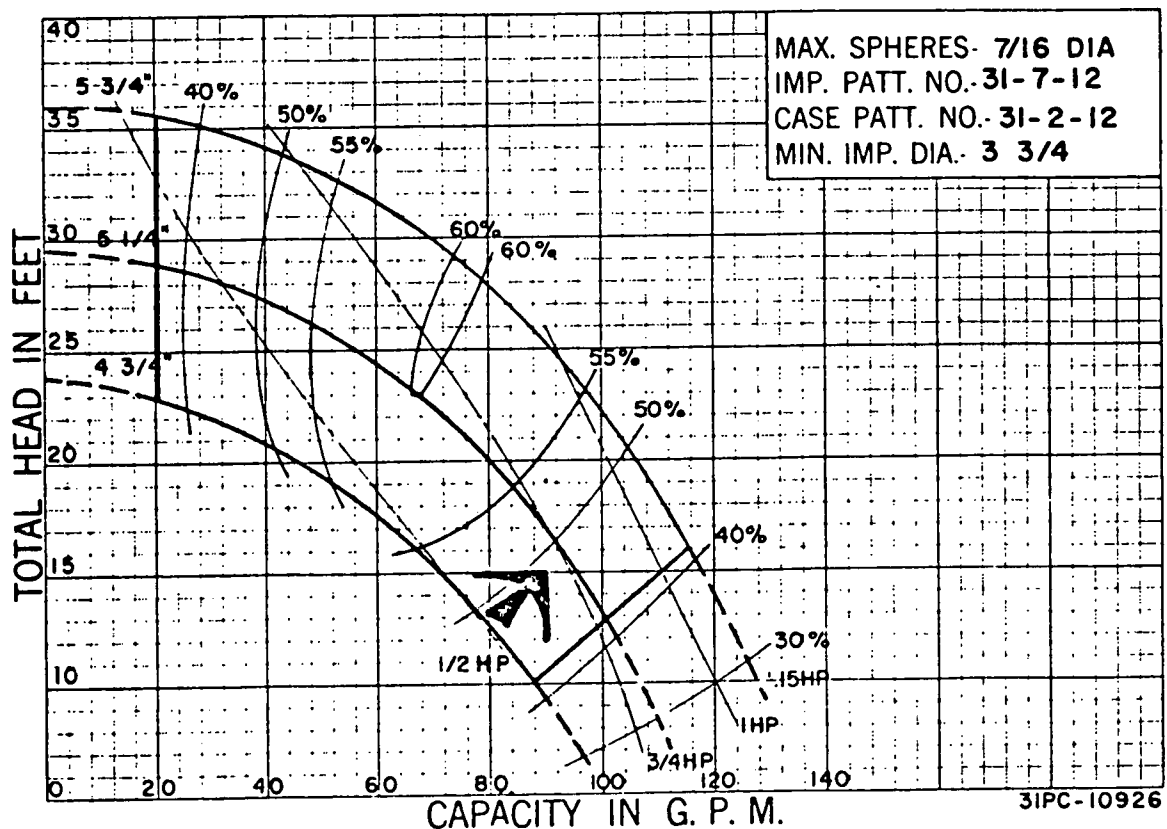
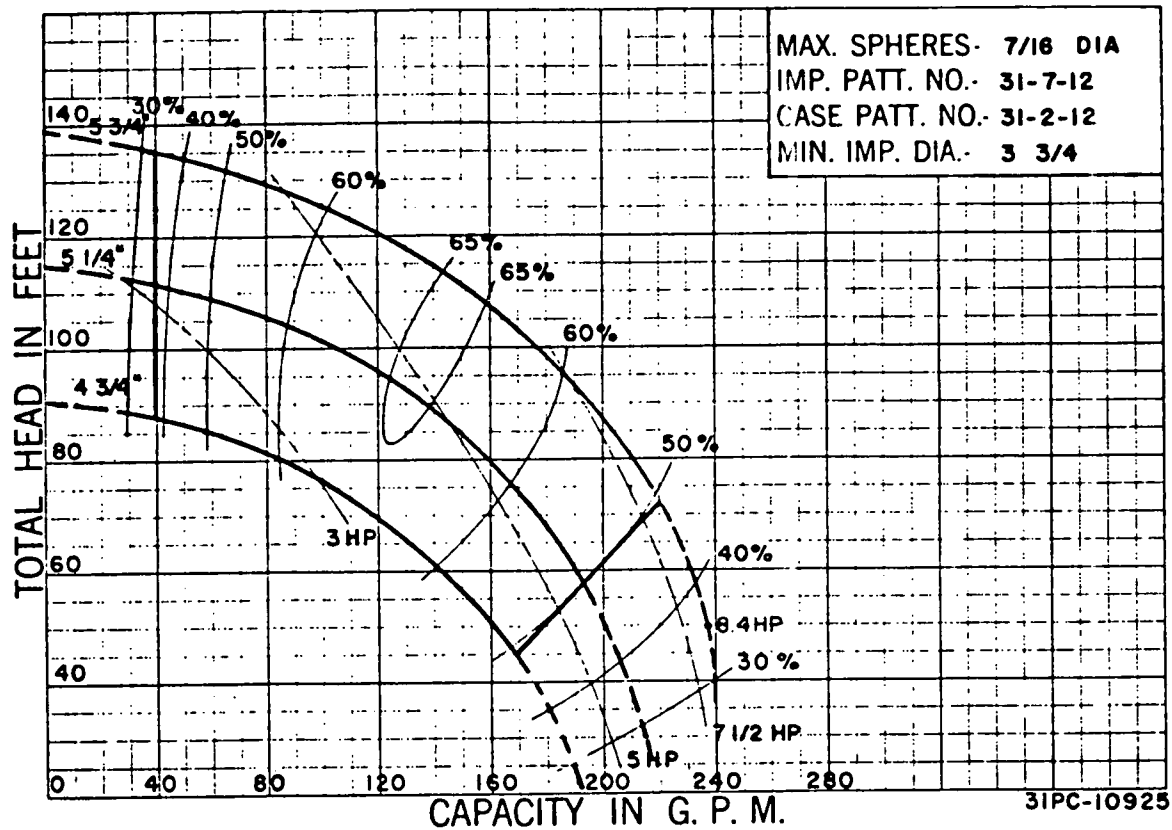
AURORA PUMP
A UNIT OF GENERAL SIGNAL

800 AIRPORT ROAD - NORTH AURORA, ILLINOIS - 60542

X 2-1/2 X 6 SERIES 320 **ENCLOSED IMPELLER**

SECTION 320 PAGE 415

DATED MARCH 1966



AURORA PUMP
 A UNIT OF GENERAL SIGNAL CORPORATION
 AURORA - ILLINOIS

**AURORA PUMP****A UNIT OF GENERAL SIGNAL**

800 AIRPORT ROAD - NORTH AURORA, ILLINOIS - 60542

NO. OF PRINTS

17

FOR APPROVAL

FINAL

SALES OFFICE: AURORA PUMP - DALLAS, T. PO# 850-93FACTORY ORDER NUMBER: 9K7-12486

JOB: _____

SERVICE: _____

ENGINEER: _____

CONTRACTOR: _____

SOLD TO: NATKIN & CO. PO# 7449-1007REFERENCE: P-7 HAMILTON SOLAR**PUMP**ONE NUMBER OF UNITS 1 1/2 * 2 * 7 SIZE 324 MODEL _____ POWER SERIES _____ PUMP ONLY ☐
60 GPM 35 TDH 1750 RPM ROTATION: RH ☒ LH ☐

BASE:	CONSTRUCTION:	COUPLING:	STUFFING BOX:	CONNECTIONS	LUBRICATION
☐ STEEL DRIP RIM	☒ STANDARD FITTED	☒ STANDARD	☒ MECHANICAL SEAL	☒ THREADED	☒ GREASE
		☐ SPACER	☒ STANDARD	☐ FLANGE	☐ OIL
☒ STEEL	☐ _____	☒ GUARD	☐ _____	☐ 125 #	
☐ FABRICATED STEEL			☐ PACKING	☐ 250 #	
			☐ LANTERN RING	☐ _____	

MOTOR1 HP. 3 PHASE 60 HERTZ 208 VOLTS 1750 RPM 143-T FRAMEY: ☒ AURORA
☐ OTHERS☒ ODP
☐ TEFC
☐ XPROOF☐ VERTICAL
☒ HORIZONTAL
☐ PART WINDINGNOTE: MOTOR NOT MOUNTED
AT FACTORY ON
VERTICAL UNITS.FACTORY CHOICE
MANUFACTURER**SPECIAL REQUIREMENTS**

JMP: _____

RIVE: _____

ELECTRICAL: _____

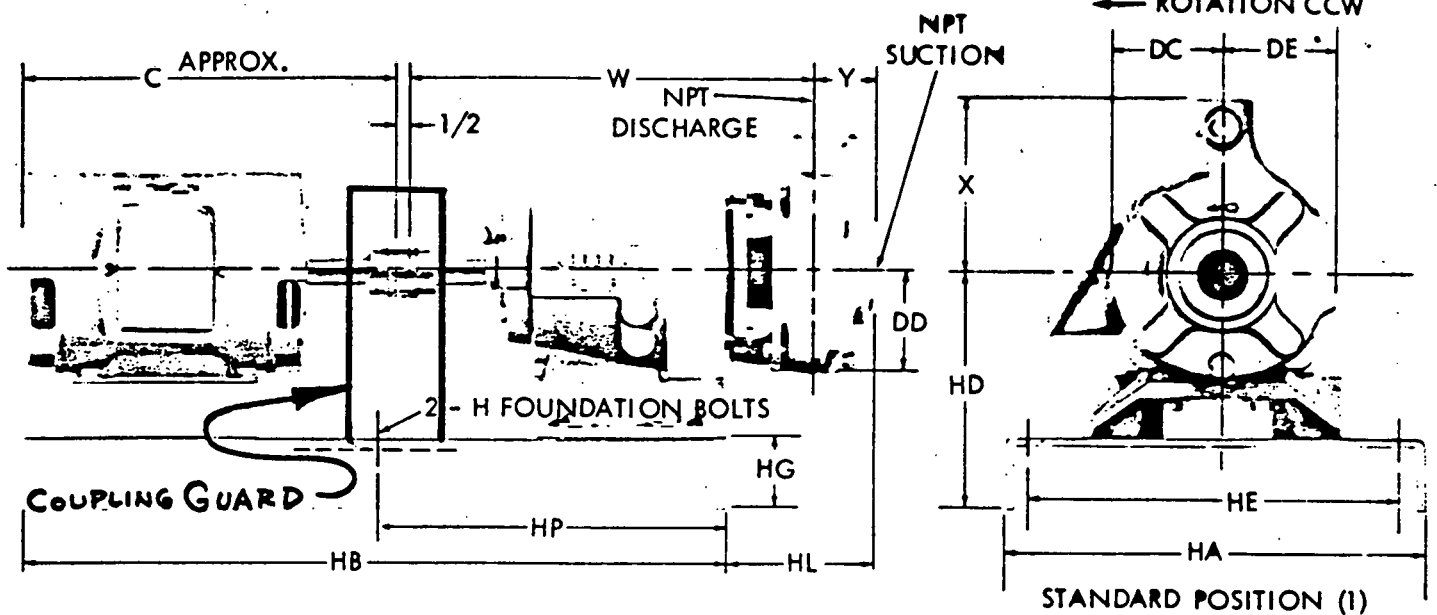
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SPECIAL: _____ MAINTENANCE: _____BY: B B DATE: 9/29/77 OFFICE: AURORATHIS ORDER WILL NOT BE PROCESSED FOR MANUFACTURING UNTIL APPROVAL IS RECEIVED.
PRINTS ARE NOT TO SCALE AND ARE CERTIFIED CORRECT ONLY FOR THIS ORDER. ALL
ORDERS SUBJECT TO ACCEPTANCE AT AURORA PUMP, NORTH AURORA, ILLINOIS.THIS ORDER CAN BE RELEASED FOR MANUFACTURING AS SHOWN: ☐
RELEASE FOR MANUFACTURING PER ATTACHED CHANGE ORDER: ☐AUTHORITY: _____
OFFICE: _____
DATE: _____

AURORA MODEL 324A PUMP S ON STEEL BASES

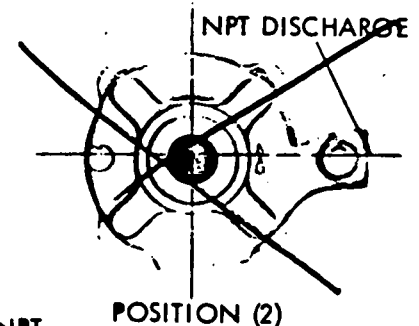
SECTION 320 PAGE 251

DATED OCTOBER 1974

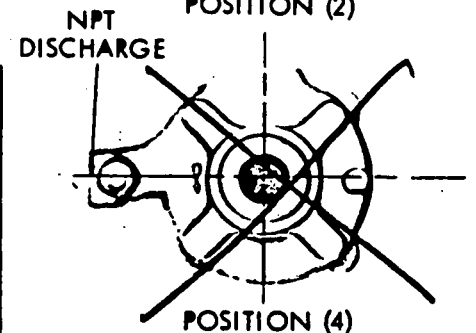
SUPERSEDES PAGE 251
DATED APRIL 1973



FRAME	C APPROX.	H	HA	HB	HD	HE	HG	HP
48	10	3 1/8	9	21	7 11/16	7	2 7/16	10 1/2
56	12	3 3/8	9	21	7 11/16	7	2 7/16	10 1/2
143T	11	3 3/8	9	21	7 11/16	7	2 7/16	10 1/2
145T	12	3 3/8	9	21	7 11/16	7	2 7/16	10 1/2
182T	13	1 1/2	10	24	7 7/8	7	2 3/8	12
184T	14	1 1/2	10	24	7 7/8	7	2 3/8	12
213T	16	1 1/2	12	27	8 1/4	9	3	13 1/2



POSITION (2)



POSITION (4)

PUMP SIZE			W	X	Y	DC	DD	DE	HL
DISCHARGE	SUCTION	CASE BORE							
3/4	1	6	13 1/4	5 1/2	1 1/2	3 3/4	3 3/4	3 3/4	4 1/4
3/4	1	7	13 1/4	6 1/4	1 1/2	3 13/16	4	4 1/4	4 11/16
1	1 1/4	4	13 1/4	4 1/4	1 11/16	2 1/2	2 1/2	2 7/8	4 1/4
1	1 1/4	5	13 3/4	5	2	2 13/16	2 1/2	3	4 1/4
1	1 1/4	6	13 3/4	5 1/2	1 15/16	3 3/8	3 3/8	3 3/8	4 13/16
1 1/4	1 1/2	5	13 1/2	5	1 15/16	2 1/2	2 15/16	3 7/8	4 1/4
1 1/4	1 1/2	7A	13 1/2	6 1/4	2	4	4 1/4	4 1/2	4 15/16
1 1/4	1 1/2	7B	13 3/4	6 1/4	2 1/4	4	4 1/4	4 1/4	5 3/8
1 1/4	1 1/2	9	13 3/4	8	2 1/4	5 13/16	5 3/4	5 13/16	5 1/2
1 1/2	2	4	13 3/4	5	2 1/4	2 1/2	3	2 3/4	5 3/8
1 1/2	2	7	13 3/4	7	2 1/4	4 1/4	4 1/4	4 1/4	5 1/2
2	2 1/4	4	13 3/4	5	3 1/4	2 1/2	3	2 13/16	6 1/2
2	2 1/4	5	13 3/4	6	2 11/16	3	3 3/4	3 7/8	5 3/4
2	2 1/4	6	13 3/4	6	2 3/4	3 3/4	3 11/16	4 1/4	5 3/4
2	2 1/4	7	13 3/4	7	2 13/16	4 1/4	4 3/4	4 1/4	6
3	3	6	13 1/2	8	3 1/2	3 3/4	4 7/8	5 1/2	6 13/16

NOTES

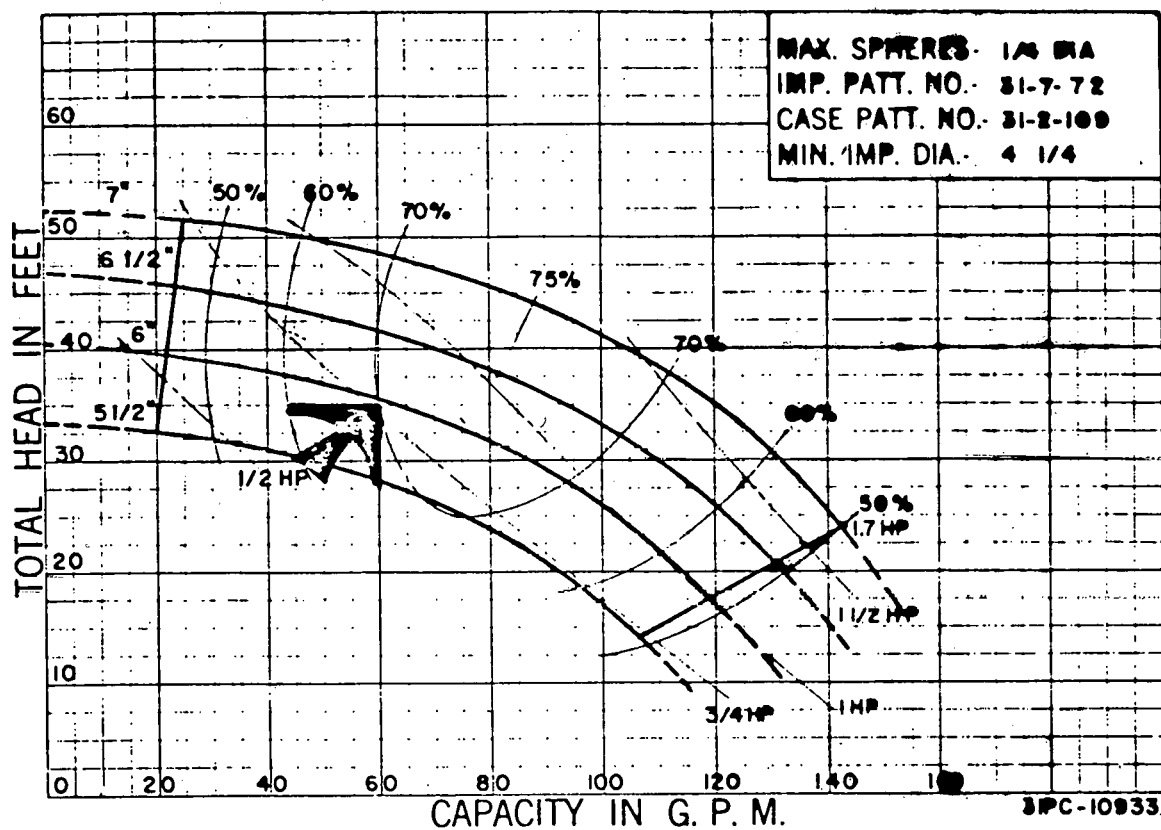
1. ALL DIMENSIONS IN INCHES.
2. DIMENSIONS MAY VARY $\pm 3/8$.
3. NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4. CONDUIT BOX SHOWN IN APPROXIMATE LOCATION. CAPACITOR, WHEN FURNISHED, NORMALLY APPEARS ON TOP OF MOTOR. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.



AURORA PUMP
A UNIT OF GENERAL SIGNAL

800 AIRPORT ROAD • NORTH AURORA, ILLINOIS • 60542

DATED MARCH 1966

1-1/2 X 2 X 7 SERIES**ENCLOSED IMPELLER****AURORA PUMP**

A UNIT OF GENERAL SIGNAL CORPORATION

AURORA - ILLINOIS

**AURORA PUMP**

A UNIT OF GENERAL SIGNAL

800 AIRPORT ROAD - NORTH AURORA, ILLINOIS - 60542

NO. OF PRINTS

13

FOR APPROVAL

FINAL

FILES OFFICE: AURORA PUMP - DALLAS, T. PO# 851-93-7-1AFACTORY ORDER NUMBER: 9K7-12487

JOB: _____

SERVICE: _____

ENGINEER: _____

CONTRACTOR: _____

SOLD TO: NATKIN & CoPO# 7449-1007REFERENCE: P-8 HAMPTON SOLAR**PUMP**

ONE NUMBER OF UNITS 3 * 3 * 6 SIZE 324 MODEL _____ POWER SERIES _____ PUMP ONLY ☐
90 GPM 27 TDH 1750 RPM ROTATION: RH ☒ LH ☐

BASE:	CONSTRUCTION:	COUPLING:	STUFFING BOX:	CONNECTIONS	LUBRICATION
☐ STEEL DRIP RIM	☒ STANDARD FITTED	☒ STANDARD	☒ MECHANICAL SEAL	☒ THREADED	☒ GREASE
		☐ SPACER	☒ STANDARD	☐ FLANGE	☐ OIL
☒ STEEL	☐ _____	☒ GUARD	☐ _____	☐ 125 #	
☐ FABRICATED STEEL			☐ PACKING	☐ 250 #	
			☐ LANTERN RING	☐ _____	

MOTOR

1.5 HP. 3 PHASE 60 HERTZ 208 VOLTS 1750 RPM 145-T FRAME

☒ AURORA	☒ ODP	☐ VERTICAL	NOTE: MOTOR NOT MOUNTED AT FACTORY ON VERTICAL UNITS.
☐ OTHERS	☐ TEFC	☒ HORIZONTAL <u>FACTORY CHOICE</u>	
	☐ XPROOF	☐ PART WINDING <u>MANUFACTURER</u>	

SPECIAL REQUIREMENTS

MP: _____

DRIVE: _____

ELECTRICAL: _____

CERTIFIED PRINT: SECTION: 320 PAGE: 251 CURVE NUMBER: 31PC-122448

SPECIAL: _____ MAINTENANCE: _____

BY: BB DATE: 9/29/77 OFFICE: AURORA

THIS ORDER WILL NOT BE PROCESSED FOR MANUFACTURING UNTIL APPROVAL IS RECEIVED.
PRINTS ARE NOT TO SCALE AND ARE CERTIFIED CORRECT ONLY FOR THIS ORDER. ALL
ORDERS SUBJECT TO ACCEPTANCE AT AURORA PUMP, NORTH AURORA, ILLINOIS.

