DOE/NASA CONTRACTOR REPORT

DOE/NASA CR-161444

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

Under DOE Contract EX-76-C-01-2543

Monitored by

National Aeronautics and Space Administration
George C. Marshall Space Flight Center, Alabama 35812

For the U. S. Department of Energy

U.S. Department of Energy

Solar Energy

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TECHNICAL REPORT STANDARD TITLE PAGE

1. REPORT NO.	2. GOVERNMENT ACCESSION NO.	3. RECIPIENT'S CATALOG NO.
DOE/NASA CR-161444		

4. TITLE AND SUBTITLE	5. REPORT DATE
Solar Energy Facility at North Hampton Recreation Center, Dallas, Texas - Final Report	May 1980
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT #
9. PERFORMING ORGANIZATION NAME AND ADDRESS Travis-Braun and Associates, Inc. 4140 Office Parkway Dallas, Texas 75204	10. WORK UNIT NO.
	11. CONTRACT OR GRANT NO. EX-76-C-01-2543
12. SPONSORING AGENCY NAME AND ADDRESS U. S. Department of Energy Conservation and Solar Energy Washington, D. C. 20585	13. TYPE OF REPORT & PERIOD COVERED Contractor Report Final
	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

This work was done under the technical management of Mr. William A. Hagen, National Aeronautics and Space Administration, Marshall Space Flight Center, Alabama.

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.

17. KEY WORDS	18. DISTRIBUTION STATEMENT UC-59a Unclassified-Unlimited William A. Brooksbank, Jr. WILLIAM A. BROOKSBANK, JR. Mgr. Solar Energy Applications Projects

19. SECURITY CLASSIF. (of this report)	20. SECURITY CLASSIF. (of this page)	21. NO. OF PAGES	22. PRICE
Unclassified	Unclassified	115	NTIS

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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 masonary 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.

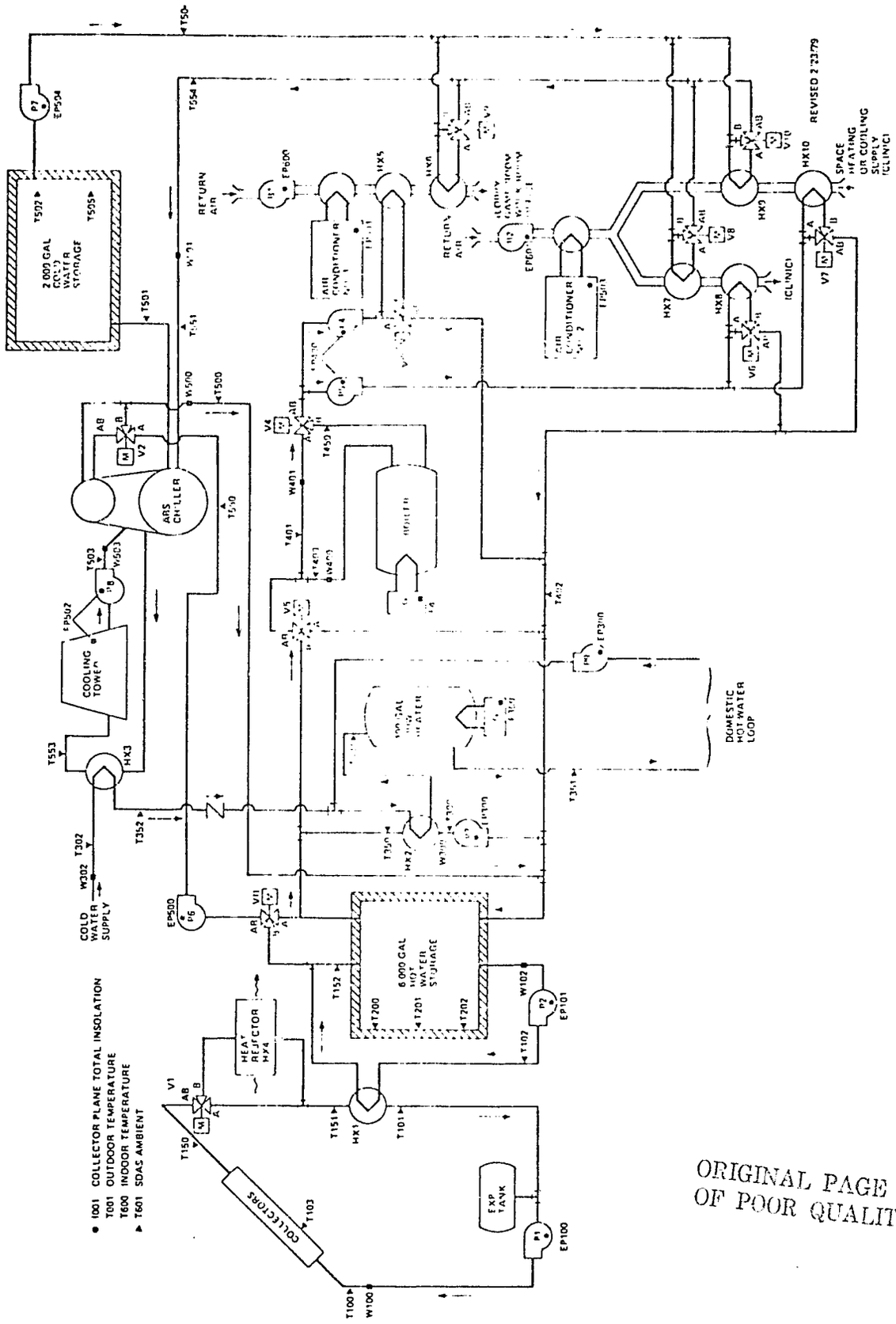

Figure 1. DALLAS RECREATION CENTER SOLAR ENERGY SYSTEM SCHEMATIC

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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

Item	Estimated ($)	Actual ($)
Collector Array	54,621	62,530
Support Structure	18,700	20,800
Piping	42,456	66 395
Duckwork	4,512	11,220
Insulation	19,655	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
	438,656	384,680
Less City of Dallas 10% Share	- 43,865	
TOTAL Project Cost	$394,791	$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:

Number Sequence	Data Group
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

Designation	Name
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)

Designation	Name
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 $\overline{M}$BTU
Collected energy	66.3 $\overline{M}$BTU
Efficiency total	31.1 %
Efficiency during collector operation	37.4 %
Electrical operating energy	2.6 $\overline{M}$BTU
Solar energy delivered to storage	63.8 $\overline{M}$BTU
Storage losses from tank	3.4 $\overline{M}$BTU
Storage efficiency	94.7 %

NOTE: 3.4 $\overline{M}$BTU loss from storage includes 0.7 $\overline{M}$BTU 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 $\overline{M}$BTU
Cooling load provided by auxiliary	68.4 $\overline{M}$BTU
Total building cooling load	85.3 $\overline{M}$BTU
% of cooling load provided by solar	19.8
Total cooling produced by solar	25.4 $\overline{M}$BTU
Energy extracted from hot water storage for absorption chiller	60.8 $\overline{M}$BTU
Solar chiller COP	0.42

* Excess Heat Rejection Mode:

Heat rejected	13.2 $\overline{M}$BTU

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 $\overline{M}$BTU of fossil fuel and 5.97 $\overline{M}$BTU 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 auxilliary 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.

Appendix A
System Operational Verification

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.

Appendix B
Drawings

FOLDOUT FRAME

SOLAR IMPL

NORTH HAMPTON PARK RECREATION

3700 NORTH HAMPTON ROAD

APPROVED FOR CONSTRUCTION

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STRUCTURAL

FOLDOUT FRAME 2

IMPLEMENTATION

RK RECREATION AND HEALTH CENTER

ROAD DALLAS , TEXAS

F DRAWINGS

PLUMBING

MECHANICAL

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ELECTRICAL

E-1 ROOF PLAN & SOUND SYSTEM DTLS.
E-2 FIRST & SECOND FLR. PLAN & LIGHT FIX SCHED.

Dallas

BUILDING SERVICES DEPARTMENT

1500 WEST MOCKINGBIRD LANE

DALLAS TEXAS 75235

ARCHITECTURAL PLANNING

& DESIGN DIVISION

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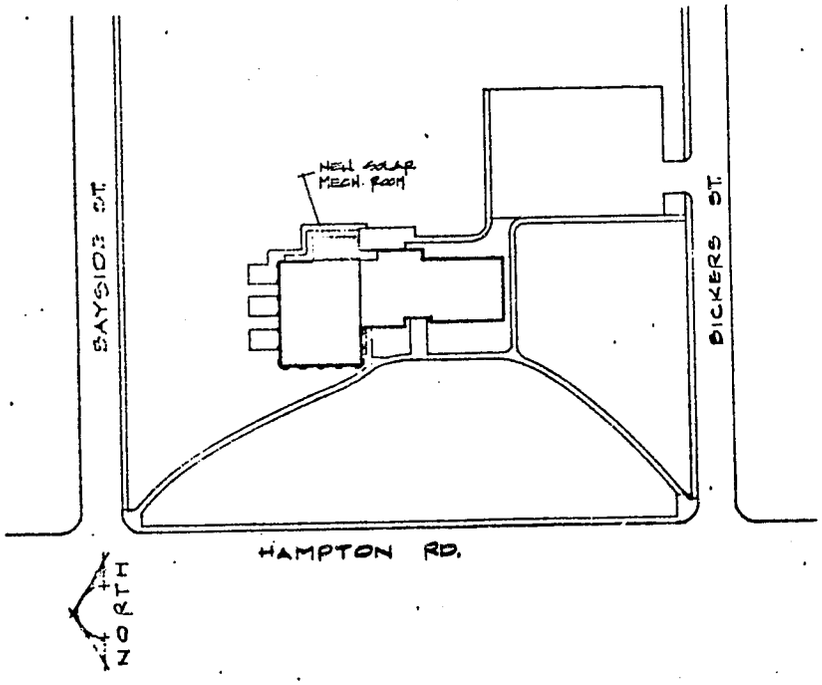

102 SITE PLAN
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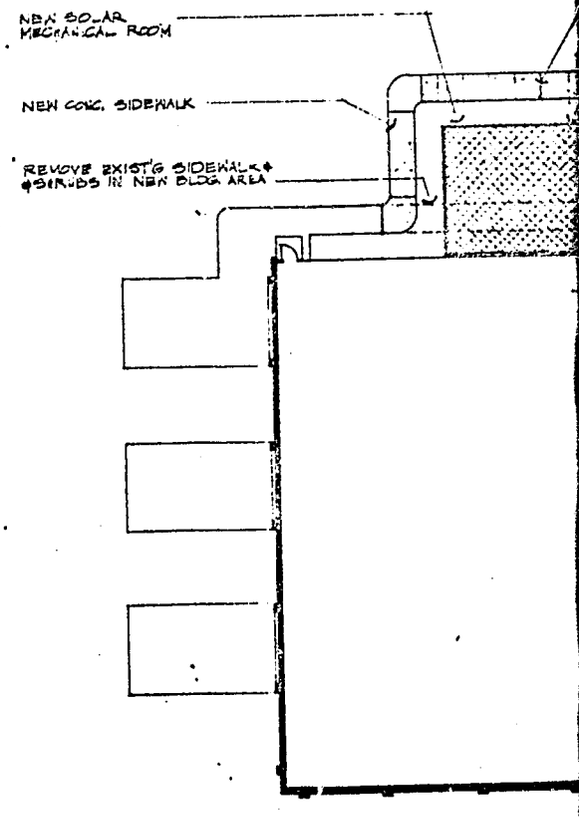

101 BUILDING PLAN
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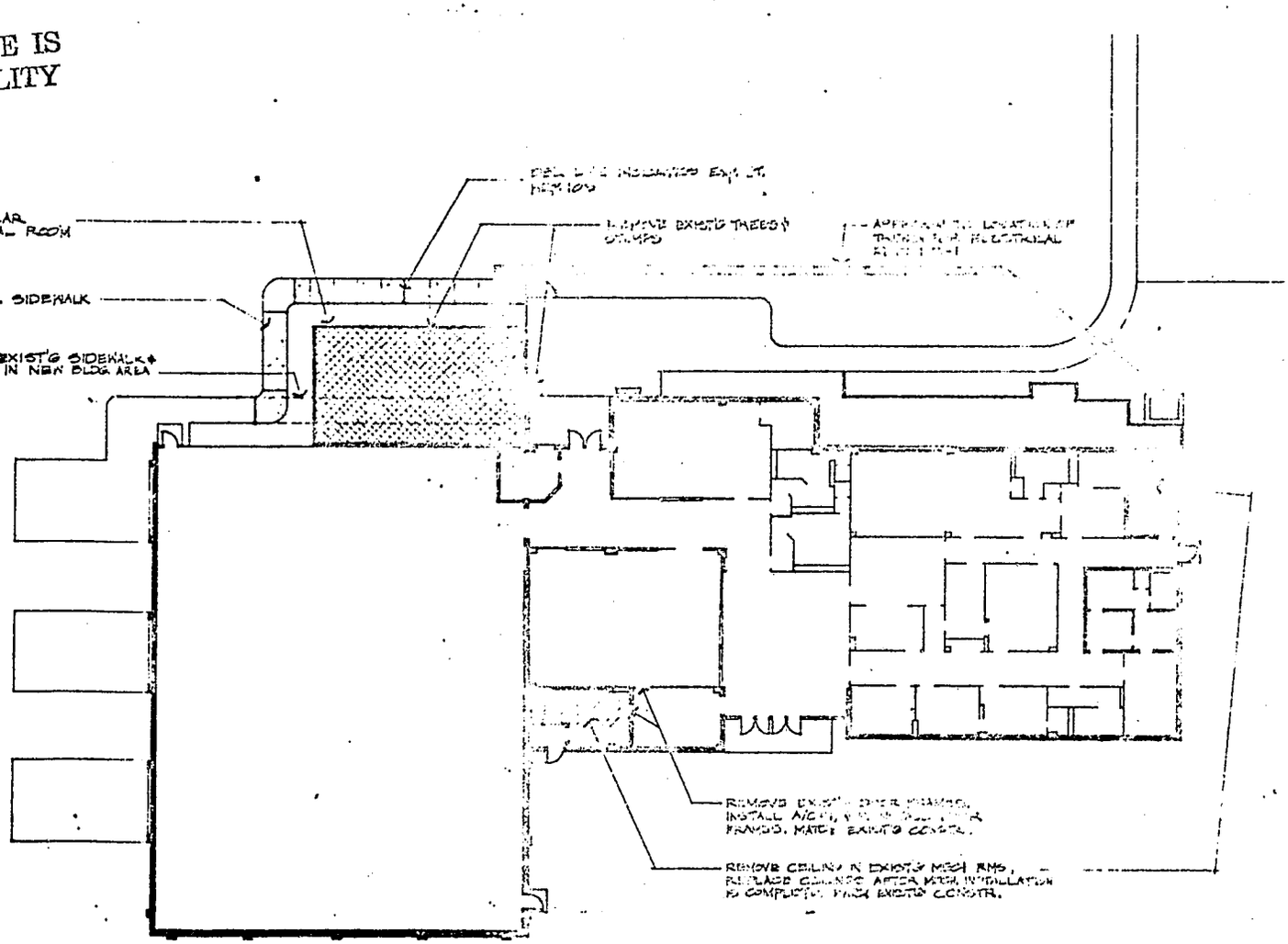

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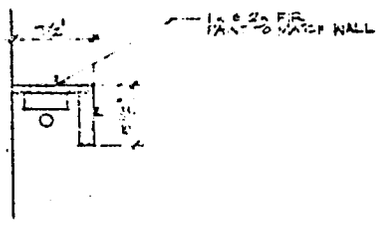
1/16" = 1'-0"



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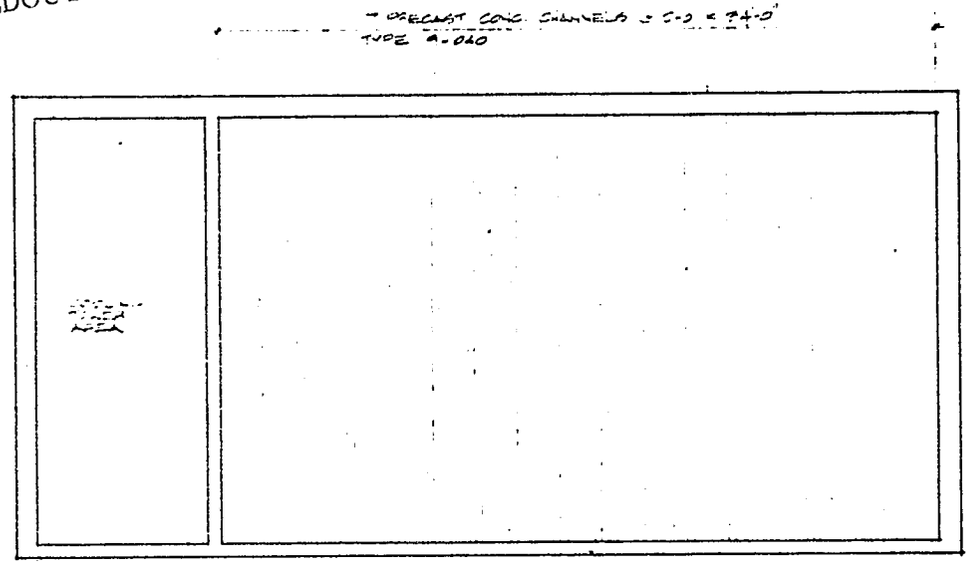
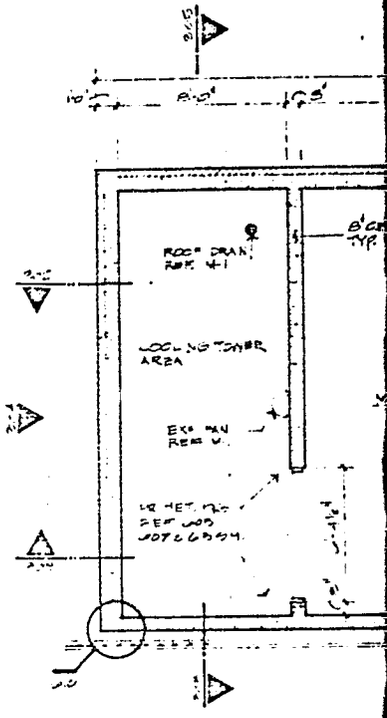
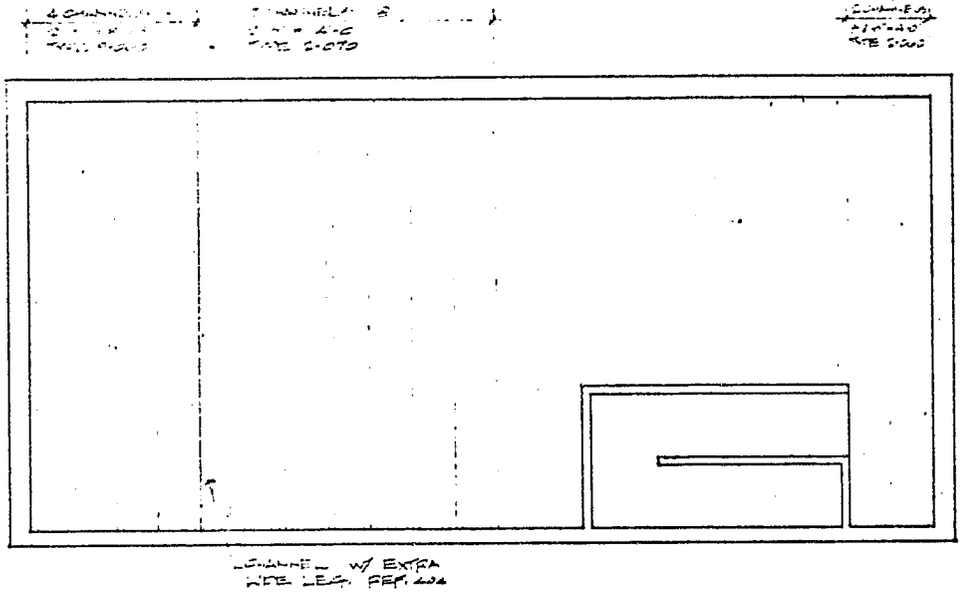


203 SECOND FLOOR REFLECTED CEILING PLAN

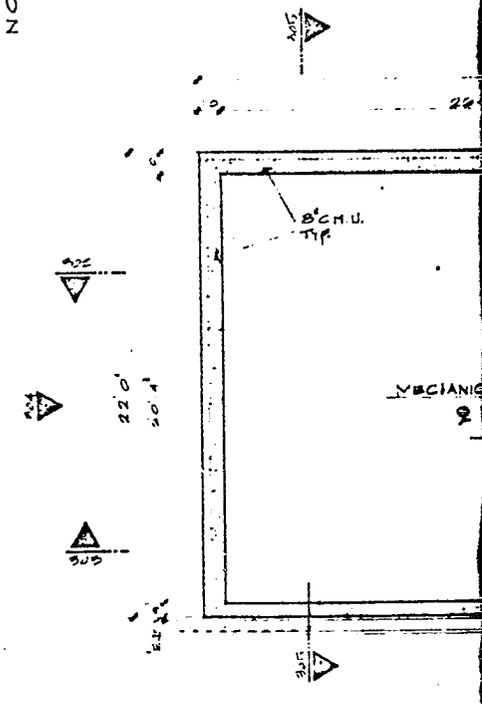


202 SECOND FL

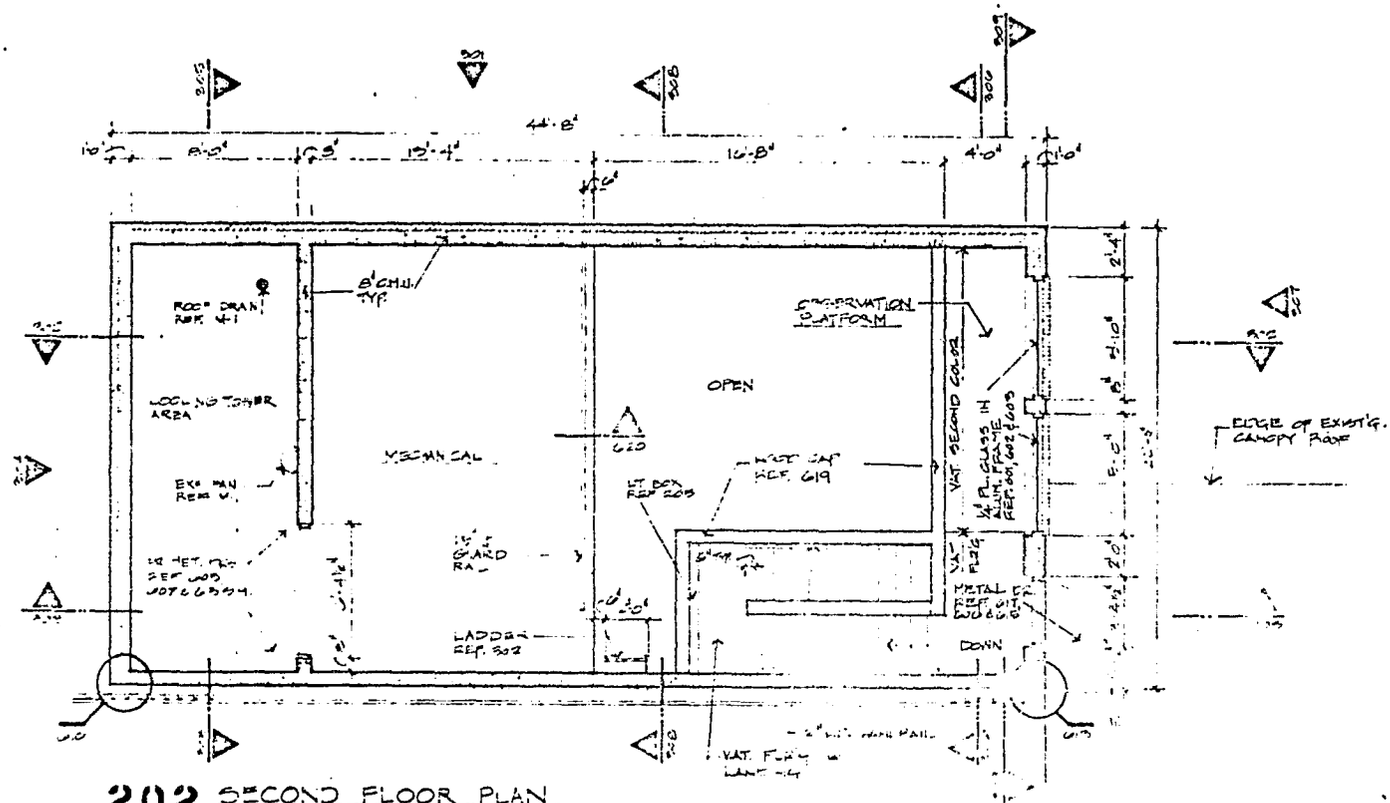
NORTH



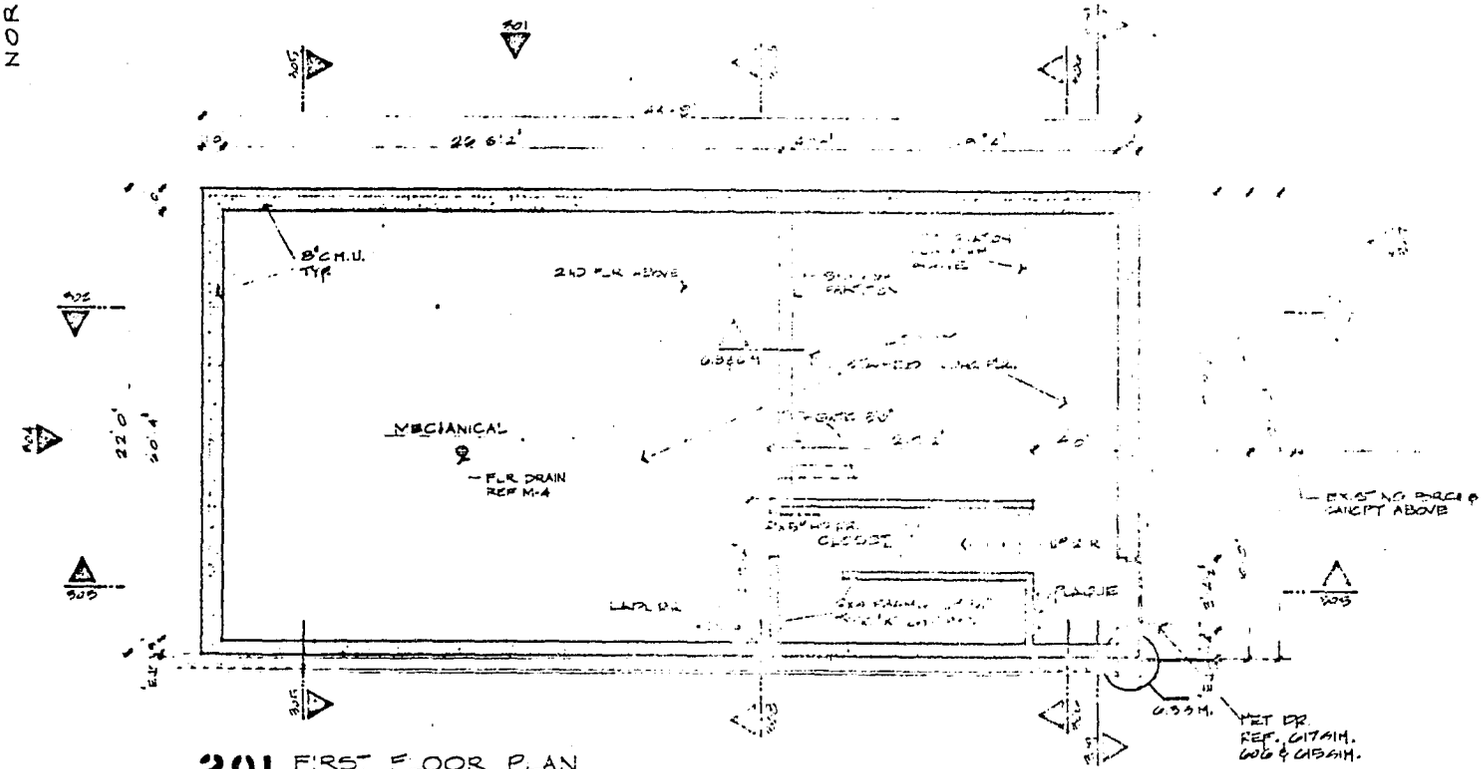
203 FIRST FLOOR REFLECTED CEILING PLAN



201 FIRST FLOOR



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



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

CITY OF DALLAS
BUILDING SERVICES DEPARTMENT
PLANNING DIVISION
ARCHITECTURAL AND DESIGN
1500 WEST MOCKINGBIRD LANE

REVISIONS
NO. DATE ITEM

PROJECT NUMBER

SHEET CONTENTS

SHEET NUMBER

OF 18 SHEETS

1 FOLDOUT FRAME

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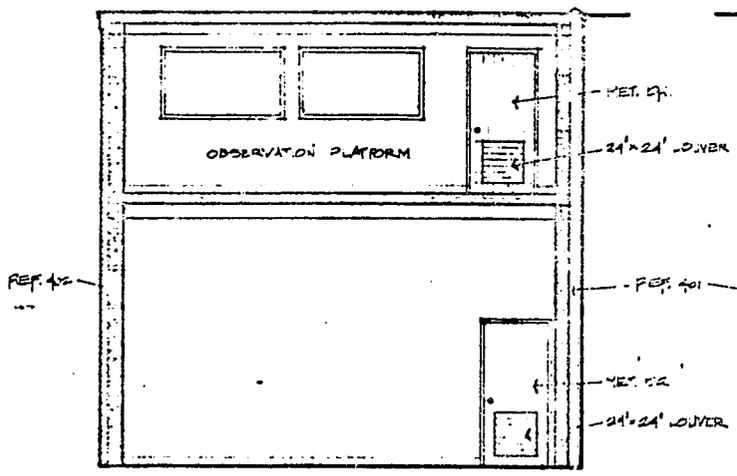

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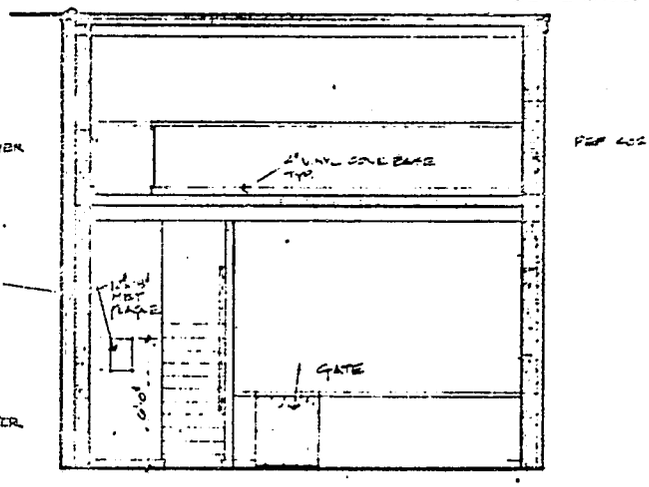

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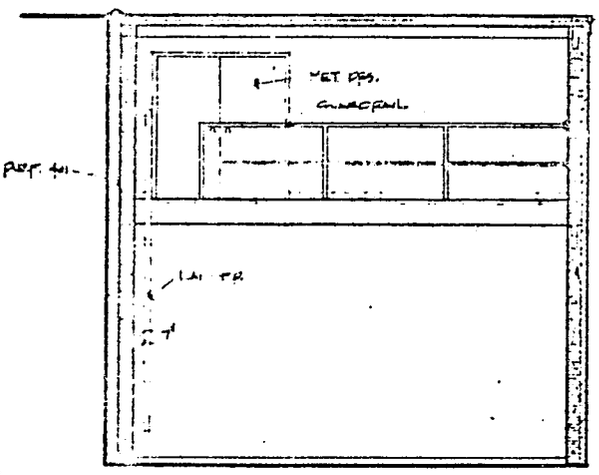

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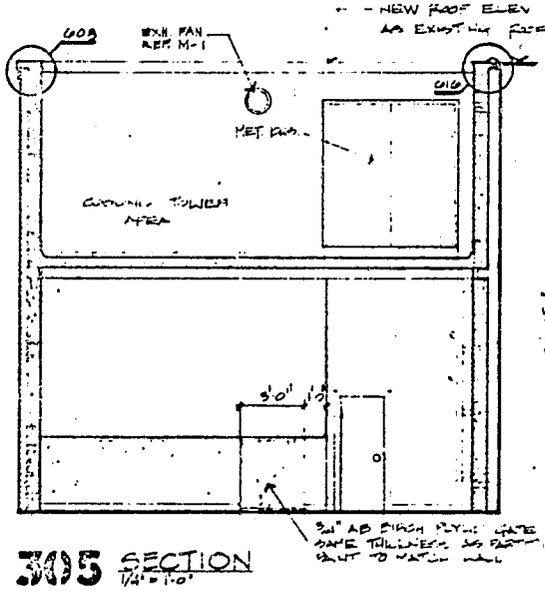

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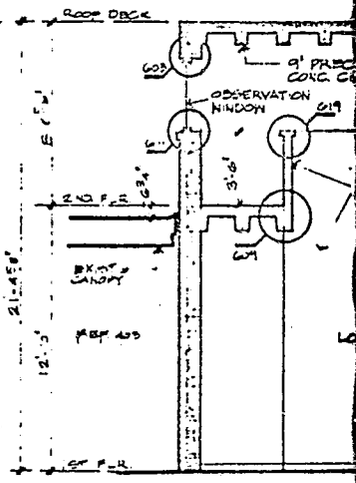

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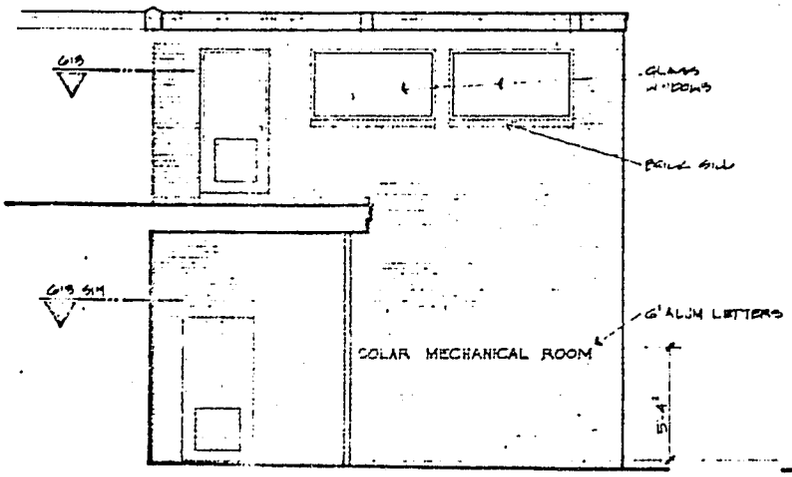

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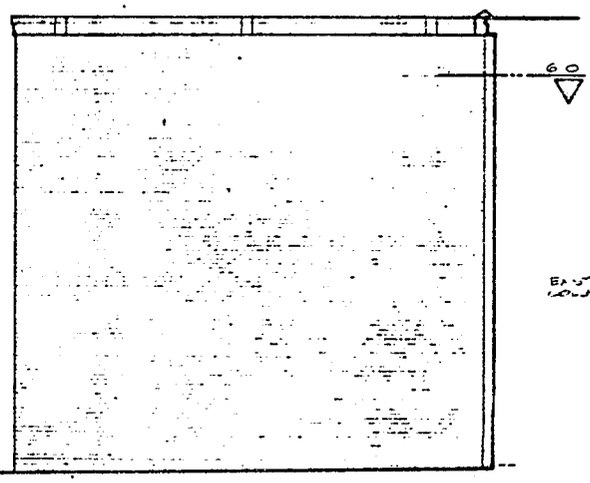
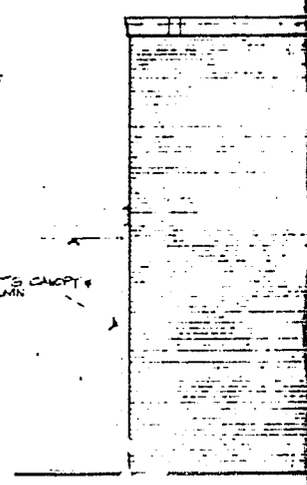