THIS ORDER CAN BE RELEASED FOR MANUFACTURING AS SHOWN: ☐LEASE FOR MANUFACTURING PER ATTACHED CHANGE ORDER: ☐

AUTHORITY: _____

OFFICE: _____

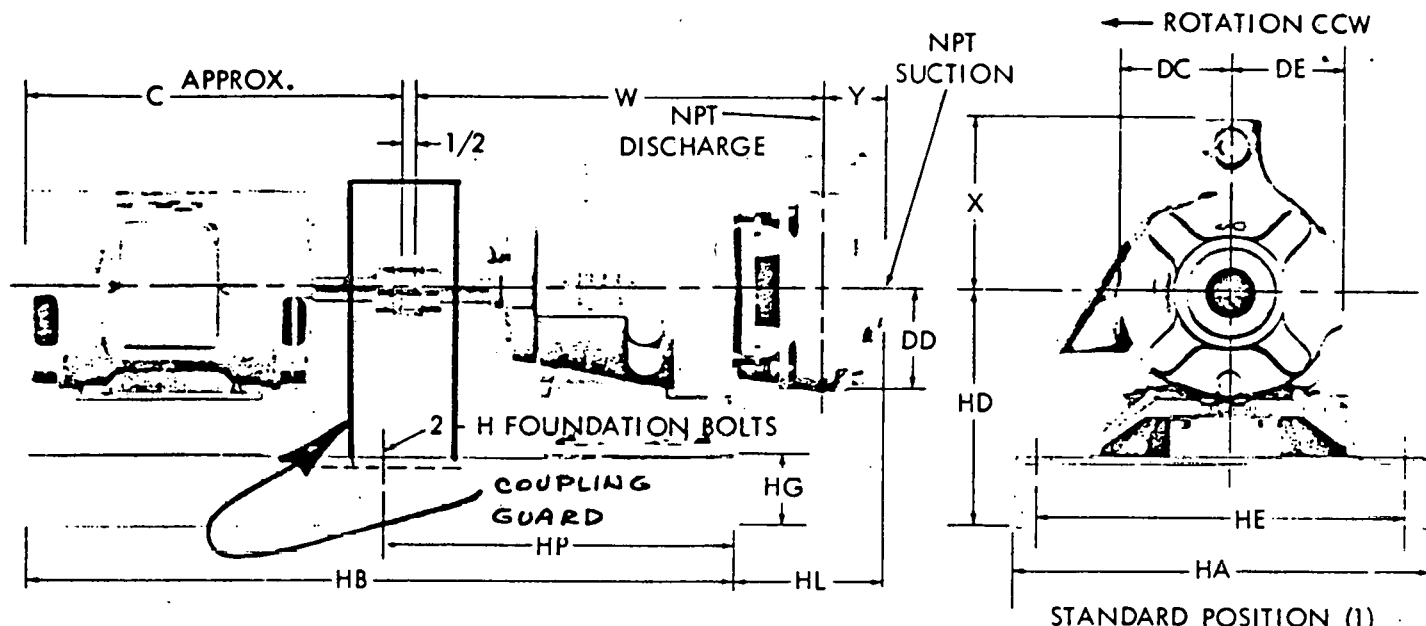
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AURORA MODEL 324A PUL S ON STEEL BASES

SECTION 320 PAGE 251

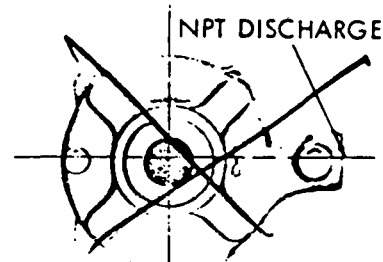
DATED OCTOBER 1974

SUPERSEDES PAGE 251
DATED APRIL 1973

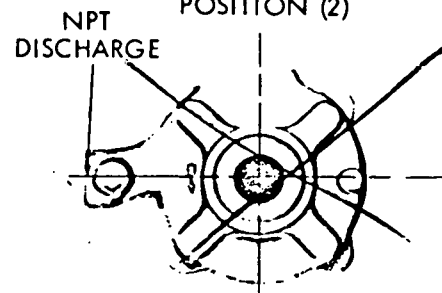


STANDARD POSITION (1)

FRAME	C APPROX.	H	HA	HB	HD	HE	HG	HP
48	10	3 1/2	9	21	7 11/16	7	2 7/16	10 1/2
56	12	3 1/2	9	21	7 11/16	7	2 7/16	10 1/2
143T	11	3 1/2	9	21	7 11/16	7	2 7/16	10 1/2
145T	12	3 1/2	9	21	7 11/16	7	2 7/16	10 1/2
182T	13	1/2	10	24	7 7/8	7	2 3/8	12
184T	14	1/2	10	24	7 7/8	7	2 3/8	12
213T	16	1/2	12	27	8 1/4	9	3	13 1/2



POSITION (2)



POSITION (4)

NOTES

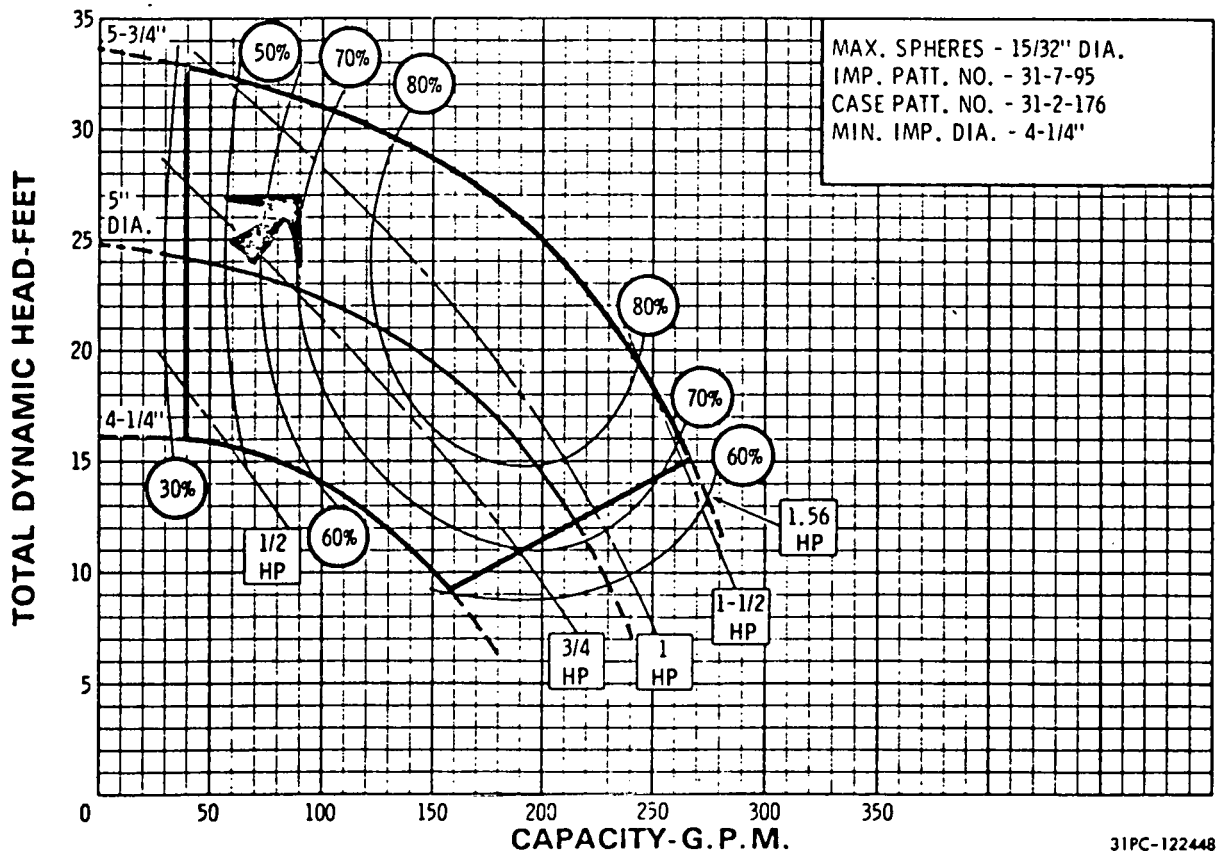
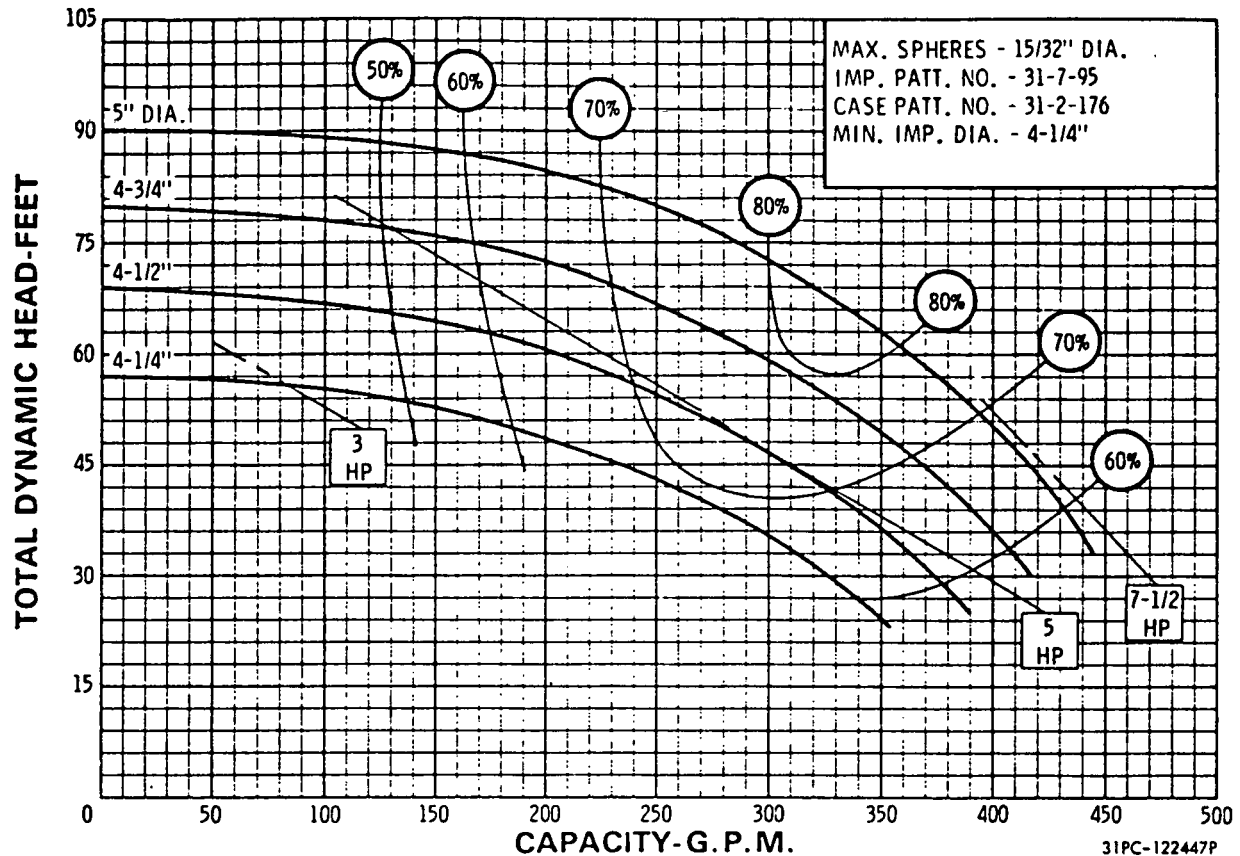
1. ALL DIMENSIONS IN INCHES.
2. DIMENSIONS MAY VARY $\pm 1/8$.
3. NOT FOR CONSTRUCTION PURPOSES UNLESS CERTIFIED.
4. CONDUIT BOX SHOWN IN APPROXIMATE LOCATION. CAPACITOR, WHEN FURNISHED, NORMALLY APPEARS ON TOP OF MOTOR. DIMENSIONS ARE NOT SPECIFIED AS THEY VARY WITH EACH MOTOR MANUFACTURER.

PUMP SIZE			W	X	Y	DC	DD	DE	HL
DISCHARGE	SUCTION	CASE BORE							
3/4	1	6	13 1/4	5 1/2	1 1/4	3 3/4	3 7/8	3 3/4	4 1/4
3/4	1	7	13 1/4	6 1/4	1 1/4	3 15/16	4	4 1/4	4 11/16
1	1 1/2	4	13 1/4	4 1/4	1 11/16	2 1/2	2 3/4	2 7/8	4 3/4
1	1 1/4	5	13 3/4	5	2	2 13/16	2 7/8	3	4 3/4
1	1 1/4	6	13 3/4	5 1/2	1 15/16	3 1/4	3 3/8	3 3/8	4 13/16
1 1/4	1 1/4	5	13 1/4	5	1 15/16	2 1/2	2 13/16	3 7/8	4 3/4
1 1/4	1 1/2	7A	13 1/4	6 1/4	2	4	4 1/4	4 1/2	4 15/16
1 1/4	1 1/2	7B	13 3/4	6 1/4	2 1/4	4	4 1/4	4 3/4	5 1/8
1 1/4	1 1/2	9	13 3/4	8	2 1/2	5 13/16	5 3/4	5 13/16	5 1/2
1 1/2	2	4	13 3/4	5	2 1/4	2 1/2	3	2 1/2	5 3/4
1 1/2	2	7	13 3/4	7	2 1/4	4 1/4	4 1/4	4 1/4	5 1/2
2	2 1/2	4	13 3/4	5	3 1/4	2 1/2	3	2 13/16	6 1/2
2	2 1/2	5	13 3/4	6	2 11/16	3	3 3/4	3 7/8	5 3/4
2	2 1/2	6	13 3/4	6	2 3/4	3 1/2	3 11/16	4 3/8	5 3/4
2	2 1/2	7	13 3/4	7	2 15/16	4 1/4	4 3/8	4 3/8	6
3	3	6	13 1/2	8	3 3/8	3 7/8	4 7/8	5 7/8	6 11/16



AURORA PUMP
A UNIT OF GENERAL SIGNAL

800 AIRPORT ROAD • NORTH AURORA, ILLINOIS • 60542



AURORA PUMP

A UNIT OF GENERAL SIGNAL

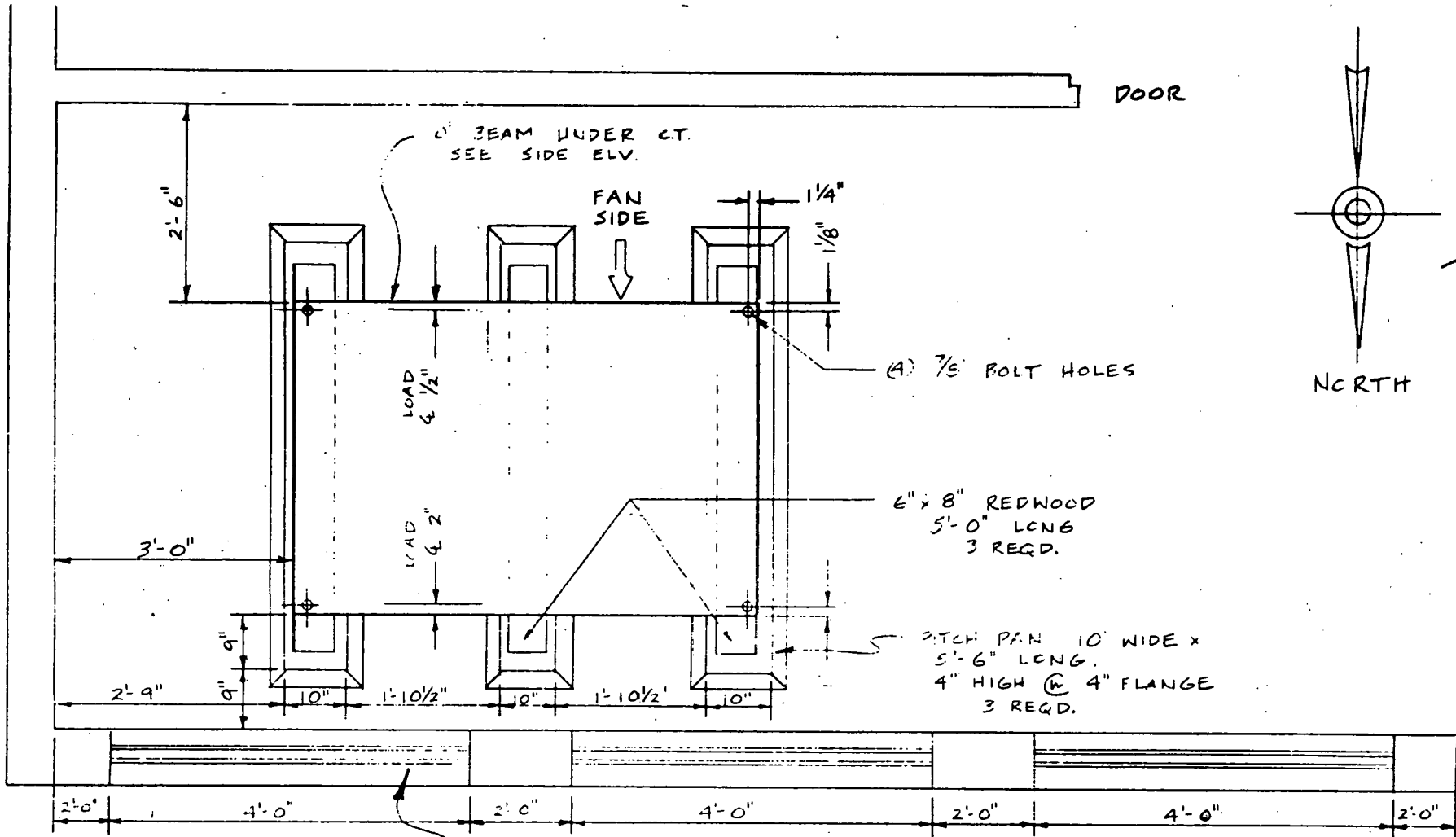
800 AIRPORT ROAD-NORTH AURORA ILLINOIS-60542

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BALTIMORE AIRCOIL MODEL VN, VL, VS, COOLING TOWERS

PROJECT	Hampton Park Recreation Center		Dallas, TX
CUSTOMER	Natkin & Co.	Dallas, TX	P.O. 7449-1002
B.A.C. SERIAL NUMBER	77-5260P		ENGINEER Travis Braun Assoc. Dallas, TX