306 NORTH ELEVATION 1/4"=1'-0"



301 EAST 1/4"=1'-0"

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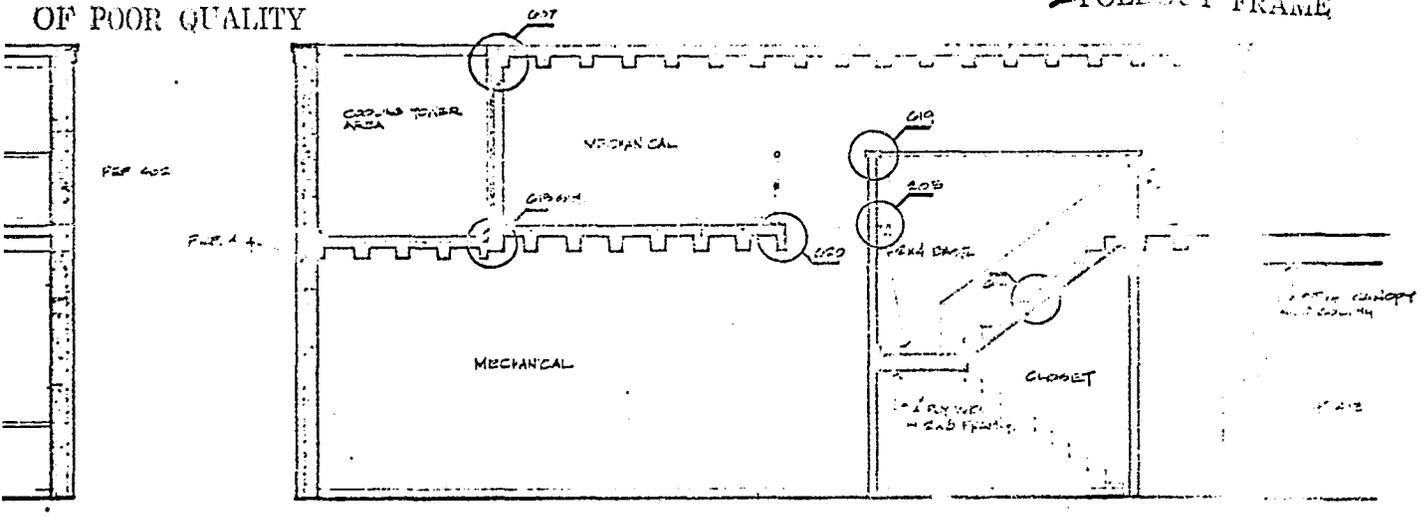

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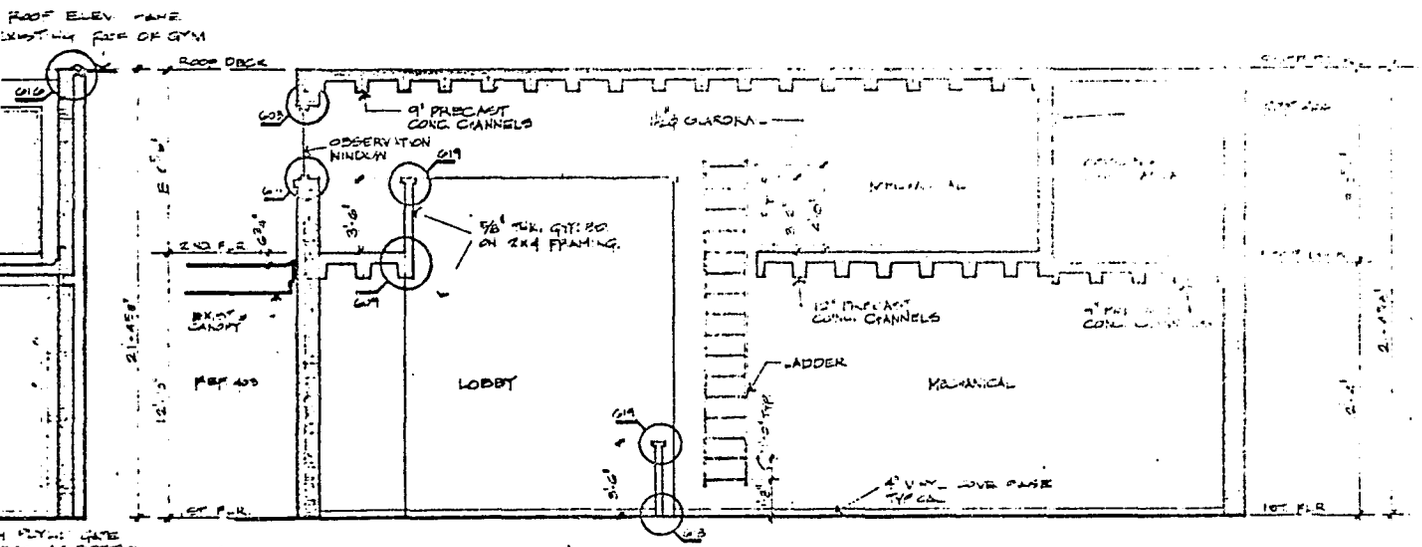

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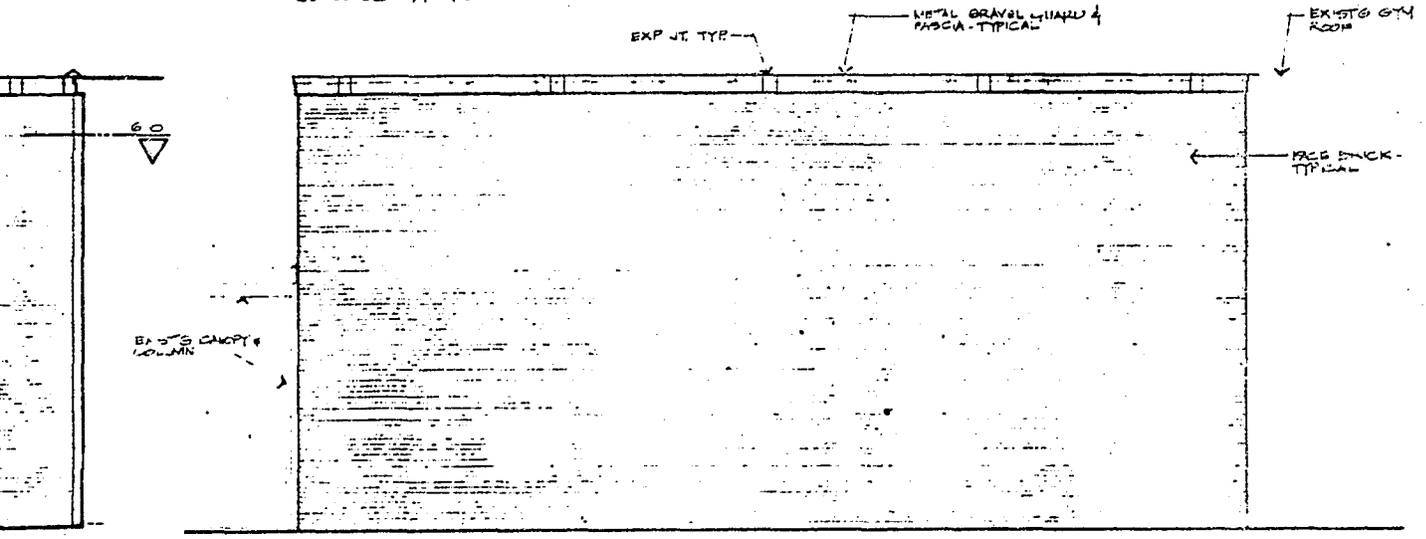
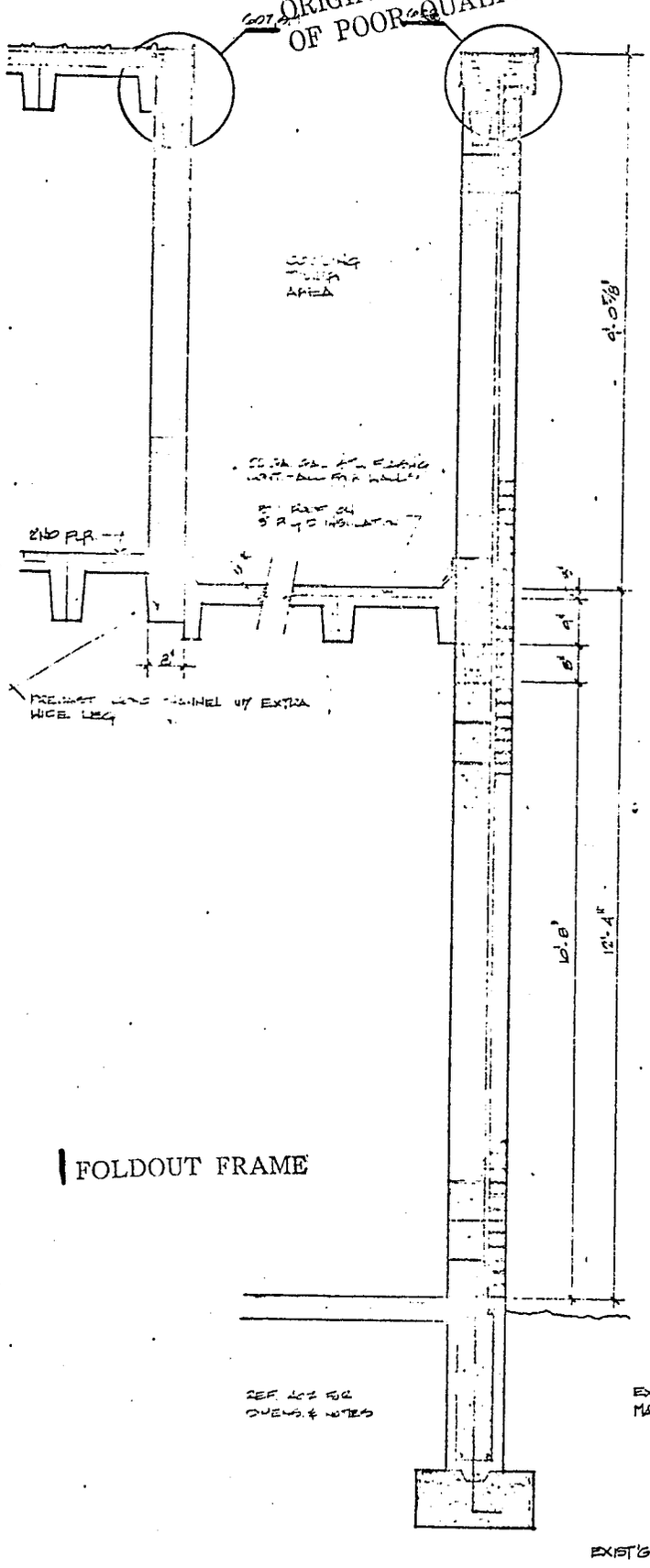
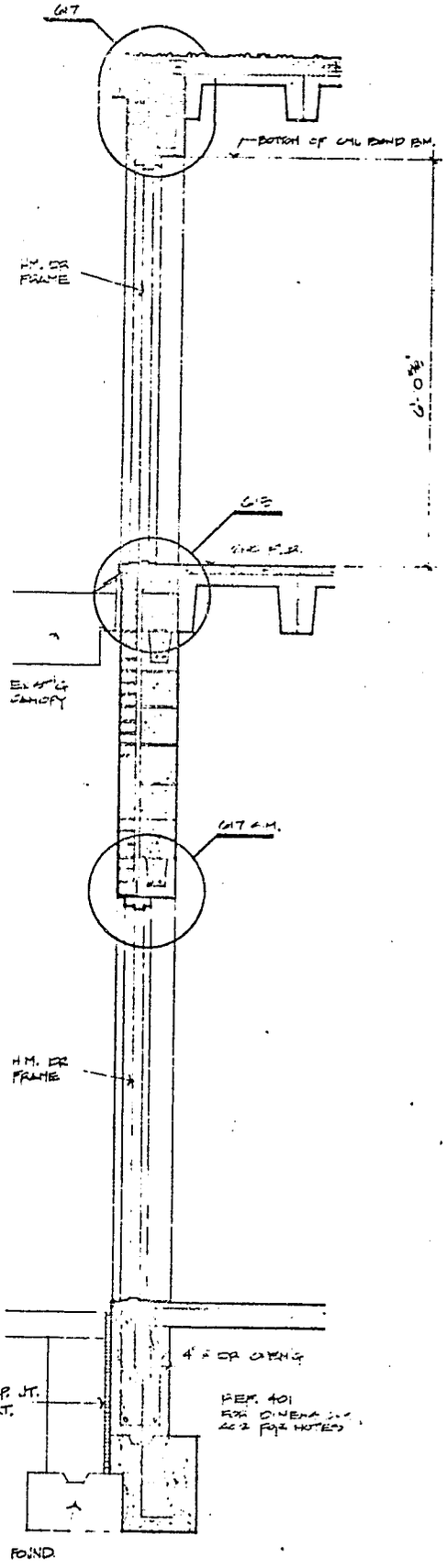


301 EAST ELEVATION
1/4" = 1'-0"



404 WALL SECTION
3/4" = 1'-0"



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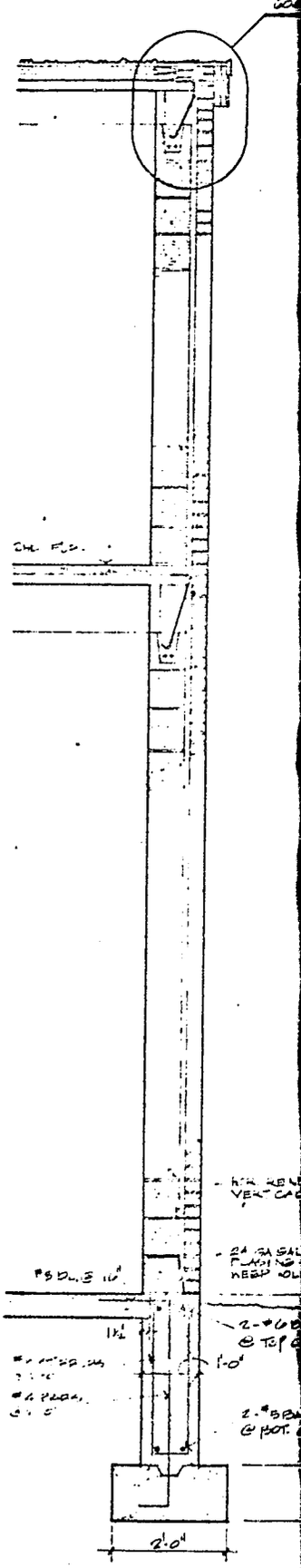

402 WALL SECTION
3/4" = 1'-0" TYP. REINFORCING

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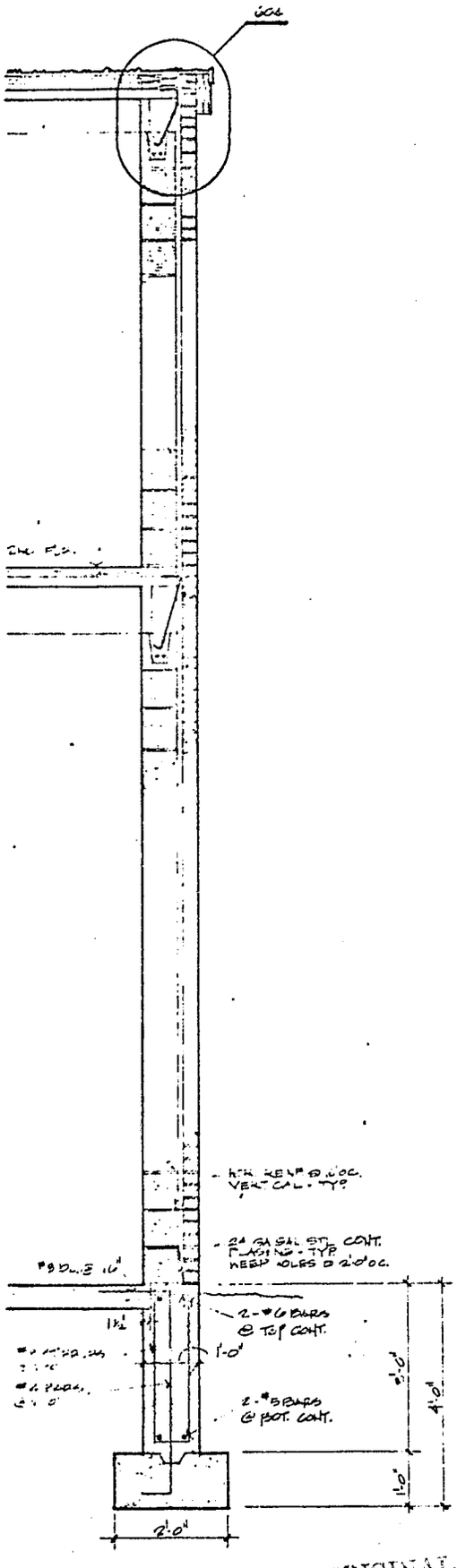
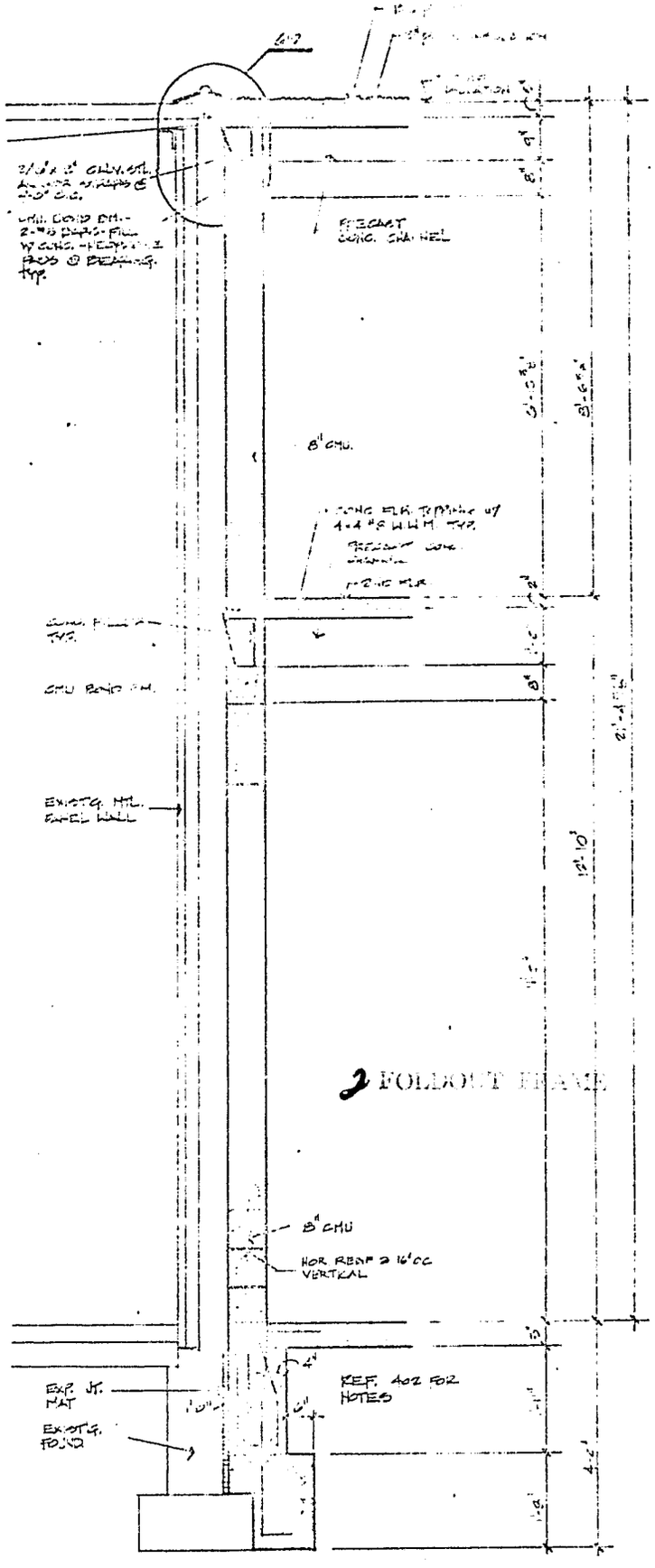


602 WALL SECTION
3/4" = 1'-0" TYP REINFORCING



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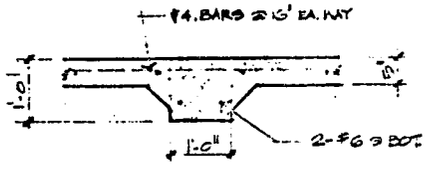

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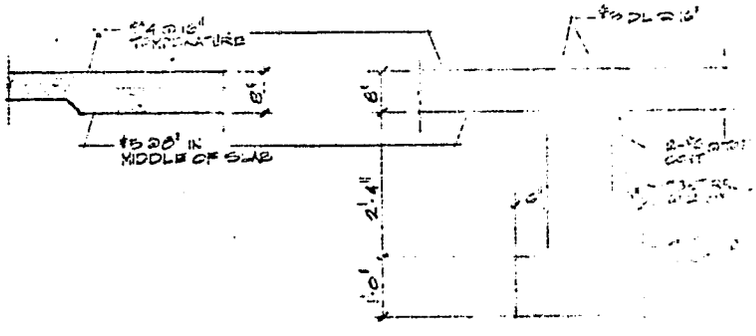
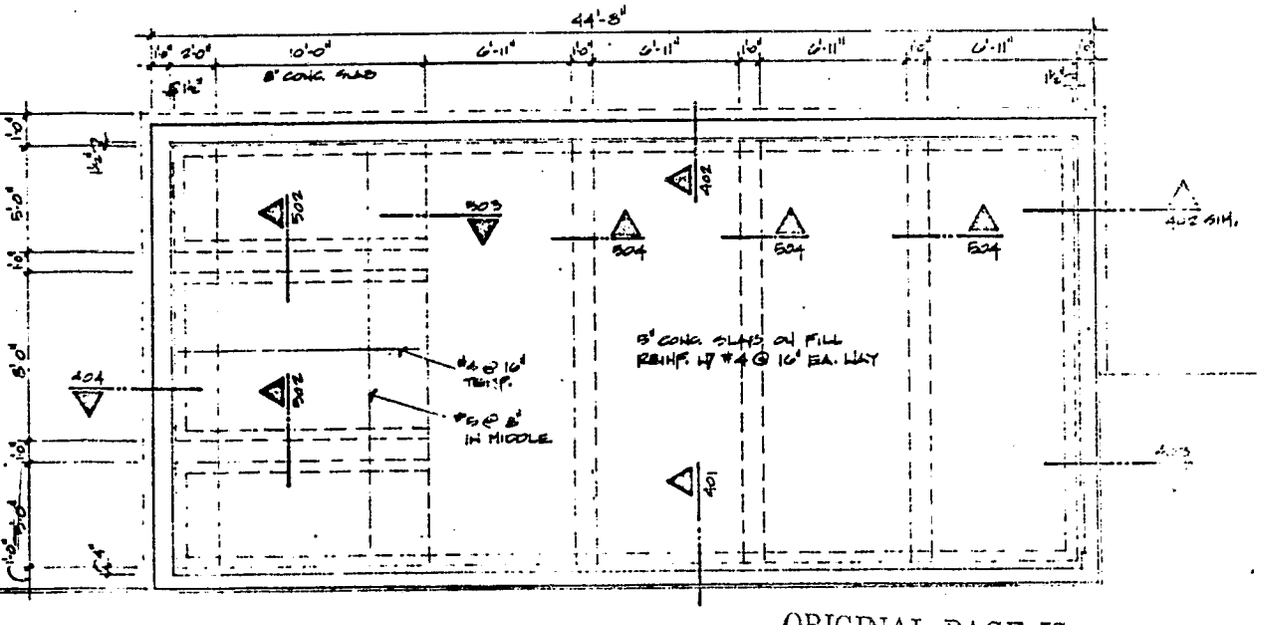


503 SECTION 3/4" = 1'-0"

502 SECTION 3/4" = 1'-0"



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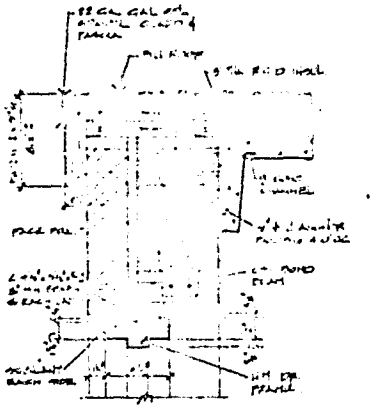
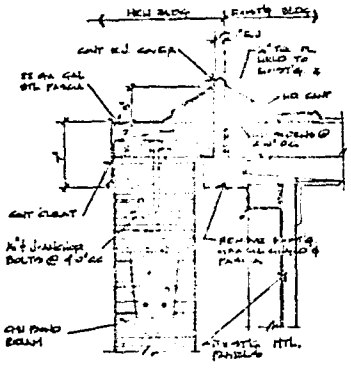
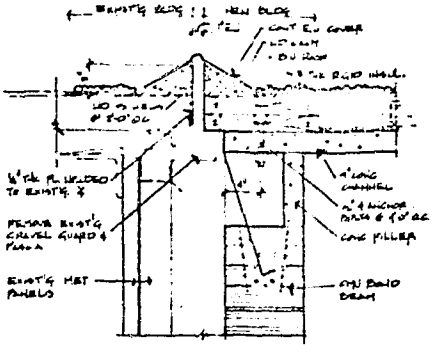
501 FOUNDATION PLAN 1/4" = 1'-0"



617 SECTION @ ROOF & HEAD @ DOOR



616 EXP JT @ PARAPET



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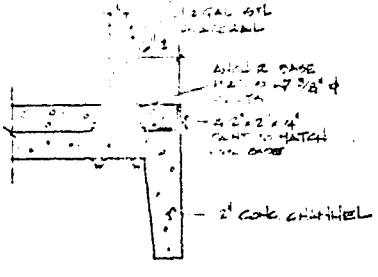

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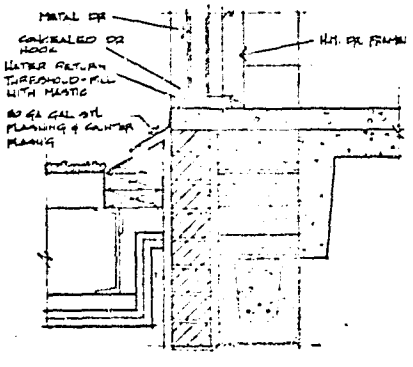
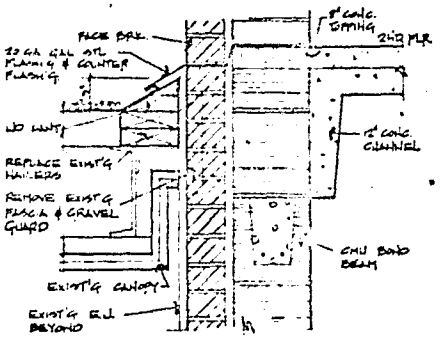


615 SILL @ DOOR TO ROOF



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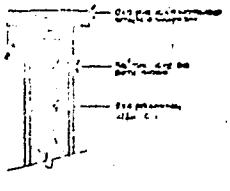

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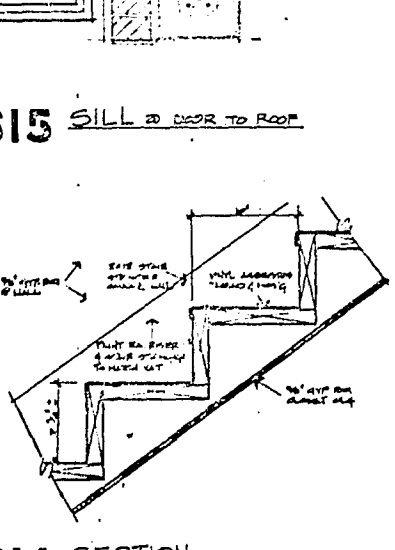

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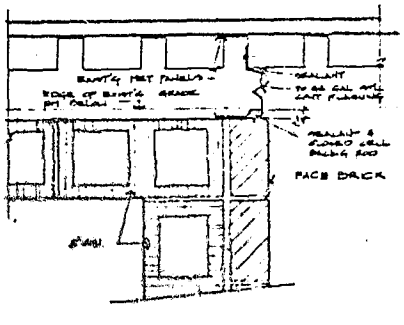

610 EXP JT @ MET PANEL WALL

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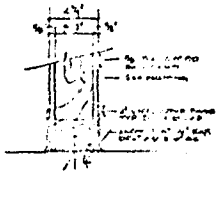

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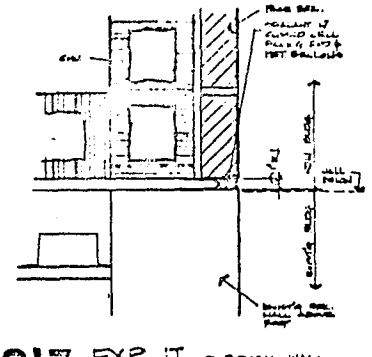
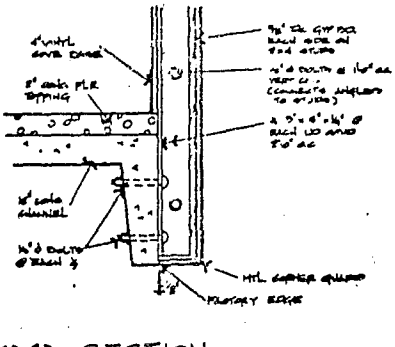
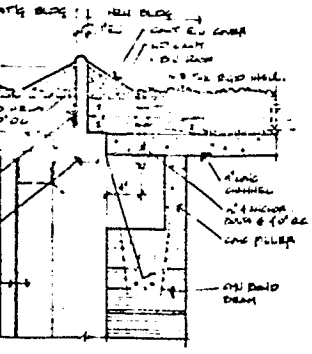


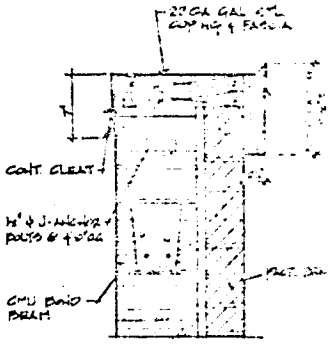
613 EXP JT @ BRICK WALL



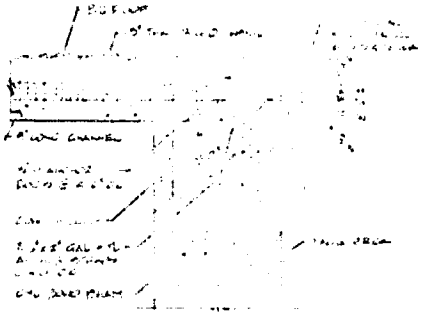
609 SECTION @ OBSERV. PLATFORM



EXP JT @ ROOF



6/08 SECTION @ PARAPET



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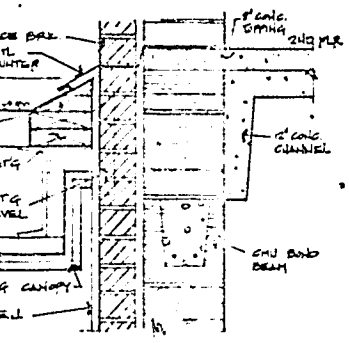

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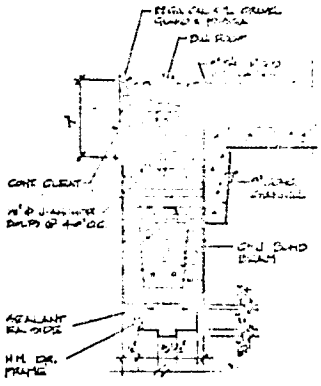
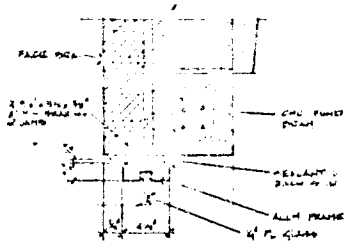
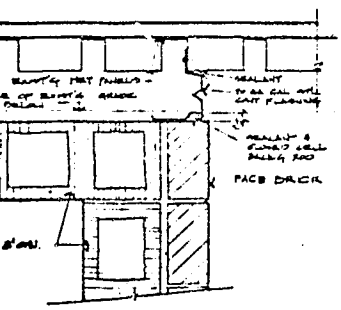


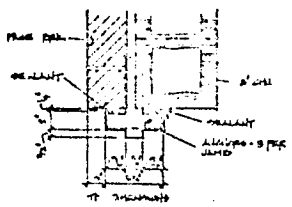
6/07 HEAD @ DOOR



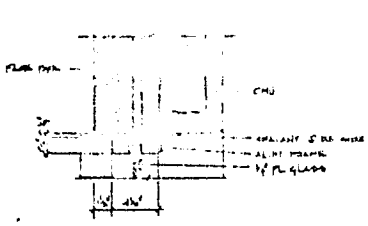
6/03 HEAD @ WINDOW



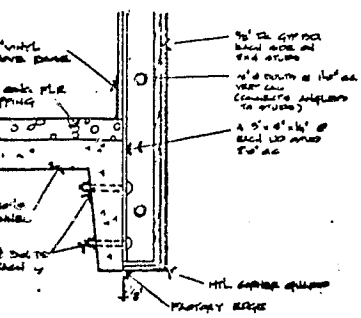
EXP JT @ MET PANEL WALL



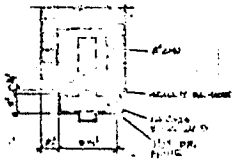
6/06 JAMB @ DOOR



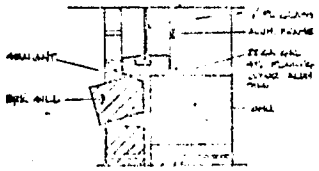
6/02 JAMB @ WINDOW



SECTION @ OBSERV PLATFORM



6/05 JAMB @ DOOR



6/01 SILL @ WINDOW

EXH. FAN EQUAL TO COOK
15 CBWB 1140 RPM 1100 CFM
1/4 HP 115 V 1Ø SEE DETAIL
SHEET M-8
RAILING SEE DETAIL
SHEET M-8
EXISTING BEAM (TYP.)
6" Ø FLUE
3" D.S. IN COL.
FOLDOUT FRAME
GUTTER
6" Ø FLUE
3" D.S. IN COL.
3" D.S. IN COL.
3" D.S. CONNECTED TO GUTTER - SEE MECH. SHT. M-3 FOR DETAIL TYPICAL ALL D.S. FOR GYM
6" Ø FLUE
18"x60" LANTERN DOME
ROOF PLAN — ME
SCALE: 1/8"= 1'-0"
WORK UN
GENERAL NOTES:
1. RISER P/2, P/5, P/6, P/8, P/11 A
S-ALL BE RELOCATED AND/OR
ROOF.
ALL PENETRATION THRU ROOF SHALL BE DONE IN ACCORDANCE TO CITY OF DALLAS RECOMMENDATIONS AND UNDER CITY OF DALLAS SUPERVISION
EXHAUST FAN
FLASHING & COUNTER FLASHING BY H.V.A.C. CONTR.
METAL CURB CAP
2"x8" CURB
LAG SCREWS
ROOF
NOMEX PAINT BLOCK
JOIST
JOIST FROM EXH. GR. SEE FLOOR PLAN
OUTSIDE WALL
36"x64" W.P. LOUVER BY GEN. CONTR.
MOUNT DAMPER MOTOR 35 HIGH V INSIDE ON SIDE OF DAMPER
36"x64" PARALLEL BLADE TWO POSITION AUTOMATIC DAMPER WITH SPRING RETURN MOTOR, BY HEATING CONTRACTOR
TYPICAL EXHAUST FAN MOUNTING DETAIL
SCALE: 1/2"=1'-0"
TYPICAL INTAKE LOUVER DETAIL
SCALE: 3/4"=1'-0"
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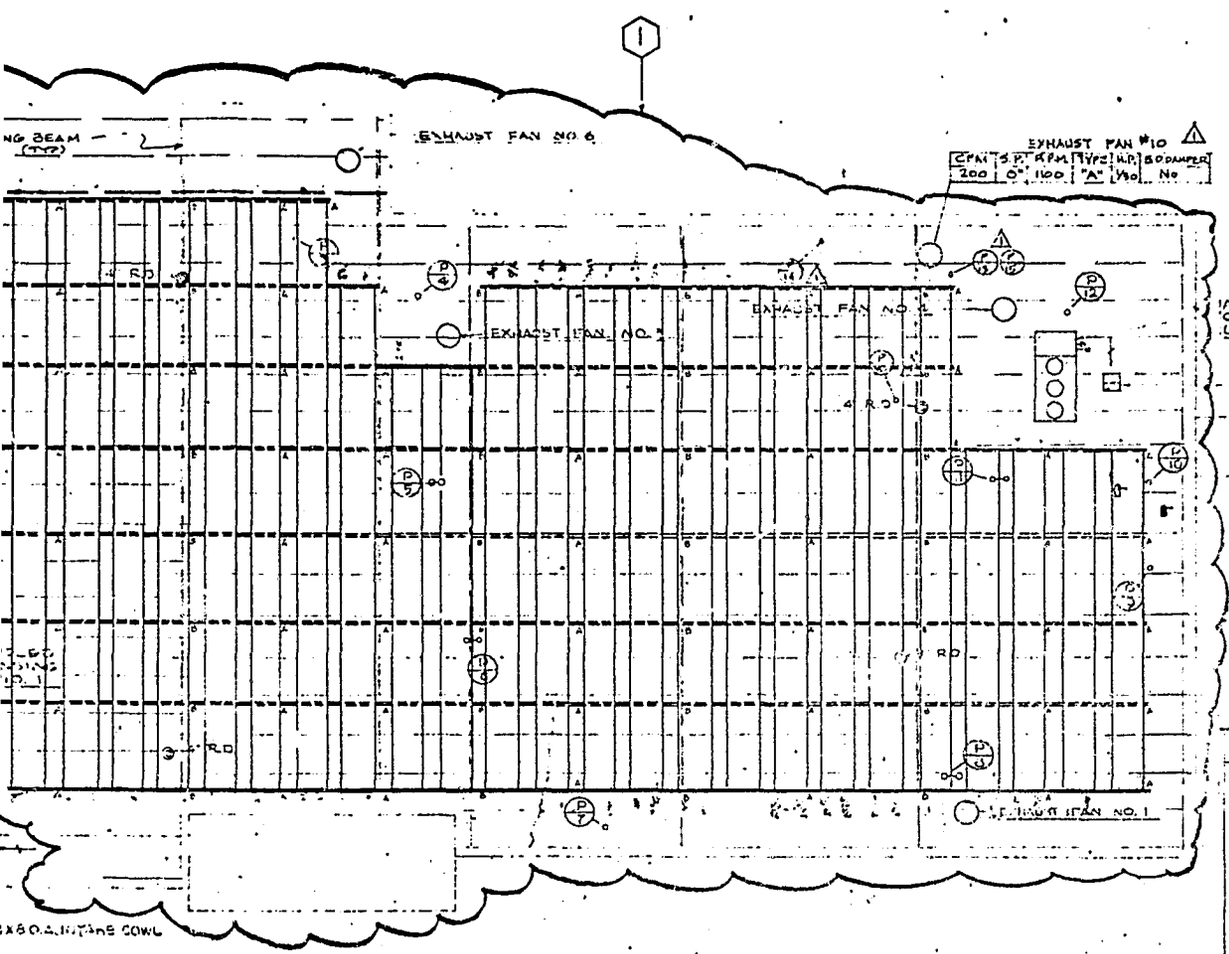
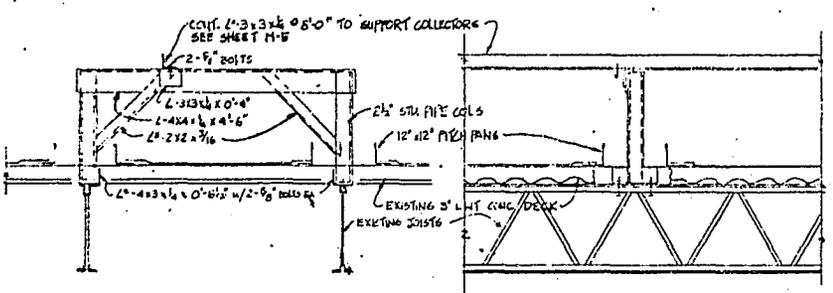


ROOF PLAN — MECHANICAL
SCALE: 1/8"= 1'-0"

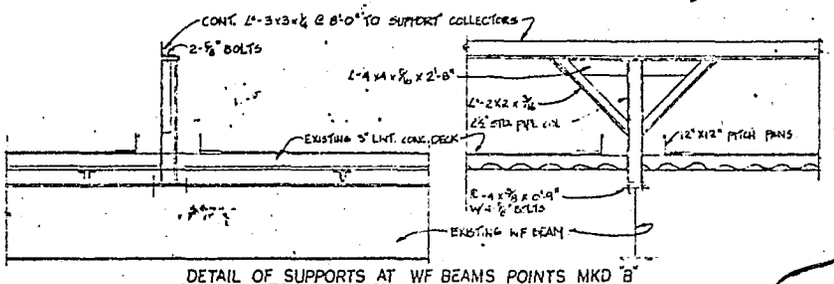
(1) WORK UNDER THIS CONTRACT

GENERAL NOTES:
1. RISER P/2, P/5, P/6, P/8, P/11 AND ALL OTHERS SHALL BE RELOCATED AND/OR OFFSET 45° ABOVE ROOF.