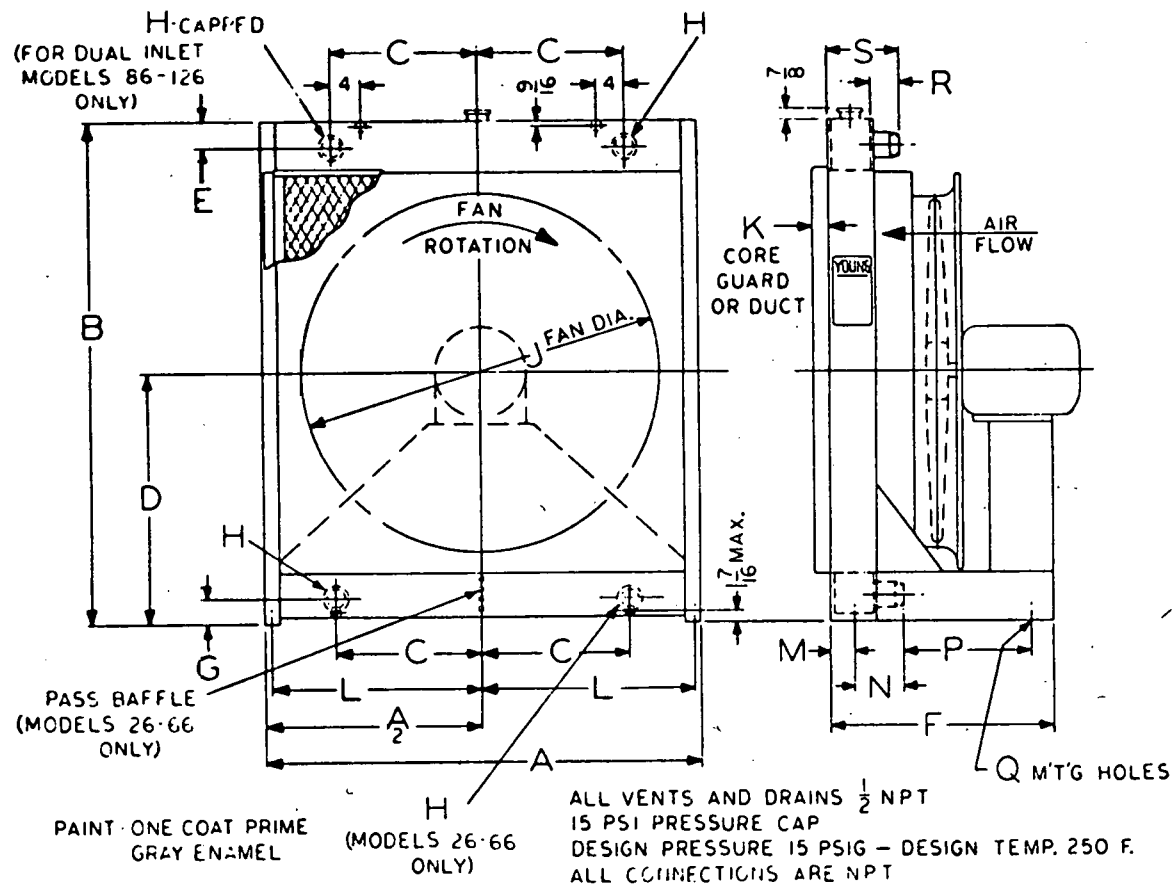
UNIT TYPE	All hot-dip galvanized steel, factory-assembled, counterflow blow through.
PAN-FAN SECTION CONSTRUCTION	Hot-dip galvanized steel self-cleaning V-shaped pan and centrifugal fans mounted beneath the sloping undersides of the pan. Heavy gauge hot-dip galvanized steel channel and angle framework.
MAKE-UP FLOAT ASSEMBLY	Brass float valve with adjustable plastic float ball (except units for remote sump operation).
STRAINER	All hot-dip galvanized steel with large-area removable perforated screens; antivortexing baffle assembly to prevent air entrainment in leaving water (except units for remote sump operation).
FAN DISCHARGE COWLS	Hot-dip galvanized steel cowls provided on each fan discharge extending within the pan to increase fan efficiency and prevent water from entering fans.
ACCESS	Hot-dip galvanized steel circular access doors at ends of tower, held in place by wingnuts.
BLEED-OFF	Waste water bleed-line with adjustable valve provided (except units for remote sump operation).
FAN WHEELS	Forwardly curved centrifugal squirrel cage type of hot-dip galvanized steel. Statically and dynamically balanced. Fan housings have compound curve inlet rings for efficient air entry.
FAN SHAFT	☒ Solid shaft of ground and polished steel. Exposed surface coated with rust preventative. ☐ Hollow steel shaft with solid bearing journals at ends. Exposed surface coated with rust preventative.
BEARINGS	☐ Self-aligning, heavy duty, grease-lubricated, ball bearings with eccentric locking collar on drive end of each fan shaft. Remaining bearings are self-aligning, heavy duty sleeve bearings with two piece cast iron bodies, deep well reservoirs and oil cups. ☒ Self-aligning, heavy duty, grease-lubricated, ball bearings with eccentric locking collars.
DRIVE	V-belt type with taper lock sheaves. Selected for 150% motor nameplate horsepower. Mounted and aligned at the factory.
MOTOR	Drip-proof ball bearing type with 1.15 service factor, suitable for outdoor service. Adjustable motor base, located in protected position under pan side.
FAN GUARD SCREENS	Hot-dip galvanized steel screens.
HEAT TRANSFER SECTION CONST.	Hot-dip galvanized steel channel-formed construction separable from pan section.
WET DECK	Wave-formed, Melamine impregnated, Neoprene-Asbestos (NMA) 19 mils thick, with all leading and trailing edges rolled to double thickness.
ELIMINATORS	Eliminators shall be constructed of hot-dip galvanized steel and be removable in easily handled sections. They shall impart three distinct changes in air direction to effectively strip entrained moisture from the leaving air stream with minimum air resistance, and shall direct discharged air away from the fans.
WATER DISTRIBUTION SYSTEM	Hot-dip galvanized steel spray header and branches. Removable branches and plastic spray nozzles held in place with snap-in rubber grommets.
FINISH	Unit given double corrosion protection with special B.A.C. zinc-chromatized aluminum paint after assembly.



LOCATE (3) WALL OPENINGS
1'-0" HIGH BY 4'-0" LONG
BOTTOM OF OPENING TO BE
6" ABOVE C.T. DECK.
(EL. 12'-10")

NUMBER	DATE	REVISIONS	BY	COOLING TOWER DETAIL -		SCALE
				DATE	NATKIN & COMPANY HEATING - AIR CONDITIONING PLUMBING - INDUSTRIAL PIPING	
				9/29/77		
				FILE NO.	DRAWN BY	CHECKED BY
				7449	TFD	
						SHEET A

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CUSTOMER REQUIREMENTS	DIMENSION DRAWING
	Customer Natkin & Company
	Address Dallas, Texas
	Cust. Order No. 7449-1005
	Y. R. Co. Order No. J-152833
	Y. R. Co. Part No. 281000
	Y. R. Co. Model No. 4602
	Per Dorothy Lutz
	Date Sept. 21, 1977
	MOTOR DATA
	2 HP 1750 RPM 1 SPEED
	3 PH 60 Hz 200 V
	TFC TYPE 145T FRAME
SPECIAL NOTE FOR MODELS 26D - 66D	
2 PASS - USE BOTTOM TANK FOR INLET AND OUTLET	
1 PASS - USE TOP TANK FOR INLET, MANIFOLD BOTTOM TANK FOR OUTLET	

MODEL	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S
26D	31	35 1/4	10	17 3/8	2 3/8	19	2 3/8	2 1/2	24	2	14 3/4	3 1/4	6 1/2	6	3/8	2 3/8	8 13/16
46D	37	40 3/4	12	20 3/8	2	19	2 1/2	3	27	2	17 3/4	3 1/4	6 1/2	6	3/8	3 1/8	9 3/8
66D	44 3/8	48 1/4	15	24 3/8	2 1/2	20 1/4	2 1/2	3	32	2	21 1/8	3 1/4	6 1/2	7 1/4	3/8	3 1/8	9 3/8
86D	50 13/16	57 1/4	18	29	2 5/8	27 3/4	3 1/2	4	36	2	24 21/32	3 1/4	6 1/2	14 3/4	3/8	3 1/8	9 3/8
106D	57 1/8	63 1/4	20	32	2 5/8	32 3/4	3 1/2	4	42	2	27 23/32	3 1/4	6 1/2	18 3/4	3/8	3 1/8	9 3/8
126D	59 1/8	69 3/8	20	34 3/8	3 3/8	35 1/4	3 1/2	4	48	2	29 1/2	3 1/4	6 1/2	22 1/4	3/8	3 1/8	9 3/8

YOUNG RADIATOR COMPANY, RACINE, WISCONSIN 53404

STANDARD MWC - DIRECT DRIVE

AM-8691

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Draw-Thru Central Station Weathermaker®

UNIT NO. AC-1
MODEL NO. 39ED12

DESCRIPTION

39E Single-Zone Weathermakers® for cooling or heating using remote sources of refrigeration and heat offer a wide freedom of design. Unit flexibility permits precise matching of the units to the individual system requirements. These "Weathermakers" provide cooling, dehumidifying, heating, humidifying, filtering and circulation of air for comfort and industrial applications. They are extremely compact and may be floor mounted or suspended with horizontal or vertical discharge. Choice of coils for direct-expansion or chilled water cooling, and steam, hot water or electric heating.

FEATURES

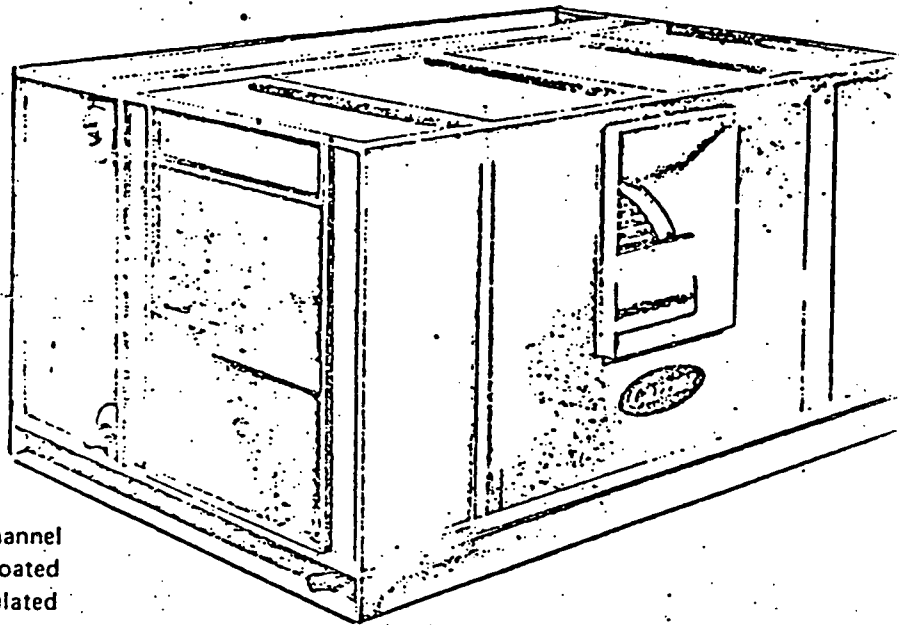
Mill galvanized steel cabinet with external hat channel frame, 1 inch thick _____ lb. density neoprene coated glass fiber NFPA-90A insulation, double wall insulated drain pan and removable panels for access.

_____, double inlet, statically and dynamically balanced fan with solid shaft, self-aligning pillow block ball bearings with extended grease fittings. Motor and drive to be factory mounted.

Cartridge type coils with ripple corrugated fins mechanically bonded to staggered tubes and removable from either side of casing.

ACCESSORIES

- ____ Velocity Filter Section
____ Filters
____ Isolators
____ Cooling Coil
____ Heating Coil
____ Motor
- ☐ Mixing box
☐ Access section with hinged doors
☐ Plenum section
☐ Zoning damper section
☐ Steam grid humidifier _____ P.S.I. _____ lb. per hour
☐ Outdoor or roof-top option
☐ Roof mounting curb
☐ _____
☐ _____
☐ _____
☐ _____
- See attached drawing No.(s) _____



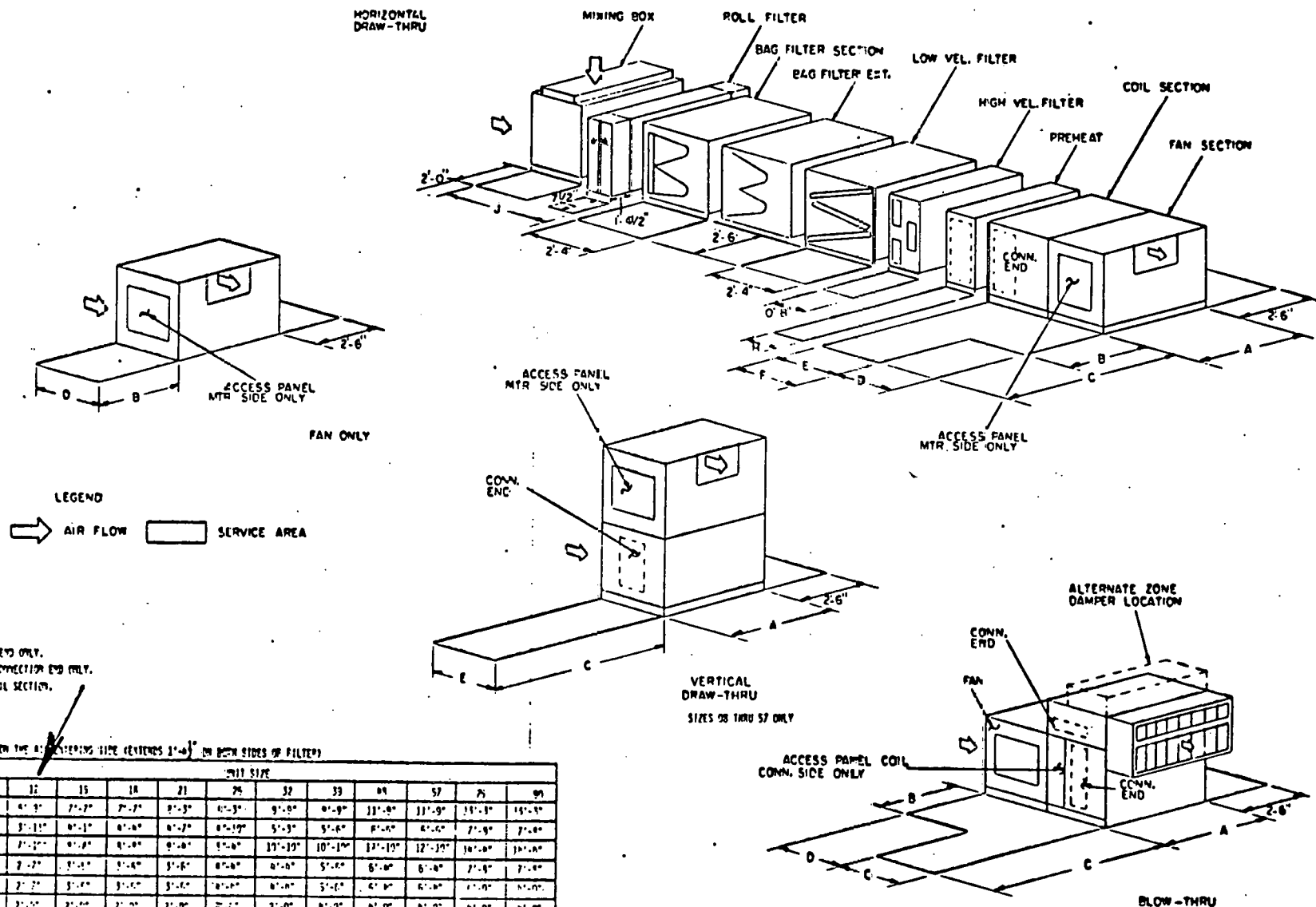
6,000

269,900 ✓
188,931 ✓
81.9 ✓
67.6 ✓
53.1 ✓
52.97 ✓
6000 ✓
522

R-22 ✓
45.68
6

CAPACITY

Total CFM
Outside Air CFM
Total S.P. 0.12
E.S.P.
B.H.P.
Motor H.P.
Volts _____ Phase _____ Hertz
BTUH Total Cooling
BTUH Sensible Cooling
°F. E.D.B.
°F. E.W.B.
°F. L.D.B.
°F. L.W.B.
°F. E.W.T. Coil CFM
°F. E.W.T. Face Vel.
G.P.M.
Ft. P.D.
Refrigerant
°F. Suction
Row 14 (XR) (FL) Fin, Cooling Coil
BTUH Heating
°F. E.A.T.
°F. L.A.T.
°F. E.W.T.
°F. L.W.T.
G.P.M.
Ft. P.D.
lb. Steam _____ P.S.I.
Row _____ Fin, Heating Coil
KW Heating
Heater Control Steps
Heater Volts _____ Phase _____ Hertz



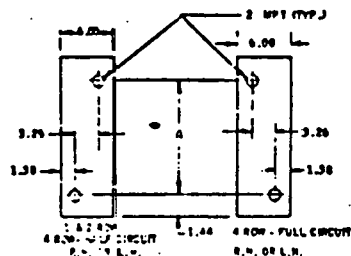
UNIT SIZE	12	15	18	21	24	27	30	33	36	39	42	45
12"	5'-11"	6'-1"	6'-3"	6'-5"	6'-7"	6'-9"	6'-11"	7'-1"	7'-3"	7'-5"	7'-7"	7'-9"
15"	6'-1"	6'-3"	6'-5"	6'-7"	6'-9"	6'-11"	7'-1"	7'-3"	7'-5"	7'-7"	7'-9"	8'-1"
18"	6'-3"	6'-5"	6'-7"	6'-9"	6'-11"	7'-1"	7'-3"	7'-5"	7'-7"	7'-9"	8'-1"	8'-3"
21"	6'-5"	6'-7"	6'-9"	6'-11"	7'-1"	7'-3"	7'-5"	7'-7"	7'-9"	8'-1"	8'-3"	8'-5"
24"	6'-7"	6'-9"	6'-11"	7'-1"	7'-3"	7'-5"	7'-7"	7'-9"	8'-1"	8'-3"	8'-5"	8'-7"
27"	6'-9"	6'-11"	7'-1"	7'-3"	7'-5"	7'-7"	7'-9"	8'-1"	8'-3"	8'-5"	8'-7"	8'-9"
30"	6'-11"	7'-1"	7'-3"	7'-5"	7'-7"	7'-9"	8'-1"	8'-3"	8'-5"	8'-7"	8'-9"	9'-1"
33"	7'-1"	7'-3"	7'-5"	7'-7"	7'-9"	8'-1"	8'-3"	8'-5"	8'-7"	8'-9"	9'-1"	9'-3"
36"	7'-3"	7'-5"	7'-7"	7'-9"	8'-1"	8'-3"	8'-5"	8'-7"	8'-9"	9'-1"	9'-3"	9'-5"
39"	7'-5"	7'-7"	7'-9"	8'-1"	8'-3"	8'-5"	8'-7"	8'-9"	9'-1"	9'-3"	9'-5"	9'-7"
42"	7'-7"	7'-9"	8'-1"	8'-3"	8'-5"	8'-7"	8'-9"	9'-1"	9'-3"	9'-5"	9'-7"	9'-9"
45"	7'-9"	8'-1"	8'-3"	8'-5"	8'-7"	8'-9"	9'-1"	9'-3"	9'-5"	9'-7"	9'-9"	10'-1"

DATE 7 9 76



U BEND HEATING COILS (1, 2 & 4 ROW)

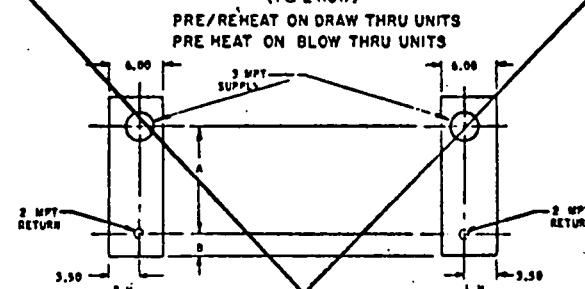
PRE/REHEAT ON DRAW THRU UNITS
PRE HEAT ON BLOW THRU UNITS



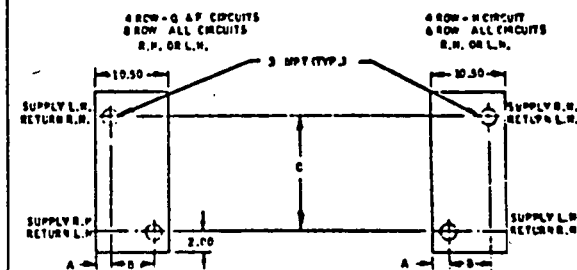
NOTES:
1. - WATER SUPPLY TO BE ON AIR LEAVING SIDE (COUNTER FLOW)
2. - STEAM SUPPLY TO BE TOP CONNECTION ALWAYS.

1" STEAM DISTRIBUTING TUBE COILS (1 & 2 ROW)

PRE/REHEAT ON DRAW THRU UNITS
PRE HEAT ON BLOW THRU UNITS



CHILLED WATER COILS (4, 6 & 8 ROW)



SIZE	1/2" O.D. TUBE			3/4" O.D. TUBE		
	A	B	C	A	B	C
05			18.50			18.50
10			23.50			22.50
12			28.50			27.50
15			33.50			34.50
18			43.50			40.50
21			43.50			40.50
24			43.50			40.50
26			43.50			40.50
28			43.50			40.50
30	UPPER	23.50	22.50	UPPER	23.50	22.50
32	LOWER	23.50	22.50	LOWER	23.50	22.50
34	UPPER	23.50	22.50	UPPER	23.50	22.50
36	LOWER	23.50	22.50	LOWER	23.50	22.50
38	UPPER	23.50	22.50	UPPER	23.50	22.50
40	LOWER	23.50	22.50	LOWER	23.50	22.50
42	UPPER	23.50	22.50	UPPER	23.50	22.50
44	LOWER	23.50	22.50	LOWER	23.50	22.50
46	UPPER	23.50	22.50	UPPER	23.50	22.50
48	LOWER	23.50	22.50	LOWER	23.50	22.50
50	UPPER	23.50	22.50	UPPER	23.50	22.50
52	LOWER	23.50	22.50	LOWER	23.50	22.50

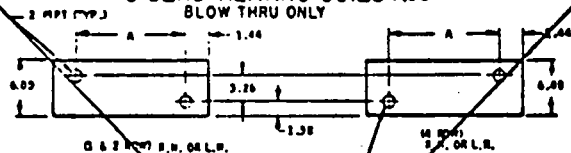
NOTE:
1. - WATER SUPPLY TO BE ON AIR LEAVING SIDE (COUNTER FLOW).

NAME FOR UNIT NO. LOCATION
JOB NAME
JOB LOCATION
INCHES
DATE

DIMENSIONS IN INCHES

U BEND HEATING COILS (1, 2 & 4 ROW)

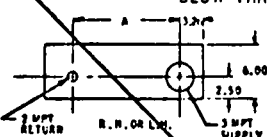
BLOW THRU ONLY



NOTES:
1. - WATER SUPPLY TO BE ON AIR LEAVING SIDE (COUNTER FLOW)
2. - STEAM SUPPLY TO BE TOP CONNECTION ALWAYS.