DETAIL OF SUPPORTS BETWEEN JOISTS @ POINTS MKD "A"

ALL PENETRATION THRU ROOF SHALL BE DONE IN ACCORDANCE TO CITY OF DALLAS RECOMMENDATIONS AND UNDER CITY OF DALLAS SUPERVISION.



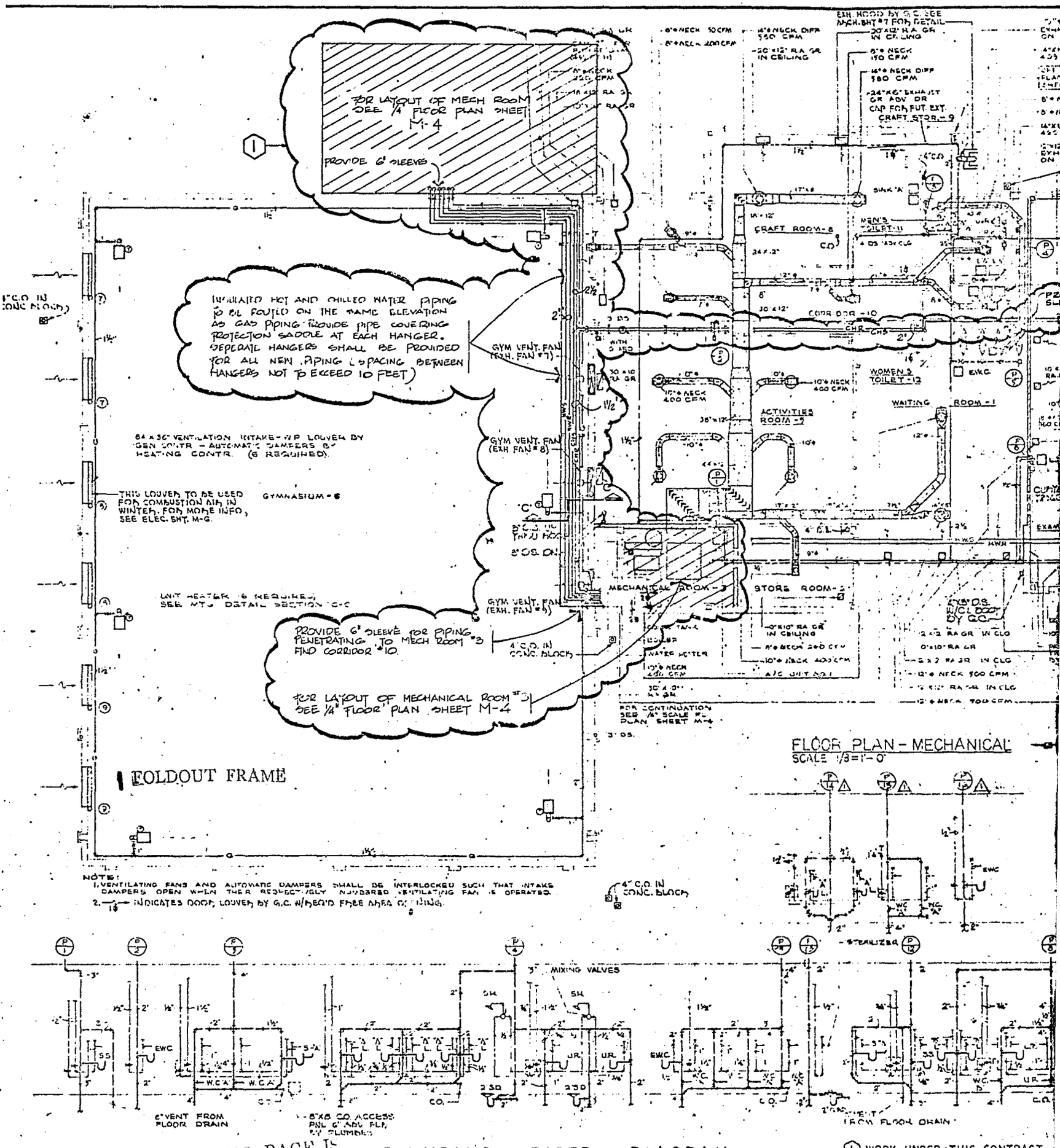
DETAIL OF SUPPORTS AT WF BEAMS POINTS MKD "B"

MECHANICAL SYMBOLS

NORTH HAMPTON PARK RECREATION & HEALTH CENTER

SOLAR IMPLEMENTATION

DALLAS, TEXAS

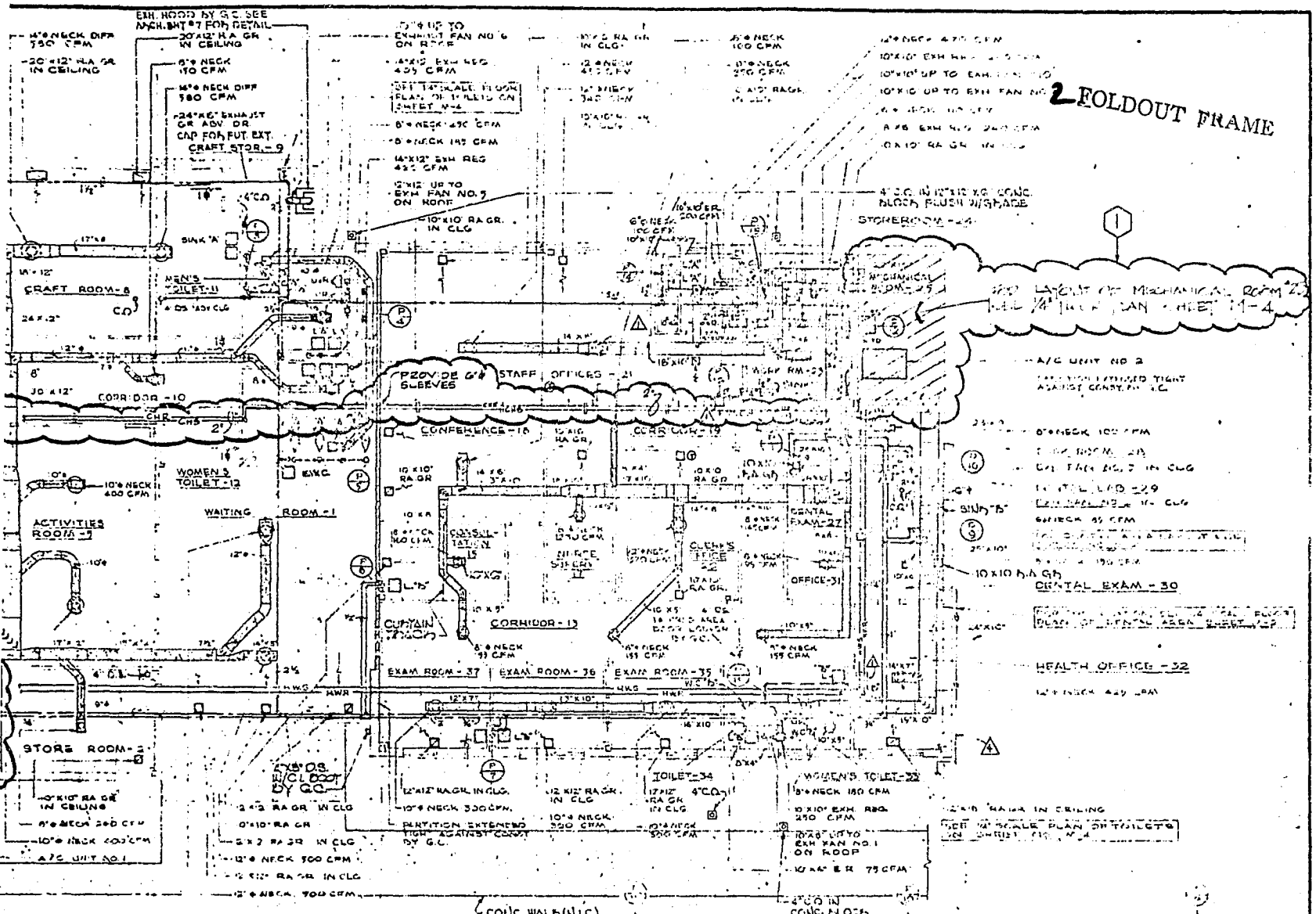


NOTE:
1. VENTILATING FANS AND AUTOMATIC DAMPERS SHALL BE INTERLOCKED SUCH THAT INTAKE DAMPERS OPEN WHEN THEIR RESPECTIVELY ASSOCIATED VENTILATING FAN IS OPERATED.
2. — INDICATES DOOR, LOUVER BY G.C. W/REQ'D. FREE AREA OPENING.

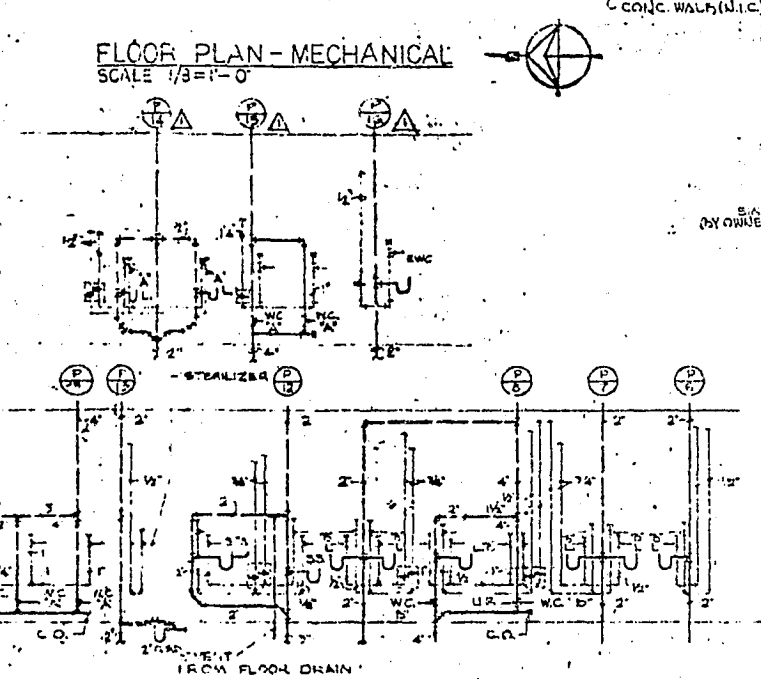
FLOOR PLAN - MECHANICAL
SCALE 1/8"=1'-0"

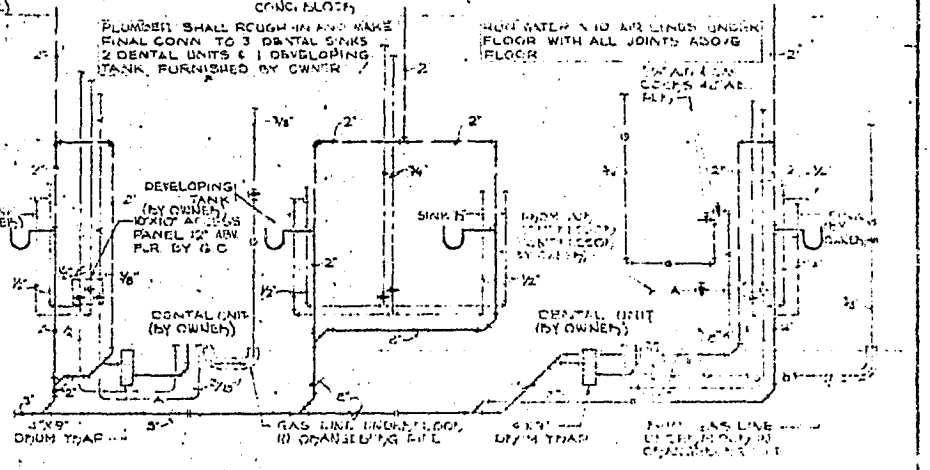
PLUMBING RISER DIAGRAM
NO SCALE

(1) WORK UNDER THIS CONTRACT



FLOOR PLAN - MECHANICAL
SCALE 1/8"=1'-0"





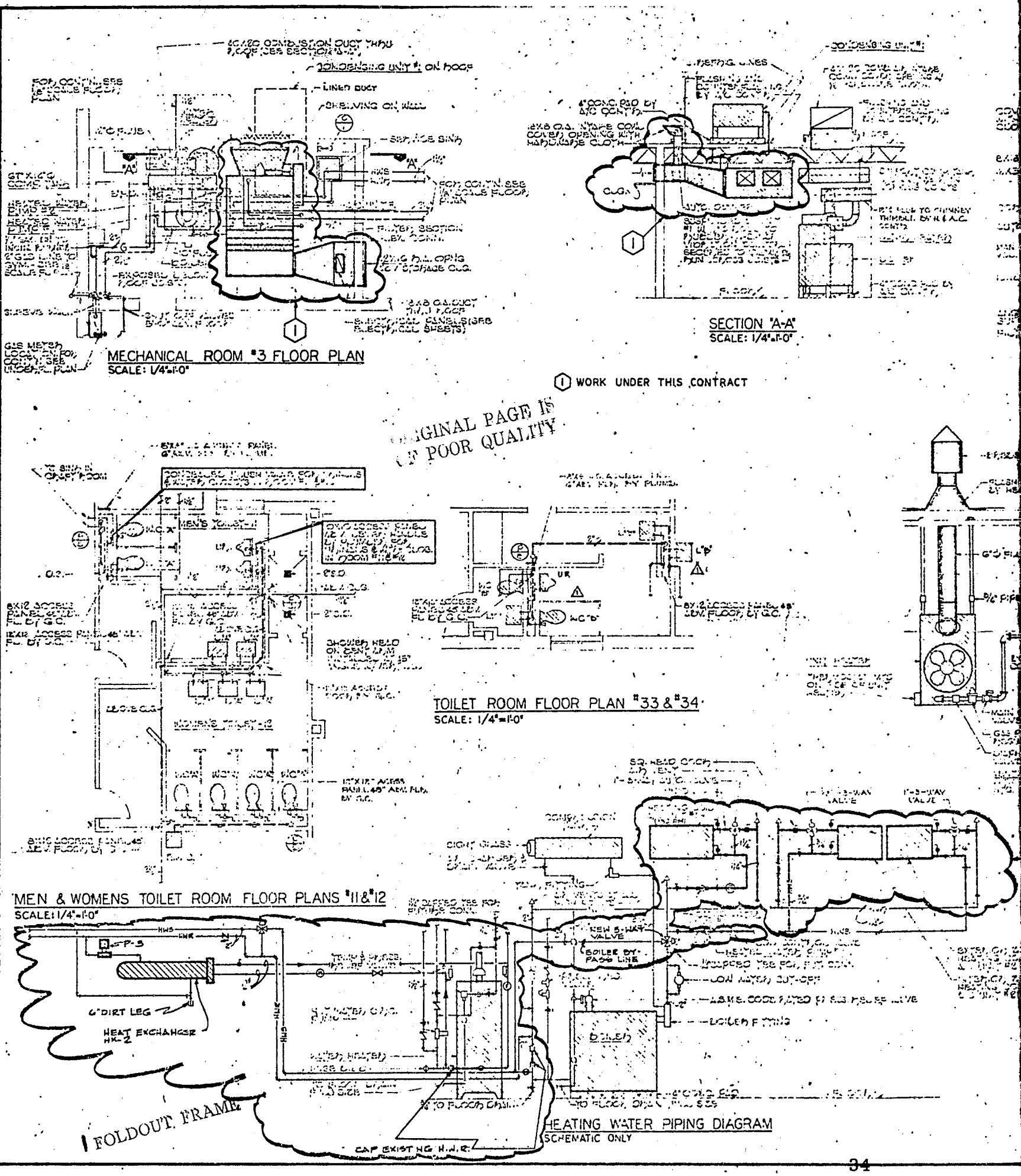
PLUMBING RISER DIAGRAM (DENTAL AREA)
NO SCALE

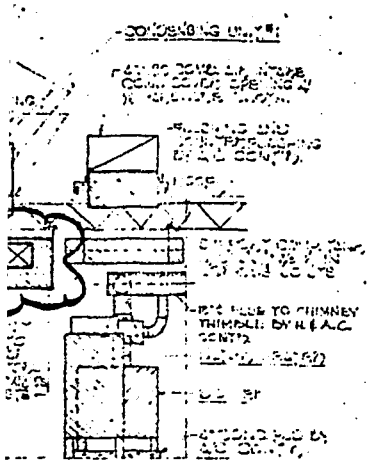
(1) WORK UNDER THIS CONTRACT

NORTH HAMPTON PARK RECREATION & HEALTH CENTER
SOLAR IMPLEMENTATION

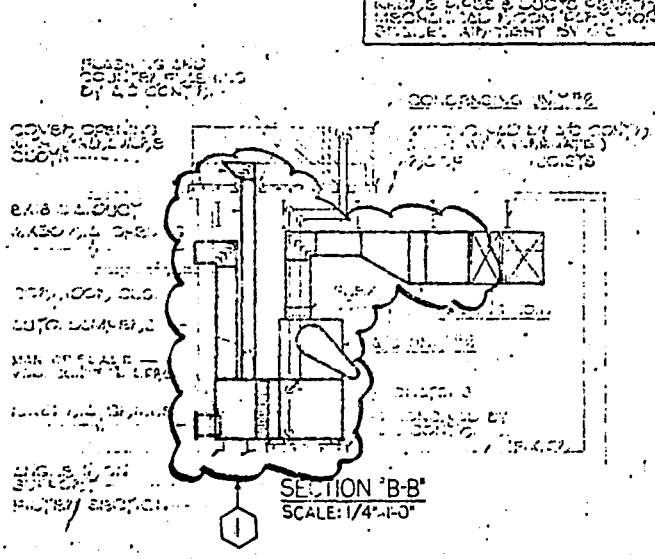
TRAVIS BRYAN & ASSOCIATES INC
ENGINEERS
DALLAS, TEXAS

DRAWN BY	CHECKED BY	DATE	JOB NO.	M-2
S.E.D.	H.O.	6-4-76	76-100	

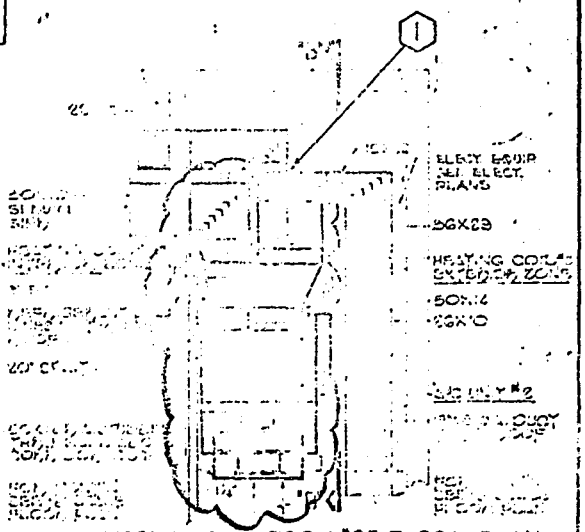

MECHANICAL ROOM #3 FLOOR PLAN
SCALE: 1/4"=1'-0"
SECTION 'A-A'
SCALE: 1/4"=1'-0"
① WORK UNDER THIS CONTRACT
ORIGINAL PAGE IS OF POOR QUALITY
TOILET ROOM FLOOR PLAN #33 & #34
SCALE: 1/4"=1'-0"
MEN & WOMENS TOILET ROOM FLOOR PLANS #11&#12
SCALE: 1/4"=1'-0"
HEATING WATER PIPING DIAGRAM
SCHEMATIC ONLY
FOLDOUT FRAME



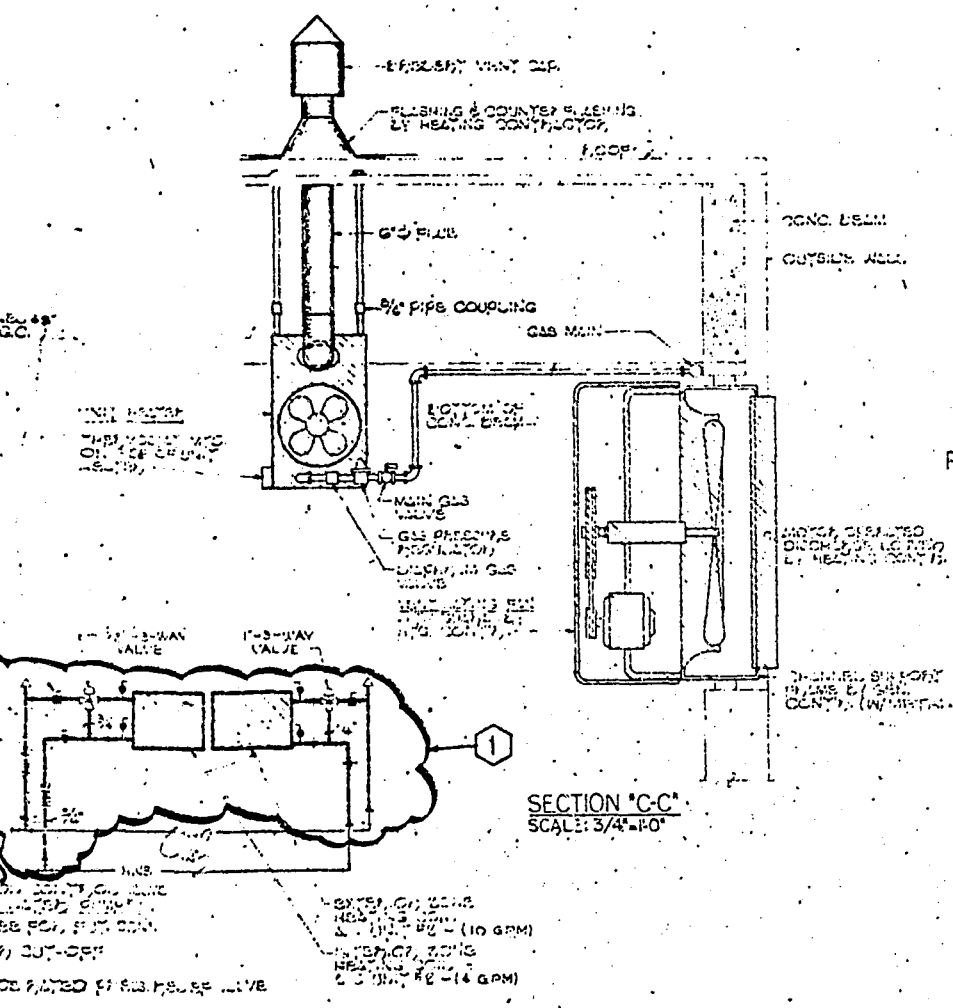
"A-A"



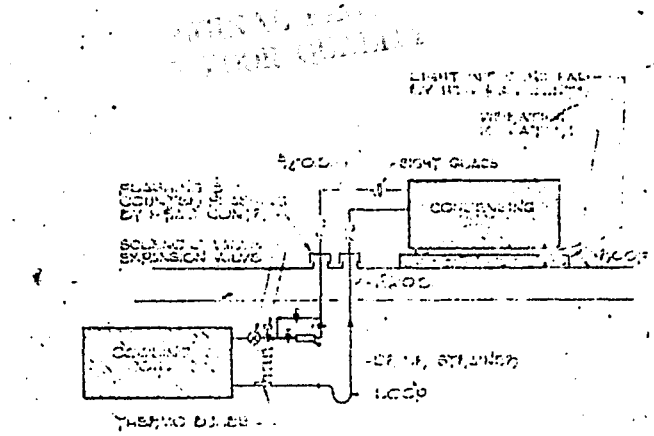
SECTION "B-B"
SCALE: 1/4"=1'-0"



MECHANICAL ROOM #25 FLOOR PLAN
SCALE: 1/4"=1'-0"



SECTION "C-C"
SCALE: 3/4"=1'-0"



REFRIGERANT PIPING DIAGRAM (TYPICAL)
SCHEMATIC ONLY - APPLIES TO

GENERAL NOTES:
1. ALL EXISTING 3-WAY VALVES TO BE RE-USED IF CONDITION OF SAME WILL BE SATISFACTORY
2. PAINT EXPOSED PIPING IN MECHANICAL ROOMS AND AREAS INDICATED EXISTING TO MATCH EXISTING

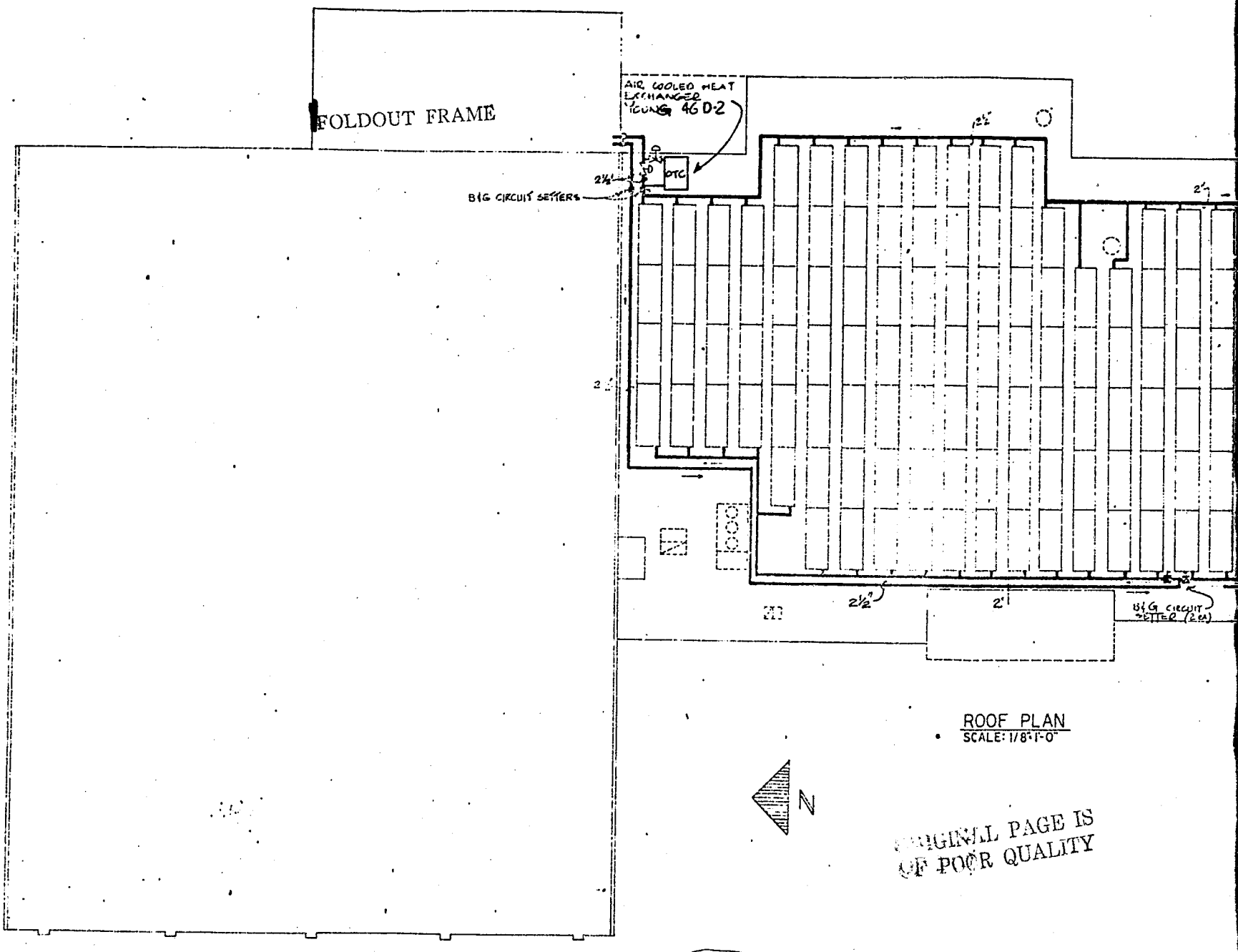
NORTH HAMPTON PARK RECREATION & HEALTH CENTER

SOLAR IMPLEMENTION

TRAVIS [illegible] ASSOC.
DALLAS, TEXAS

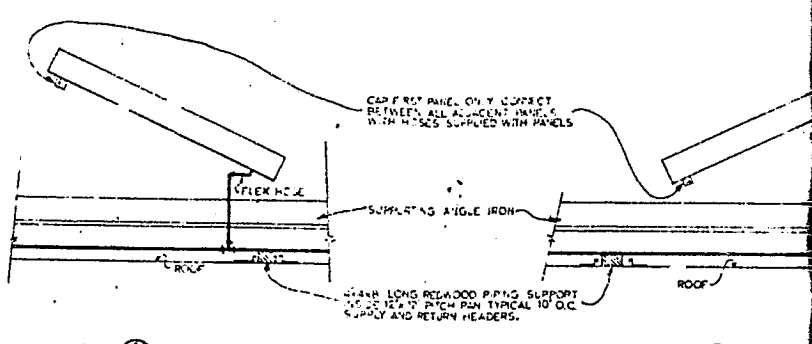
S.E.D. | H.O. | 10-4-76 | M-3

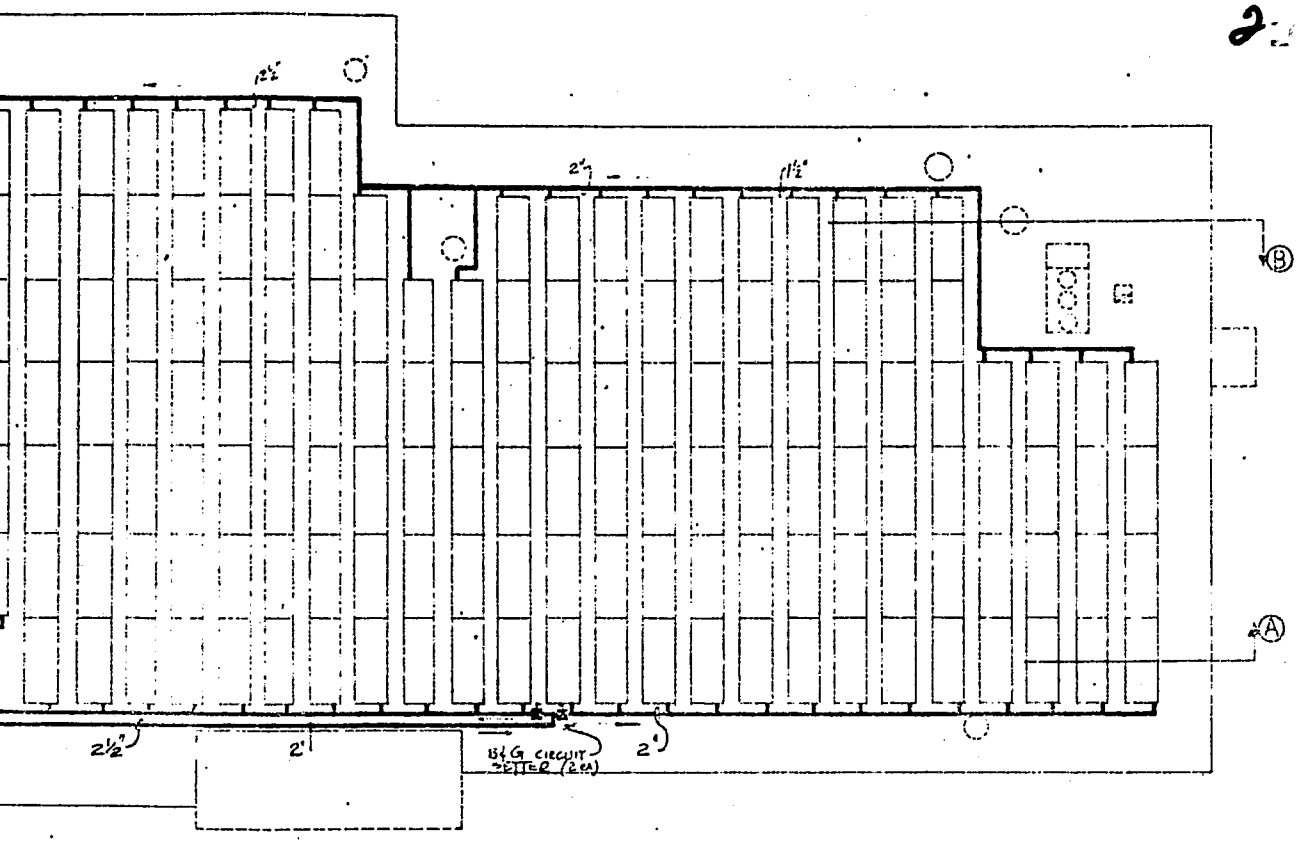
FOLDOUT FRAME



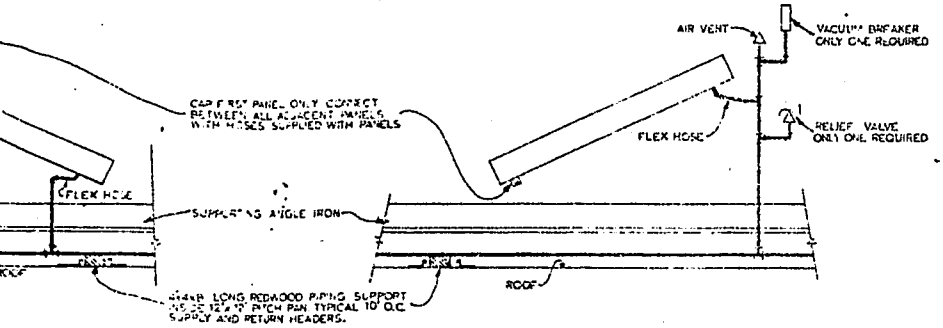
ROOF PLAN
SCALE: 1/8"=1'-0"

N





ROOF PLAN
SCALE: 1/8"=1'-0"



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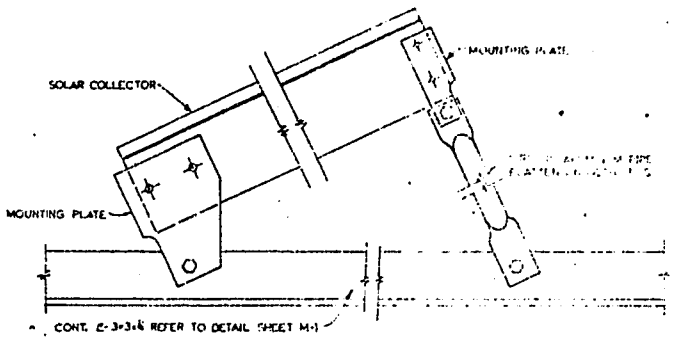
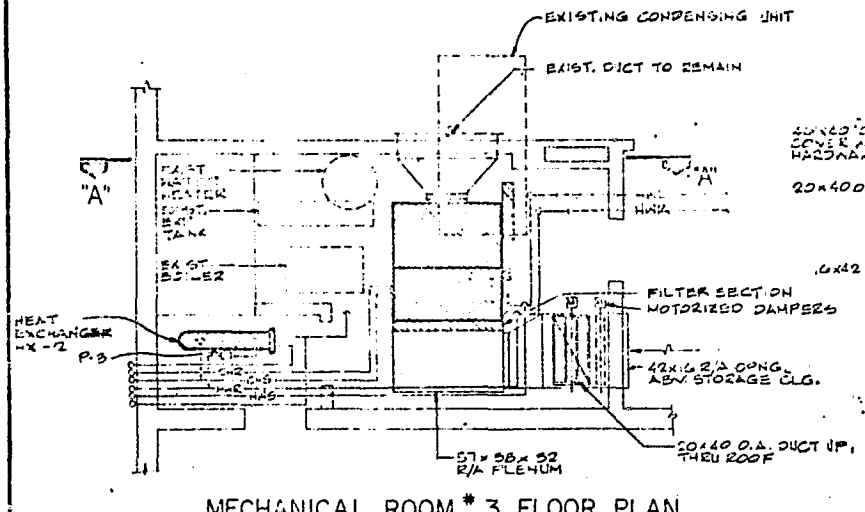
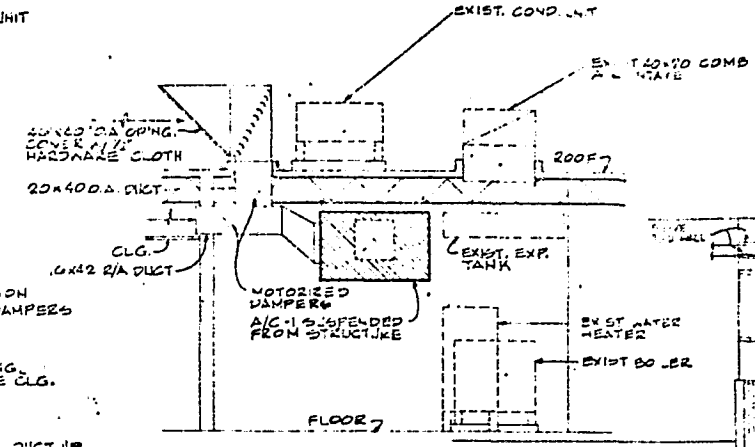


COLLECTOR MOUNTING DETAIL

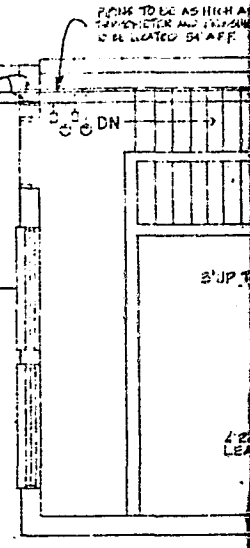
NORTH HAMPTON PARK RECREATION & HEALTH CENTER
SOLAR IMPLEMENTATION



MECHANICAL ROOM # 3 FLOOR PLAN
SCALE: 1/4" = 1'-0"

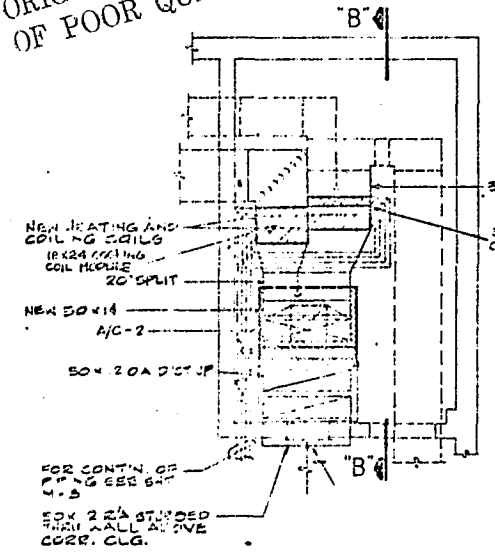


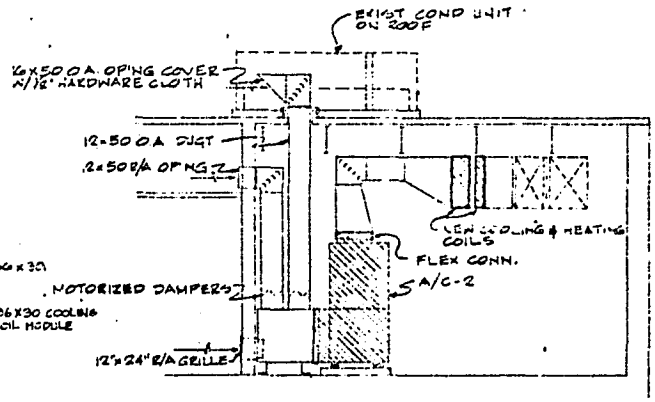
SECTION "A-A"
SCALE: 1/4" = 1'-0"



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

ORIGINAL PAGE IS
OF POOR QUALITY

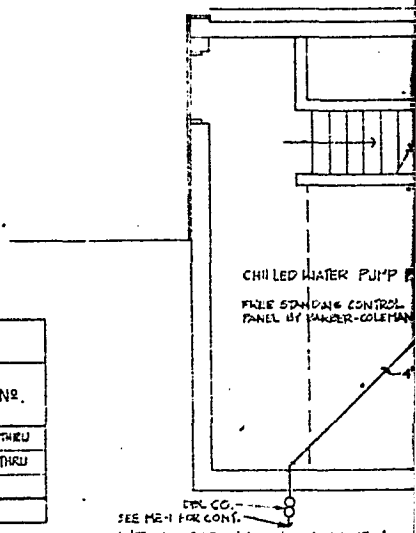




NOTE:
PROVIDE 1¼" CONDENSATE DRAIN FROM COOLING COILS TO FLOOR DRAIN

SECTION "B-B"
SCALE: 1/4" = 1'-0"

MECHANICAL ROOM #25 FLOOR PLAN
SCALE: 1/4" = 1'-0"



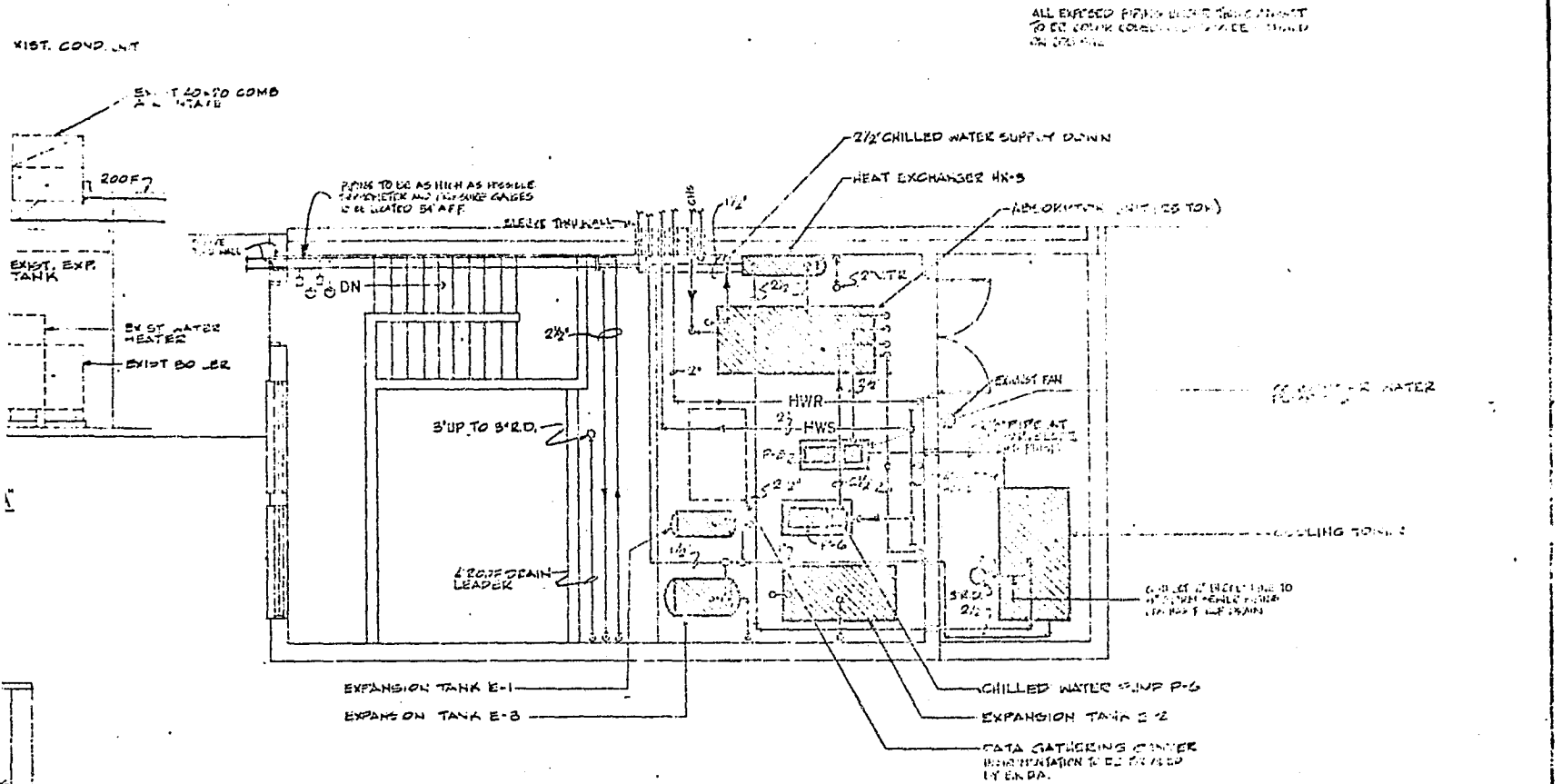
FIRST FLOOR PLA
1/4" = 1'-0"

AIR CONDITIONING UNIT SCHEDULE — ALL EQUIPMENT BASED ON TRANE

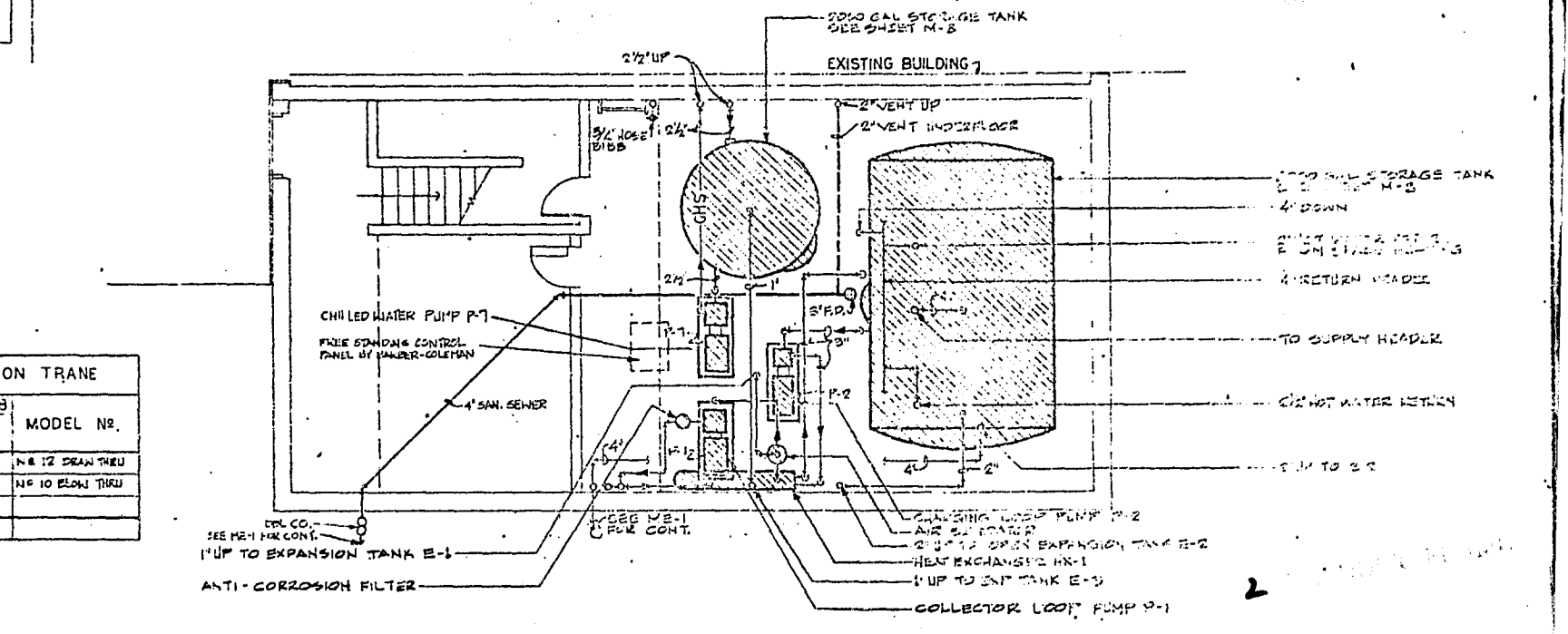
UNIT Nº	FAN CFM	FAN S.P.	FAN VOLT/Ø	FAN H.P.	COOLING COIL EAT DB	EAT WB	LAT DB	LAT WB	COOLING COIL GPM	COOLING COIL BTUH	HEATING COIL * EWT °F	HEATING COIL LAT DB	HEATING COIL LAT WB	HEATING COIL GPM	HEATING COIL BTUH	DX COIL EAT DB	EAT WB	LAT DB	LAT WB	DX COIL BTUH	CONDUNIT 100%A/B			MODEL Nº.
A/C-1	10000	2.50	208/3	7½	82	67	57		53.9	59	258000	160	84.2		12.0	157200	81.9	67.6	55.4	55.3	209400	EXISTING			Nº 12 DRAW THRU
A/C-2	15000	1.35	208/3	5	—	—	—	—	—	—	—	—	—	—	—	—	82.0	68.0	56.4	54.4	202500				Nº 10 BLOW THRU
ZONE #2	—	—	—	—	82	68	57		51.2	22	142050	160	83.3		12.0	168800	—	—	—	—	—				
ZONE #3	—	—	—	—	82	68	57		50.2	6	59100	160	83.3		5	29400	—	—	—	—	—				
					4 ROWS 16 FINS/INCH							1 ROW 16 FINS/INCH					6 ROWS 18 FINS/INCH								

	CFM	FACE VELOCITY	FACE AREA	SIZE
ZONE #2	3700	493 F.P.M.	7.5 S.F.	36x30
ZONE #3	1574	524 F.P.M.	3.0 S.F.	16x24

ADOUT FRAME



SECOND FLOOR PLAN
¼" = 1'-0"



ON TRANE	
	MODEL Nº.
Nº 12 DRAW THRU	
Nº 10 BLOW THRU	

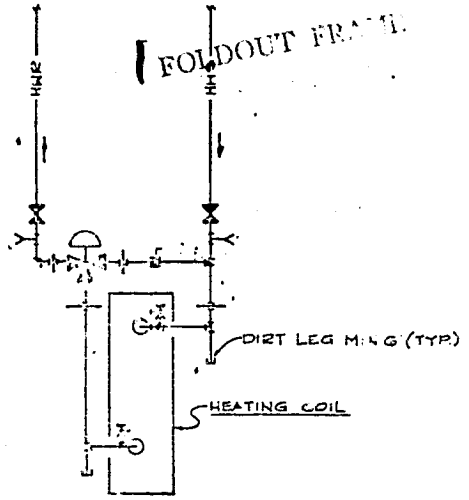
FIRST FLOOR PLAN
¼" = 1'-0"

ALL THERMOMETERS AND GAUGES TO BE LOCATED IN EYE LEVEL OR BE EASILY READABLE.

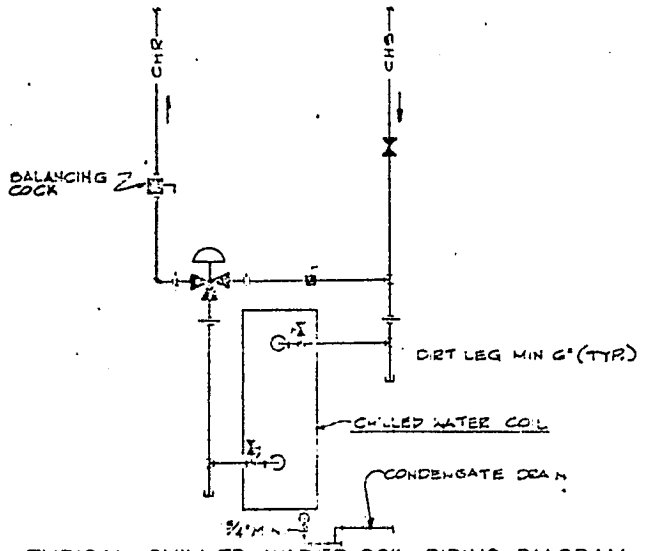
NORTH HAMPTON PARK RECREATION & HEALTH CENTER

SOLAR IMPLEMENTATION

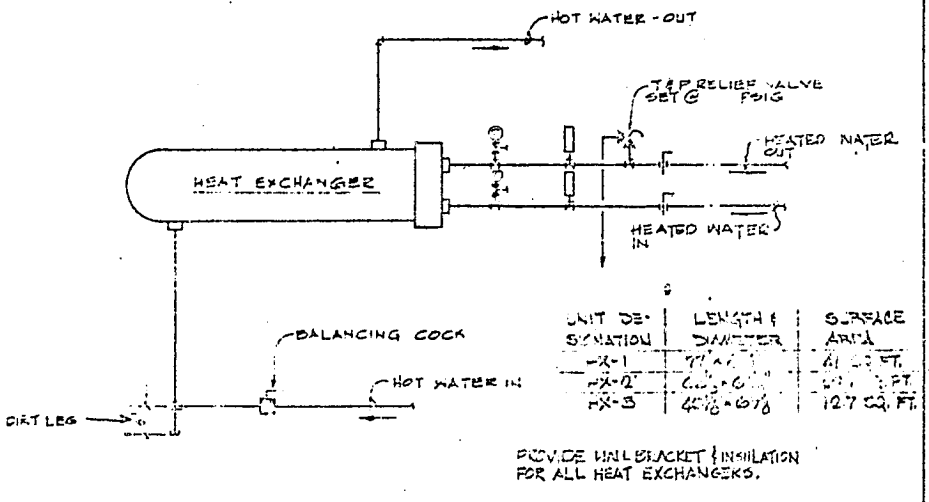
DALLAS, TEXAS



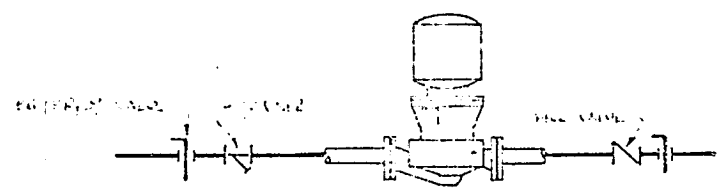
TYPICAL HEATING WATER COIL PIPING DIAGRAM



TYPICAL CHILLED WATER COIL PIPING DIAGRAM

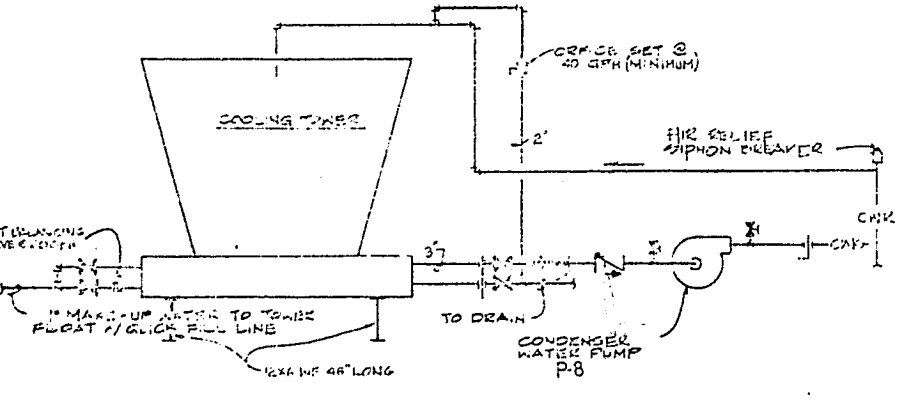


WATER TO WATER HEAT EXCHANGER PIPING DIAGRAM (TYPICAL)

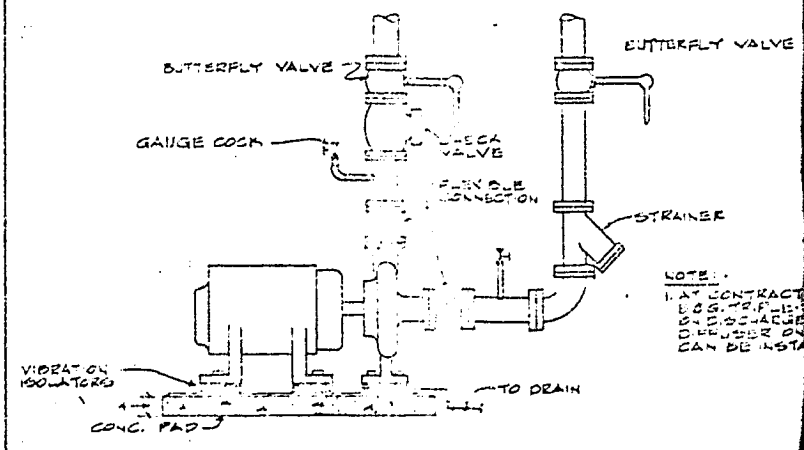


DESIGNATION	P3	P4	P5
GPM	20	10	17
HEAD FT	10	25	20
RPM	1750	1750	1750
HP	1/2	1/2	1
EQUAL TO BELL & GOSSETT	60-1BT 1/2" AA	60-1BT 1/2" AA	60-1BT 1/2" AA

IN-LINE PUMP PIPING DIAGRAM

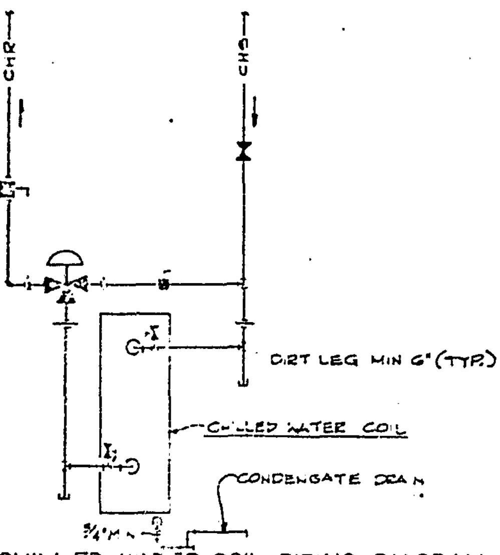


COOLING TOWER PIPING DIAGRAM

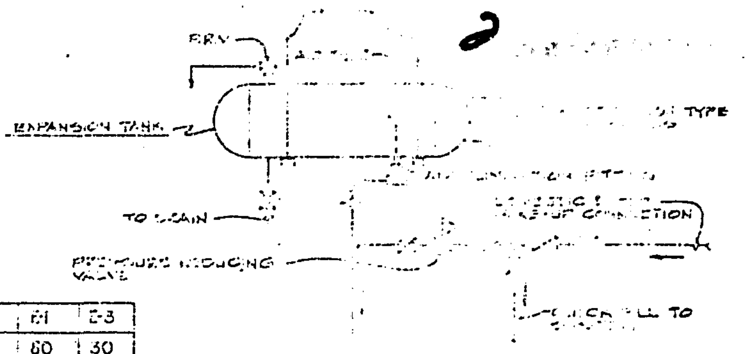


TYPICAL PUMP PIPING DIAGRAM

DESIGNATION	P1	P2	P6	P7	P8
GPM	55	120	90	90	90
HEAD FT	60	15	15	35	15
RPM	1750	1750	1750	1750	1750
HP	5	1½	1½	3	1½
EQUAL TO BELL & GOSSETT	1½ SB 1510	1½ AB 1510	1½ AB 1510	2½ AB 2C 1510	1½ AB 1510

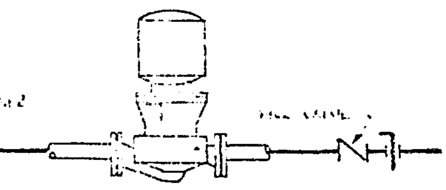


CHILLED WATER COIL PIPING DIAGRAM



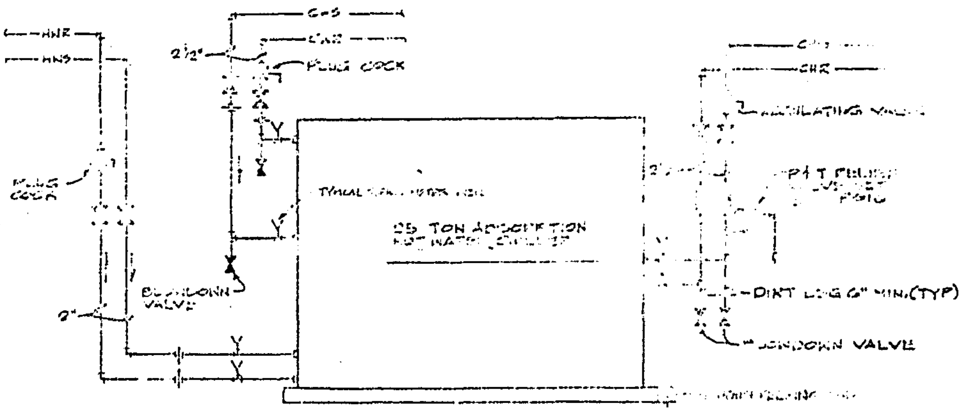
DESIGNATION	E-1	E-3
SIZE-GALS.	60	30
[illegible] RELIEF VALVE SETTING	30	30
PRESSURE REDUCING VALVE SETTING	12	12

CLOSED SYSTEM EXPANSION TANK PIPING DIAGRAM

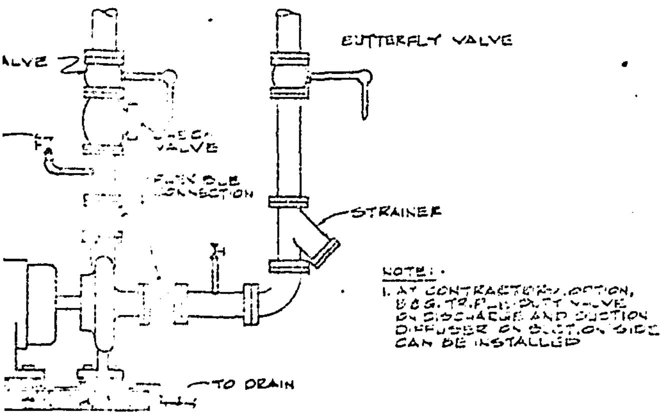


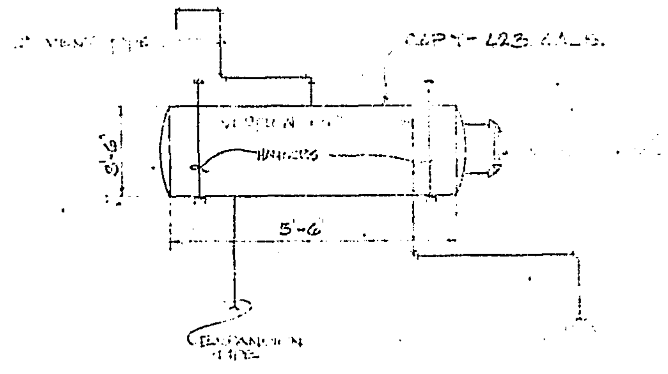
	P 4	P 5
	10	17
	25	20
	1750	[illegible]
	1/2	[illegible]
T A	60-13T 1½"AA	60-13T 1½"AA

UMP PIPING DIAGRAM



ABSORPTION CHILLER PIPING DIAGRAM





OPEN SYSTEM EXPANSION TANK PIPING DETAIL

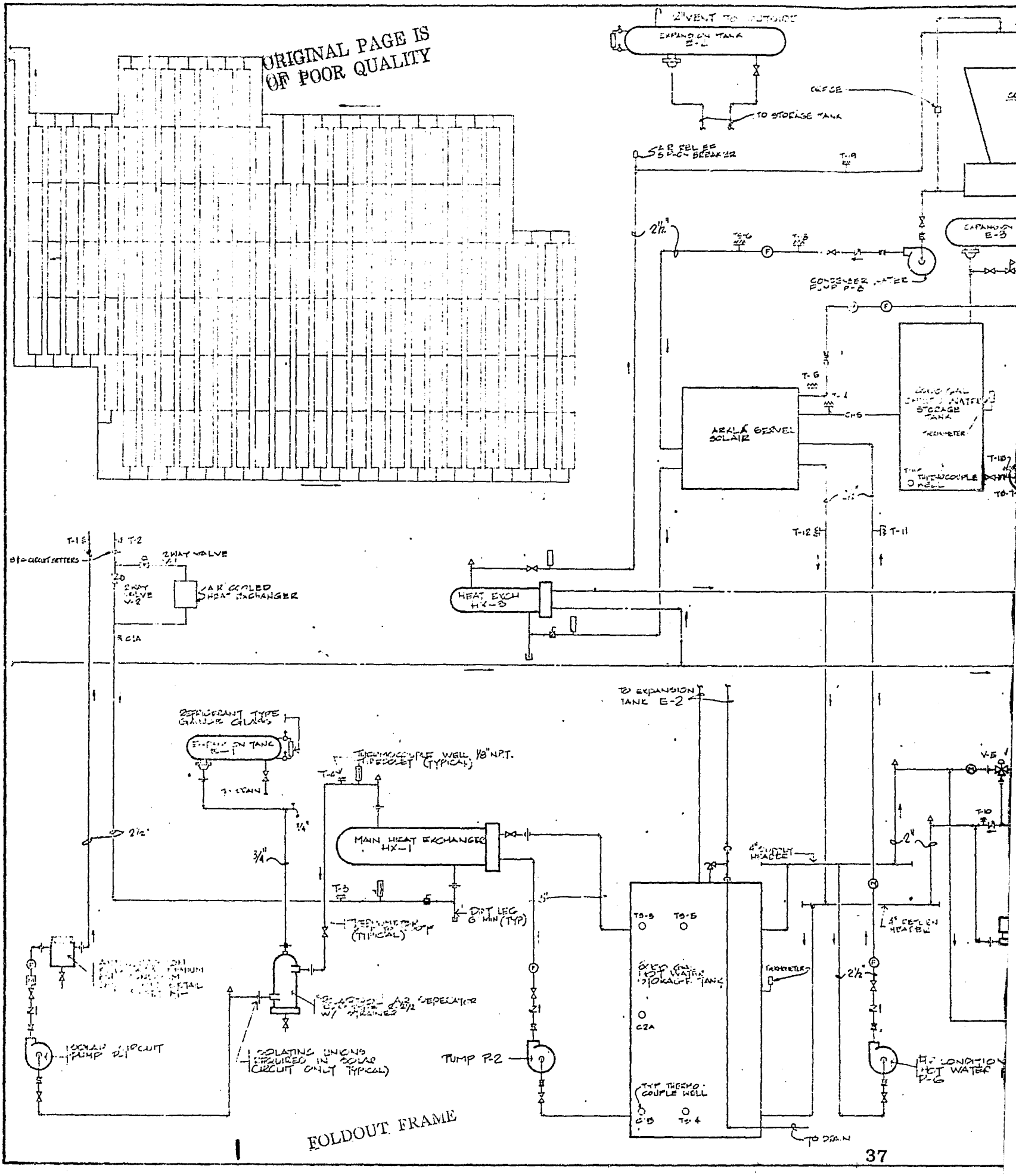
PUMP PIPING DIAGRAM

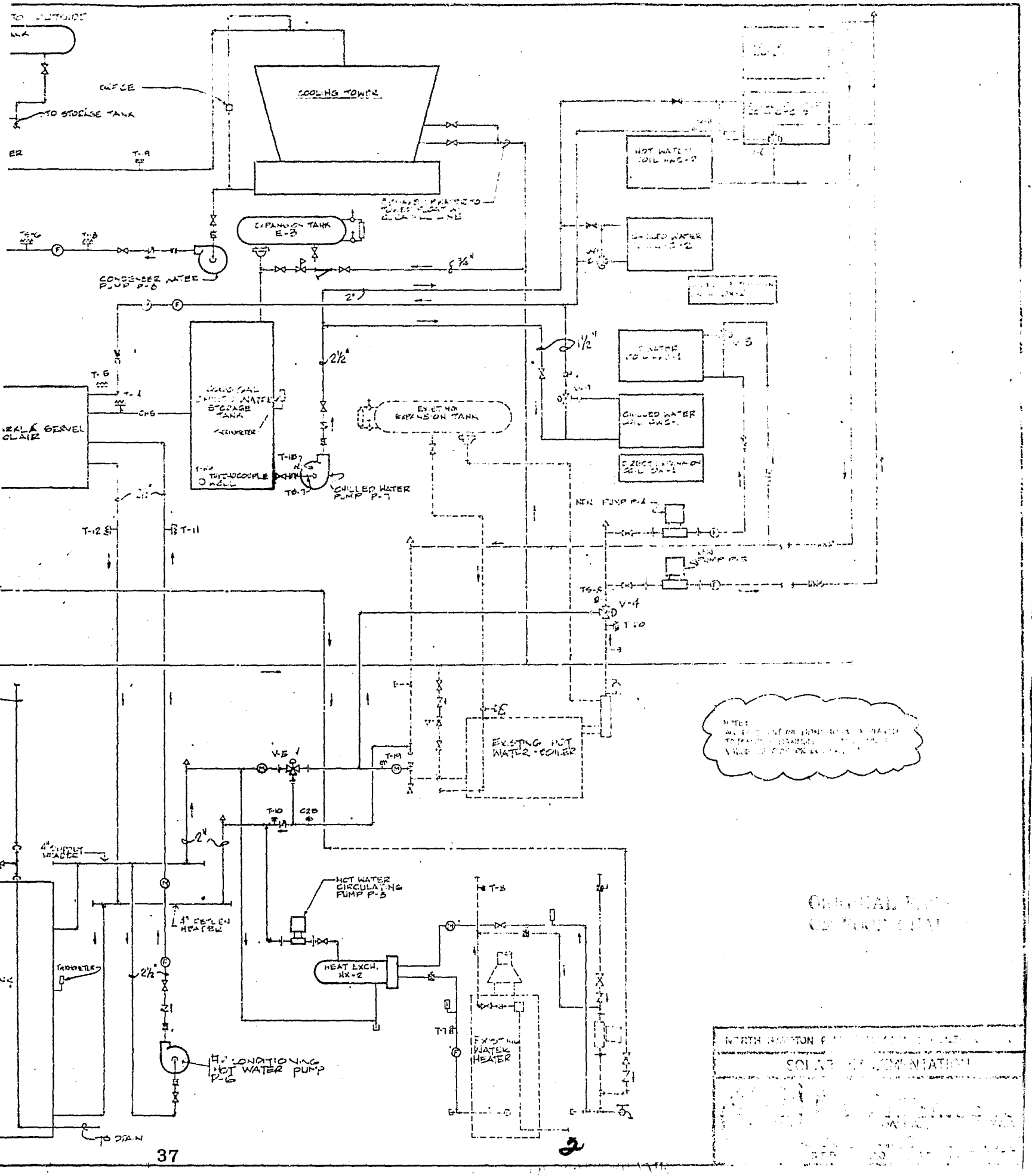
	P 6	P 7	P 8
	90	60	90
	15	[illegible]	15
	1750	[illegible]	1750
	1½	1	[illegible]
B	1½ AB	[illegible]	½ AB
	1510	[illegible]	1510

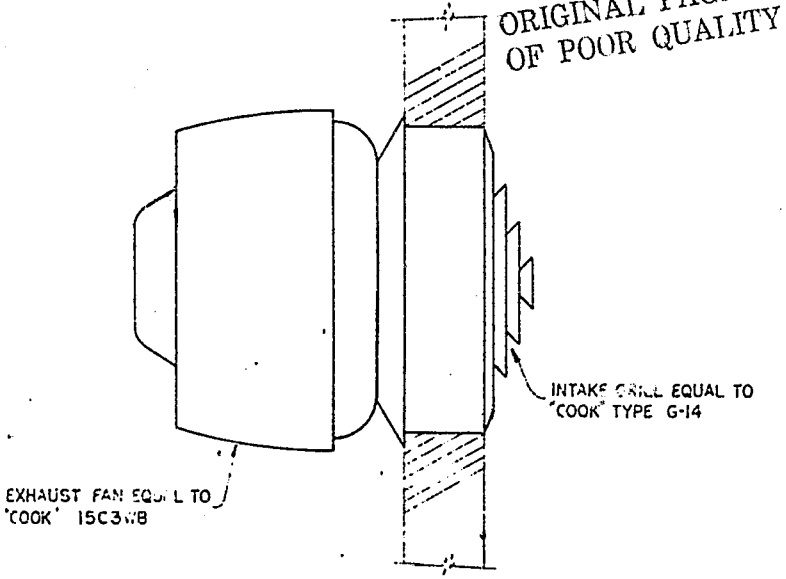
NORTH HAMPTON PARK RECREATION & HEALTH CENTER