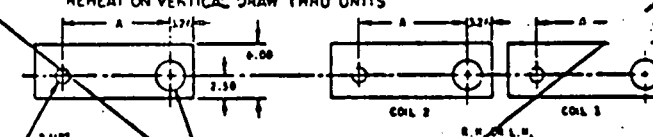
1" STEAM DISTRIBUTING TUBE COILS (1 & 2 ROW)

BLOW THRU ONLY



1" STEAM DISTRIBUTING TUBE COILS (1 & 2 ROW)

REHEAT ON VERTICAL DRAW THRU UNITS



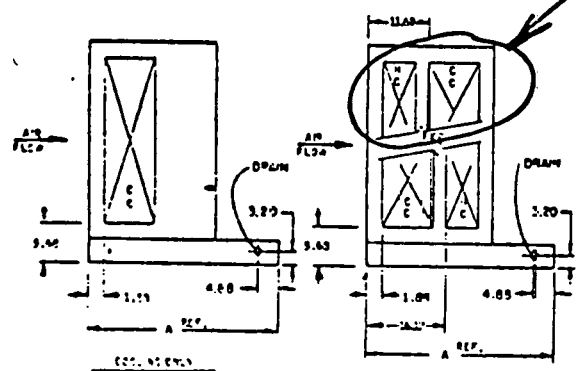
505-928



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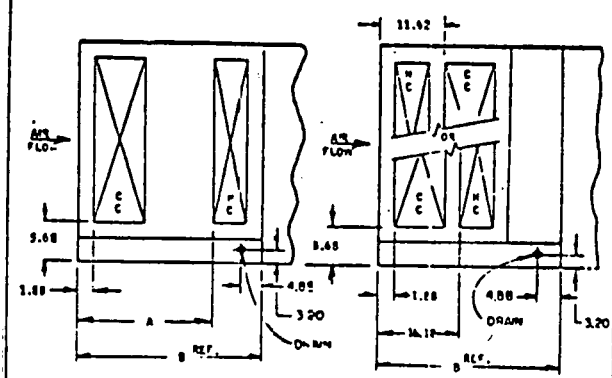
NAME FOR
UNIT NO. AC-L LOCATION
DRAWN

STANDARD HORIZONTAL DRAW THRU UNIT



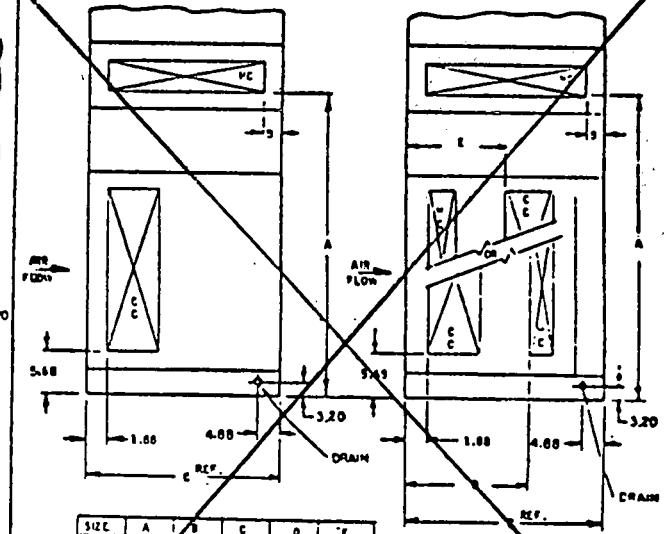
SIZE	A	B	C
00			
01	59.00		
02			
03	49.00		
04			
05	39.00		
06			
07			

HORIZONTAL LONG DRAW THRU UNIT



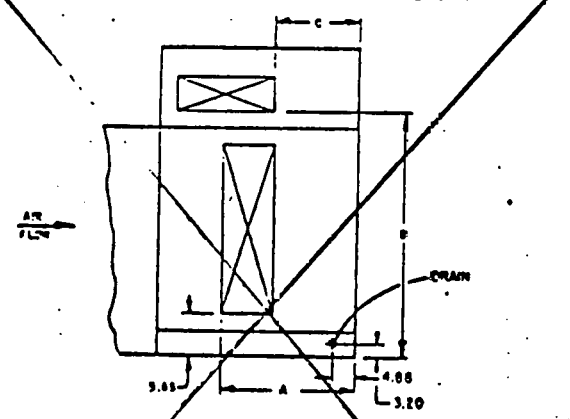
SIZE	A	B	C
00			
01	23.12	51.00	
02			
03	34.12	82.00	
04			
05	45.62	81.50	
06			
07			

VERTICAL DRAW THRU UNIT



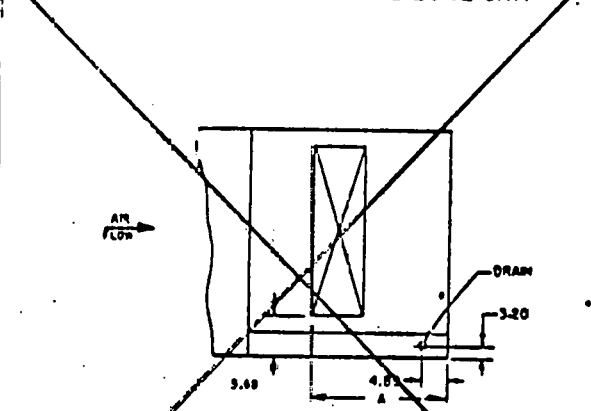
SIZE	A	B	C	D	E
00					
01	40.10		31.00	N.A.	N.A.
02					
03		.82			
04	57.10		42.00		
05				10.11	11.62
06	60.60	3.30	51.50		
07					

BLOW THRU MULTI ZONE UNIT



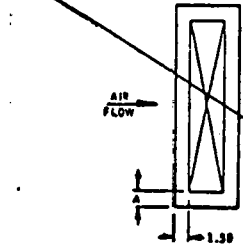
SIZE	A	B	C
00			
01	45.45	43.76	11.62
02			
03	59.00	51.50	17.00
04			
05	77.91	45.11	27.12
06			
07			

BLOW THRU SINGLE ZONE UNIT

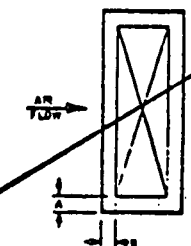


GENERAL NOTE:
NO TOLERANCE AND REMOVAL OF COILS ONLY
ON SIDE OF COIL CONNECTIONS.

PREHEAT / REHEAT SECTION



CONDENSER SECTION

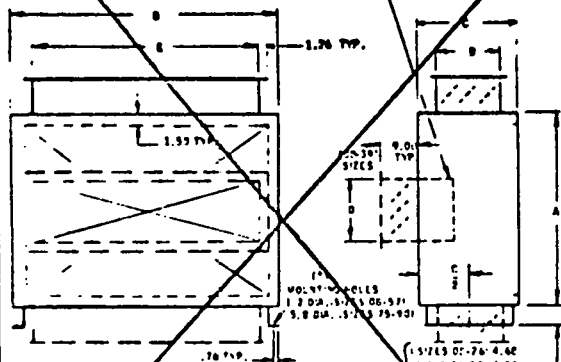


SIZE	A	B	C
00			
01			
02	.82	3.30	
03			
04			
05	1.00	3.50	
06			
07			

☐ MIXING BOX SECTION

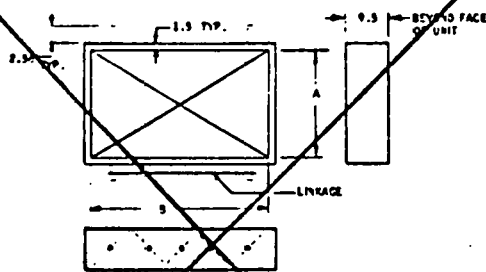
1. THE FOLLOWING INFORMATION IS APPLIED AT THE
END OF THE REPORT. CALL DIRECTION
AND THE...

~~148-987 SIZES 9.00 TYPE
REAR DAMPERS ARE LOCATED
INSIDE MIXING BOX~~



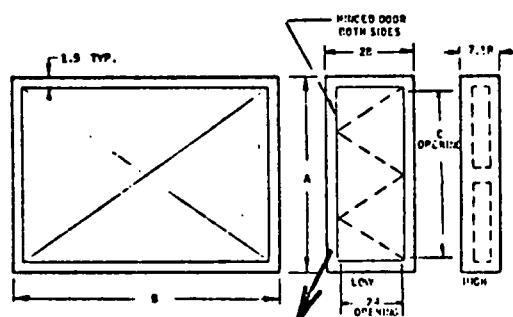
	C9	10	11	12	21	26	32	37	41	57	90
A	31	31	42	42	51.5	51.5	65.5	75.5	100		
B	71	21	51	80	99	117	117	141	159		
C	19.7	19.52	21.54	25.24	26.74	54.25	54.25	73.30	61.50	55.12	
D	15	16	23.32	23.32	23.32	30.64	39.64	57.96	72.60		
E	4.35	64.35	74.35	82.36	82.36	102.36	100.36	128.36	128.36		
F	2.81	3.7	6.79	6.55	5.35	4.95	5.25	6.60	6.174		

☐ FAN DISCHARGE DAMPER

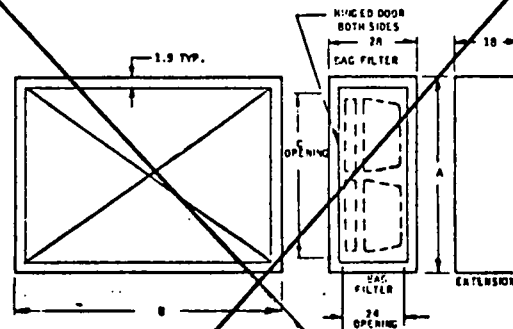


SHEL	00	10	25	10	21	2	32	39	48	57
A	88.35	79.50	76.10		25.14	36.14	35.10	36.10	40.10	
B	57.45	76.50	76.00		24.00	35.35	37.20	37.70	40.00	
	2	3	3		3	4	5	5	5	
	27	36	43		55	55	73	77	87	

☐ LOW ☒ HIGH VELOCITY FILTER SECTION



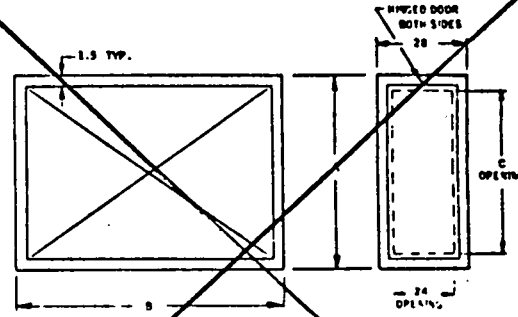
SIZE	0*	10	15	21	26	32	39	47	55
		12	13					57	90
A	31	31	42	42	51.5	51.5	65.5	75.5	100
B	21	31	41	50	60	117	117	141	151
C	76.5	76.5	137	137.5	157	157	163	73	94
	0	10	15	16	21	26	26		
	4		5	9	12	13	14	24	25
	163	121	126	124	163	112	123	451	26
	58	74	55	93	72	122	165	191	21

☒ BAG FILTER SECTION ☐ EXTENSION

NOTE:
USE EXTENSION FOR BAG FILTER
OVER 22 INCHES DEEP.

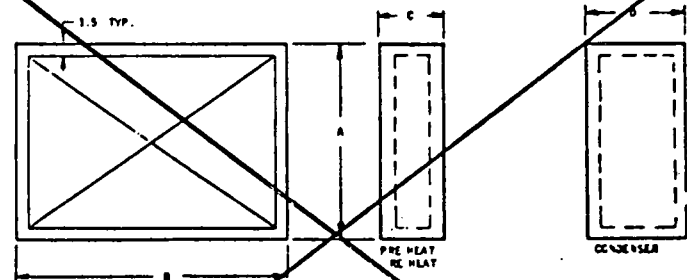
SIZE	04	10	12	14	20	26	32	39	48	75
A	31	31	42	52	51.9	51.5	55.9	75.9	100	100
B	71	81	91	99	99	117	117	141	151	151
C	24.5	24.5	37.5	37.5	43	43	61	71	79	79
	1	9	4	4	9	4	2	4	2	4
	2	3	3	4	4	4	19	7	7	7
	1	0	4	4	0	2	4	1	4	4
	2	3	2	4	4	8	8	12	24	24
	172	102	220	222	313	313	422	502	632	632
	21	59	105	111	111	127	132	142	152	152

☐ ACCESS SECTION



SIZE	08	10	15	21	26	32	39	46	73
			10					57	90
A	51	51	42	42	51.5	51.5	55.5	75.5	100
B	71	81	91	99	99	117	117	141	159
C	26.5	26.5	37.5	37.5	47	47	61	71	94.5
	132	145	169	172	172	223	223	279	334

☐ PRE HEAT, REHEAT COIL SECTION
☐ CONDENSER COIL SECTION



SIZE	ON	10	15	21	26	32	39	43	75
		12	18				57		92
A	31	31	42	42	51.5	51.5	65.5	72	107
B	7	81	91	99	99	117	117	141	145
C	9	9	9	9	9	9	12	12	12
D	13.5	13.5	13.5	13.5	17.5	17.5	17.5	17.5	17.5
E	56	40	77	83	110	120	437	477	477
F	93	100	127	142	164	200	455	565	675

NAME FOR	LOCATION
AC	

DATE	11/18/21
TIME	11:18

DATE _____
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01/04/2007
01/04/2007

DATE

ADDITIONAL COMMENTS

2014/04/15 0 00:00



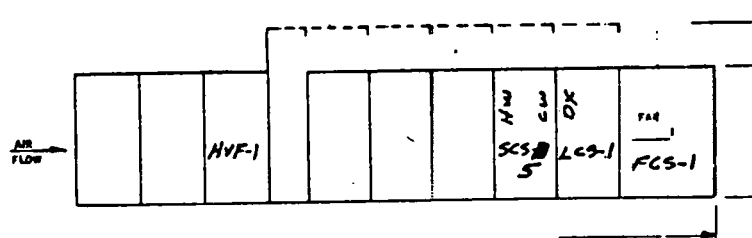
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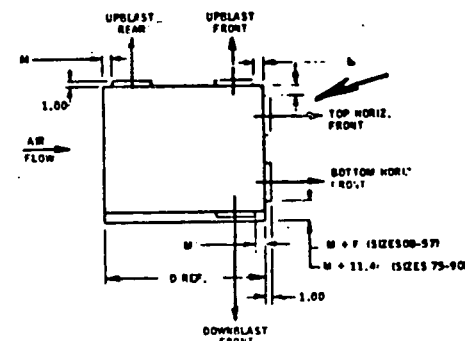
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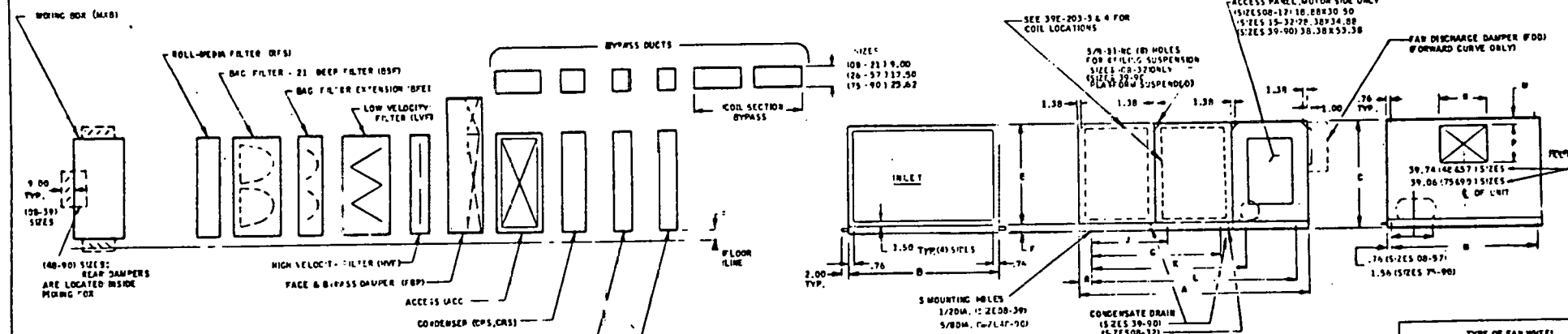
IN DIRECTION OF AIR FLOW			
CON. CONNECTIONS		FAN MOTOR	
RM	HV FDX	RM	✓
LM	CW	LM	

Diagram No. 5

FAN DISCHARGE



BASE UNIT & ACCESSORIES



PREHEAT (P.H.S. R.H.S.)															OPTIONAL FAN CONDENSAT. PAN REQUIRES LESS MOUNTING HOLES SIZE 48-57															MOUNTING HOLE LOCATIONS															FORWARD CURVE					TYPE OF FAN WHEEL				
PLENUM															SIZE															A B C D E F G H I J K L M N O P Q R S															M R P W					ALL				
SIZE	W X		BFS	BFS	BFE	LWF	HWF	FEP	ACC	CPS CAS	P.H.S. R.H.S.	PLU	ESB	FDD	SIZE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	M	R	P	W																
08			16.00	20.00	18.00	28.00	7.10		20.00	13.50				9.50	08	86.00	71.00	59.68	59.00	51.00			51.00	67.50																														
10	19.52														10		81.00							70.50																														
12								16.80				9.00			12																																							
14													24.00		14		91.00		46.40	42.00	42.00	4.60		63.00	89.50																													
16	20.04													42.00	16	108.00																																						
18															18																																							
20															20		99.00																																					
22															22	127.80		56.16	51.50	51.50			77.50																															
24															24		117.00																																					
26															26	179.00		70.44	63.50	63.50			120.50																															
28															28																																							
30	34.16							17.50							30	199.00	141.00	62.44	75.50	75.50			112.50	139.50																														
32															32																																							
34															34																																							
36															36																																							
38	41.40														38																																							
40															40																																							
42															42																																							
44															44																																							
46															46																																							
48															48																																							
50	56.12														50																																							
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SEE 39E, 39F, 39G, 39H, 39I, 39J, 39K, 39L, 39M, 39N, 39O, 39P, 39Q, 39R, 39S, 39T, 39U, 39V, 39W, 39X, 39Y, 39Z, 39AA, 39AB, 39AC, 39AD, 39AE, 39AF, 39AG, 39AH, 39AI, 39AJ, 39AK, 39AL, 39AM, 39AN, 39AO, 39AP, 39AQ, 39AR, 39AS, 39AT, 39AU, 39AV, 39AW, 39AX, 39AY, 39AZ, 39BA, 39BB, 39BC, 39BD, 39BE, 39BF, 39BG, 39BH, 39BI, 39BJ, 39BK, 39BL, 39BM, 39BN, 39BO, 39BP, 39BQ, 39BR, 39BS, 39BT, 39BU, 39BV, 39BW, 39BX, 39BY, 39BZ, 39CA, 39CB, 39CC, 39CD, 39CE, 39CF, 39CG, 39CH, 39CI, 39CJ, 39CK, 39CL, 39CM, 39CN, 39CO, 39CP, 39CQ, 39CR, 39CS, 39CT, 39CU, 39CV, 39CW, 39CX, 39CY, 39CZ, 39DA, 39DB, 39DC, 39DD, 39DE, 39DF, 39DG, 39DH, 39DI, 39DJ, 39DK, 39DL, 39DM, 39DN, 39DO, 39DP, 39DQ, 39DR, 39DS, 39DT, 39DU, 39DV, 39DW, 39DX, 39DY, 39DZ, 39EA, 39EB, 39EC, 39ED, 39EE, 39EF, 39EG, 39EH, 39EI, 39EJ, 39EK, 39EL, 39EM, 39EN, 39EO, 39EP, 39EQ, 39ER, 39ES, 39ET, 39EU, 39EV, 39EW, 39EX, 39EY, 39EZ, 39FA, 39FB, 39FC, 39FD, 39FE, 39FF, 39FG, 39FH, 39FI, 39FJ, 39FK, 39FL, 39FM, 39FN, 39FO, 39FP, 39FQ, 39FR, 39FS, 39FT, 39FU, 39FV, 39FW, 39FX, 39FY, 39FZ, 39GA, 39GB, 39GC, 39GD, 39GE, 39GF, 39GG, 39GH, 39GI, 39GJ, 39GK, 39GL, 39GM, 39GN, 39GO, 39GP, 39GQ, 39GR, 39GS, 39GT, 39GU, 39GV, 39GW, 39GX, 39GY, 39GZ, 39HA, 39HB, 39HC, 39HD, 39HE, 39HF, 39HG, 39HH, 39HI, 39HJ, 39HK, 39HL, 39HM, 39HN, 39HO, 39HP, 39HQ, 39HR, 39HS, 39HT, 39HU, 39HV, 39HW, 39HX, 39HY, 39HZ, 39IA, 39IB, 39IC, 39ID, 39IE, 39IF, 39IG, 39IH, 39II, 39IJ, 39IK, 39IL, 39IM, 39IN, 39IO, 39IP, 39IQ, 39IR, 39IS, 39IT, 39IU, 39IV, 39IW, 39IX, 39IY, 39IZ, 39JA, 39JB, 39JC, 39JD, 39JE, 39JF, 39JG, 39JH, 39JI, 39JJ, 39JK, 39JL, 39JM, 39JN, 39JO, 39JP, 39JQ, 39JR, 39JS, 39JT, 39JU, 39JV, 39JW, 39JX, 39JY, 39JZ, 39KA, 39KB, 39KC, 39KD, 39KE, 39KF, 39KG, 39KH, 39KI, 39KJ, 39KK, 39KL, 39KM, 39KN, 39KO, 39KP, 39KQ, 39KR, 39KS, 39KT, 39KU, 39KV, 39KW, 39KX, 39KY, 39KZ, 39LA, 39LB, 39LC, 39LD, 39LE, 39LF, 39LG, 39LH, 39LI, 39LJ, 39LK, 39LM, 39LN, 39LO, 39LP, 39LQ, 39LR, 39LS, 39LT, 39LU, 39LV, 39LW, 39LX, 39LY, 39LZ, 39MA, 39MB, 39MC, 39MD, 39ME, 39MF, 39MG, 39MH, 39MI, 39MJ, 39MK, 39ML, 39MN, 39MO, 39MP, 39MQ, 39MR, 39MS, 39MT, 39MU, 39MV, 39MW, 39MX, 39MY, 39MZ, 39NA, 39NB, 39NC, 39ND, 39NE, 39NF, 39NG, 39NH, 39NI, 39NJ, 39NK, 39NL, 39NM, 39NN, 39NO, 39NP, 39NQ, 39NR, 39NS, 39NT, 39NU, 39NV, 39NW, 39NX, 39NY, 39NZ, 39OA, 39OB, 39OC, 39OD, 39OE, 39OF, 39OG, 39OH, 39OI, 39OJ, 39OK, 39OL, 39OM, 39ON, 39OO, 39OP, 39OQ, 39OR, 39OS, 39OT, 39OU, 39OV, 39OW, 39OX, 39OY, 39OZ, 39PA, 39PB, 39PC, 39PD, 39PE, 39PF, 39PG, 39PH, 39PI, 39PJ, 39PK, 39PL, 39PM, 39PN, 39PO, 39PP, 39PQ, 39PR, 39PS, 39PT, 39PU, 39PV, 39PW, 39PX, 39PY, 39PZ, 39QA, 39QB, 39QC, 39QD, 39QE, 39QF, 39QG, 39QH, 39QI, 39QJ, 39QK, 39QL, 39QM, 39QN, 39QO, 39QP, 39QQ, 39QR, 39QS, 39QT, 39QU, 39QV, 39QW, 39QX, 39QY, 39QZ, 39RA, 39RB, 39RC, 39RD, 39RE, 39RF, 39RG, 39RH, 39RI, 39RJ, 39RK, 39RL, 39RM, 39RN, 39RO, 39RP, 39RQ, 39RR, 39RS, 39RT, 39RU, 39RV, 39RW, 39RX, 39RY, 39RZ, 39SA, 39SB, 39SC, 39SD, 39SE, 39SF, 39SG, 39SH, 39SI, 39SJ, 39SK, 39SL, 39SM, 39SN, 39SO, 39SP, 39SQ, 39SR, 39SS, 39ST, 39SU, 39SV, 39SW, 39SX, 39SY, 39SZ, 39TA, 39TB, 39TC, 39TD, 39TE, 39TF, 39TG, 39TH, 39TI, 39TJ, 39TK, 39TL, 39TM, 39TN, 39TO, 39TP, 39TQ, 39TR, 39TS, 39TT, 39TU, 39TV, 39TW, 39TX, 39TY, 39TZ, 39UA, 39UB, 39UC, 39UD, 39UE, 39UF, 39UG, 39UH, 39UI, 39UJ, 39UK, 39UL, 39UM, 39UN, 39UO, 39UP, 39UQ, 39UR, 39US, 39UT, 39UU, 39UV, 39UW, 39UX, 39UY, 39UZ, 39VA, 39VB, 39VC, 39VD, 39VE, 39VF, 39VG, 39VH, 39VI, 39VJ, 39VK, 39VL, 39VM, 39VN, 39VO, 39VP, 39VQ, 39VR, 39VS, 39VT, 39VU, 39VV, 39VW, 39VX, 39VY, 39VZ, 39WA, 39WB, 39WC, 39WD, 39WE, 39WF, 39WG, 39WH, 39WI, 39WJ, 39WK, 39WL, 39WM, 39WN, 39WO, 39WP, 39WQ, 39WR, 39WS, 39WT, 39WU, 39WV, 39WW, 39WX, 39WY, 39WZ, 39XA, 39XB, 39XC, 39XD, 39XE, 39XF, 39XG, 39XH, 39XI, 39XJ, 39XK, 39XL, 39XM, 39XN, 39XO, 39XP, 39XQ, 39XR, 39XS, 39XT, 39XU, 39XV, 39XW, 39XX, 39XY, 39XZ, 39YA, 39YB, 39YC, 39YD, 39YE, 39YF, 39YG, 39YH, 39YI, 39YJ, 39YK, 39YL, 39YM, 39YN, 39YO, 39YP, 39YQ, 39YR, 39YS, 39YT, 39YU, 39YV, 39YW, 39YX, 39YY, 39YZ, 39ZA, 39ZB, 39ZC, 39ZD, 39ZE, 39ZF, 39ZG, 39ZH, 39ZI, 39ZJ, 39ZK, 39ZL, 39ZM, 39ZN, 39ZO, 39ZP, 39ZQ, 39ZR, 39ZS, 39ZT, 39ZU, 39ZV, 39ZW, 39ZX, 39ZY, 39ZZ

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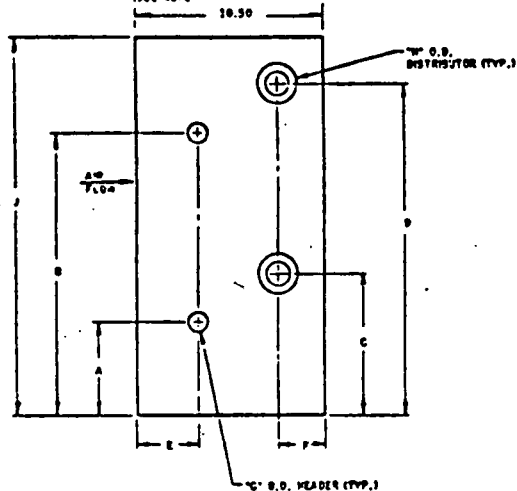


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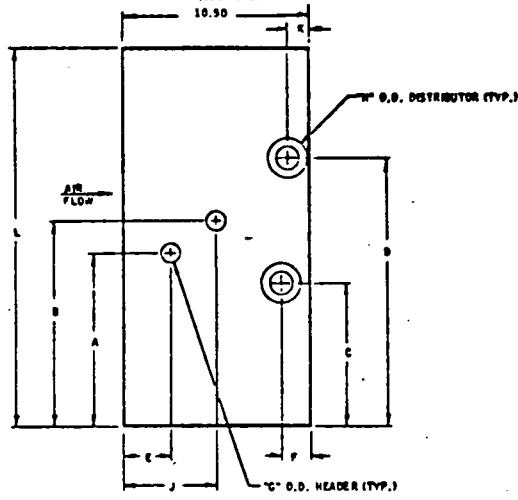
FACE SPLIT

(SEE NOTE)



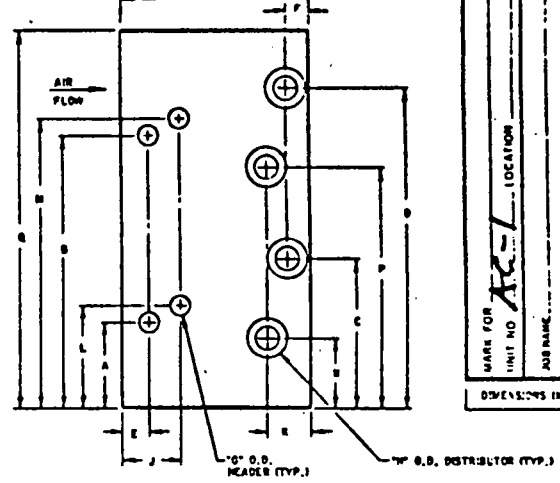
ROW SPLIT

(SEE NOTE)



DOUBLE CIRCUIT FACE OR ROW SPLIT

(SEE NOTE)



UNIT SIZE	ROW	CIRCUIT	A	B	C	D	E	F	G	H	J
08 & 10	4	HALF	9.04	19.94	6.56	16.56	3.62	2.00	7/8	7/8	
		FULL			5.76	12.76			1 1/8	1 1/8	
		QUARTER	9.04	19.94	6.56	16.56	2.94	4.18	1 1/8	7/8	
	6	HALF			6.28	14.28			1 1/8	1 1/8	
		FULL	9.04	19.94	6.28	14.28	1.46	3.10	1 1/8	1 1/8	
		QUARTER	9.04	19.94	6.28	14.28	1.46	3.10	1 1/8	1 1/8	
12	4	HALF	8.44	19.44	7.24	17.24	3.62	2.00	1 1/8	1 1/8	
		FULL			7.24	17.24			1 1/8	1 1/8	
		QUARTER	8.44	19.44	7.24	17.24	2.94	4.18	1 1/8	7/8	
	6	HALF			7.24	17.24			1 1/8	1 1/8	
		FULL	8.44	19.44	7.24	17.24	1.46	3.10	1 1/8	1 1/8	
		QUARTER	8.44	19.44	7.24	17.24	1.46	3.10	1 1/8	1 1/8	
15	4	HALF	8.44	23.44	9.24	21.24	3.62	2.00	1 1/8	7/8	
		FULL			9.24	21.24			1 1/8	1 1/8	
		QUARTER	8.44	23.44	9.24	21.24	2.94	4.18	1 1/8	7/8	
	6	HALF			9.24	21.24			1 1/8	1 1/8	
		FULL	8.44	23.44	9.24	21.24	1.46	3.10	1 1/8	1 1/8	
		QUARTER	8.44	23.44	9.24	21.24	1.46	3.10	1 1/8	1 1/8	
10 & 21	4	HALF	12.04	25.04	11.04	23.04	3.62	2.00	1 1/8	7/8	
		FULL			11.04	23.04			1 1/8	1 1/8	
		QUARTER	12.04	25.04	11.04	23.04	2.94	4.18	1 1/8	7/8	
	6	HALF			11.04	23.04			1 1/8	1 1/8	
		FULL	12.04	25.04	11.04	23.04	1.46	3.10	1 1/8	1 1/8	
		QUARTER	12.04	25.04	11.04	23.04	1.46	3.10	1 1/8	1 1/8	
26 & 32	4	HALF	12.04	27.04	12.04	25.04	3.62	2.00	1 1/8	7/8	
		FULL			12.04	25.04			1 1/8	1 1/8	
		QUARTER	12.04	27.04	12.04	25.04	2.94	4.18	1 1/8	7/8	
	6	HALF			12.04	25.04			1 1/8	1 1/8	
		FULL	12.04	27.04	12.04	25.04	1.46	3.10	1 1/8	1 1/8	
		QUARTER	12.04	27.04	12.04	25.04	1.46	3.10	1 1/8	1 1/8	

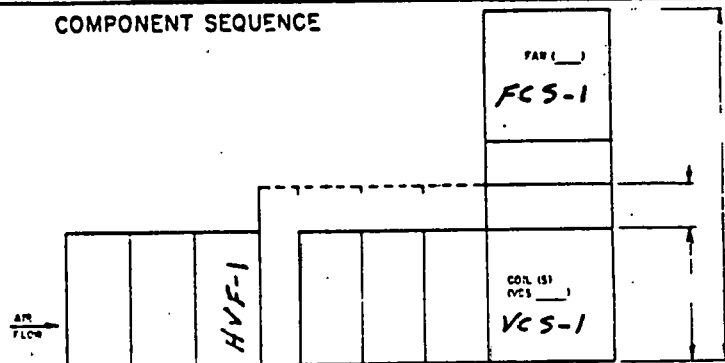
UNIT SIZE	ROW	CIRCUIT	A	B	C	D	E	F	G	H	J	K	L
08 & 10	4	QUARTER	6.56	15.56			2.38	7/8	7/8	4.88		1.46	
		HALF	6.56	15.56	9.06	14.06	2.38	7/8	7/8	4.88		1.46	
		FULL	10.56	17.56			2.38	7/8	7/8	4.88		1.46	
	6	QUARTER	6.56	15.56			1.30	7/8	7/8	3.80		3.62	
		HALF	6.56	15.56	9.06	14.06	1.30	7/8	7/8	3.80		3.62	
		FULL	10.56	17.56			1.30	7/8	7/8	3.80		3.62	
12	4	HALF	7.52	18.52			2.38	7/8	7/8	4.88		1.46	
		FULL	12.02	24.02	10.02	16.56	2.38	7/8	7/8	4.88		1.46	
		QUARTER	7.52	18.52			1.30	7/8	7/8	3.80		3.62	
	6	HALF	7.52	18.52	11.56	16.56	1.30	7/8	7/8	3.80		3.62	
		FULL	12.02	24.02			1.30	7/8	7/8	3.80		3.62	
		QUARTER	7.52	18.52			1.30	7/8	7/8	3.80		3.62	
15	4	HALF	7.52	22.52			2.38	7/8	7/8	4.88		1.46	
		FULL	12.02	28.02	11.56	18.56	2.38	7/8	7/8	4.88		1.46	
		QUARTER	7.52	22.52			1.30	7/8	7/8	3.80		3.62	
	6	HALF	7.52	22.52	12.56	18.56	1.30	7/8	7/8	3.80		3.62	
		FULL	12.02	28.02			1.30	7/8	7/8	3.80		3.62	
		QUARTER	7.52	22.52			1.30	7/8	7/8	3.80		3.62	
10 & 21	4	HALF	12.02	26.02			2.38	7/8	7/8	4.88		1.46	
		FULL	17.02	32.02	16.56	21.56	2.38	7/8	7/8	4.88		1.46	
		QUARTER	12.02	26.02			1.30	7/8	7/8	3.80		3.62	
	6	HALF	12.02	26.02	17.56	21.56	1.30	7/8	7/8	3.80		3.62	
		FULL	17.02	32.02			1.30	7/8	7/8	3.80		3.62	
		QUARTER	12.02	26.02			1.30	7/8	7/8	3.80		3.62	
26 & 32	4	HALF	12.02	30.02			2.38	7/8	7/8	4.88		1.46	
		FULL	22.02	38.02	21.56	26.56	2.38	7/8	7/8	4.88		1.46	
		QUARTER	12.02	30.02			1.30	7/8	7/8	3.80		3.62	
	6	HALF	12.02	30.02	23.56	26.56	1.30	7/8	7/8	3.80		3.62	
		FULL	22.02	38.02			1.30	7/8	7/8	3.80		3.62	
		QUARTER	12.02	30.02			1.30	7/8	7/8	3.80		3.62	

UNIT SIZE	ROW	CIRCUIT	A	B	C	D	E	F	G
08 & 10	4	DOUBLE	9.04	19.94	6.56	16.56	1.46	3.10	1 1/8
		DOUBLE	9.04	19.94	6.56	16.56	1.46	3.10	1 1/8
12	4	DOUBLE	8.44	19.44	7.24	17.24	1.46	3.10	1 1/8
		DOUBLE	8.44	19.44	7.24	17.24	1.46	3.10	1 1/8
15	4	DOUBLE	8.44	23.44	9.24	21.24	1.46	3.10	1 1/8
		DOUBLE	8.44	23.44	9.24	21.24	1.46	3.10	1 1/8
10 & 21	4	DOUBLE	12.04	25.04	11.04	23.04	1.46	3.10	1 1/8
		DOUBLE	12.04	25.04	11.04	23.04	1.46	3.10	1 1/8
26 & 32	4	DOUBLE	12.04	27.04	12.04	25.04	1.46	3.10	1 1/8
		DOUBLE	12.04	27.04	12.04	25.04	1.46	3.10	1 1/8

UNIT SIZE	ROW	CIRCUIT	A	B	C	D	E	F	G
08 & 10	4	DOUBLE	1.78	3.16	4.12	8.64	12.64	5.76	22.56
		DOUBLE	1.78	3.16	4.12	8.64	12.64	5.76	22.56
12	4	DOUBLE	1.78	3.16	4.12	9.56	22.56	5.76	22.56
		DOUBLE	1.78	3.16	4.12	9.56	22.56	5.76	22.56
15	4	DOUBLE	1.78	3.16	4.12	10.06	22.56	5.76	22.56
		DOUBLE	1.78	3.16	4.12	10.06	22.56	5.76	22.56
10 & 21	4	DOUBLE	1.78	3.16	4.12	12.52	22.56	5.76	22.56
		DOUBLE	1.78	3.16	4.12	12.52	22.56	5.76	22.56
26 & 32	4	DOUBLE	1.78	3.16	4.12	14.52	22.56	5.76	22.56
		DOUBLE	1.78	3.16	4.12	14.52	22.56	5.76	22.56

NOTE:
R.P. COIL CONNECTION SHOWN
FOR L.P. COIL CONNECTION ROTATE
COIL 180° IN VERTICAL PLANE.

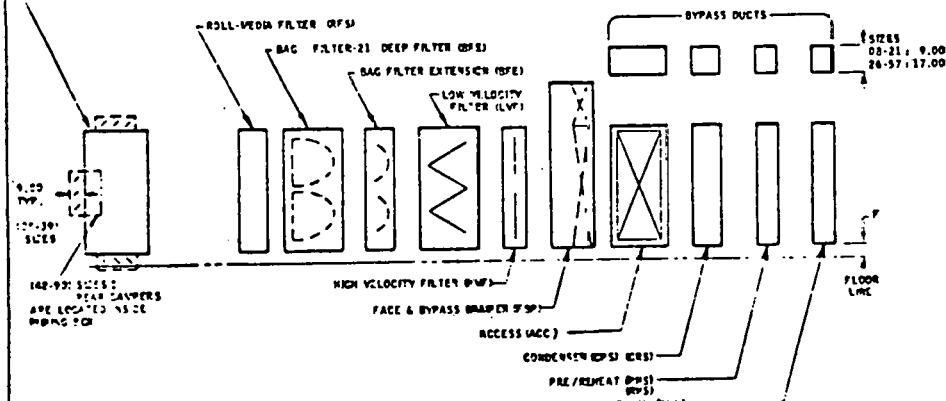
COMPONENT SEQUENCE



IN DIRECTION OF AIR FLOW			
COIL CONNECTIONS		FAN MOTOR	
ON	✓	ON	✓
OFF		OFF	

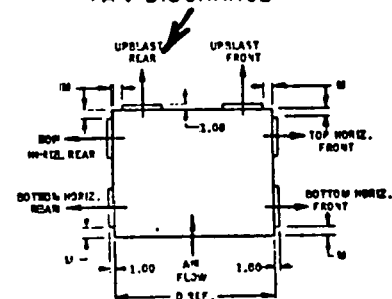
Diagram No. 6

WIRING BOX (WBS)



SIZE	WBS	RFS	BFS	BFE	LVF	HVF	FBD	PLN	CDS	CRS	RHS	PLN	FBD
10	19.32	16.00	28.00	16.00	28.00	7.18	29.00	13.50	9.00	9.50			
12							14.00	13.50	9.00				
15													
21	26.84												
24													
32	34.16						17.50	17.50	12.00	17.50			
36													
42	41.48	12.75											
57													

FAN DISCHARGE



BASE UNIT & ACCESSORIES

ACCESS PANEL MOTOR SIDE ONLY
 (SIZE 100-121) 10.00 X 33.50
 (SIZE 121-221) 22.00 X 33.50
 (SIZE 221-321) 33.50 X 33.50

FAN DISCHARGE DAMPER (FDD)
(FORWARD CURVE ONLY)SEE DIV. 39E-202-3 & 4
FOR COIL LOCATIONSCONDENSATE
DRAIN HPT
BOTH SIDES
SIZES
174 08-32
172 39-372.00
TYP.