SOLAR AUGMENTATION

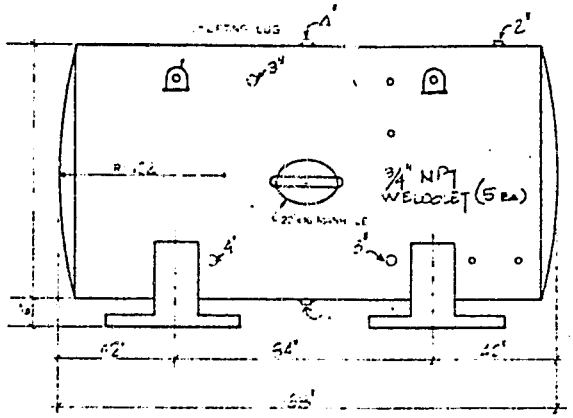
ENGINEERS



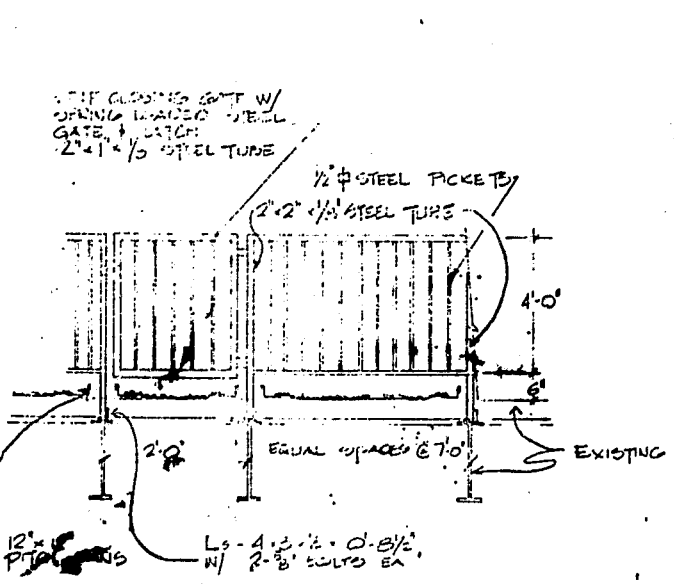

COOLING TOWER
EXPANSION TANK E-3
CONDENSER WATER PUMP P-8
EXISTING EXPANSION TANK
CHILLED WATER PUMP P-7
HOT WATER CIRCULATING PUMP P-5
HEAT EXCH. HX-2
EXISTING HOT WATER HEATER
EXISTING HOT WATER BOILER
CONDITIONING HOT WATER PUMP P-6
TO DRAIN
SOLAR INSTRUMENTATION



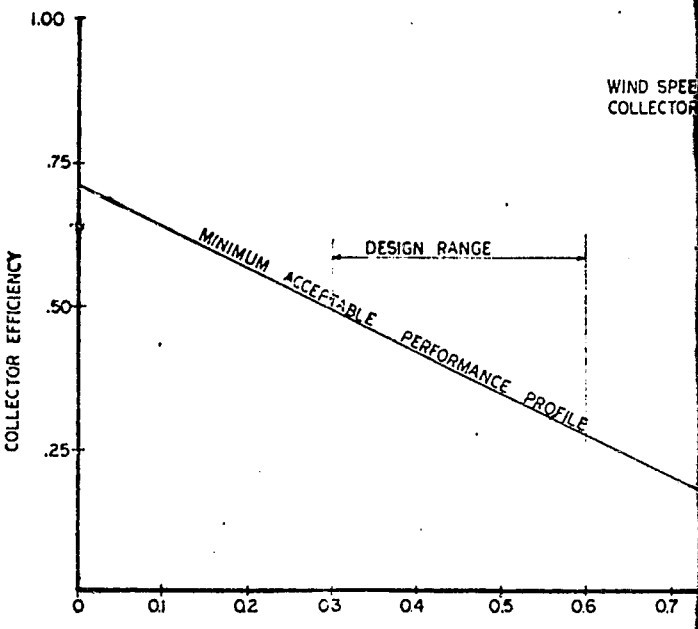
WALL MOUNTED EXHAUST FAN



HOT WATER STORAGE TANK 6000 G



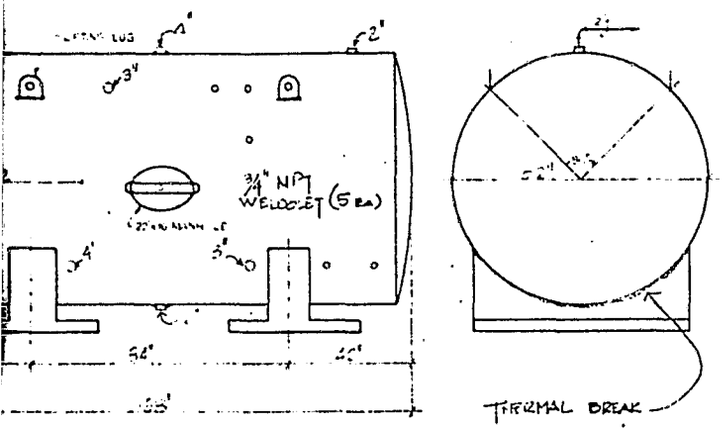
ROOF RAILING DETAIL



$\frac{T_o + T_i}{2} - T_a = \Delta T$ (°F-FT²-HR)

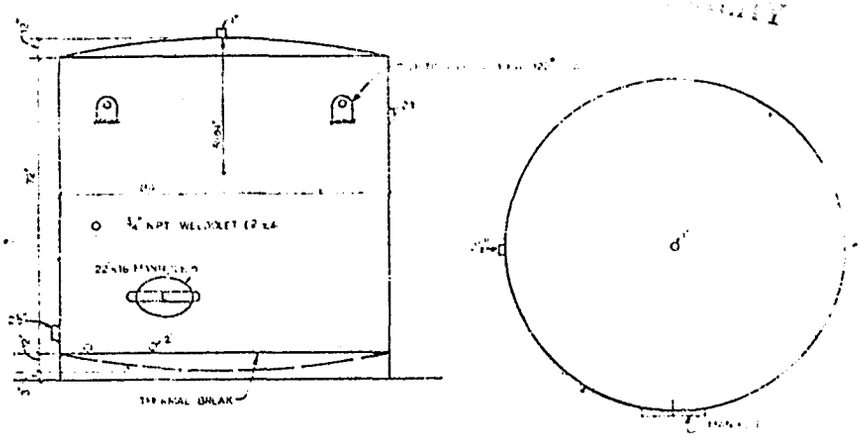
T_o - TEMPERATURE @ COLLECTOR OUTLET °F
T_i - TEMPERATURE @ COLLECTOR INLET °F
T_a - AMBIENT TEMPERATURE

FOLDOUT FRAME



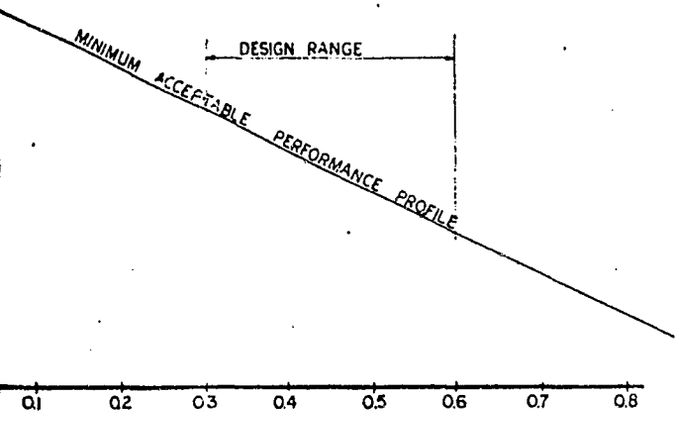
SADDLE AS RECOMMENDED BY STORAGE TANK MNFCT.

HOT WATER STORAGE TANK 6000 GAL.



CHILLED WATER STORAGE TANK 2000 GAL.

WIND SPEED = 0-10 MPH
COLLECTOR TILT = 25°



$$\frac{T_o + T_i}{2} - T_a = \Delta T \ (^\circ F\text{-}FT^2\text{-}HR)$$

ATURE ? COLLECTOR OUTLET °F
ATURE ? COLLECTOR INLET °F
T- TEMPERATURE

NORTH HAMPTON [illegible] & HEALTH CENTER

SOLAR [illegible]

[illegible] of Operation (AC1 and AC#2):

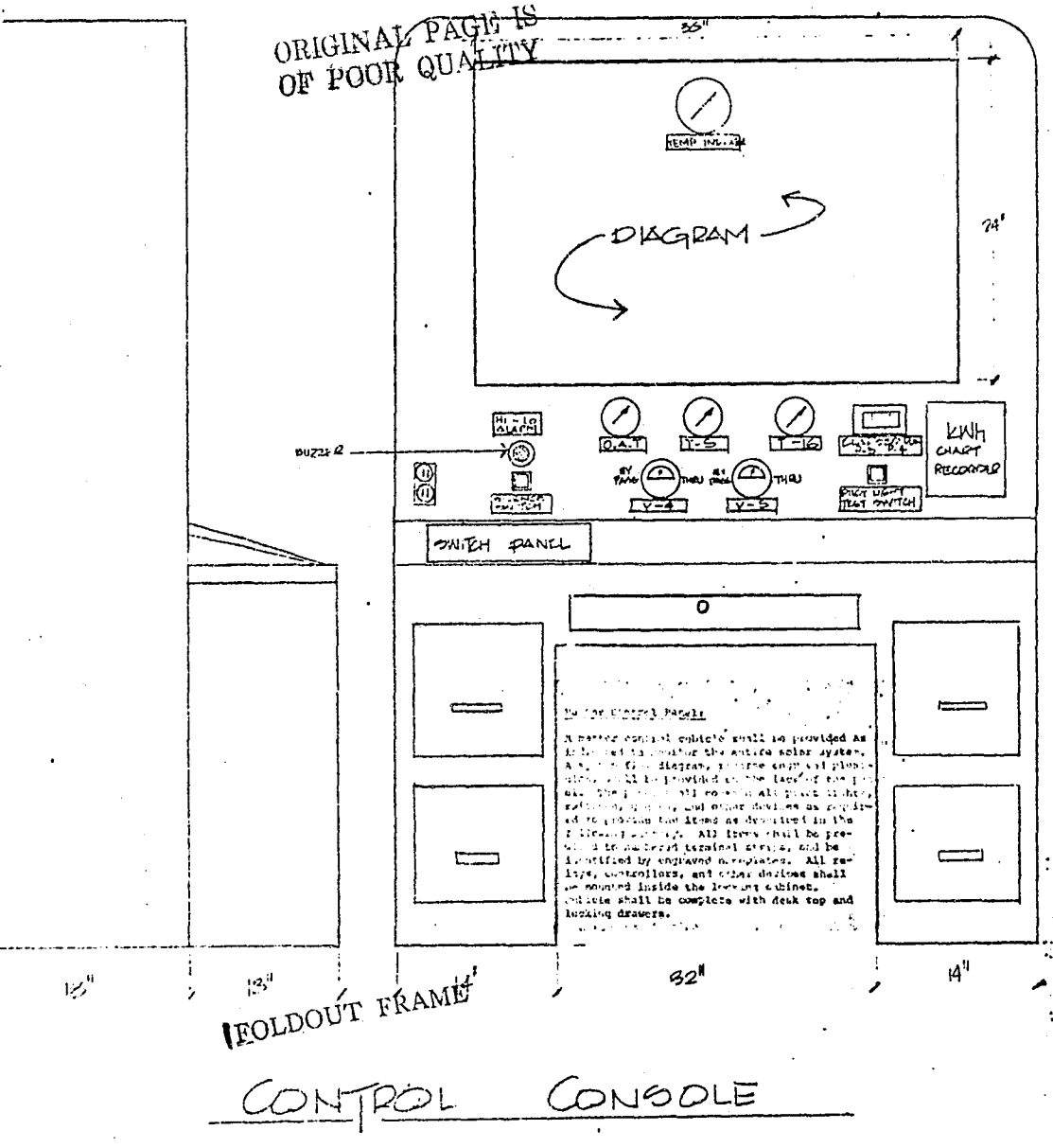
[illegible] unit is [illegible] by an operating control panel, by either time [illegible] or switch, and will modulate outside air and return air [illegible] to maintain mixed air supply temperature, initially set [illegible] operation. The night override switch (S-2) shall be set to override manual [illegible] and put either outside air or return air for cooling whenever [illegible] of [illegible] available for this purpose. Roof exhaust fans are interlocked with the outside air damper motor.

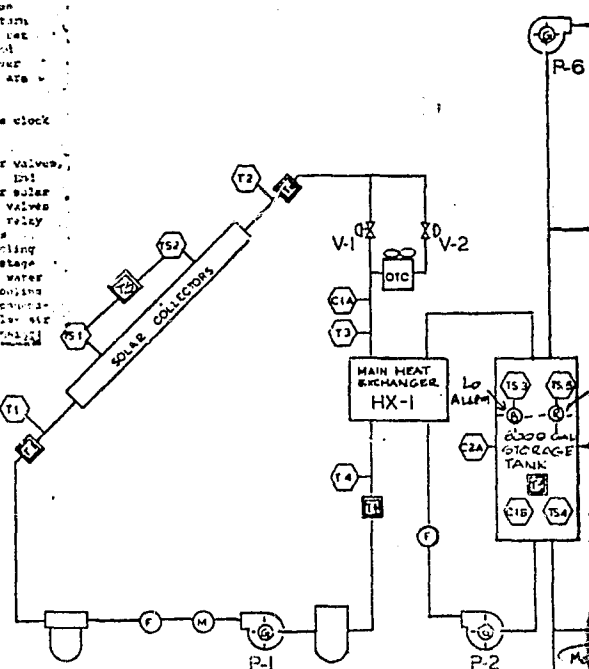
Space thermostat high and low limit night thermostats shall override time clock [illegible] to prevent extreme interior temperatures.

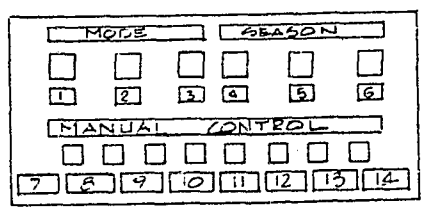
[illegible] shall operate the hot water or chilled water valves, [illegible] heating, in sequence to maintain the desired space temperature. [illegible] Valves shall open [illegible] and C.W. pumps as described under solar [illegible] will [illegible] by space demand as determined by valves [illegible] in space two, [illegible] are, electronic relay [illegible] to recirculate unit and close chilled water valve to bypass [illegible] Adjustable time delay relay shall prevent frequent cycling [illegible] space temperature in Zones 2 and 3 continue to rise, second stage [illegible] energize condensing unit for AC#2 and both associated chilled water [illegible] go to bypass position, and unit #7 will operate in backup cooling [illegible] for this adjustable time period. After the time delay period, the respective unit shall be de-energized and the solar mode reinitiated. If the solar air [illegible] can handle the load, the relay will de-energize AC#1's condensing unit and place it back in the solar cooling mode.

[illegible] switch on valve V5. [illegible] in the [illegible] switches in valves V5 or V6 will cause [illegible] heating).

[illegible] water temperature shall be maintained by energizing chiller when chilled water [illegible] exceeds 50 degrees and not to [illegible] degrees. [illegible] Pump P7 shall be de-energized [illegible] valves V4, V5, or V6 [illegible] for cooling.







1 AUTOMATIC
2 MANUAL
3 SPARE
4 HEATING
5 COOLING
6 SPARE
7 AUTO-SYSTEM OPERATION
8 SOLAR HEATING
9 AUXILIARY HEATING
10 SOLAR COOLING
11 AUXILIARY COOLING AC#1
12 AUXILIARY COOLING AC#2
13 SPARE
14 SPARE

SYSTEM CONTROL FLOW DIAGRA

SWITCH PANEL

SUPPORT FOR MASTER CONTROL PANEL

Pilot Light Indications: (For AC #1's AC #2)

- Pumps #1 thru #8
- Absorption chiller
- Cooling Tower Fan
- Auxiliary Cooling Fan #1
- Auxiliary Cooling Fan #2
- Auxiliary Heating

Temperature Gauges For:

- Outside Air Indication
- (T-5) Hot Storage Temperature Tank
- (T-16) Chilled Water Storage Tank
- Master Temperature Meter for Items Listed under Indication

Indication For: T-1, T-2, T-3, T-7, T-10, T-11, T-9, T-13, T-14, T-15
Provide for (4) additional spaces.

Position Indication For: Valves V5 & V6

Elapsed Run Time for: Pumps 3 & 4

kWH Chart Recorder For

Alarms:

Provide alarm [illegible]
becomes too high
be or as too low.
Provide momentary

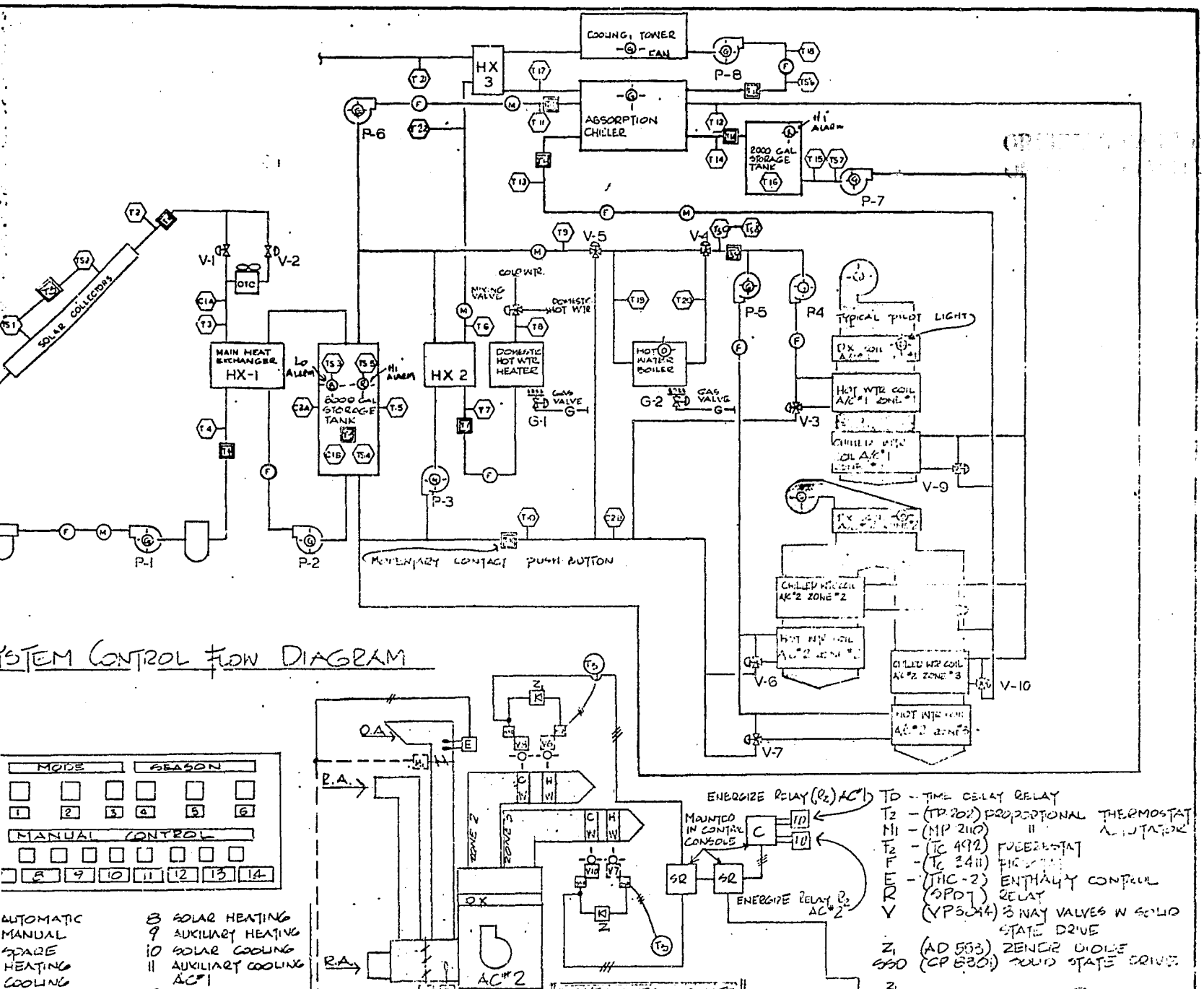
System Switches:

Mode
(1) Au
(2) Ma
(3) Sp

Season
(1) Co
(2) He
(3) Sp

Pushbutton Switch:

Water flow circuits a
fault contributes to
collectors [illegible]
[illegible] operation



STEM CONTROL FLOW DIAGRAM

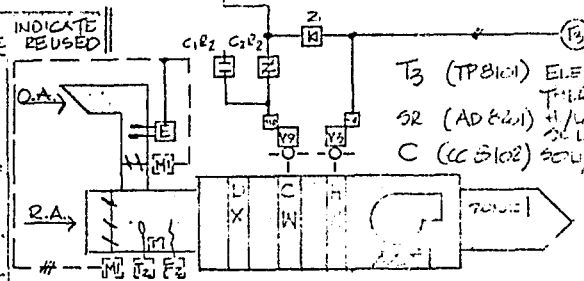
AUTOMATIC
MANUAL
SPARE
HEATING
COOLING
SPARE
AUTO - SYSTEM OPERATION

8 SOLAR HEATING
9 AUXILIARY HEATING
10 SOLAR COOLING
11 AUXILIARY COOLING AC#1
12 AUXILIARY COOLING AC#2
13 SPARE
14 SPARE

ENERGIZE RELAY (R_2) AC#1
MOUNTED IN CONTROL CONSOLE
ENERGIZE RELAY R_2 AC#2

TD - TIME DELAY RELAY
T_2 - (TP 202) PROPORTIONAL THERMOSTAT ACTUATOR
NI - (NIP 2110) " "
T_2 - (TC 492) FREEZESTAT
F - (TC 2411) FLOW SWITCH
E - (TIC-2) ENTHALPY CONTROL
R (SPDT) RELAY
V (VP3044) 3 WAY VALVES W SOLID STATE DRIVE
Z_1 (AD 503) ZENER DIODE
SSD (CP 8301) SOLID STATE DRIVE

T_3 (TP8101) ELECTRONIC ROOM THERMOSTAT
SR (AD 6201) H/C SIGNAL SELECTOR
C (CC 8102) SOLID STATE RELAY (2 STAGE)



EXISTING CONTROL PANEL

WITCH PANEL

SUPPLY FOR MASTER CONTROL PANEL

ight Indication: (For AC #1's AC #2)

- Pumps #1 thru #8
- Absorption Chiller
- Cooling Tower Fan
- Auxiliary Cooling Fan #1
- Auxiliary Cooling Fan #2
- Auxiliary Heating

ure Gauges For:

- Outside Air Indication
- (T-5) Hot Storage Temperature Tank
- (T-16) Chilled Water Storage Tank
- Master Temperature Meter for Items Listed Under Indication

on For: T-1, T-2, T-4, T-7, T-10, T-11, T-9, T-13, T-14, T-15
Provide for (4) additional spaces.

Indication For: Valves V5 & V6

Run Time For: Pumps 1 & 4

40

Alarm:

Provide alarm buzzer to sound alarm when H.X storage tank temperature becomes too high or too low (adjustable), or chilled water storage temperature be ones too high (adjustable).
Provide momentary contact switch to silence alarm.

System Switches: On-Off (with Pilot Lights), Push-button

Mode
(1) Automatic
(2) Manual
(3) Spare

Season
(1) Cooling
(2) Heating
(3) Spare

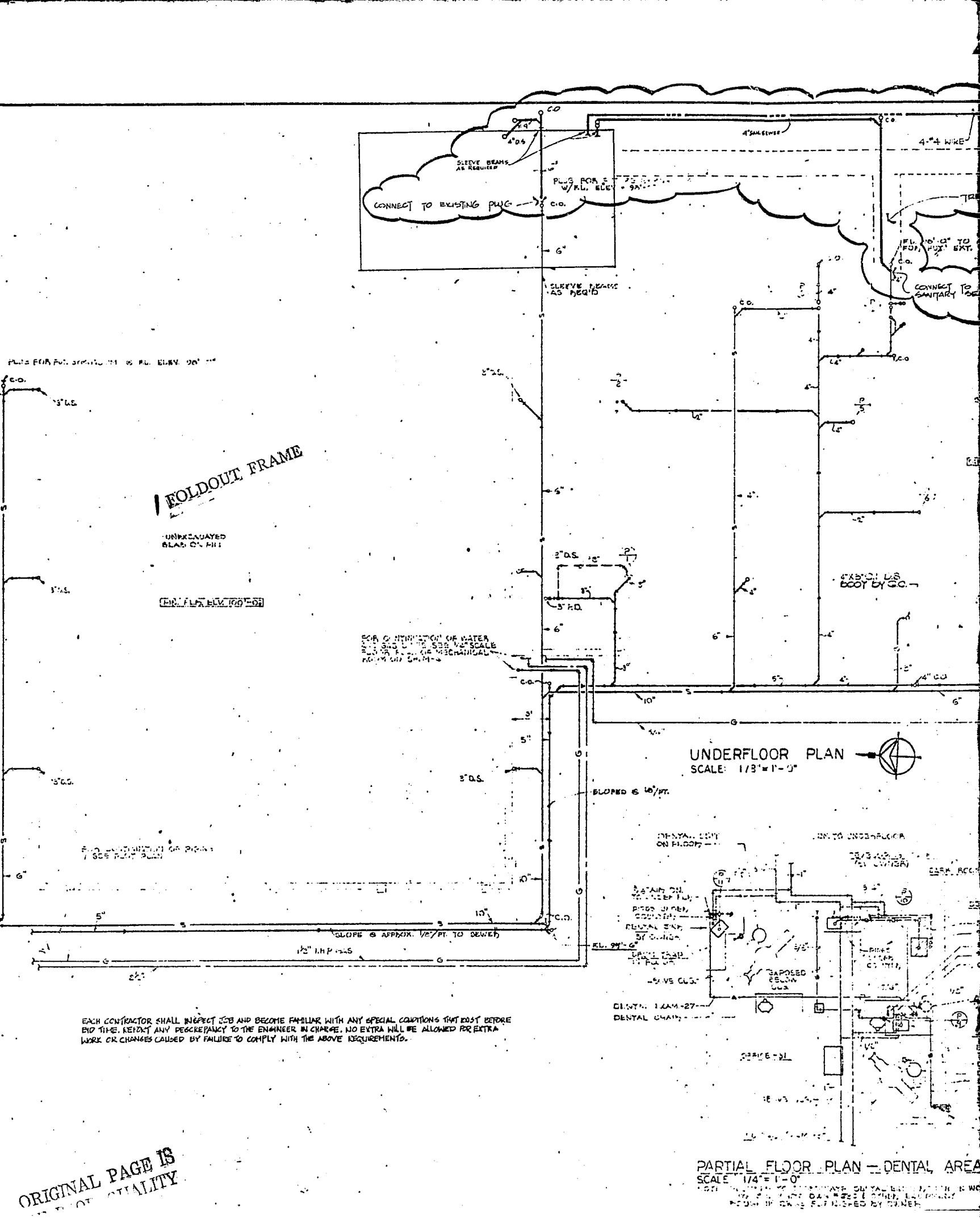
Manual control
(1) system
(2) Solar Heating
(3) Solar Cooling
(4) Auxiliary Cooling AC #1
(5) Auxiliary Cooling AC #2
(6) Auxiliary Cooling AC #2
(7) spare
(8) Spare

Push-To-Test Switch: To check all pilot lights on the panel

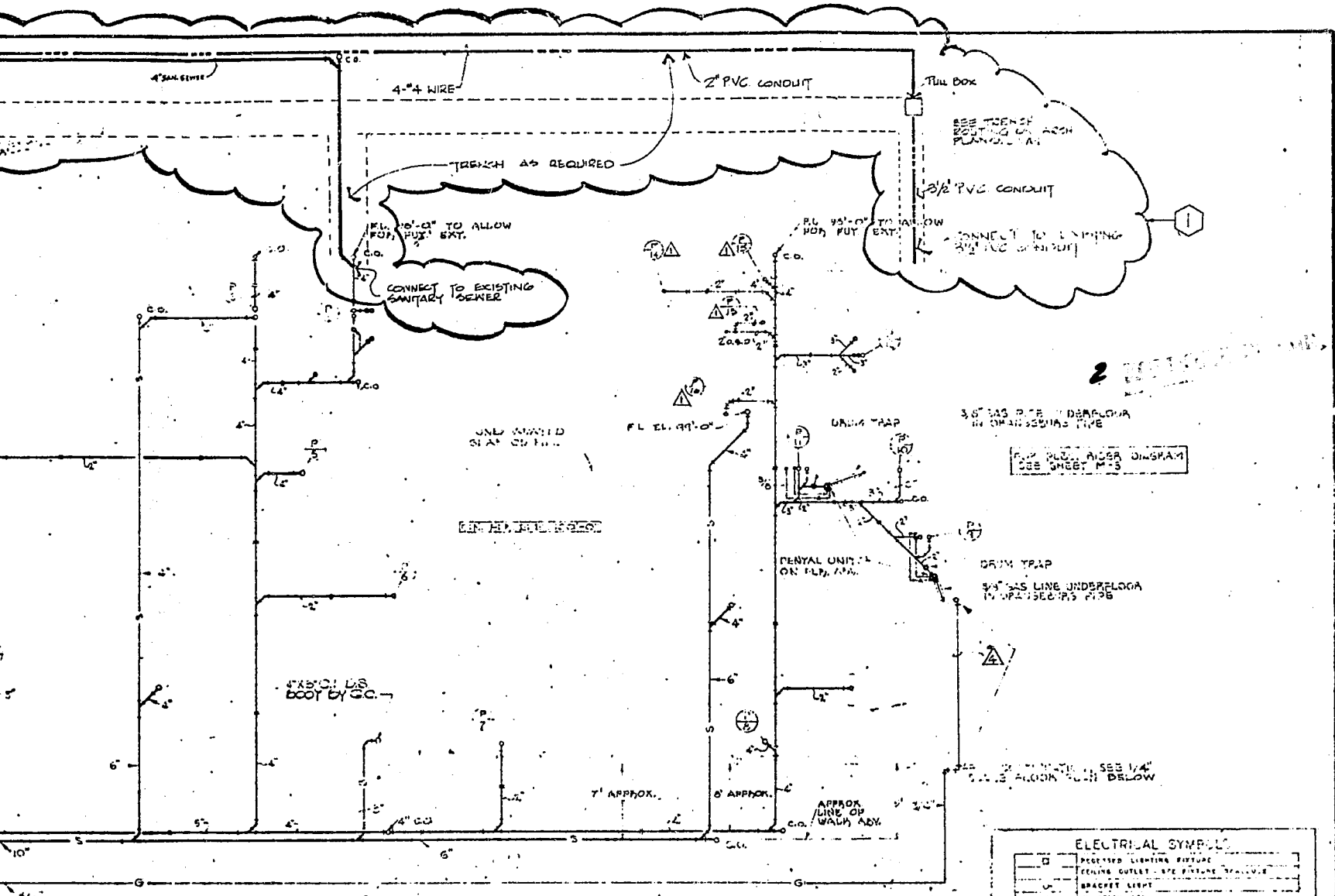
Water flow circuits shall indicate ... path sequentially ... collector loops, to heat ... structure approximate water ...

NORTH HAMPTON PARK RECREATION & HEALTH CENTER

SOLAR IMPLEMENTATION

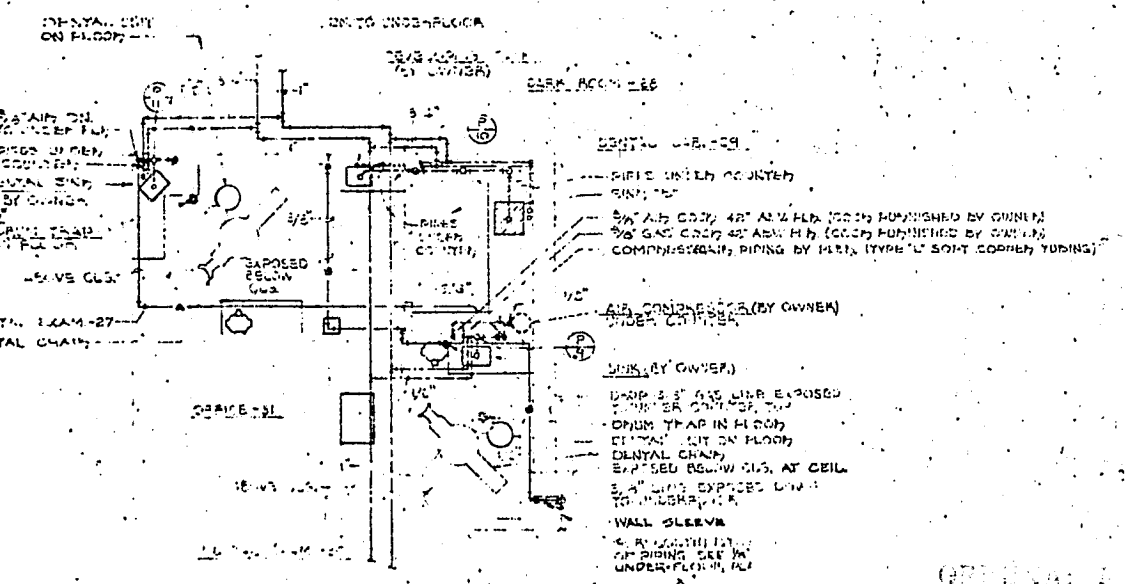


EACH CONTRACTOR SHALL INSPECT JOB AND BECOME FAMILIAR WITH ANY SPECIAL CONDITIONS THAT EXIST BEFORE BID TIME. REPORT ANY DISCREPANCY TO THE ENGINEER IN CHARGE. NO EXTRA WILL BE ALLOWED FOR EXTRA WORK OR CHANGES CAUSED BY FAILURE TO COMPLY WITH THE ABOVE REQUIREMENTS.



UNDERFLOOR PLAN
SCALE: 1/8" = 1'-0"

(1) WORK UNDER THIS CONTRACT



PARTIAL FLOOR PLAN — DENTAL AREA
SCALE: 1/4" = 1'-0"

ELECTRICAL SYMBOLS

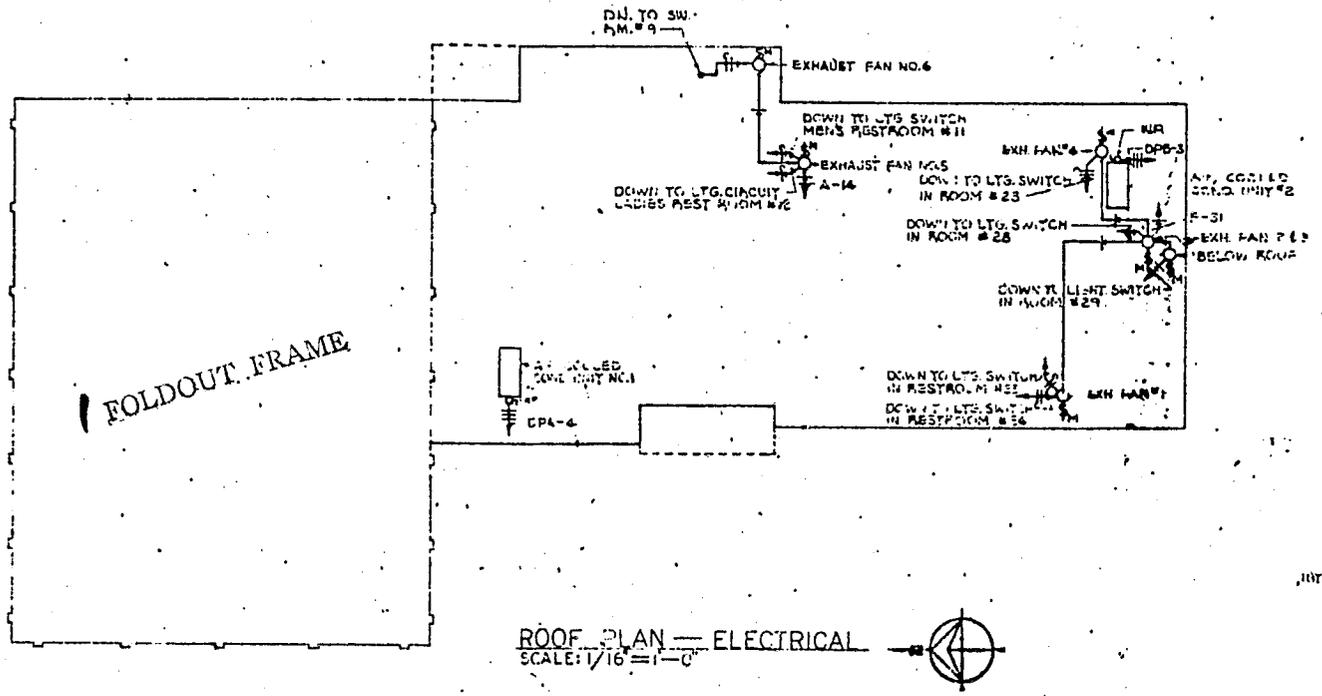
NORTH HAMPTON PARK RECREATION & HEALTH CENTER

SOLAR IMPLEMENTATION

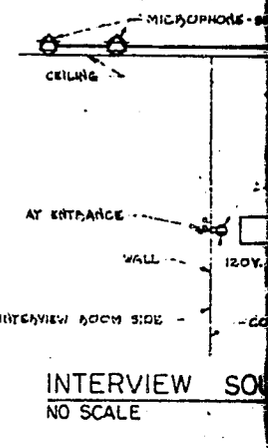
DALLAS,

S.E.D. H.O.