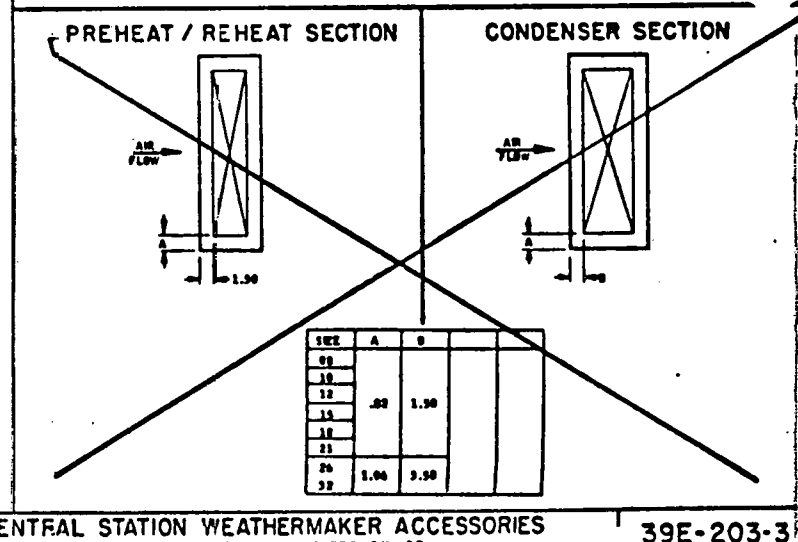
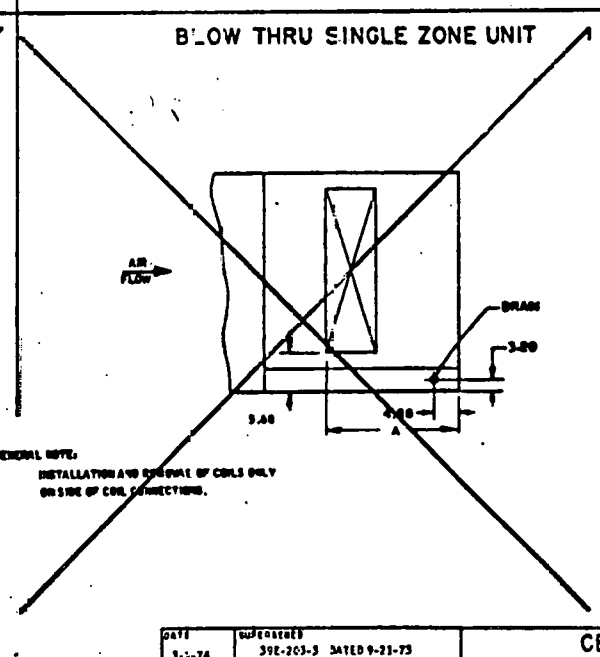
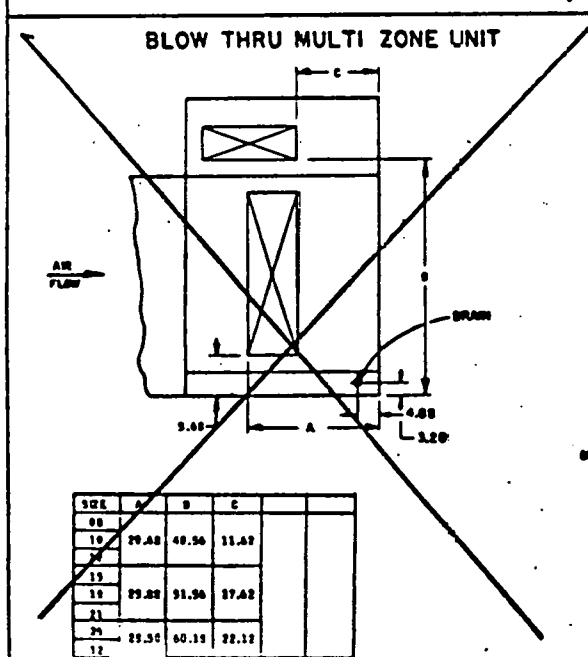
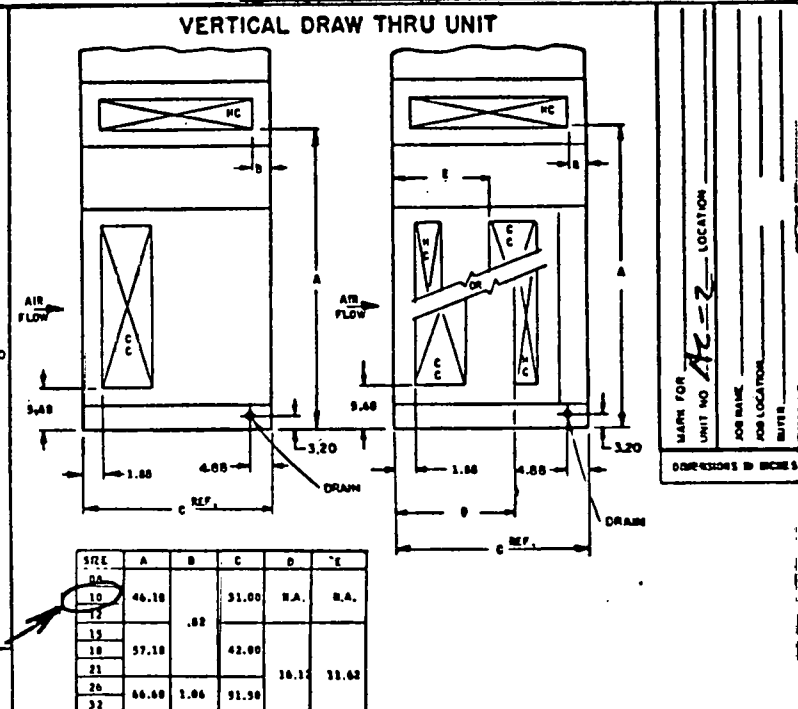
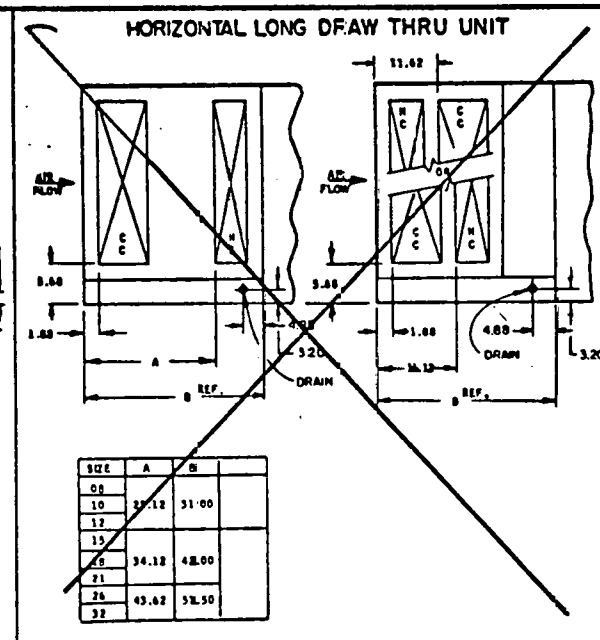
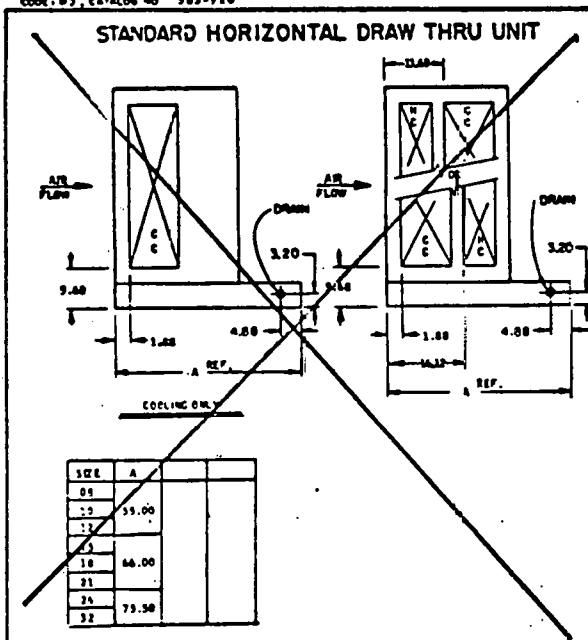
SIZE	A	C	D	E	F	G	H	I	L		M	N	P	Q	R	S
08		71.02					69.50				5.92	14.64	13.33	4.30	14.55	11
10	31.00	81.00	66.60	31.00	31.00	78.00	79.50				3.02	14.55	15.02	3.32	21.75	13
12												18.55			21.02	
15							89.50					17.76		4.00	26.44	25
18	42.30	91.00	88.60	42.00	42.00	4.68	39.00	1.30	4		2.30	14.55	24.76	4.16	27.44	27
21												22.76		2.50	32.16	31
24		99.00					97.50							4.54	35.05	37
26			107.00	31.50	31.40		48.50				2.72	31.26	31.26	2.62	33.50	43
32	51.50							115.50						7.32	43.30	51
36	65.59	117.00	135.94	65.50	65.29		67.50				6.04	34.46	34.46			
42						4.94								2.74	53.13	61
48	75.50	143.00	155.94	75.50	75.50		19.50	139.50	3.00	4		5.44	36.88	43.16		

SEE DIV. 39E-202-3 FOR ACCESSORY AND COIL DETAILS.
 SEE DIV. 39E-202-3 FOR ACCESSORY AND COIL DETAILS.
 SEE DIV. 39E-202-3 FOR ACCESSORY AND COIL DETAILS.

DATE SUPERSEDES

VERTICAL DRAW-THRU CENTRAL STATION WEATHERMAKER
0-1" TOP

39E-202-3

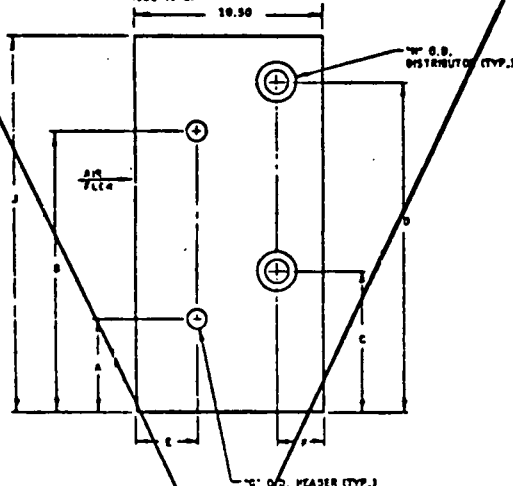




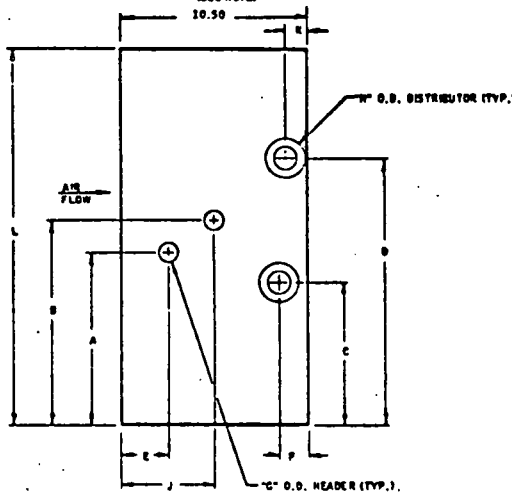
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39E

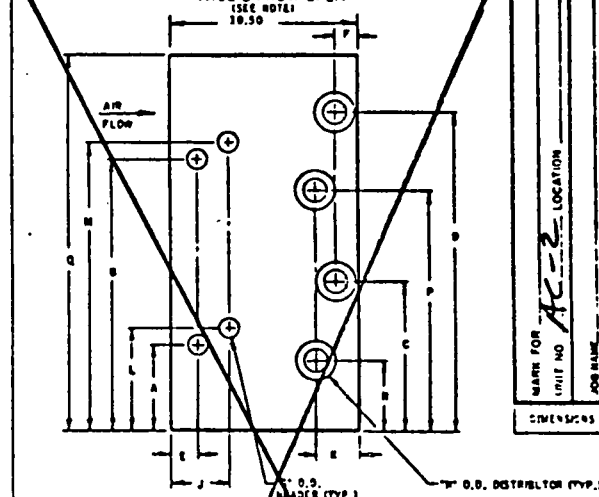
FACE SPLIT (SEE NOTE)



ROW SPLIT (SEE NOTE)



DOUBLE CIRCUIT FACE OR ROW SPLIT (SEE NOTE)



MARK FOR
UNIT NO. **AC-2** LOCATION
JOB NAME
JOB LOCATION
DATE
UNIT NO. CA
DATE WHEN CERTIFIED BY

UNIT SIZE	ROW	CIRCUIT	A	B	C	D	E	F	G	H	J
08 & 10	4	QUARTER	5.94	15.94	4.56	10.56	3.62	2.00	7/8	7/8	22.50
	4	HALF	5.94	15.94	9.76	12.26	3.62	2.00	1 1/8	1 1/8	22.50
	4	FULL	5.94	15.94	14.96	13.96	3.62	2.00	1 1/2	1 1/2	22.50
	4	DOUBLE	5.94	15.94	20.16	14.96	3.62	2.00	1 3/4	1 3/4	22.50
12	4	QUARTER	8.44	23.44	6.56	13.56	4.12	2.10	1 1/8	1 1/8	27.50
	4	HALF	8.44	23.44	13.12	13.56	4.12	2.10	1 1/2	1 1/2	27.50
	4	FULL	8.44	23.44	19.68	13.56	4.12	2.10	1 3/4	1 3/4	27.50
	4	DOUBLE	8.44	23.44	26.24	13.56	4.12	2.10	1 7/8	1 7/8	27.50
15	4	QUARTER	10.94	28.44	9.06	16.06	4.62	2.20	1 1/8	1 1/8	32.50
	4	HALF	10.94	28.44	18.12	16.06	4.62	2.20	1 1/2	1 1/2	32.50
	4	FULL	10.94	28.44	27.18	16.06	4.62	2.20	1 3/4	1 3/4	32.50
	4	DOUBLE	10.94	28.44	36.24	16.06	4.62	2.20	1 7/8	1 7/8	32.50
18 & 21	4	QUARTER	13.44	33.44	11.56	18.06	5.12	2.30	1 1/8	1 1/8	37.50
	4	HALF	13.44	33.44	23.12	18.06	5.12	2.30	1 1/2	1 1/2	37.50
	4	FULL	13.44	33.44	34.68	18.06	5.12	2.30	1 3/4	1 3/4	37.50
	4	DOUBLE	13.44	33.44	46.24	18.06	5.12	2.30	1 7/8	1 7/8	37.50
24 & 32	4	QUARTER	18.44	38.44	16.06	23.06	6.12	2.50	1 1/8	1 1/8	47.50
	4	HALF	18.44	38.44	32.12	23.06	6.12	2.50	1 1/2	1 1/2	47.50
	4	FULL	18.44	38.44	48.18	23.06	6.12	2.50	1 3/4	1 3/4	47.50
	4	DOUBLE	18.44	38.44	64.24	23.06	6.12	2.50	1 7/8	1 7/8	47.50

UNIT SIZE	ROW	CIRCUIT	A	B	C	D	E	F	G	H	J	K
08 & 10	4	QUARTER	5.94	15.94	4.56	10.56	3.62	2.00	7/8	7/8	4.00	1.40
	4	HALF	5.94	15.94	9.76	12.26	3.62	2.00	1 1/8	1 1/8	4.00	1.40
	4	FULL	5.94	15.94	14.96	13.96	3.62	2.00	1 1/2	1 1/2	4.00	1.40
	4	DOUBLE	5.94	15.94	20.16	14.96	3.62	2.00	1 3/4	1 3/4	4.00	1.40
12	4	QUARTER	8.44	23.44	6.56	13.56	4.12	2.10	1 1/8	1 1/8	5.00	1.60
	4	HALF	8.44	23.44	13.12	13.56	4.12	2.10	1 1/2	1 1/2	5.00	1.60
	4	FULL	8.44	23.44	19.68	13.56	4.12	2.10	1 3/4	1 3/4	5.00	1.60
	4	DOUBLE	8.44	23.44	26.24	13.56	4.12	2.10	1 7/8	1 7/8	5.00	1.60
15	4	QUARTER	10.94	28.44	9.06	16.06	4.62	2.20	1 1/8	1 1/8	6.00	1.80
	4	HALF	10.94	28.44	18.12	16.06	4.62	2.20	1 1/2	1 1/2	6.00	1.80
	4	FULL	10.94	28.44	27.18	16.06	4.62	2.20	1 3/4	1 3/4	6.00	1.80
	4	DOUBLE	10.94	28.44	36.24	16.06	4.62	2.20	1 7/8	1 7/8	6.00	1.80
18 & 21	4	QUARTER	13.44	33.44	11.56	18.06	5.12	2.30	1 1/8	1 1/8	7.00	2.00
	4	HALF	13.44	33.44	23.12	18.06	5.12	2.30	1 1/2	1 1/2	7.00	2.00
	4	FULL	13.44	33.44	34.68	18.06	5.12	2.30	1 3/4	1 3/4	7.00	2.00
	4	DOUBLE	13.44	33.44	46.24	18.06	5.12	2.30	1 7/8	1 7/8	7.00	2.00
24 & 32	4	QUARTER	18.44	38.44	16.06	23.06	6.12	2.50	1 1/8	1 1/8	8.00	2.20
	4	HALF	18.44	38.44	32.12	23.06	6.12	2.50	1 1/2	1 1/2	8.00	2.20
	4	FULL	18.44	38.44	48.18	23.06	6.12	2.50	1 3/4	1 3/4	8.00	2.20
	4	DOUBLE	18.44	38.44	64.24	23.06	6.12	2.50	1 7/8	1 7/8	8.00	2.20

UNIT SIZE	ROW	CIRCUIT	A	B	C	D	E	F	G
08 & 10	4	DOUBLE	5.94	15.94	4.56	10.56	3.62	2.00	1 1/2
	4	DOUBLE	5.94	15.94	9.76	12.26	3.62	2.00	1 3/4
	4	DOUBLE	5.94	15.94	14.96	13.96	3.62	2.00	1 7/8
	4	DOUBLE	5.94	15.94	20.16	14.96	3.62	2.00	2
12	4	DOUBLE	8.44	23.44	6.56	13.56	4.12	2.10	1 3/4
	4	DOUBLE	8.44	23.44	13.12	13.56	4.12	2.10	1 7/8
	4	DOUBLE	8.44	23.44	19.68	13.56	4.12	2.10	2
	4	DOUBLE	8.44	23.44	26.24	13.56	4.12	2.10	2 1/8
15	4	DOUBLE	10.94	28.44	9.06	16.06	4.62	2.20	1 7/8
	4	DOUBLE	10.94	28.44	18.12	16.06	4.62	2.20	2
	4	DOUBLE	10.94	28.44	27.18	16.06	4.62	2.20	2 1/8
	4	DOUBLE	10.94	28.44	36.24	16.06	4.62	2.20	2 1/4
18 & 21	4	DOUBLE	13.44	33.44	11.56	18.06	5.12	2.30	2
	4	DOUBLE	13.44	33.44	23.12	18.06	5.12	2.30	2 1/8
	4	DOUBLE	13.44	33.44	34.68	18.06	5.12	2.30	2 1/4
	4	DOUBLE	13.44	33.44	46.24	18.06	5.12	2.30	2 3/8
24 & 32	4	DOUBLE	18.44	38.44	16.06	23.06	6.12	2.50	2 1/4
	4	DOUBLE	18.44	38.44	32.12	23.06	6.12	2.50	2 3/8
	4	DOUBLE	18.44	38.44	48.18	23.06	6.12	2.50	2 3/4
	4	DOUBLE	18.44	38.44	64.24	23.06	6.12	2.50	2 7/8

NOTE:
R.O. COIL CONNECTION SHOWN
FOR FACE SPLIT CONNECTIONS ROTATE
COIL 90° IN VERTICAL PLANE.

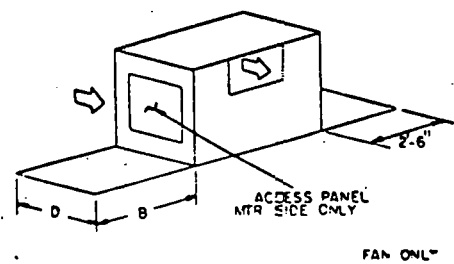
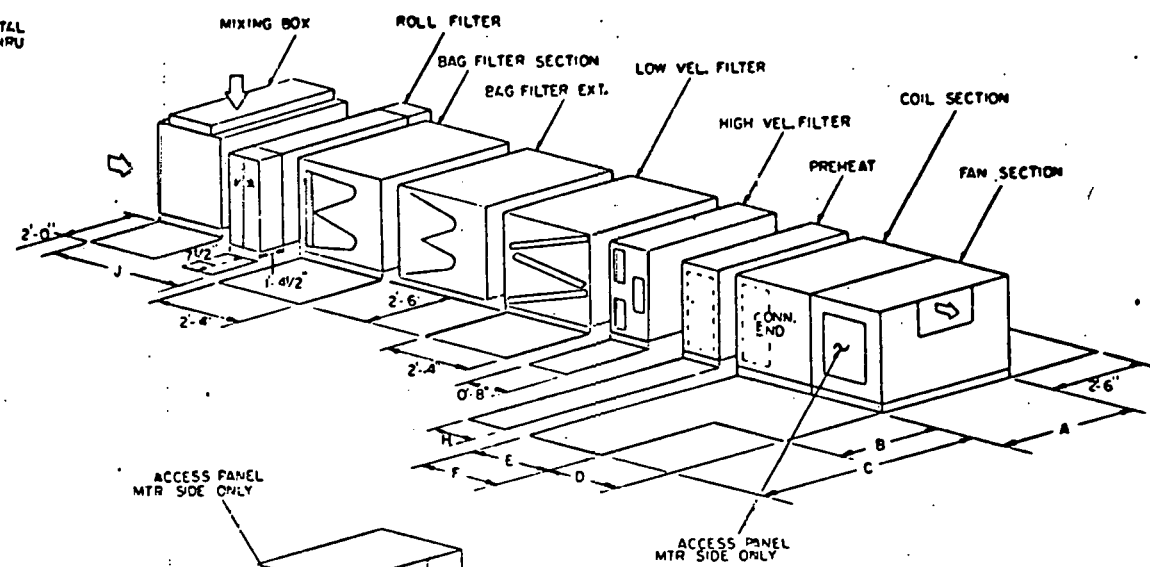


Carrier Corporation - Syracuse, New York

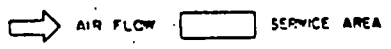
Model No. 39E-203-13

39E

HORIZONTAL
DRAW-THRU



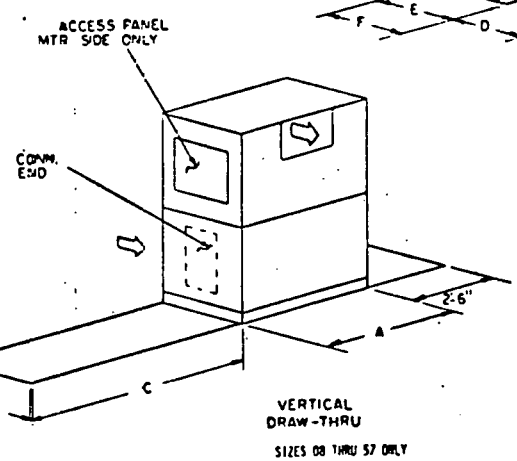
LEGEND



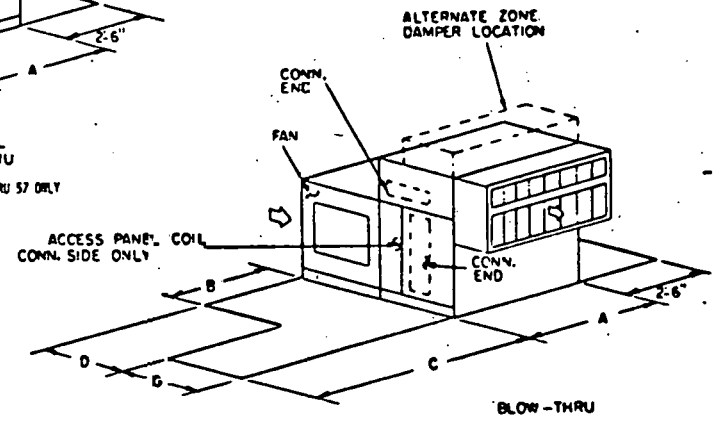
NOTES:
• SERVICE AREA ON MOTOR END ONLY.
• SERVICE AREA ON COIL CONNECTION END ONLY.
• DIMENSIONS FOR LONG COIL SECTION.