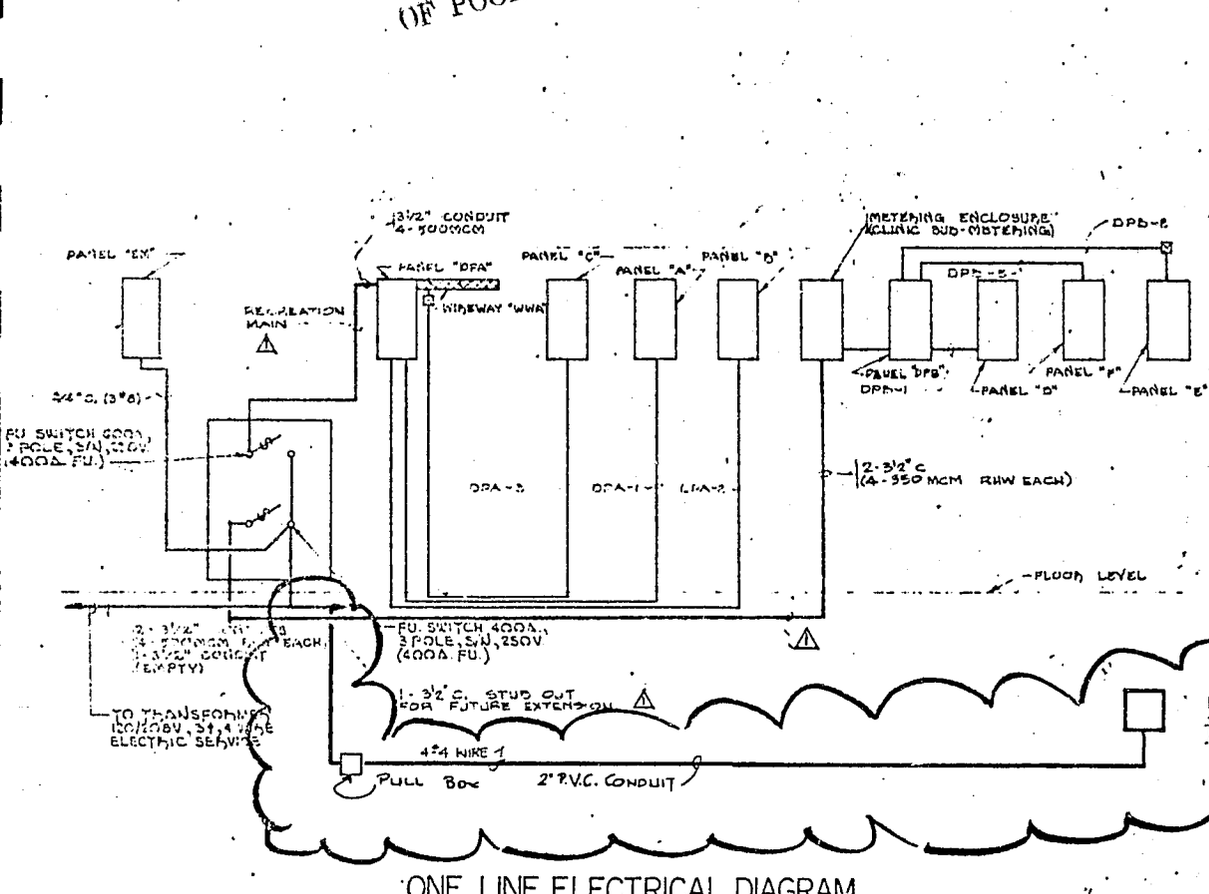
FOLDOUT FRAME



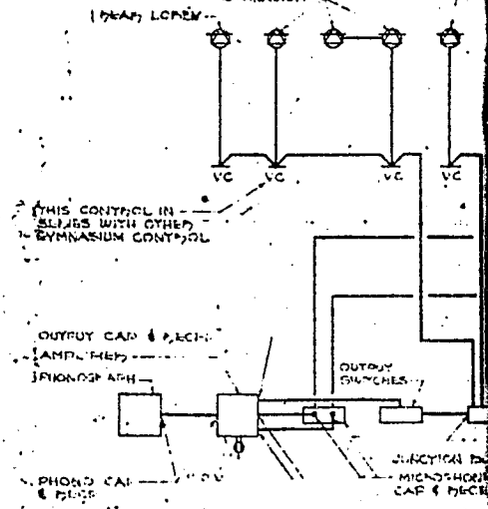
ROOF PLAN — ELECTRICAL
SCALE: 1/16" = 1'-0"



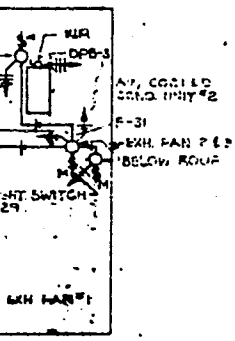
INTERVIEW SO
NO SCALE

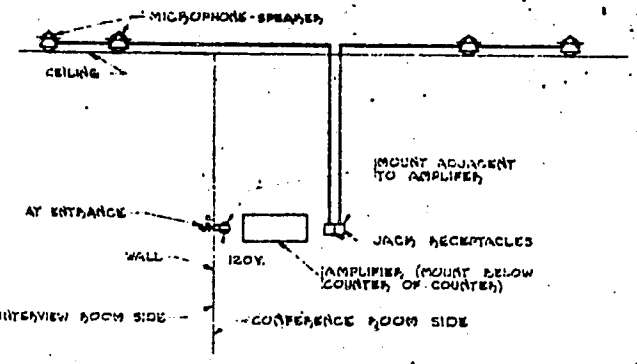


ONE LINE ELECTRICAL DIAGRAM



RECREATION SOUND SY
NO SCALE





INTERVIEW SOUND SYSTEM
NO SCALE

PANEL "DPB"

120/208 VOLT 3 ϕ 4 WIRE
400 AMP. ϕ BUS 400 AMP. NEUT. BUS

CKT.	SERVES	H.P	START	LOAD	POLE	FUSE	SWITCH	CONDUIT	WIRE AWG
1	PANEL "D"	—	—	—	3	70	(60)	1"	2
2	" "E"	—	**	—		40	60	1"	4
3	COND. UNIT #2	—	—	—		80	(60)	1"	3
4	AIR HAND. #2	2	D	—		4	30	3/4"	3
5	PANEL "F"	—	—	—		80	100	1 1/2" C	4
6	AUTO CLAVE	—	—	—	3	30	60	1"	4
7	SPACE	—	—	—	3	—	100	—	—

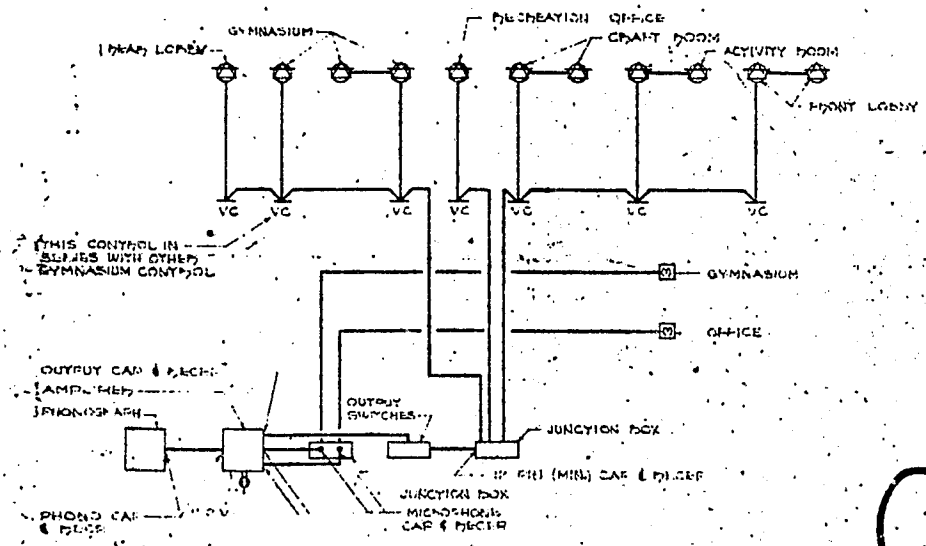
* STARTERS ARE IN SEPARATE, INDIVIDUAL ENCLOSURES
** 60A., 3 POLE, MECHANICALLY HELD CONTACTOR

PANEL "DPA"

120/208 VOLT 3 ϕ 4 WIRE
400 AMP. ϕ BUS 400 AMP. NEUT. BUS

CKT.	SERVES	H.P	START	LOAD	POLE	FUSE	SWITCH	CONDUIT	WIRE AWG
1	PANEL "A"	—	—	—	3	100	200	2"	4
2	" "B"	—	—	—		125	"	"	4
3	" "C"	—	**	—		40	60	1"	4
4	COND. UNIT #1	—	—	20 KW		80	(60)	1 1/2"	3
5	AIR HAND. #1	2	D	—		6	30	3/4"	3
6	FAN #1	1	—	—		4 1/2			
7	" #3	1	—	—					
8	" #2	1	D	—	3	4 1/2	30	3/4"	3
9	SPACE	—	—	—	3	—	100	—	—

* STARTERS ARE IN SEPARATE, INDIVIDUAL ENCLOSURES
** 60A, 3 POLE, MECHANICALLY HELD CONTACTOR



RECREATION SOUND SYSTEM
NO SCALE

LIGHTING PANEL SCHEDULE
VOLTAGE SYSTEM

PANEL	MAINS AMP	MAINS TYPE	ϕ	1P-20A. BREAKERS	1S-20A. SPACES	OTHER ARRANGEMENTS	REMARKS
A	100	MLO	3	19	5		
b	225			12	3		
C	100			4	6		
D				19	4		
E				5	9		
F		MLO	3	31	6		
EM	100	MCB	1	2	2	20-1 MCB	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.

100A 3P 4W
EL "D" IN NEW
LTION, SEE E-2

NORTH HAMPTON PARK RECREATION & HEALTH CENTER

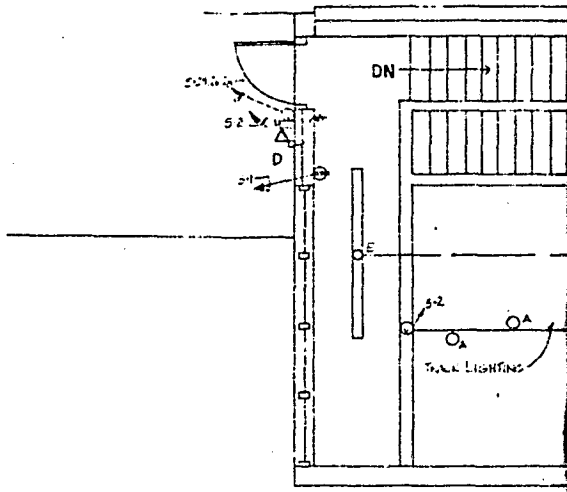
SOLAR IMPLEMENTATION

TRAVIS BRAUN & ASSOCIATES INC
ENGINEERS
DALLAS, TEXAS

DRAWN BY	CHECKED BY	DATE	JOB NO.	SHEET
S.E.D.	H.O.	6-4-76	76-100	E-1

LIGHT FIXTURE SCHEDULE

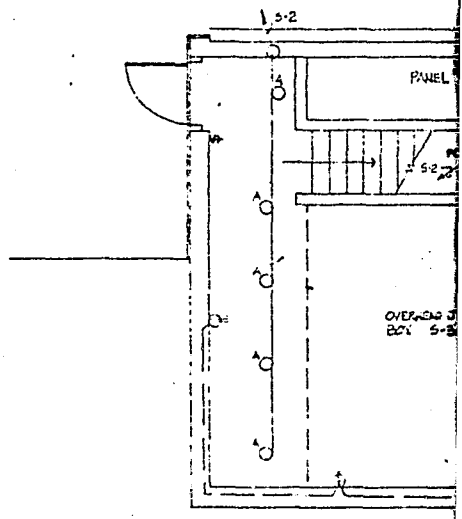
MANUFACTURER	CAT. NO.	TYPE	FINISH	LENS	MOUNTING	LAMP	REMARKS
PROGRESS	[illegible]	INCAND.	WHITE	—	TRACK	PAR 38	PENDANT MTD
LITHONIA	[illegible]	FLOUR.	"	—	SURFACE	" " "	—
PASS & SEYMOUR	35	INCAND	PORCELAIN	—	SURFACE	100 W.I.F.	PULL CHAIN
STONCO	150-L	INCAND.	ALUM.	207	WALL	PAR-38	—
LITHONIA	[illegible]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



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

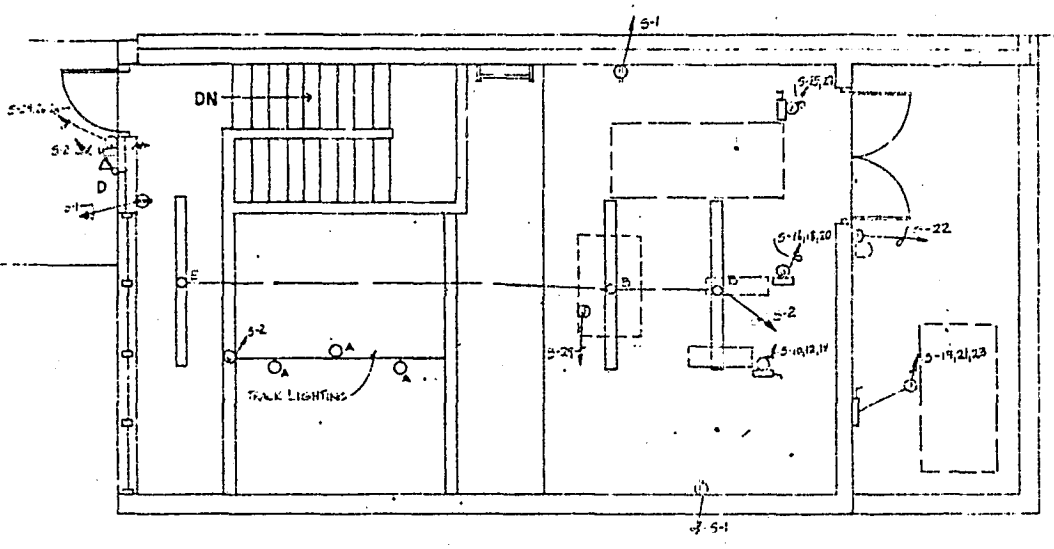
1ST. PANEL 'S 100AMLO				
CKT	BREAKER	MOTOR STARTER	WIRE SIZE	SERVING
3 5 7	60A	NEMA 1	3"10-½ C	PUMP P1
9,11	30A	NEMA 0	3"12-½ C	PUMP P3
[illegible]	30A	NEMA 0	3"12-½ C	PUMP P5
[illegible]	30A	NEMA 1	3"10-½"C	[illegible]
[illegible]	20A	[illegible]	3"12-½"C	AUDITORIUM
[illegible]	20A	[illegible]	3"12-½"C	[illegible]
[illegible]	20A	NEMA 0	3"12-½"C	PUMP P6
[illegible]	20A	NEMA 0	3"12-½"C	PUMP P8
[illegible]	20A	NEMA 0	3"12-½"C	O.T.C.

* ALL BREAKERS NOT SHOWN SHALL BE 20A-1P
FEEDER FOR P1, P3, P5 & P6 = 3"4-1¼"C.
2 SPARES FOR 3 PHASE PUMPS TO BE FURNISHED
BY ELECTRICAL SUB-CONTRACTOR.

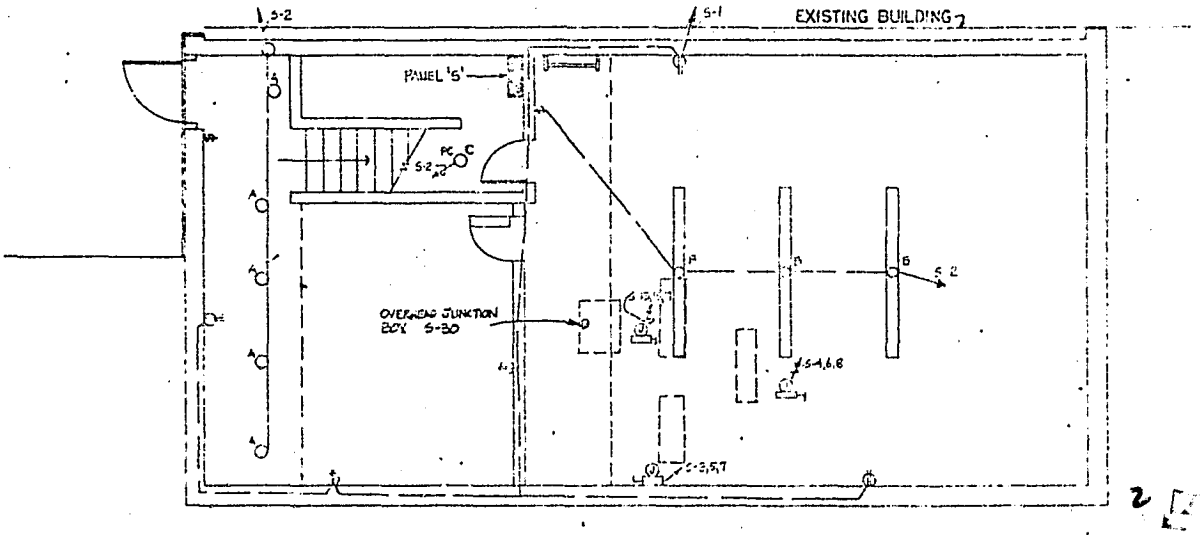


FIRST FLOOR PLAN
1/4" = 1'-0"

FOLDOUT FRAME

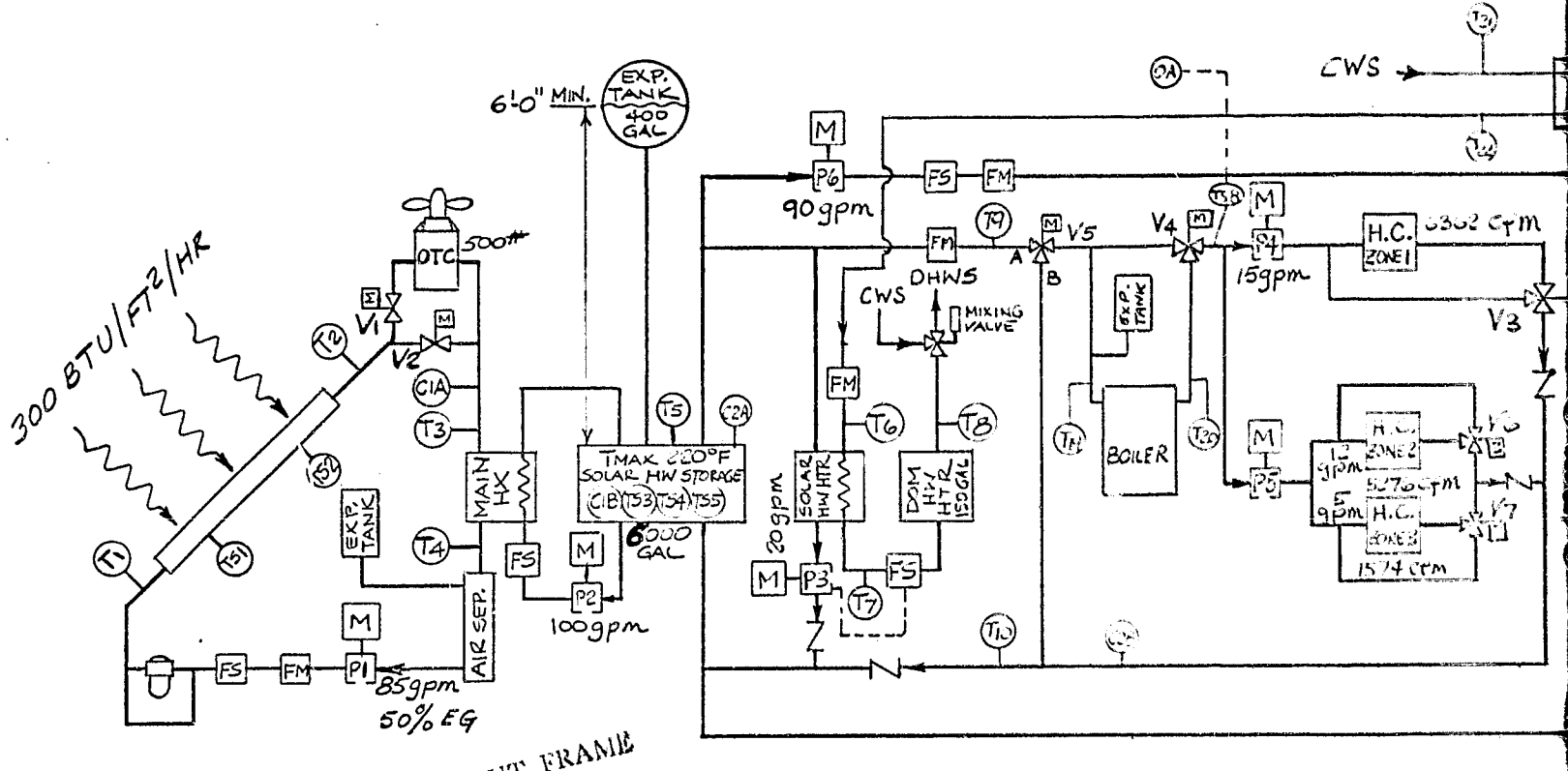


SECOND FLOOR PLAN
1/4" = 1'-0"



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

UNLESS OTHERWISE SPECIFIED USE THE FOLLO
APPLIED PRACTICES | SURFACES | TOL. RANGE ON FRACTIONS ± | ± .



FOLDOUT FRAME

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.
C1A/C1B = 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/P8 - 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 (160/120°)(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 HTR
T8 - DHWS
T9/T10 - ΔT HEATING SYST
T11/T12 - ΔT ARKLA HWS
T13/T15 - ΔT CHILLED WAT
T14 - ARKLA CW OUTLET
T16 - CW STORAGE TEM
T17/T18 - ΔT COOLING TO
T19/T20 - ΔT CONVEN. BOILER
T21/T22 - ΔT D.H.W HEAT EX

FLOW METERS

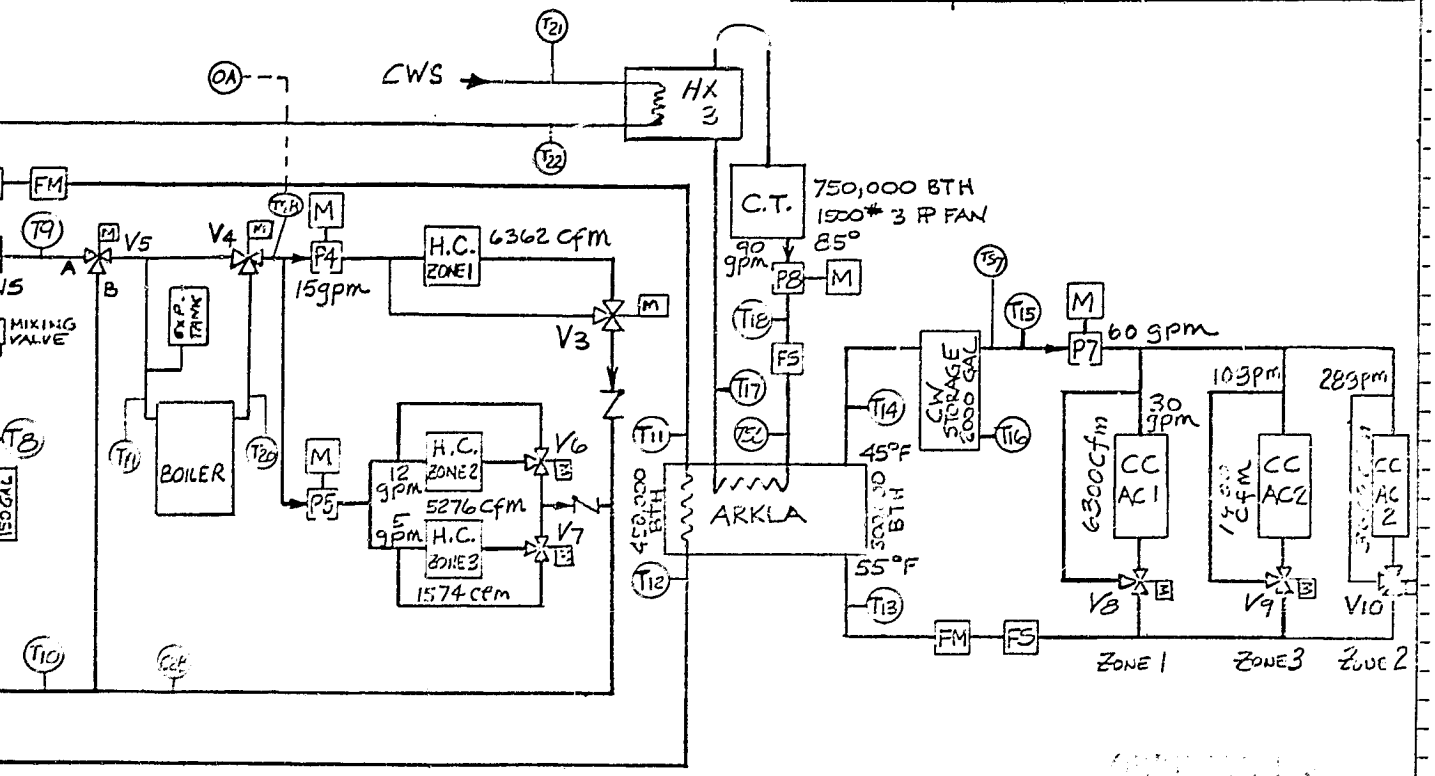
COLLECTOR LOOP
CONV. HEATING HWS EXT. RANGE
SOLAR HEATING HWS EXT RANG
COOLING HWS
COOLING CWS
DOMESTIC H.W. EXT. RANGE

GENERAL ELECTRIC

163C5292

UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING:— APPLIED PRACTICES | SURFACES | TOLERANCES ON MACHINED DIMENSIONS: FRACTIONS ± | DECIMALS ± | ANGLES ±

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



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

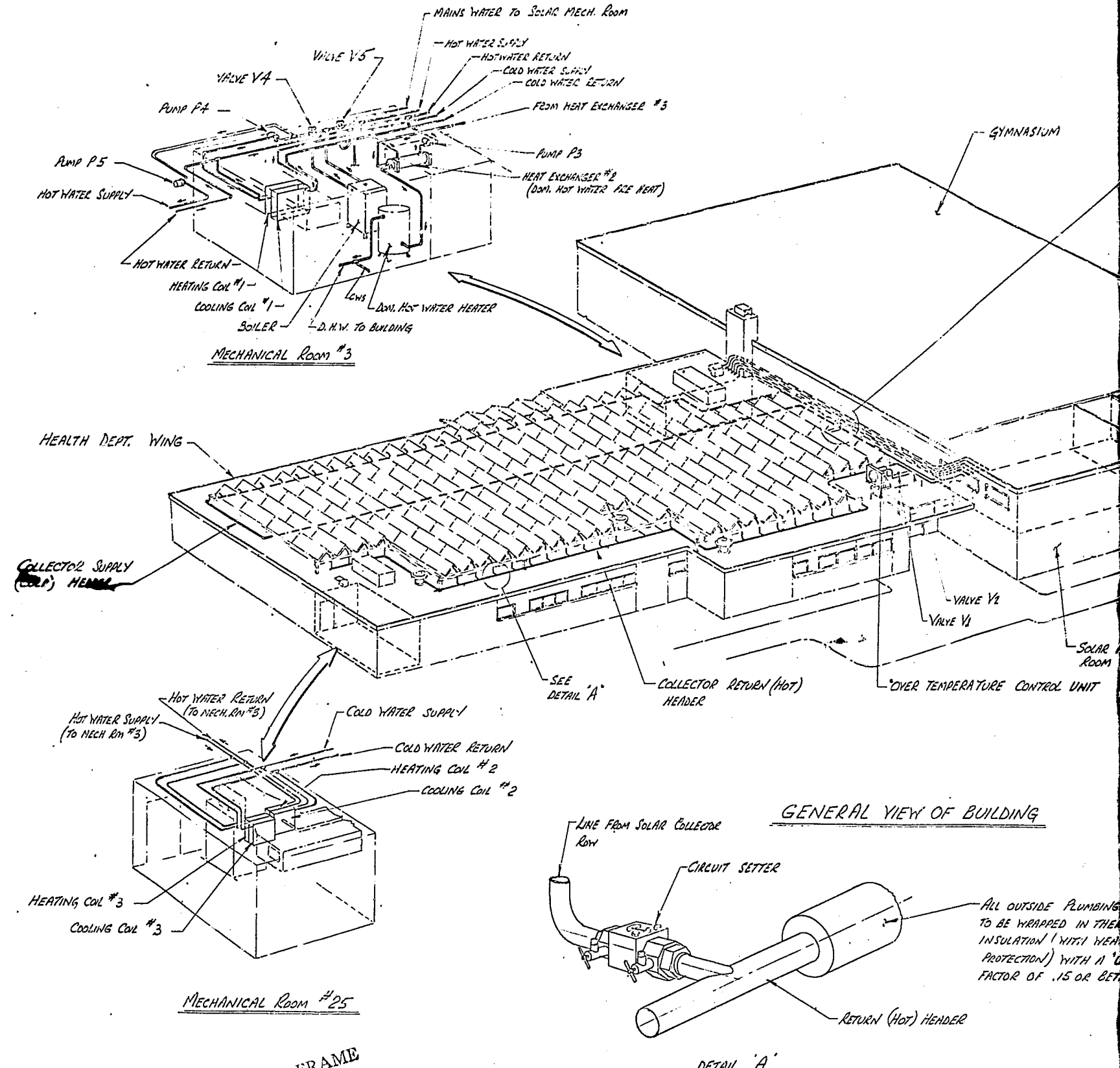
COLLECTOR LOOP
CONV. HEATING HWS EXT. RANGE
SOLAR HEATING HWS EXT. RANGE
COOLING HWS
COOLING CWS
DOMESTIC H.W. EXT. RANGE

2

DRAWING NO. 163C5292 REV NO.

REVISIONS | PRINTS TO

MADE BY G.V.S
ISSUED APR. '76
APPROVALS
A.E. SYS DIV OR DEPT
BLD #7, V.F LOCATION
163C5292 CONT ON SHEET — SH NO. 1



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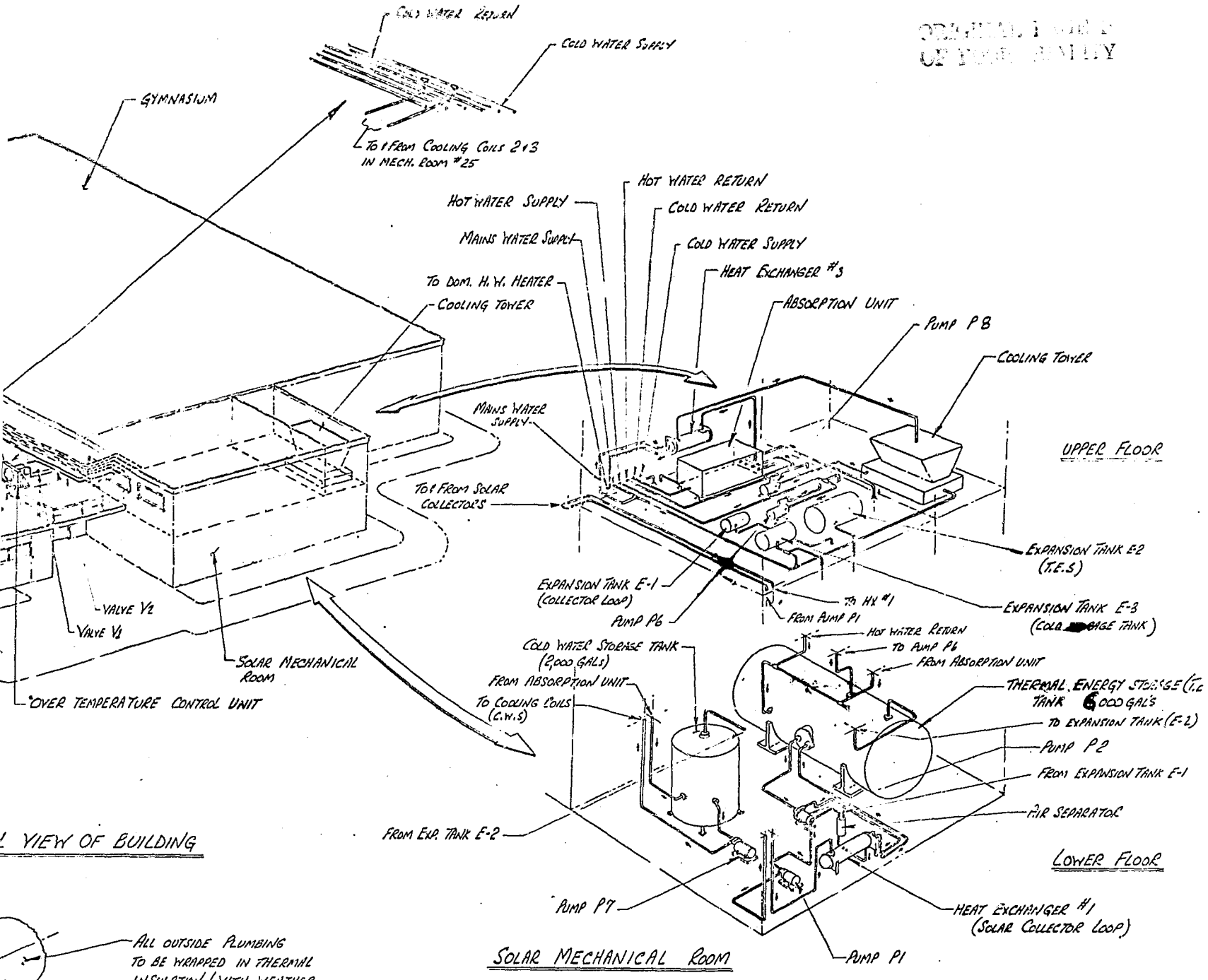


! VIEW OF BUILDING

SOLAR MECHANICAL ROOM

All outside plumbing to be wrapped in thermal insulation (with weather protection) with a "U" factor of .15 or better

RN (HOT) HEADER

WS

SOLAR SYSTEM PLUMBING ARRANGEMENT

NORTH HAMPTON PARK RECREATION & HEALTH CENTER - DALLAS

SOLAR HEATING & COOLING SYSTEM

SCALE : NONE

SK1976-6-A

RBS JUNE '76

Appendix C

Major Component Manufacturers Information

Collectors

operation maintenance and installation instructions

SOLAR
501,368M
2/79

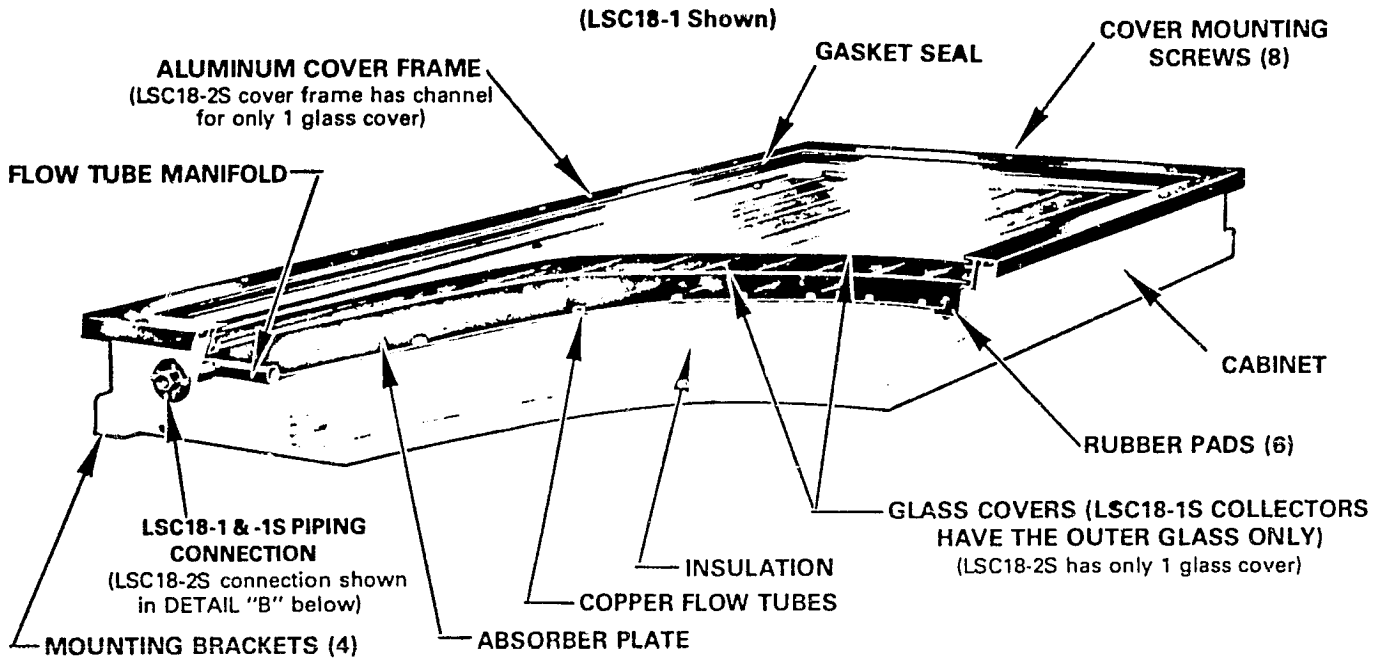
RETAIN THESE INSTRUCTIONS
FOR FUTURE REFERENCE

Supersedes 9/78

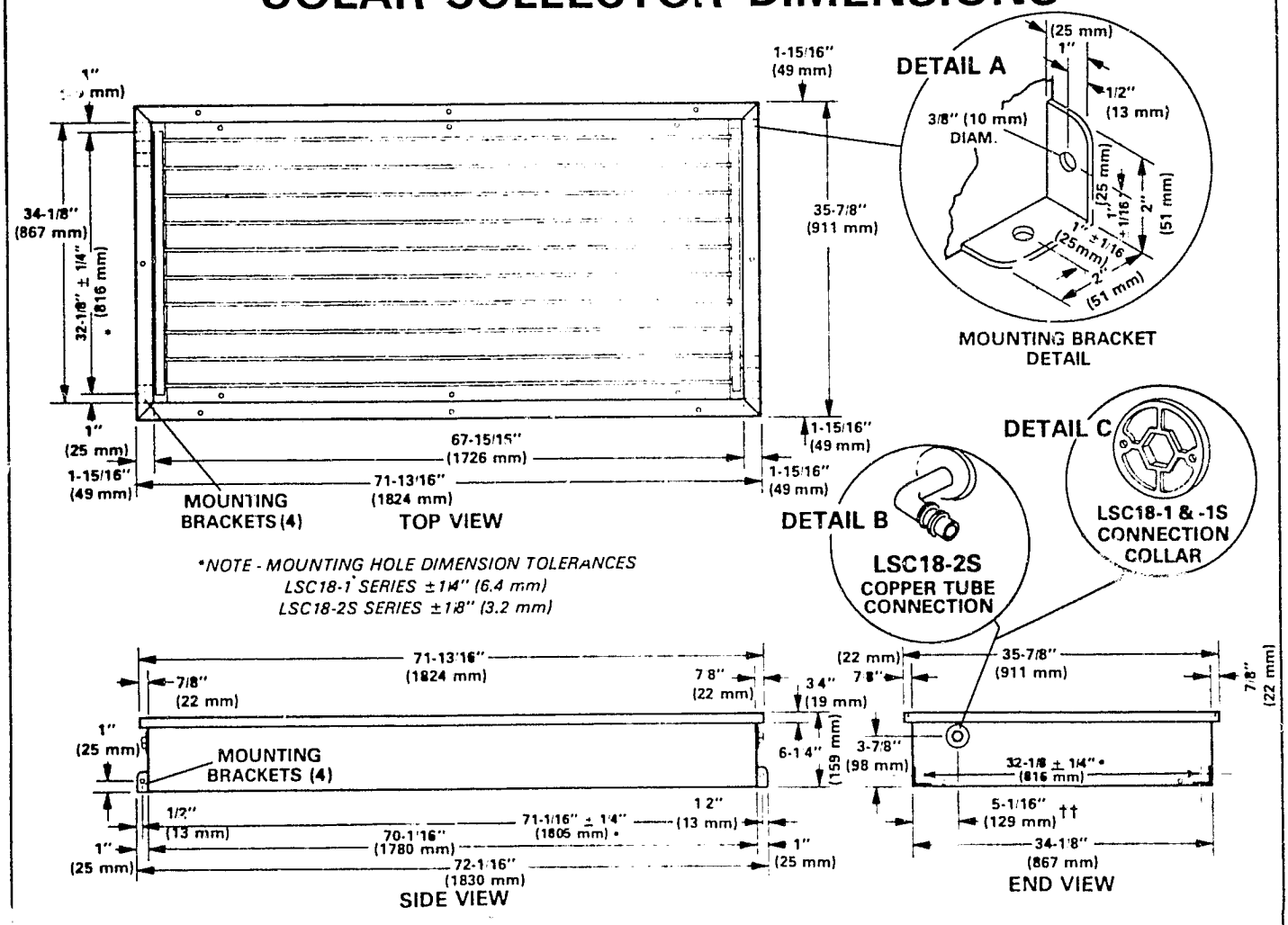
LENNOX Industries Inc.

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

PARTS ARRANGEMENT



SOLAR COLLECTOR DIMENSIONS



†† - 3-1/16" (78 mm) for LSC18-2S

FRAMING - FLASHING - COLLECTOR MOUNTING

I - SHIPPING AND PACKING LIST
Package 1 of 1 Contains
1 - Assembled solar collector

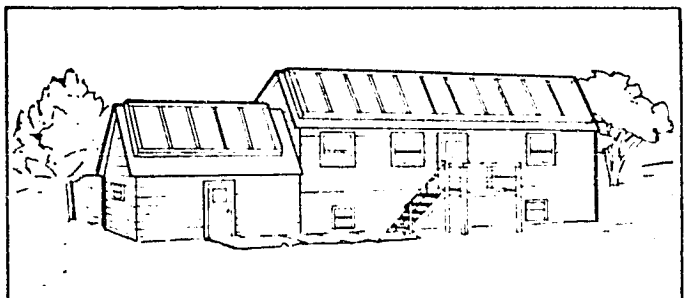
II - SHIPPING DAMAGE
Check unit for shipping damage. Contact the last carrier immediately if any damage is found.

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

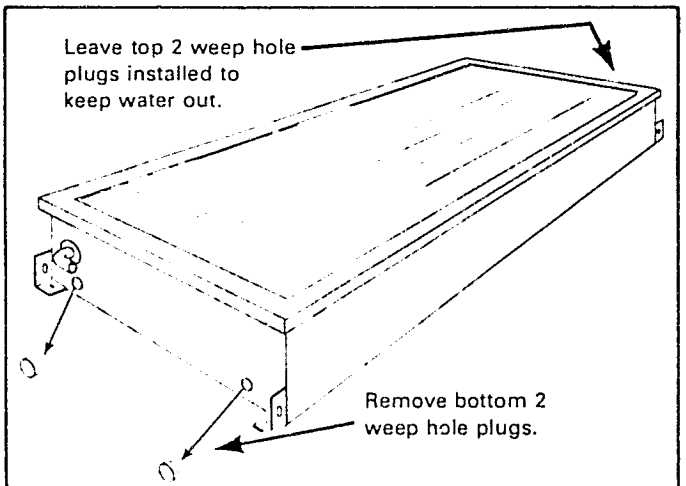
Space heating—angle equals latitude of installation minus 10°
Space cooling—angle equals latitude plus 15°
Water heating—angle equals latitude

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



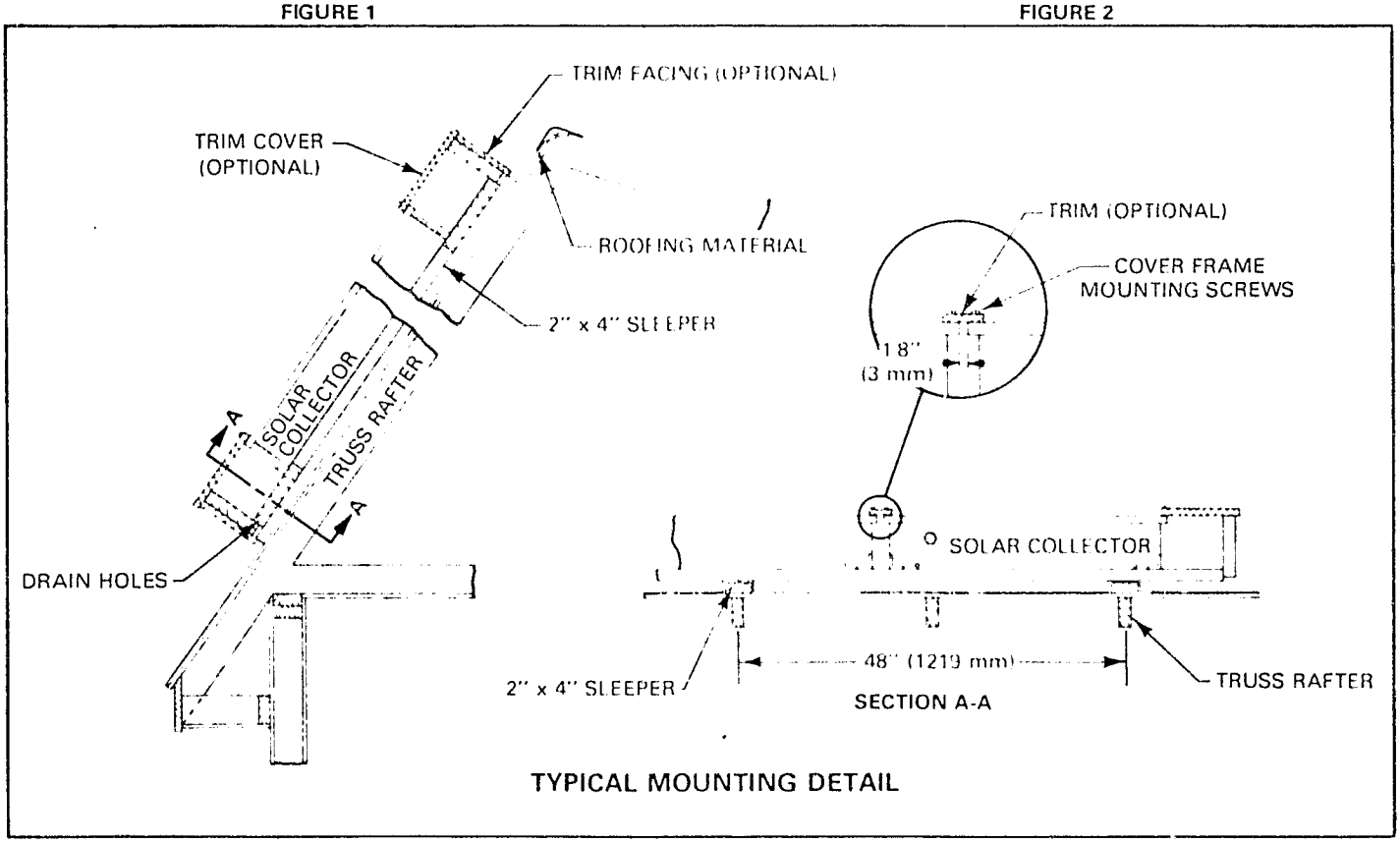
TYPICAL INSTALLATION

FIGURE 1



LSC18-2S COLLECTOR SHOWN

FIGURE 2



TYPICAL MOUNTING DETAIL

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.

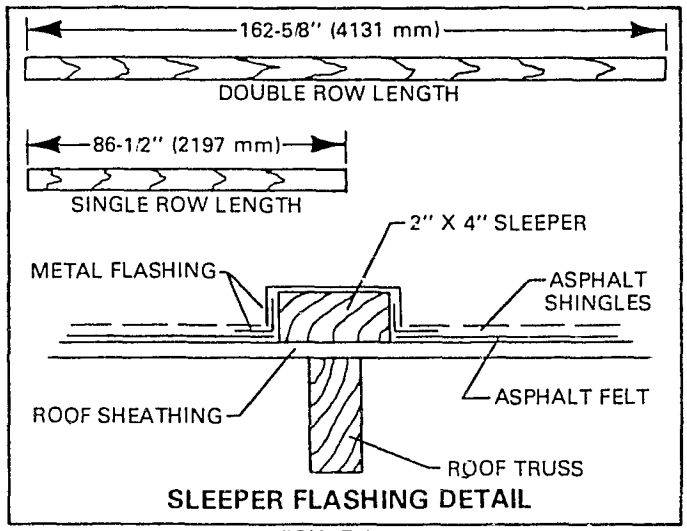
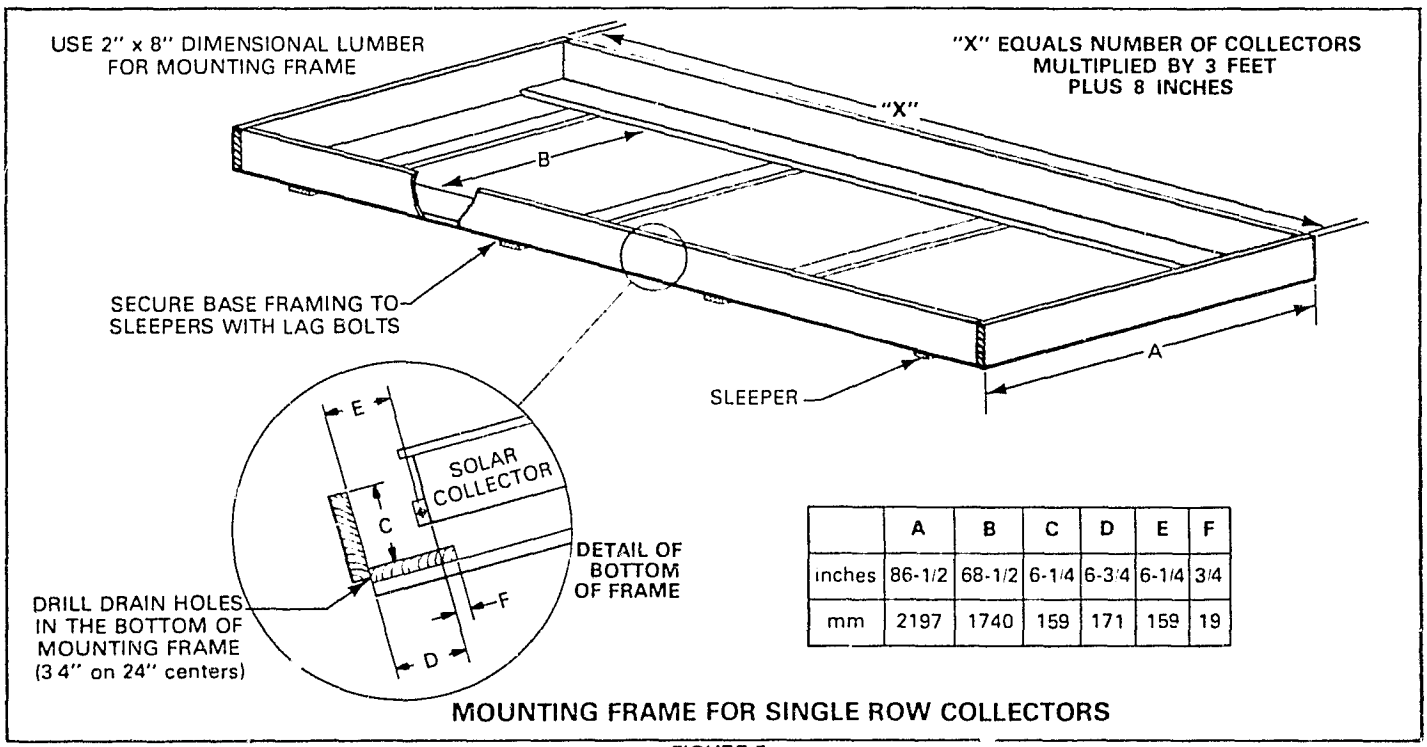


FIGURE 4



	A	B	C	D	E	F
inches	86-1/2	68-1/2	6-1/4	6-3/4	6-1/4	3/4
mm	2197	1740	159	171	159	19

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

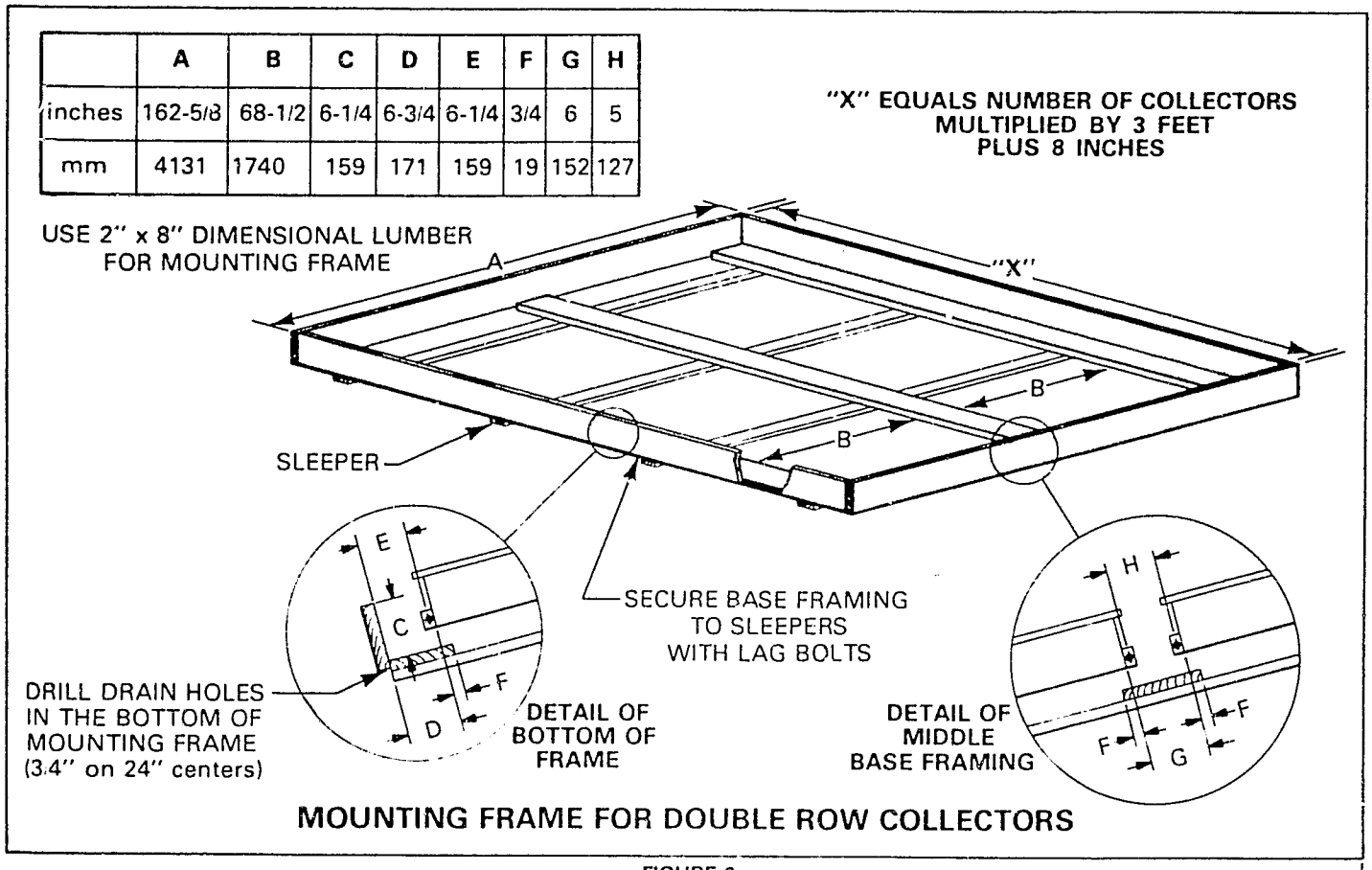


FIGURE 6

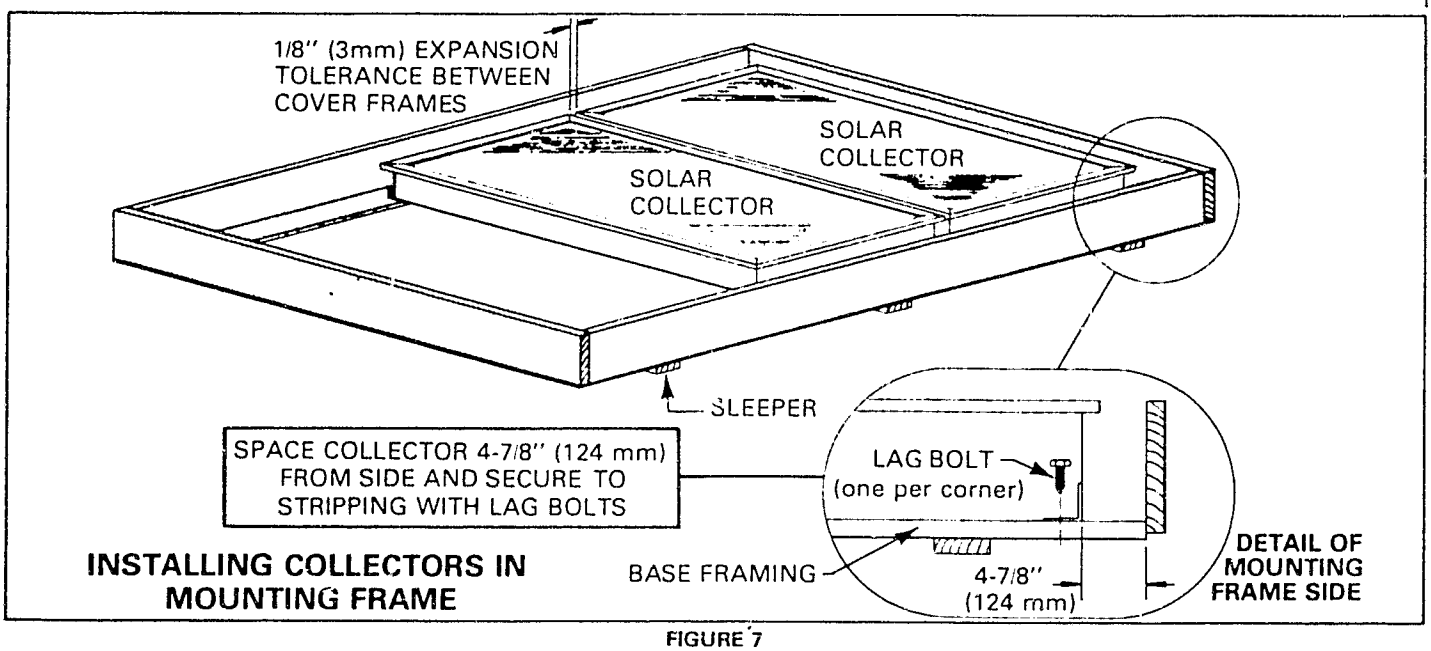


FIGURE 7

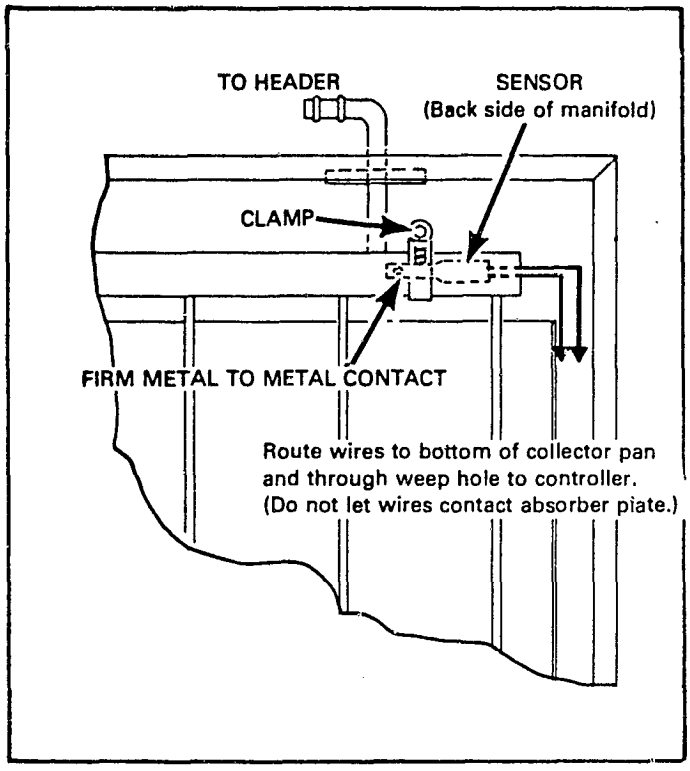


FIGURE 8

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.

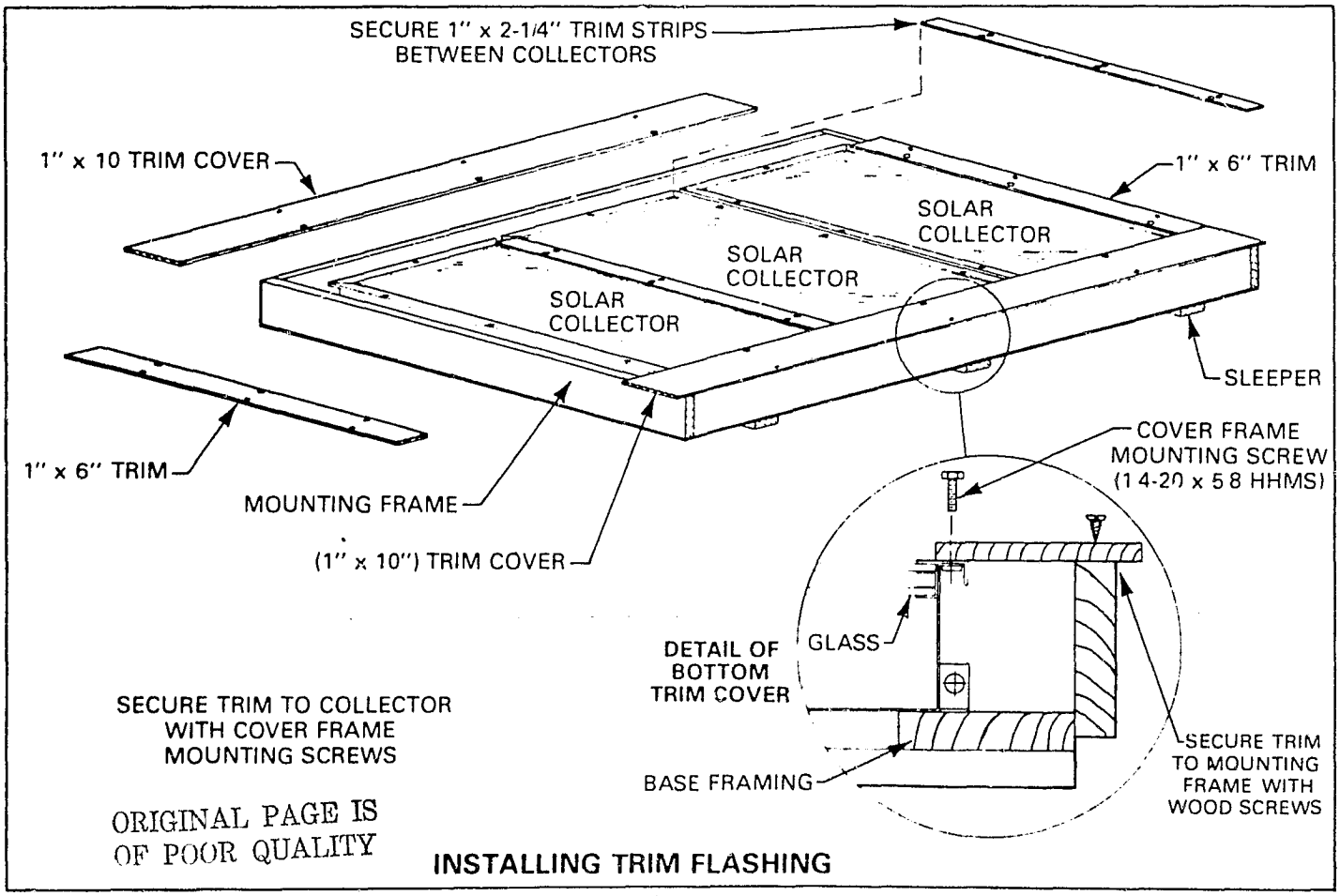


FIGURE 9

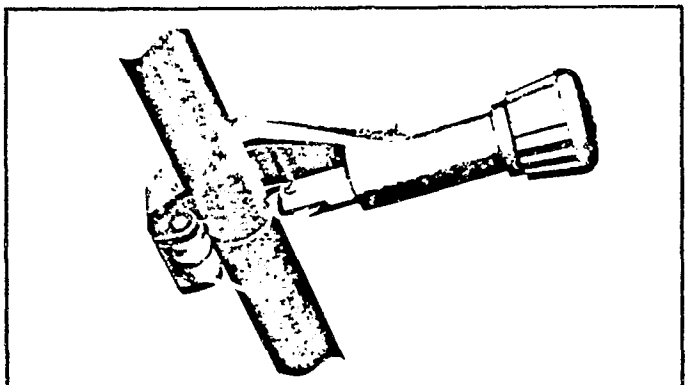
PIPING

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.



CUT TUBING WITH A ROLLER-TYPE TUBING CUTTER

FIGURE 10

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

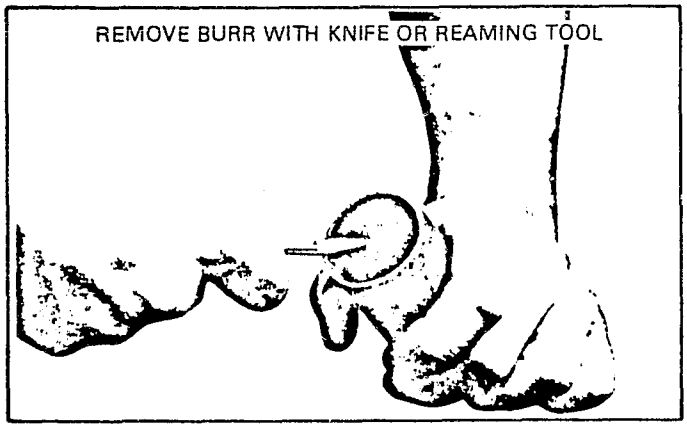
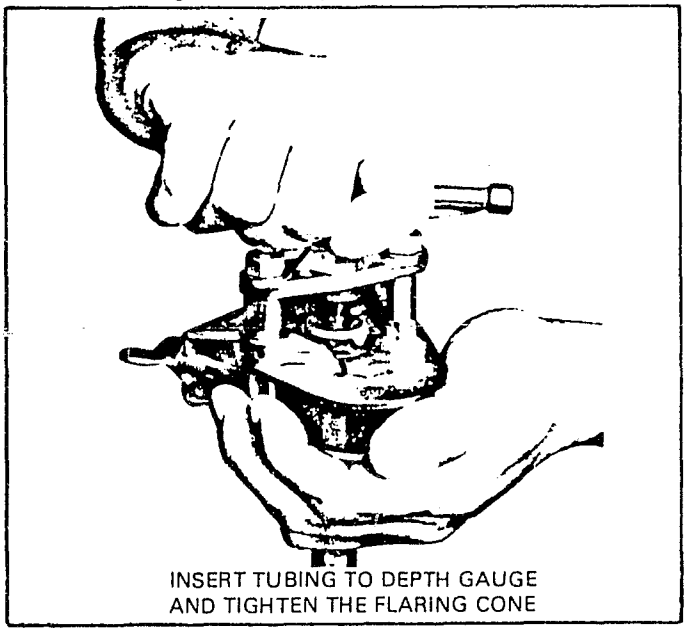


FIGURE 11

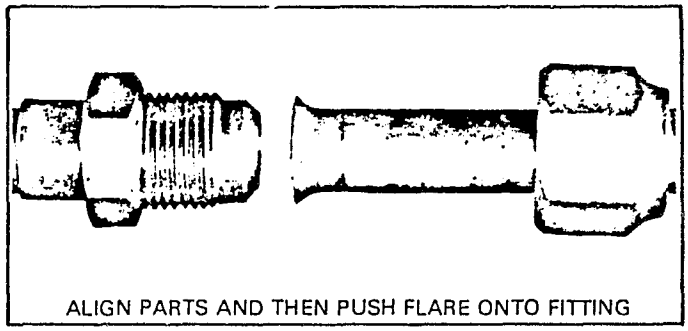
c - Flare tubing with a flaring tool as illustrated in Figure 12.



INSERT TUBING TO DEPTH GAUGE
AND TIGHTEN THE FLARING CONE

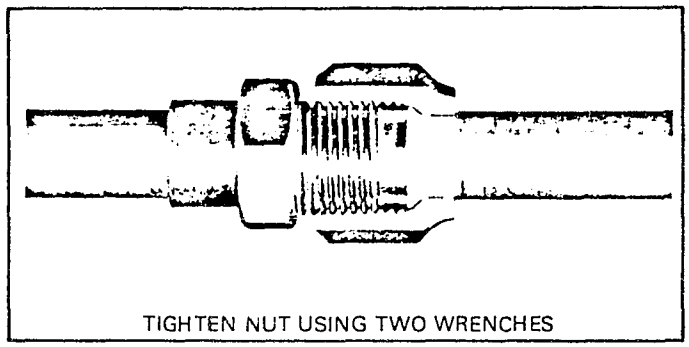
FIGURE 12

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



ALIGN PARTS AND THEN PUSH FLARE ONTO FITTING

FIGURE 13



TIGHTEN NUT USING TWO WRENCHES

FIGURE 14

2 - Soldered Connections

a - Cut the pipe to size.

b - Remove burr.

c - Fit tubing into coupling maintaing 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.

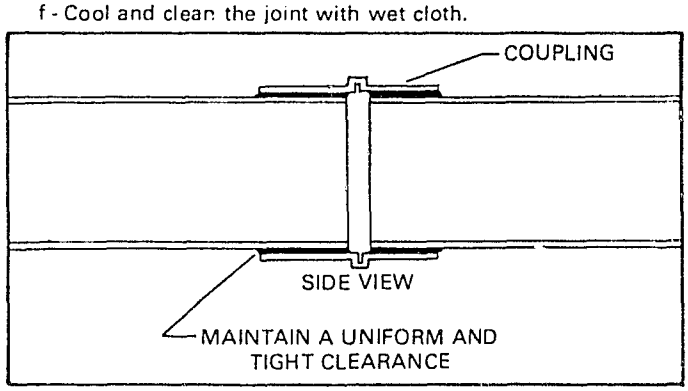


FIGURE 15

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

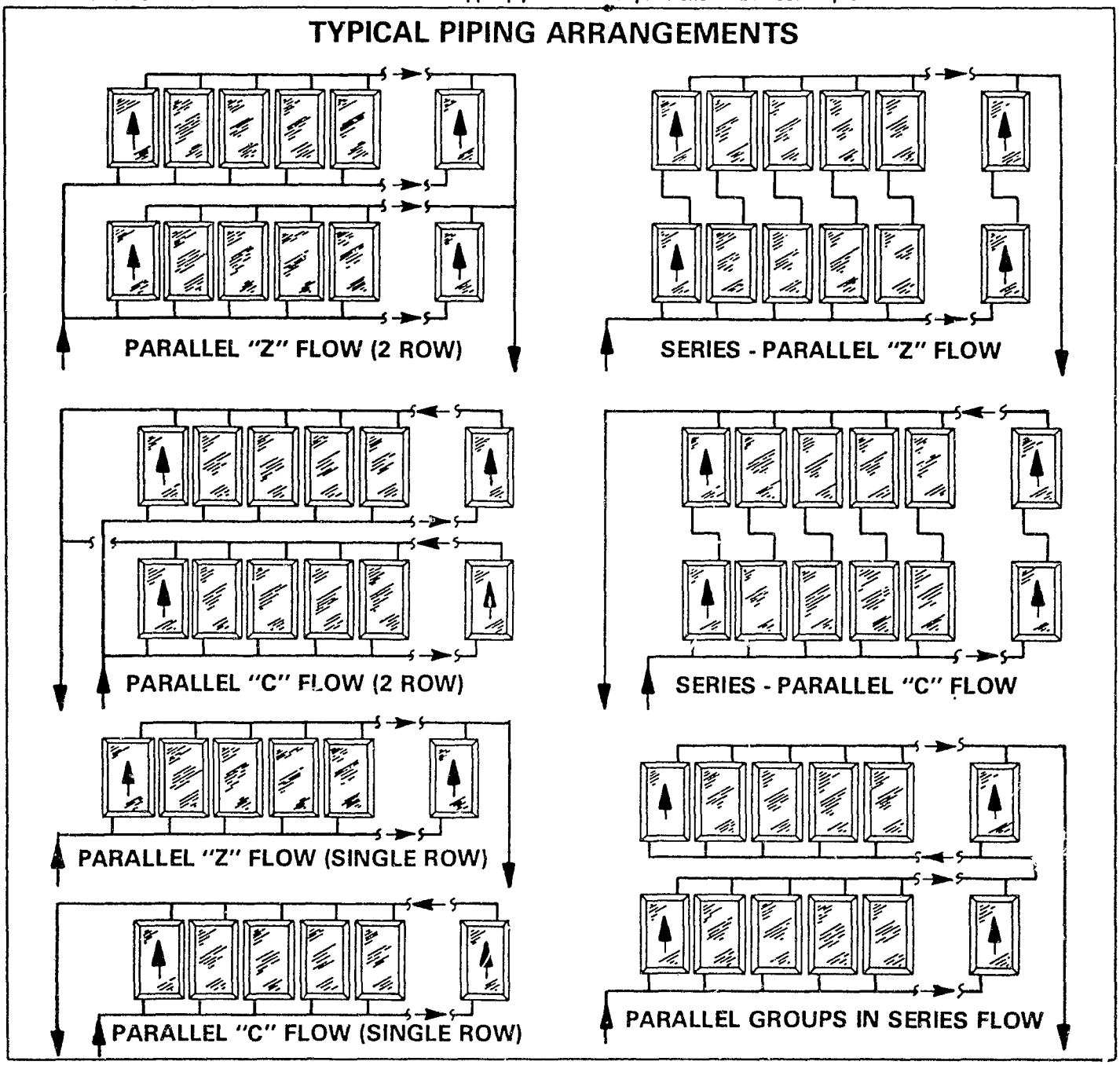


FIGURE 16

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.