** ACCESS DOOR 1' ON THE AIR ENTERING SIDE (EXTENDS 3'-6" ON BOTH SIDES OF FILTER)

UNIT SIZE	UNIT SIZE									
	10	12	15	18	21	24	26	32	39	49
A	5'-10"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	10'-0"	11'-0"
B	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"	3'-0"
C	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
D	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
E	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
F	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
G	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
H	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
I	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
J	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
K	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
L	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
M	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
N	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
O	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"



VERTICAL
DRAW-THRU
SIZES 08 THRU 57 ONLY



DATE 3-8-76 SUPERSEDES

CENTRAL STATION WEATHERMAKER SERVICE AREA REQUIREMENTS

39E-203-13

AC-2

JOB NAME
JOB LOCATION
UNIT NO
UNIT NO
DRAWING CENTER NO

DATE

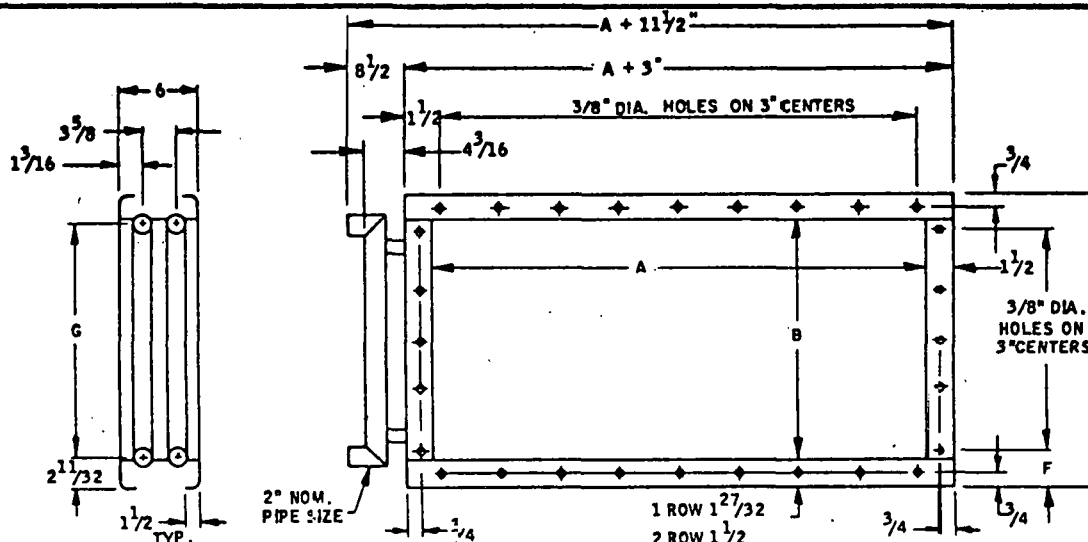
CHILLED WATER COOLING COILS

Two Carrier 28SW chilled water cooling coils with spiral aluminum fins, 5/8" O.D. copper tubes, steel headers, heavy gauge galvanized steel casing, and standard return bends. Maximum operating limits are 300 PSIG and 200 degrees F.

<u>Desig</u>	<u>CFM</u>	<u>FA</u>	<u>FV</u>	<u>Total</u>	<u>Sensible</u>	<u>EAT</u>	<u>GPM</u>	<u>PD</u>
Zone-2	3700	8.53	434	142,000 ✓	102,213	82/68 ✓	22.2 ✓	3.5'
Zone-3	1574	3.83	411	54,100 ✓	41,123	82/68 ✓	8.0 ✓	.9'

<u>R/F</u>	<u>TFXNTL</u>
6/8	.24 x 36
6/8	16 x 24

FOR BEST PERFORMANCE, COILS SHOULD BE PIPED FOR COUNTERFLOW OF AIR AND WATER.



NOMINAL TUBE LENGTH - A (INCHES)

TUBE FACE	NOMINAL TUBE LENGTH - A (INCHES)																				
	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144
12	2.79	3.49	4.19	4.88	5.58	6.28	6.98	7.67	8.37	9.07	9.76	10.5	11.2	—	—	—	—	—	—	—	—
16	3.72	4.65	5.57	6.50	7.43	8.36	9.29	10.2	11.2	12.1	13.0	13.9	14.9	15.8	16.7	17.7	18.6	—	—	—	—
20	—	—	6.96	8.13	9.29	10.5	11.6	12.8	13.9	15.1	16.3	17.4	18.6	19.7	20.9	22.1	23.2	24.4	25.5	26.7	27.9
24	—	—	8.35	9.75	11.1	12.5	13.9	15.3	16.7	18.1	19.5	20.9	22.3	23.7	25.1	26.5	27.9	29.2	30.6	32.0	33.4
28	—	—	—	—	13.0	14.6	16.2	17.9	19.5	21.1	22.7	24.4	26.0	27.6	29.2	30.9	32.5	34.1	35.7	37.4	39.0

	SERIES		SEPARATE SALE SPIRAL FIN COIL		COIL TYPE		HEADER STYLE *		ROWS		TUBES IN FACE		CIRCUITING *		FIN MATERIAL AND SERIES				LENGTH				SPECIAL	
POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16								
SAMPLE COIL NO.	2	8	6	0	1	2	1	6	H	A	-	0	7	8	-	-								

TUBE FACE	B 1 ROW	B 2 ROW	E	F	G
12	$16^{3/4}$	$17^{7/16}$	$20^{7/16}$	$4^{7/32}$	$15^{3/4}$
16	$22^{5/16}$	23	26	4	$21^{5/16}$
20	$27^{7/16}$	$28^{9/16}$	$31^{9/16}$	$3^{25/32}$	$26^{7/8}$
24	$33^{7/16}$	$34^{1/8}$	$37^{1/8}$	$3^{9/16}$	$32^{7/16}$
28	39	$39^{11/16}$	$42^{11/16}$	$3^{11/32}$	38

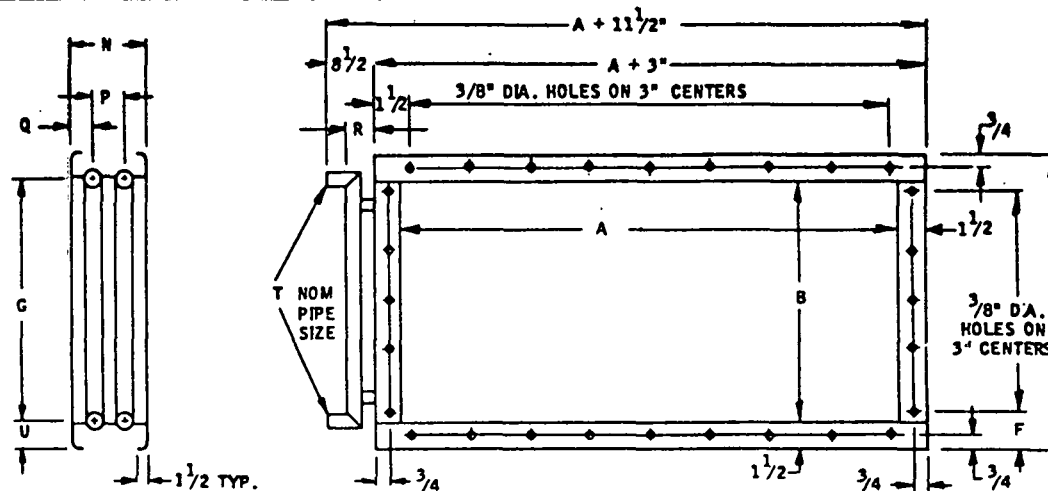
CIRCUITING	H - HALF ; F-FULL
HEADER STYLE	1-STD. HEADER & RETURN BENDS 2-STD. HEADER & CLEANABLE RETURN BENDS
FIN SERIES AND MATERIAL	A - 8, ALUM; B - 14,ALUM; K - 8, COPPER; L - 14,COPPER

[illegible]

JOB NAME _____
 JOB LOCATION _____
 BUYER _____
 BUYER NO. _____ CARRIER NO. _____
 DIMENSIONS CERTIFIED BY _____ DATE _____

NOTE: AIR VALVE
FURNISHED ON EACH
HEADER CONNECTION
FOR VENTING COIL.

FOR BEST PERFORMANCE
COILS SHOULD BE PIPED
FOR COUNTERFLOW OF
AIR AND WATER.



COIL FACE AREAS, SQ. FT.

NOMINAL TUBE LENGTH - A (INCHES)

TUBE FACE	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144
12	2.91	3.63	4.36	5.09	5.81	6.54	7.26	7.99	8.72	9.45	10.2	10.9	11.6	—	—	—	—	—	—	—	—
16	3.83	4.75	5.75	6.71	7.67	8.62	9.58	10.5	11.5	12.5	13.5	14.4	15.3	16.3	17.3	18.2	19.2	—	—	—	—
20	—	—	7.14	8.33	9.52	10.7	11.9	13.1	14.3	15.5	16.7	17.9	19.0	20.2	21.4	22.6	23.8	25.0	26.2	27.4	28.6
24	—	—	8.53	9.95	11.4	12.8	14.2	15.6	17.1	18.5	19.9	21.3	22.7	24.2	25.6	27.0	28.4	29.9	31.3	32.7	34.1
28	—	—	—	—	13.2	14.9	16.5	18.2	19.8	21.5	23.2	24.8	26.5	28.1	29.8	31.4	33.1	34.7	36.4	38.0	39.7

	SERIES		SEPARATE SALE SPIRAL FIN COIL	COIL TYPE	HEADER STYLE *	ROWS	TUBES IN FACE		CIRCUITING *	FIN MATERIAL AND SERIES *		LENGTH					SPECIAL
POSITION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
SAMPLE COIL NO.	2	8	S	W	1	8	2	4	D	A	-	1	0	2	-	-	

CIRCUITING	Q-QTR, H-HALF, F-FULL, D-DOUBLE
HEADER STYLE	1 - STANDARD HEADER AND RETURN BENDS 2 - STANDARD HEADER WITH CLEANABLE RETURN BENDS
FIN SERIES AND MATERIAL	A - 8, ALUM.; B - 14, ALUM. K - 8, COPPER; L - 14, COPPER

TUBE FACE	B	E	F	2, 2 1/2 & 3 HDRS	G 4 HDRS
12	17 7/16	20 7/16	4 7/32	15 3/4	14
16	23	26	4	21 5/16	19 9/16
20	28 9/16	31 9/16	3 25/32	26 7/8	25 1/8
24	34 1/8	37 7/8	3 9/32	32 7/16	30 11/16
28	39 11/16	42 11/16	3 11/32	33	36 1/4

ROWS	CIRCUITING	N	P	Q	R	T	U
4	QUARTER	8	4 7/8	1 9/16	4 3/16	2	2 11/32
	HALF	8	4 7/8	1 9/16	4 3/16	2	2 11/32
	FULL	8	5	1 1/2	4 11/16	2 1/2	2 11/32
6	HALF	10	6 1/32	2	4 3/16	2	2 11/32
	FULL	10	6 1/32	2	4 11/16	2 1/2	2 11/32
	DOUBLE	10	6 1/32	2	5 5/16	3	2 11/32
8	HALF	12	8 7/16	1 13/16	4 3/16	2	2 11/32
	FULL	12	6 1/32	3	4 3/16	2 1/2	2 11/32
	DOUBLE	12	7 7/32	2 3/8	6 5/16	4	3 7/32

Δ P - PRESSURE DROP

QTY.	IDENT.	COIL NUMBER	FACE AREA (SQ. FT.)	SCFM	FACE VEL.	AIR Δ P IN-WG	AIR TEMP.				WATER TEMP.				CAP. MBH	GPM	WATER Δ P FT-WG
							ENT.	WB	DB	WB	ENT.	LVG.	ENT.	LVG.			

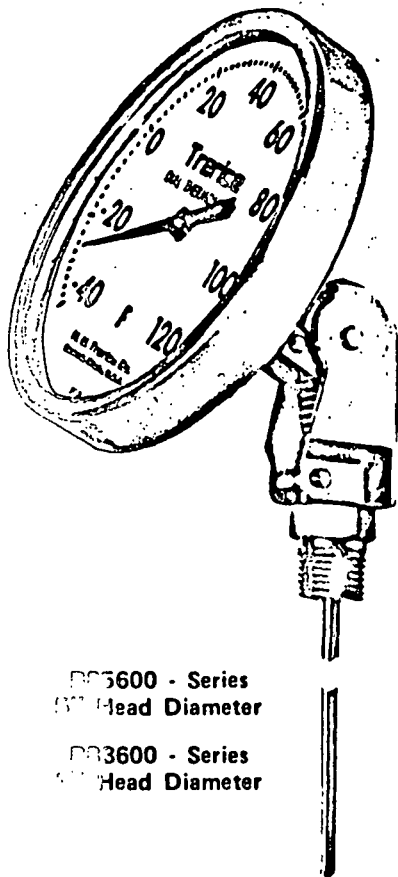
JOB NAME _____
 JOB LOCATION _____
 BUYER _____
 BUYER NO. _____ CARRIER NO. _____
 DIMENSIONS CERTIFIED BY _____ DATE _____

DATE 3-11-76	SUPERSEDES 28S-202-3A DATED 5-23-73	28SW CHILLED WATER COILS (4, 6 & 8 ROW)	28S-202-3	REV. 8
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Treerice

DIAL THERMOMETERS ADJUSTABLE ANGLE BI-METAL TYPE



B85600 - Series
3" Head Diameter

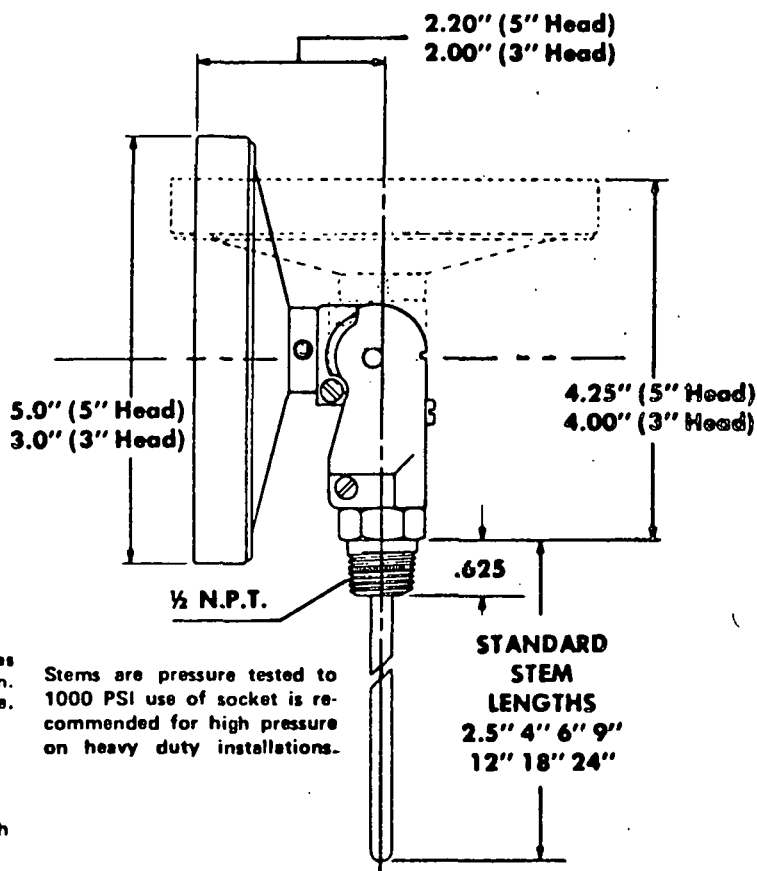
B85600 - Series
3" Head Diameter

ADJUSTABLE FOR VIEWING AT ANY ANGLE.
HEAD MAY BE TURNED 360° AND TILTED OVER A FULL 180° ARC.

SPECIFICATIONS

- Type 304 stainless steel.
- All welded construction.
- Easy to recalibrate by loosening a socket head screw, located in back of thermometer head.
- Anti-Parallax dial avoids reading errors. White dial with Black numbers and graduations on raised ring for surest, sharpest, easiest readability.
- Rustproof - Dustproof - Leakproof - Hermetically Sealed.
- Connection Nut: 1/2" N.P.T. standard.
- Stem diameter: 1/8". Standard stem lengths: 2 1/2", 4", 6", 9", 12", 18", 24", including threads. Available in stem lengths up to 72".
- Actuated by super-sensitive bi-metallic Helix Coil - No liquids.
- Bi-metallic element dampened with silicone for minimum pointer vibration and maximum heat transfer.
- Guaranteed accurate within 1% around entire dial range.
- Over-range protection 50% up to 500°F, 10% above 500°F.
- Extra-heavy glass crystal. Plastic or tempered crystal can be supplied at extra charge.

DIMENSIONS



STANDARD DIAL RANGES

Fahrenheit	°/Div.	Centigrade	°/Div.
-100 to 100°	2°	-50 to 100°	1°
-40 to 160°	2°	-10 to 110°	1°
0 to 180°	2°	**0 to 50°	1/2°
**25 to 125°	1°	0 to 100°	1°
20 to 240°	2°	0 to 150°	1°
50 to 300°	2°	0 to 250°	2°
50 to 400°	5°	100 to 400°	5°
50 to 500°	5°		
150 to 750°	10°		
*200 to 1000°	10°		

*Not recommended for continuous use above 800°F. **Ranges 25 to 125°F and 0 to 50°C not available with 2 1/2" Stem. Special dial ranges and stem lengths available at extra charge. Above ranges can also be furnished in combination, e.g.: 30 to 240°F. and 0 to 115°C. as a double scale at no extra charge.

ORDER BY SPECIFYING:

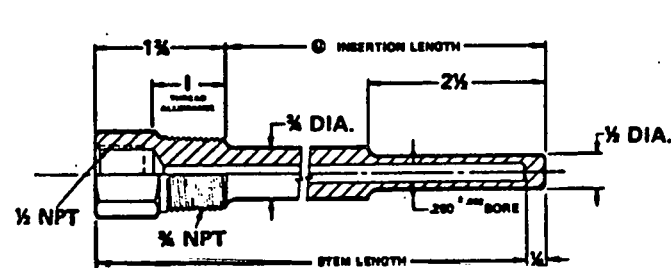
State quantity, Catalog number, name, range, stem length and separable socket specification, if required.

Catalog Number	Nominal Stem Length (Including Thread)	Catalog Number	Nominal Stem Length (Including Thread)	Catalog Number	Nominal Stem Length (Including Thread)
B85602	2 1/2"	B85609	9"	B85624	24"
B85604	4"	B85612	12"		
B85606	6"	B85618	18"		

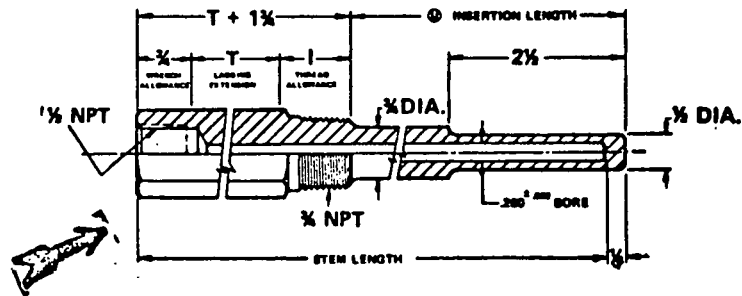
Trerice

DIAL THERMOMETERS BI-METAL TYPE ACCESSORIES

SEPARABLE SOCKETS



SOCKET WITHOUT EXTENSION NECK
Supplied for thermometers having 4" or longer stem length.



SOCKET WITH EXTENSION NECK
Supplied for thermometers having 6" or longer stem length.

CATALOG NOS. — SEPARABLE SOCKETS

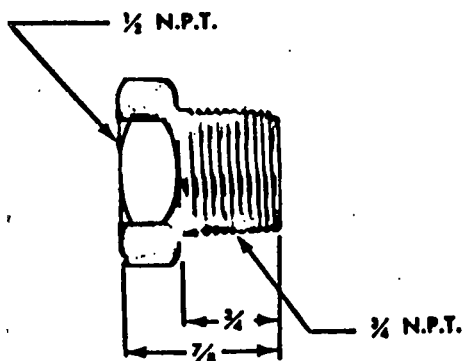
Nominal Thermometer Stem Length	Socket $\varnothing$ Insertion Length	Extension Neck $\varnothing$ Length	MATERIAL		
			Brass	Stainless Steel 304	Stainless Steel 316
4"	2 1/2"	None	76-4G2	76-4G5	76-4G6
6"	4 1/2"	None	76-4J2	76-4J5	76-4J6
6"	2 1/2"	2"	76-4JC2	76-4JC5	76-4JC6
9"	7 1/2"	None	76-4M2	76-4M5	76-4M6
9"	4 1/2"	3"	76-4MC2	76-4MC5	76-4MC6
12"	10 1/2"	None	76-4R2	76-4R5	76-4R6
12"	7 1/2"	3"	76-4RC2	76-4RC5	76-4RC6
18"	16 1/2"	None	76-Wa2	76-Wa5	76-Wa6
18"	13 1/2"	3"	76-WaC2	76-WaC5	76-WaC6
24"	22 1/2"	None	76-Wk2	76-Wk5	76-Wk6
24"	19 1/2"	3"	76-WkC2	76-WkC5	76-WkC6

Items printed in dark shaded areas are normally carried in stock.

PRESSURE — TEMPERATURE RATING LBS. PER SQ. INCH

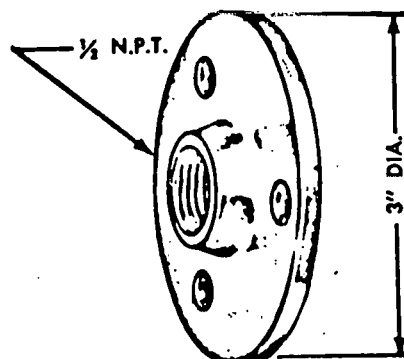
MATERIAL	TEMPERATURE — °F.						
	70°	200°	400°	600°	800°	1000°	1200°
BRASS	5000	4200	1000	-----	-----	-----	-----
A.I.S.I. — 304	7000	6200	5600	5400	5200	4500	1650
A.I.S.I. — 316	7000	7000	6400	6200	6100	5100	2500

ADAPTER HUB
For connecting 1/2" N.P.T.
conn. to 1/2" N.P.T.



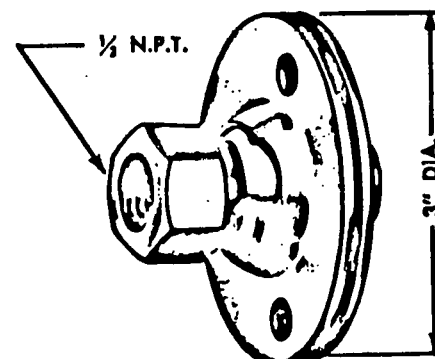
No. 75-4-2 Brass
No. 75-4-5 Stainless Steel

FIXED FLANGED
For mounting thermometers

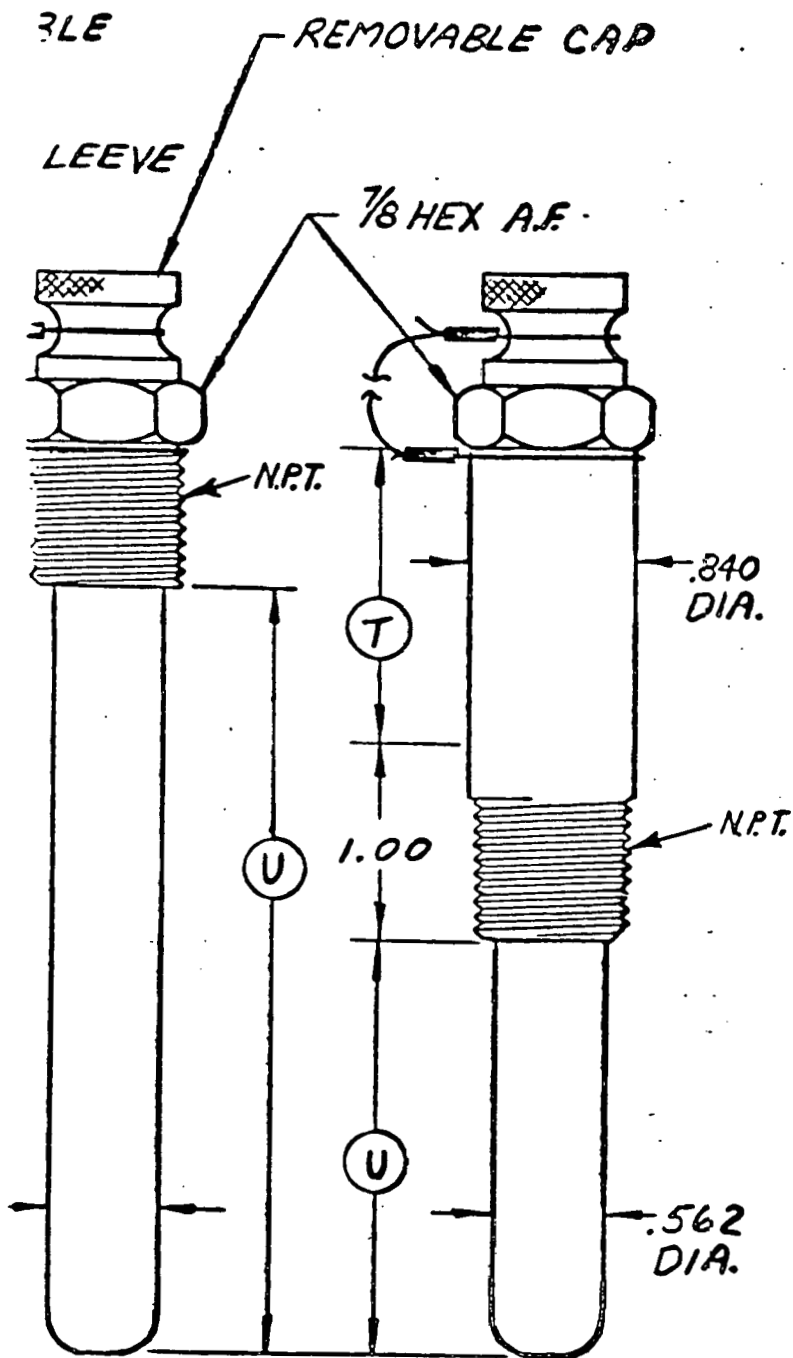


No. 77-3 Steel

SWIVEL FLANGE
For adjusting viewing angle



No. 77S-3 Cadmium Plated Steel
With Brass Hub



NOTE - FOR PART BREAKDOWN REFER TO DWG. #169-1A

ISSUED
MAY 7 1974
ENGINEERING DEPT.
H. O. TRERICE CO.

CATALOG NO.	INSERTION LENGTH (U)	EXT. NECK LENGTH (T)	NOT	MATERIAL
5571	2 1/16	—	1/2"	BRASS
5572	2 1/16	—	1/2"	303 ST. S
5573	3 13/16	—	1/2"	BRASS
5574	2 1/16	1 7/16	1/2"	BRASS
5575	3 13/16	—	1/2"	303 ST. S
5577	2 1/16	1 7/16	1/2"	304 ST. S
5578	5 5/8	—	1/2"	BRASS
5579	3 13/16	1 1/2	1/2"	BRASS
5580	5 5/8	—	1/2"	303 ST. S
5581	3 13/16	1 1/2	1/2"	303 ST. S
5582	2 1/16	—	1/2"	316 ST. S
5583	3 13/16	—	1/2"	316 ST. S
5584	2 1/16	1 7/16	1/2"	316 ST. S
5585	5 5/8	—	1/2"	316 ST. S
5586	3 13/16	1 1/2	1/2"	316 ST. S

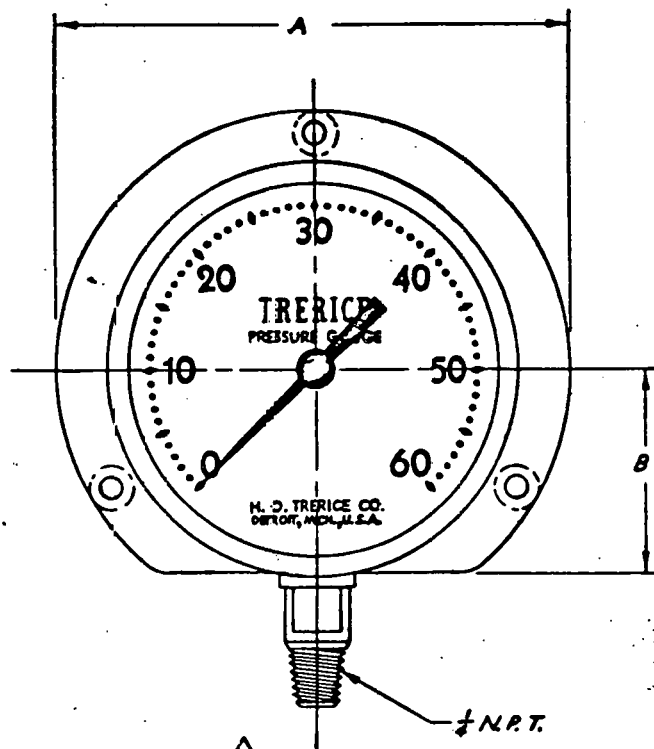
4-24-74	5	ADDED . CAT. NOS. 5582-5586
3-9-73	4	REDRAWN AND REVISED
DATE	NO.	REVISION RECORD

H. O. Trerice Co.
Detroit, Mich., U.S.A.

NAME

TEST WELLS

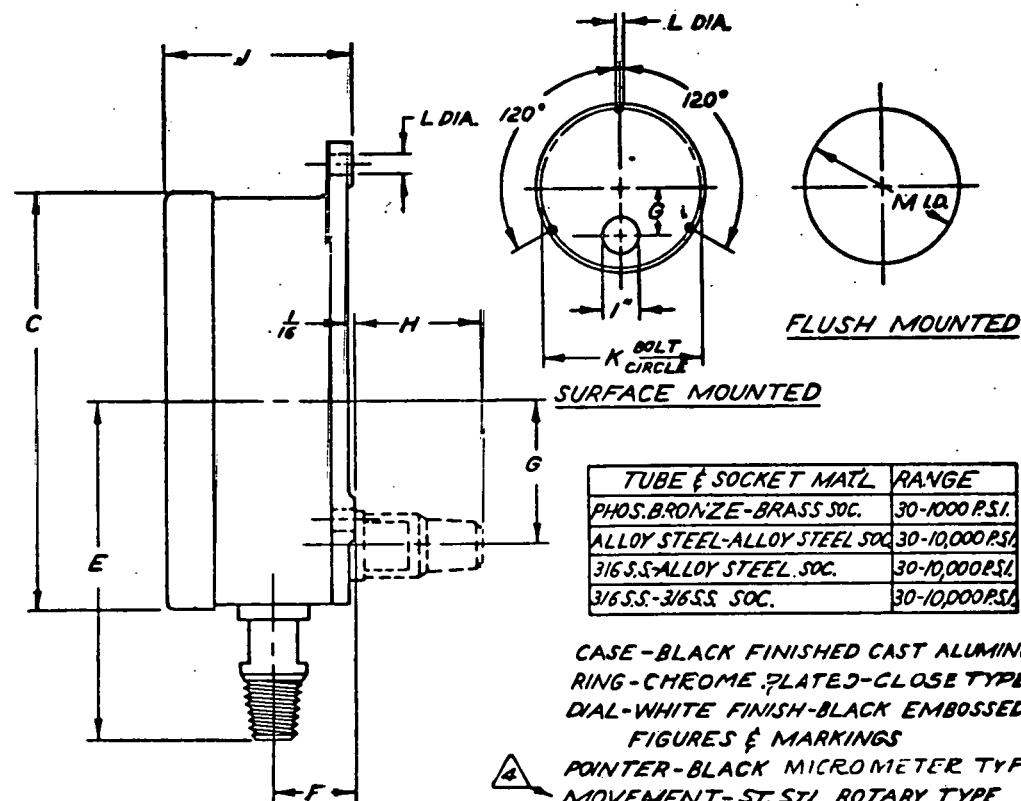
DWN [signature] APVD [signature] NO. 169-1A



NO. 500X PRESS. GAUGE DIMENSIONAL DATA											
DIAL SIZE	A	B	C	E	F	G	H	J	K	L	M
4 1/2"	5 7/8	2 1/4	4 1/2	3 5/16	1 5/16	1 5/8	1 3/16	2 1/8	5 1/2	1/32	5 1/8
6"	7 5/8	3 1/4	6 1/2	4 3/16	1 5/8	1 5/8	1 3/16	2 1/8	7	1/32	6 5/8
8 1/2"	10 1/4	4 3/8	8 1/2	5 3/16	1 5/8	1 5/8	1 3/16	2 1/8	9 5/8	1/32	9 1/8

FOR 12" GAUGE & MOUNTING DIMENSION SEE DRAWING NO. 127-326

NOTE: Flangeless case



TUBE & SOCKET MAT'L	RANGE
PHOS. BRONZE-BRASS SOC.	30-1000 P.S.I.
ALLOY STEEL-ALLOY STEEL SOC.	30-10,000 P.S.I.
316 S.S.-ALLOY STEEL SOC.	30-10,000 P.S.I.
316 S.S.-316 S.S. SOC.	30-10,000 P.S.I.

CASE-BLACK FINISHED CAST ALUMINUM.
RING-CHROME PLATED-CLOSE TYPE
DIAL-WHITE FINISH-BLACK EMBOSSED
FIGURES & MARKINGS
POINTER-BLACK MICROMETER TYPE.
MOVEMENT-ST. STL. ROTARY TYPE
DEL RIN PINION & BUSHINGS.
ACCURACY-1/2 OF 1% OF SCALE RANGE

STANDARD RANGES	
30" VAC. TO 0"	0 TO 200"
30" VAC. TO 15"	0 TO 300"
30" VAC. TO 30"	0 TO 400"
30" VAC. TO 60"	0 TO 600"
30" VAC. TO 100"	0 TO 800"
30" VAC. TO 150"	0 TO 1000"
30" VAC. TO 300"	0 TO 1500"
0 TO 15"	0 TO 2000"
0 TO 30"	0 TO 3000"
0 TO 60"	0 TO 5000"
0 TO 100"	0 TO 10000"
0 TO 160"	

8-31-67	4	WAS MODEL	226
7-1-66	3	WAS 5 1/2 - 7 1/2 - 10	280
8-15-65	2	REDRAWN NO CHANGE	118
DATE	NO.	REVISION RECORD	BY

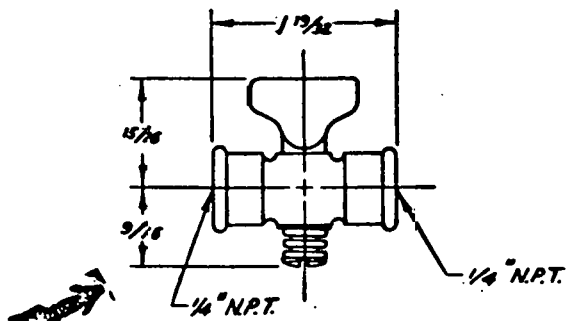
H. D. Trerice Co.
Detroit, Mich., U.S.A.

NAME DIMENSION DRAWING OF
NO. 500X PRESS. GAUGE

DWN. W.L.	APPRO. MYERS	NO. 127-323	REV. 3-31-61
DATE 2-27-61	SCALE		

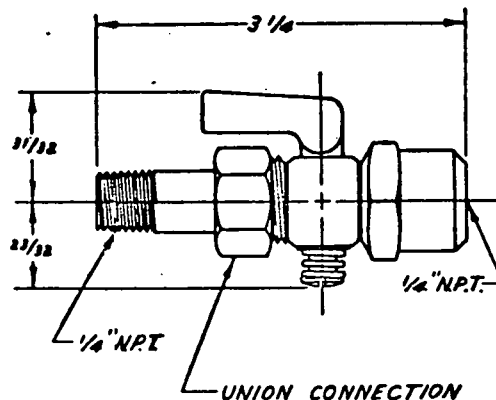
TOLERANCES: 2 PLACE DECIMALS ± .01, 3 PLACE DECIMALS ± .001, ANGLES ± 1° UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE.



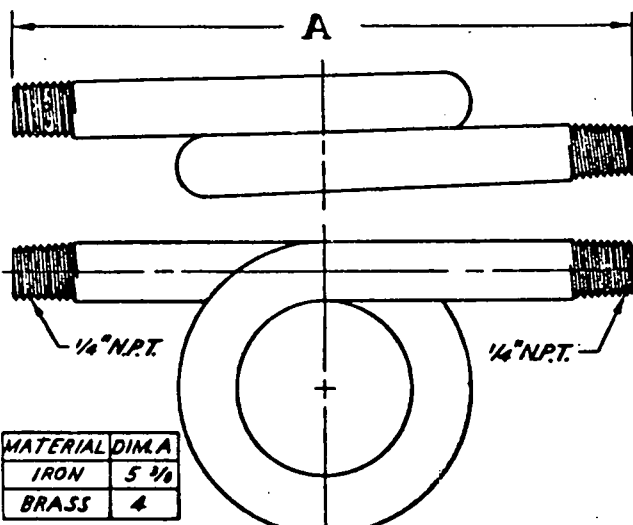
MATERIAL - BRASS
MAX. PRESS. - 150 P.S.I. OF STEAM OR AIR
300 P.S.I. HYDRAULIC

NO. 865 TRERICE 'T' HANDLE GAUGE COCK



MATERIAL - BRASS
MAX. PRESS. - 150 P.S.I. OF STEAM OR AIR
300 P.S.I. HYDRAULIC

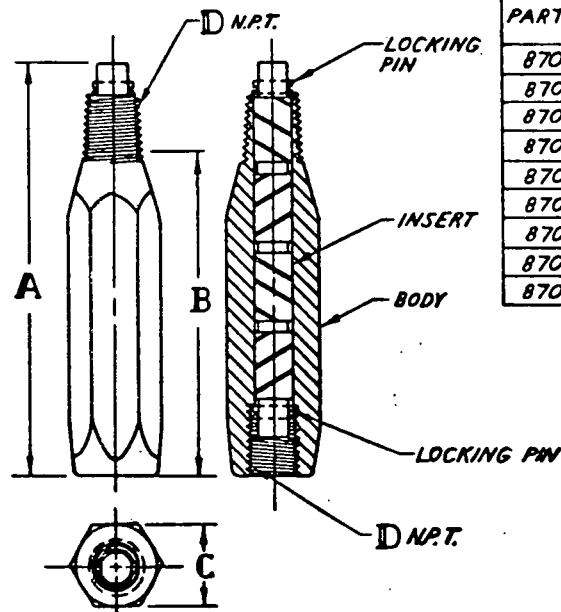
NO. 860 TRERICE LEVER
HANDLE GAUGE COCK



MATERIAL	DIM. A
IRON	5 3/8
BRASS	4

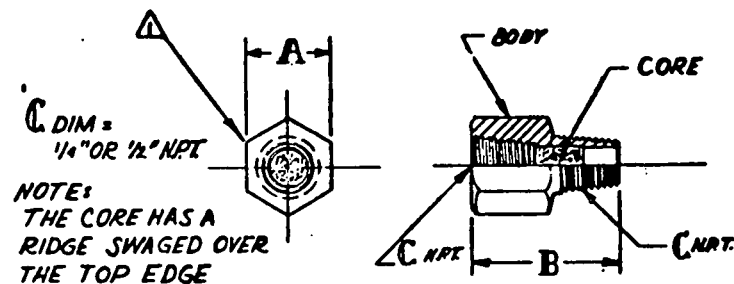
MAX. PRESS. - IRON, 500 P.S.I. AT 400°F.
BRASS, 250 P.S.I. AT 400°F.

NO. 885 TRERICE COIL SIPHON



TOLERANCES: 2 PLACE DECIMALS ± .010, 3 PLACE DECIMALS ± .001, ANGLES ± 1° UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE.



NOTE:
THE CORE HAS A
RIDGE SWAGED OVER
THE TOP EDGE

NO. 872 TRERICE PRESSURE SNUBBER

PART NO.	MATERIAL		DIMENSIONS				MAX. PRESS.	SERVICE RECOMMENDATION
	BODY	CORE	1/4 NPT. A	1/2 NPT. B	1/4 NPT. C	1/2 NPT. D		
872-1	BRASS	BRONZE	3/4	1 1/4	1 1/8	1 1/4	5,000 P.S.I.	AIR, GASES
872-2								GASOLINE, LIGHT OILS, STEAM, WATER
872-3								LUBRICATING & HEAVY OILS
872-4	STAIN-LESS	STAIN-LESS	3/4	1 1/4	1 1/8	1 1/4	10,000 P.S.I.	AIR, GASES
872-5								GASOLINE, LIGHT OILS, STEAM, WATER
872-6	STEEL	STEEL						LUBRICATING & HEAVY OILS

NO. 870 TRERICE IMPULSE DAMPENER

PART NO.	"D" N.P.T.	MATERIAL	DIMENSIONS			MAX. PRESS.	SERVICE RECOMMENDATION
	BODY	INSERT	A	B	C		
870-1	1/4	BRASS	3 1/8	3 1/4	3/4	12,000 P.S.I.	AIR, WATER, STEAM, GASES
870-2							GASOLINE & LIGHT OILS
870-3							LUBRICATING & HEAVY OILS
870-7	1/4	STAIN-LESS	4 1/2	3 1/8	1	25,000 P.S.I.	AIR, WATER, STEAM, GASES
870-8							GASOLINE & LIGHT OILS, AMMONIA
870-9							LUBRICATING & HEAVY OILS
870-10	1/2	STAIN-LESS	4 1/2	3 1/8	1	50,000 P.S.I.	AIR, WATER, STEAM, GASES
870-11							GASOLINE & LIGHT OILS, AMMONIA
870-12							LUBRICATING & HEAVY OILS

12-1268	3	REVISED TO # 872-2 & 872-5	DATE	NO.	REVISION RECORD	BY	CR
11-2268	2	MOVED TO # 872-2 & 872-5					
4-17-68	1	REDESIGNED NO. 872					

H. O. Trerice Co.
Detroit, Mich., U. S. A.

NAME
PRESSURE GAUGE ACCESSORIES

DATE 3-17-68 SCALE NO. 127-444