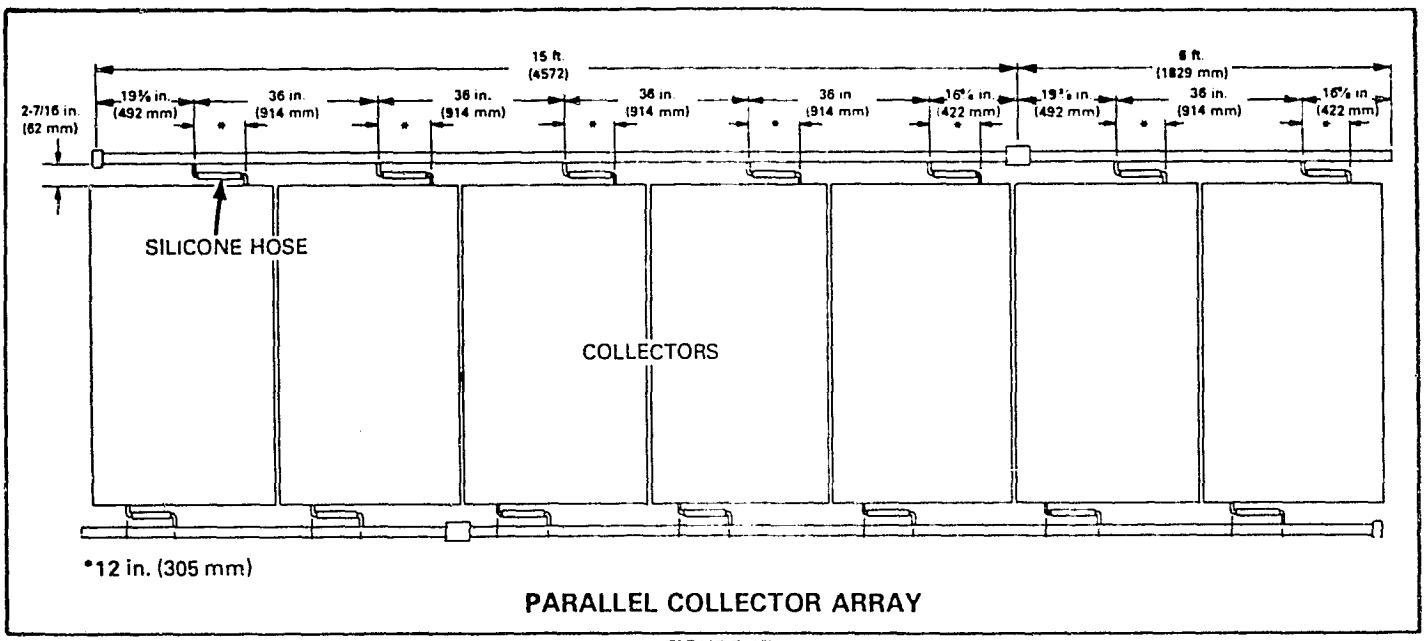
2 - Lengthen header pipes if necessary by joining additional header sections with the provided couplings. All hose connector must be aligned properly.

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.)

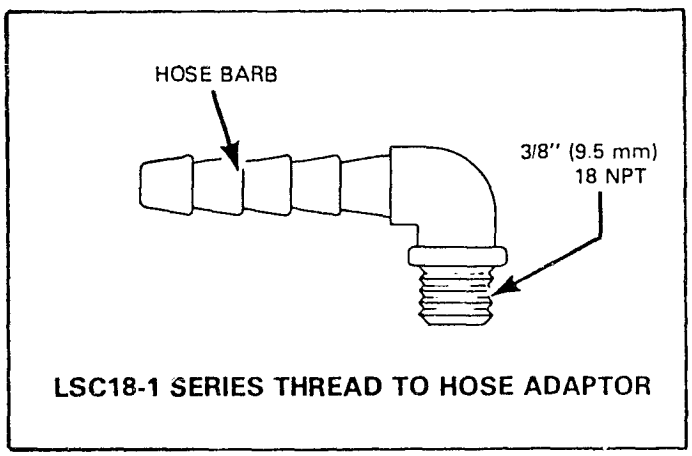
5 - Provide fittings at outlet end of the return header (top header) for installation of an air vent valve. The air vent valve must be positioned vertically at the highest point in the system to function properly. See Figure 19.

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.



PARALLEL COLLECTOR ARRAY

FIGURE 17

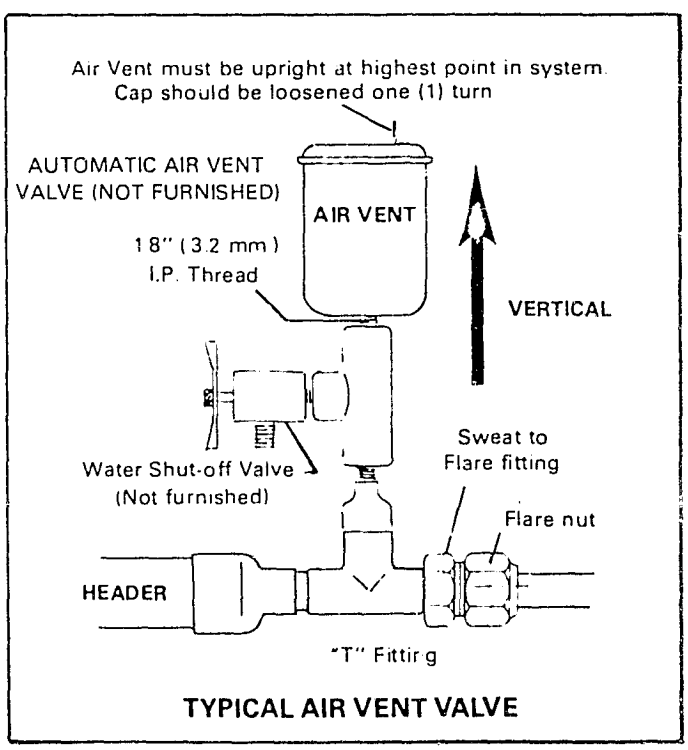


LSC18-1 SERIES THREAD TO HOSE ADAPTOR

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.



TYPICAL AIR VENT VALVE

FIGURE 19

VIII - INSULATION

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

A - Indoor Plumbing —

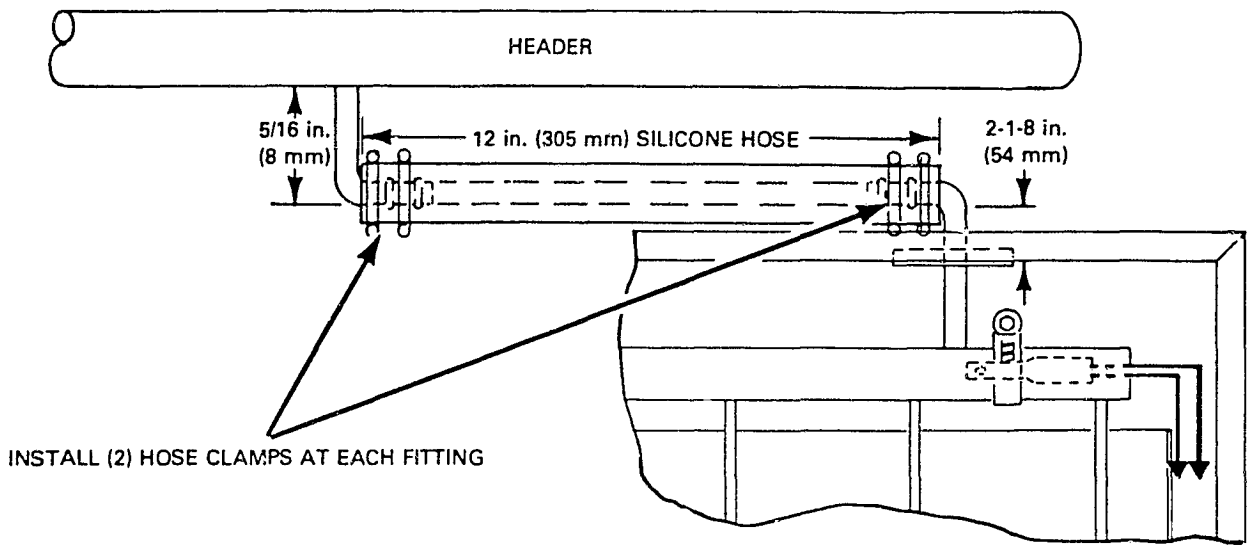
All interior piping, including solar collection, solar heating, and domestic hot and cold piping, shall be insulated with 1" (25 mm) thick split, preformed glass fiber pipe insulation, 3-1/2 lb. (1.56 kg.) minimum density, with pre-sized glass cloth secured with adhesive and staples. Fittings and valves 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.

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.

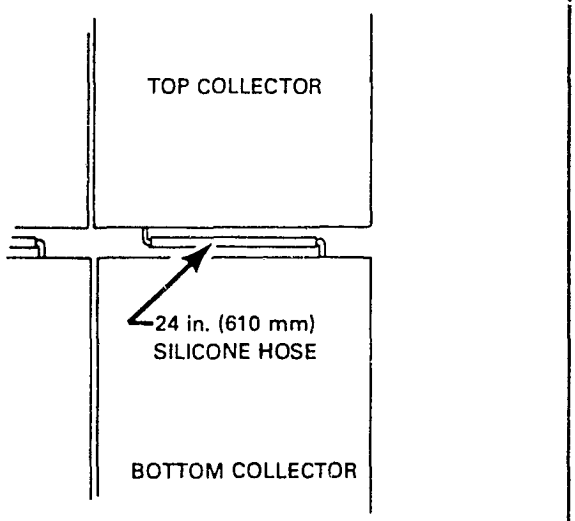
IMPORTANT

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



SILICONE HOSE INSTALLATION

FIGURE 20



SERIES COLLECTOR CONNECTION

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.

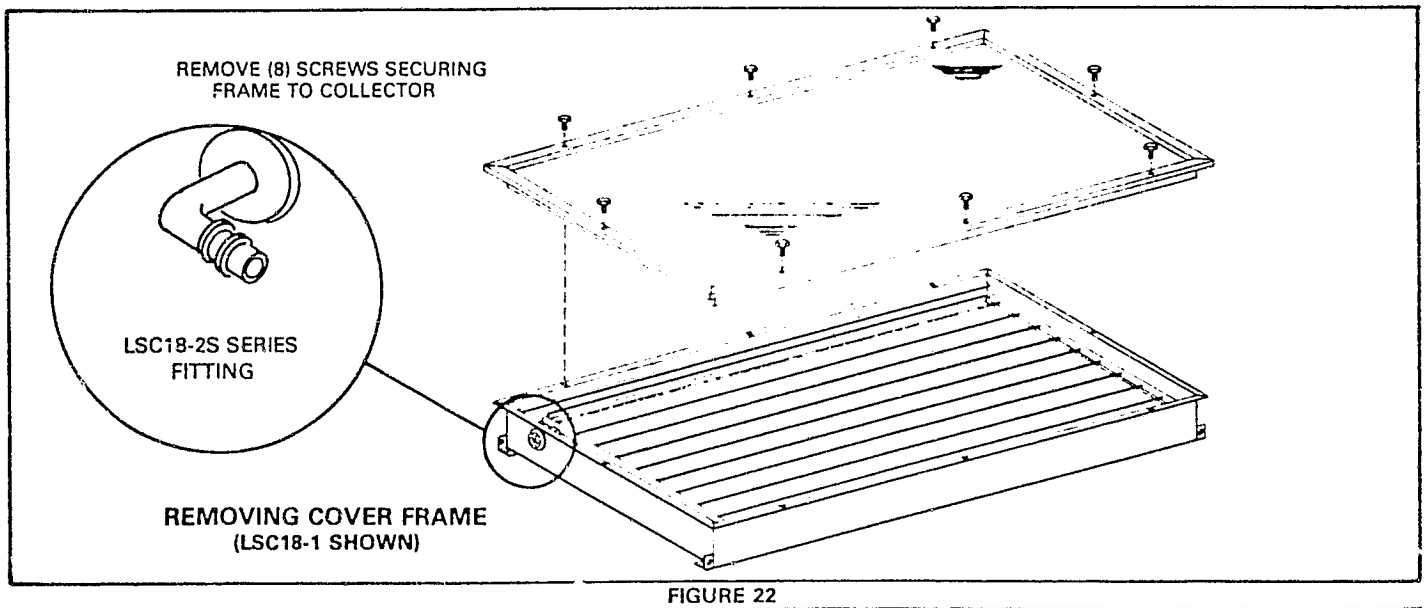


FIGURE 22

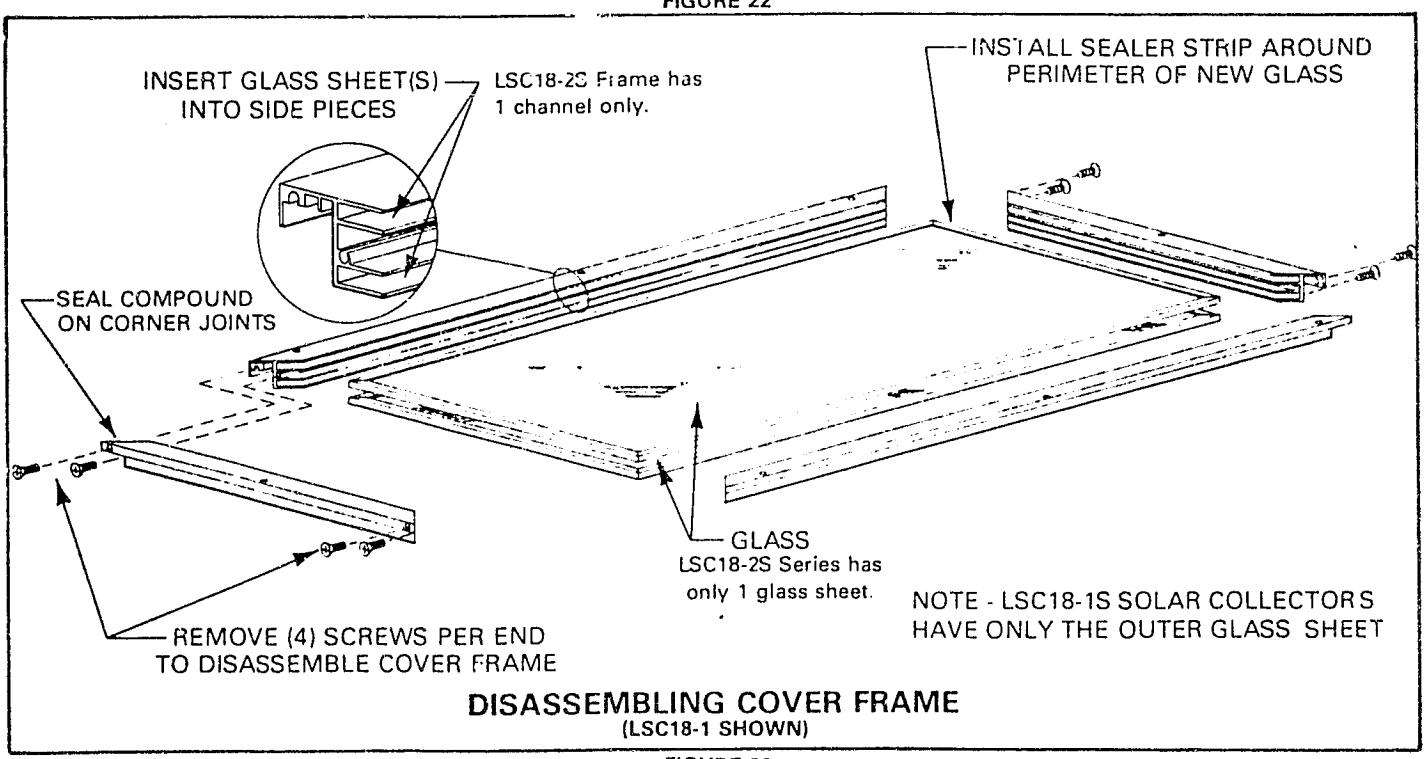
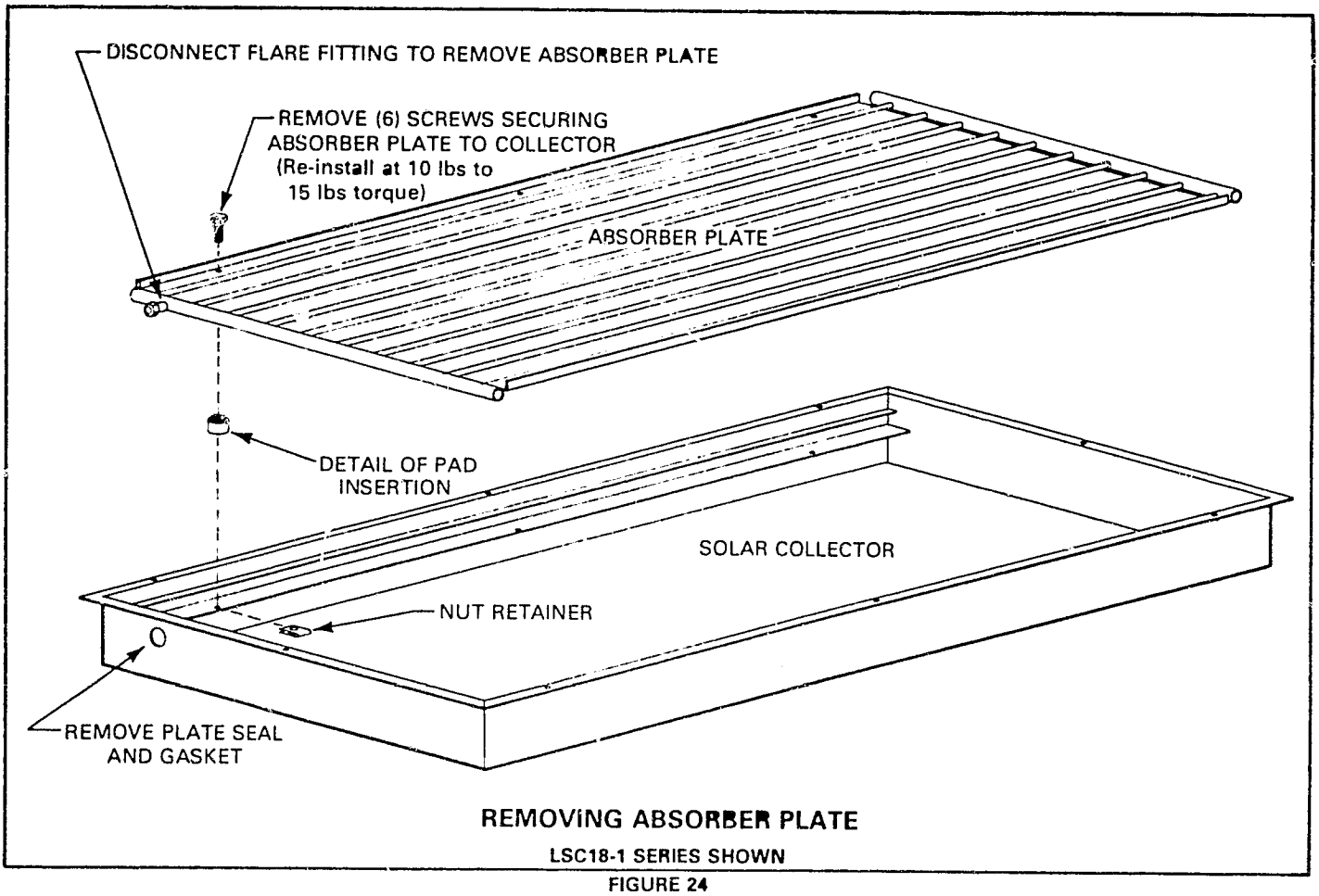


FIGURE 23



REMOVING ABSORBER PLATE

LSC18-1 SERIES SHOWN

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.

Absorption Chiller

DESIGN DELIVERED CAPACITY, Btu/h..... 306,000[1]

DESIGN DELIVERED CAPACITY, Tons I.M.E..... 25.5[1]

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	115[2]
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	75[3]

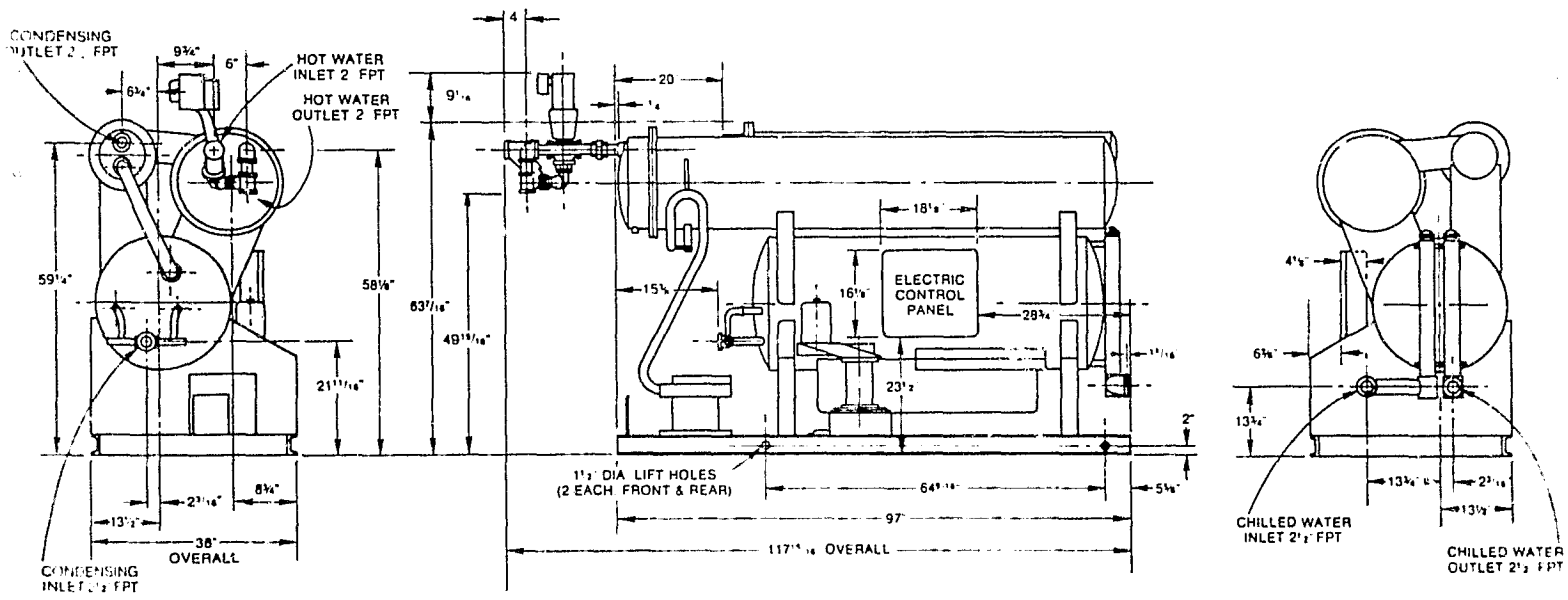
SERVICE CONNECTIONS

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	3,420[4]
Shipping Weight, Pounds	3,145[5]
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.



LEFT VIEW FRONT VIEW RIGHT VIEW

Condensing Water Flow: 90 gpm
Chilled Water Flow: 60 gpm
Hot Water Flow: 90 gpm
Temperatures in Degrees Fahrenheit

85° Inlet Condensing Water

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
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	190,800	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	216,400	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	481,400	50	329,000	27.4	810,400
200	188.7	490,900	40	277,200	23.1	768,100
	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	96,800	45	60,000	5.0	156,800
170	166.9	139,100	45	96,000	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	414,5	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

95° Inlet Condensing Water

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
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	345,000
	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	357,600	45	259,200	21.6	616,800
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	6.1	9.4	13	17	23	29.4	36
Chilled Water Circuit	2.5	4.1	6.8	9.6	13.4	17.4	21.8	27.3	33
Condensing Water Circuit	NA	NA	4	10.5	14.1	18.3	23.4	29	35

Where Progress Is Built On Quality
Ariel Industries, Inc.
P.O. Box 534
Bryan, OH 43506
FORM NO. SP-0101-1 OCT. 1979

Heat Exchangers HX1, HX2, HX3

Oslin Nation Co.
Manufacturers Representatives

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

September 23, 1977

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.

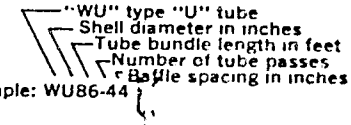
1 Bell & Gossett Model WU-65-23 with 22.1 sq. ft. of heating surface. To be marked HX-2

1 Bell & Gossett Model WU-63-23 with 12.7 sq. ft. of heating surface. To be marked HX-3

TYPE "WU" HEAT EXCH GERS ("U" Tube Design)

OK

DIMENSIONS (Continued)

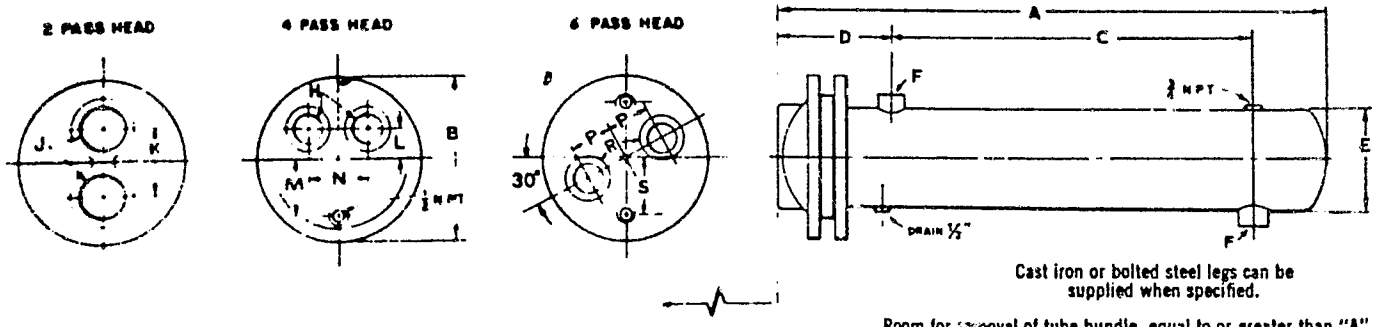


Complete sales number consists of example: WU86-44

UNIT NUMBER		DIMENSIONS IN INCHES												HEATING SURFACE SQ.FT.		Approx. Shpg. Wt.
		2 Pass		4 Pass				2, 4 and 6 Pass								
2 Pass	4 Pass	J	K	H	L	M	N	A	B	C	D	E	F	2 Pass	4 Pass	(Lbs.)
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	77 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.

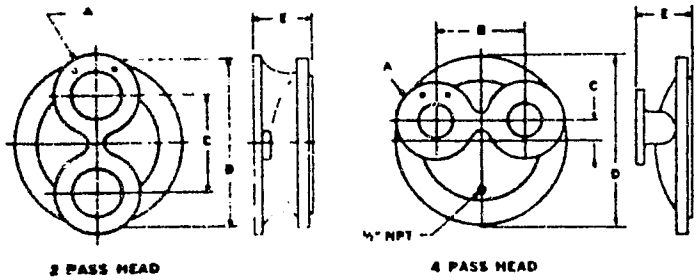
TYPE "WU" HEAT EXCHANGERS ("U" Tube Design)



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.



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

2-PASS					4-PASS					
SHELL DIA.	A FLG	C	D	E	SHELL DIA.	A FLG	B	C	D	E
10"	4	9⅛	14⅝	5½	10"		NOT AVAILABLE			
12"	4	8¾	16⅝	5	12"		NOT AVAILABLE			
14"	5	10¼	17¾	6½	14"	4	9¼	2⅝	17⅝	6¾
16"	5	11¼	19¾	6¾	16"	4	9½	2⅛	19⅝	6¾
18"	6	11½	22	7¼	18"	4	8½	4½	22	7
20"	6	13¾	24	8	20"	6	11¼	3¼	24	7¾

DIMENSIONS 4" THRU 20" DIAMETER

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

Complete sales number consists of example: WU86-44

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	N	P	R	S	A	B	C	D	E	F	2 Pass	4 Pass	6 Pass	
WU63-24	WU43-44	–	1¼ NPT	2⅛	1 NPT	1	1⅜	2¼	–	–	–	40⅞	7¼	29	6⅜	4½	2½" NPT	4.1	4.1	–	78
WU44-24	WU44-44	–	1¼ NPT	2⅛	1 NPT	1	1⅜	2¼	–	–	–	52⅞	7¼	41	6⅜	4½	2½" NPT	5.7	5.7	–	92
WU45-24	WU45-44	–	1¼ NPT	2⅛	1 NPT	1	1⅜	2¼	–	–	–	64⅞	7¼	53	6⅜	4½	2½" NPT	7.2	7.2	–	106
WU46-24	WU46-44	–	1¼ NPT	2⅛	1 NPT	1	1⅜	2¼	–	–	–	76⅞	7¼	65	6⅜	4½	2½" NPT	8.8	8.8	–	120
WU47-24	WU47-44	–	1¼ NPT	2⅛	1 NPT	1	1⅜	2¼	–	–	–	88⅞	7¼	77	6⅜	4½	2½" NPT	10.4	10.4	–	134
WU63-33	WU43-43	WU63-63	2 NPT	3¾	1¼ NPT	1 19/32	2 13/16	3 5/16	2 11/32	1¼ NPT	2 13/16	40⅛	10½	27½	6⅞	6⅝	2½" NPT	12.7	12.7	9.6	125
WU64-33	WU44-43	WU64-63	2 NPT	3¾	1¼ NPT	1 19/32	2 13/16	3 5/16	2 11/32	1¼ NPT	2 13/16	52⅛	10½	39½	6⅞	6⅝	2½" NPT	17.4	17.4	13.1	150
WU65-33	WU45-43	WU65-63	2 NPT	3¾	1¼ NPT	1 19/32	2 13/16	3 5/16	2 11/32	1¼ NPT	2 13/16	64⅛	10½	51½	6⅞	6⅝	2½" NPT	22.1	22.1	16.7	175
WU66-33	WU46-43	WU66-63	2 NPT	3¾	1¼ NPT	1 19/32	2 13/16	3 5/16	2 11/32	1¼ NPT	2 13/16	76⅛	10½	63½	6⅞	6⅝	2½" NPT	26.8	26.8	20.2	200
WU67-33	WU67-43	WU67-63	2 NPT	3¾	1¼ NPT	1 19/32	2 13/16	3 5/16	2 11/32	1¼ NPT	2 13/16	88⅛	10½	75½	6⅞	6⅝	2½" NPT	31.5	31.5	23.8	225
WU68-33	WU68-43	WU68-63	2 NPT	3¾	1¼ NPT	1 19/32	2 13/16	3 5/16	2 11/32	1¼ NPT	2 13/16	100⅛	10½	87½	6⅞	6⅝	2½" NPT	36.2	36.2	27.3	250
WU64-24	WU64-44	WU64-64	3 NPT	5	2 NPT	2	3½	4	3	2 NPT	3¾	53	12½	37	8½	8⅝	4" FLG	32	32	26	222
WU65-24	WU65-44	WU65-64	3 NPT	5	2 NPT	2	3½	4	3	2 NPT	3¾	65	12½	49	8½	8⅝	4" FLG	41	41	33	258
WU66-24	WU66-44	WU66-64	3 NPT	5	2 NPT	2	3½	4	3	2 NPT	3¾	77	12½	61	8½	8⅝	4" FLG	49	49	41	294
WU67-24	WU67-44	WU67-64	3 NPT	5	2 NPT	2	3½	4	3	2 NPT	3¾	89	12½	73	8½	8⅝	4" FLG	58	58	48	330
WU68-24	WU68-44	WU68-64	3 NPT	5	2 NPT	2	3½	4	3	2 NPT	3¾	101	12½	85	8½	8⅝	4" FLG	67	67	55	366
WU69-24	WU69-44	WU69-64	3 NPT	5	2 NPT	2	3½	4	3	2 NPT	3¾	113	12½	97	8½	8⅝	4" FLG	75	75	62	402
WU124-33	WU124-43	WU124-63	4 NPT	5⅞	3 NPT	2⅜	4⅞	4⅜	3 13/16	2½ NPT	4⅞	53	14⅜	38½	9	10¾	4" FLG	56	53	45	331
WU125-33	WU125-43	WU125-63	4 NPT	5⅞	3 NPT	2⅜	4⅞	4⅜	3 13/16	2½ NPT	4⅞	65	14⅜	48½	9	10¾	4" FLG	71	68	56	384
WU126-33	WU126-43	WU126-63	4 NPT	5⅞	3 NPT	2⅜	4⅞	4⅜	3 13/16	2½ NPT	4⅞	77	14⅜	60½	9	10¾	4" FLG	86	82	68	437
WU127-33	WU127-43	WU127-63	4 NPT	5⅞	3 NPT	2⅜	4⅞	4⅜	3 13/16	2½ NPT	4⅞	89	14⅜	72½	9	10¾	4" FLG	101	96	80	490
WU128-33	WU128-43	WU128-63	4 NPT	5⅞	3 NPT	2⅜	4⅞	4⅜	3 13/16	2½ NPT	4⅞	101	14⅜	84½	9	10¾	4" FLG	116	110	92	543
WU129-33	WU129-43	WU129-63	4 NPT	5⅞	3 NPT	2⅜	4⅞	4⅜	3 13/16	2½ NPT	4⅞	113	14⅜	96½	9	10¾	4" FLG	131	124	104	596
WU1313-33	WU1313-43	WU1313-63	4 NPT	5⅞	3 NPT	2⅜	4⅞	4⅜	3 13/16	2½ NPT	4⅞	125	14⅜	108½	9	10¾	4" FLG	146	138	116	650
WU124-53	WU124-43	WU124-63	5 NPT	7¼	4 NPT	2⅜	5⅞	5⅞	4½	3 NPT	5 13/16	56½	16⅜	37½	10½	12¾	5" FLG	83	78	68	456
WU125-53	WU125-43	WU125-63	4 NPT	7¼	4 NPT	2⅜	5⅞	5⅞	4½	3 NPT	5 13/16	68½	16⅜	49½	10½	12¾	5" FLG	104	98	85	525
WU126-53	WU126-43	WU126-63	4 NPT	7¼	4 NPT	2⅜	5⅞	5⅞	4½	3 NPT	5 13/16	80½	16⅜	61½	10½	12¾	5" FLG	126	119	103	594
WU127-53	WU127-43	WU127-63	4 NPT	7¼	4 NPT	2⅜	5⅞	5⅞	4½	3 NPT	5 13/16	92½	16⅜	73½	10½	12¾	5" FLG	148	139	121	663
WU128-53	WU128-43	WU128-63	4 NPT	7¼	4 NPT	2⅜	5⅞	5⅞	4½	3 NPT	5 13/16	104½	16⅜	85½	10½	12¾	5" FLG	169	160	139	732
WU129-53	WU129-43	WU129-63	4 NPT	7¼	4 NPT	2⅜	5⅞	5⅞	4½	3 NPT	5 13/16	116½	16⅜	97½	10½	12¾	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

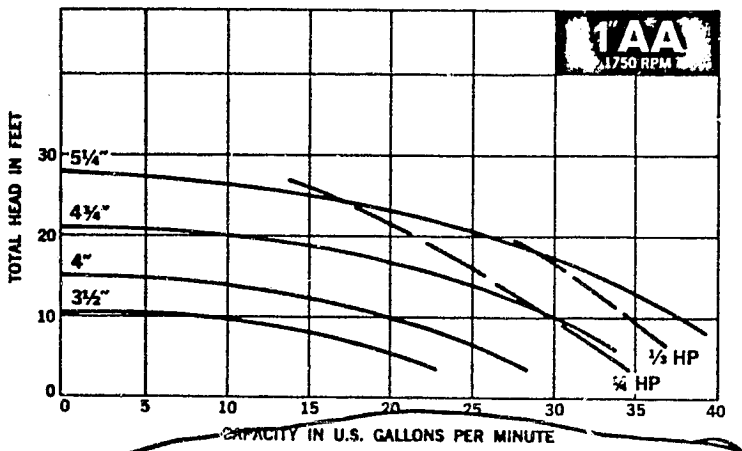
Pumps P3, P4, P5

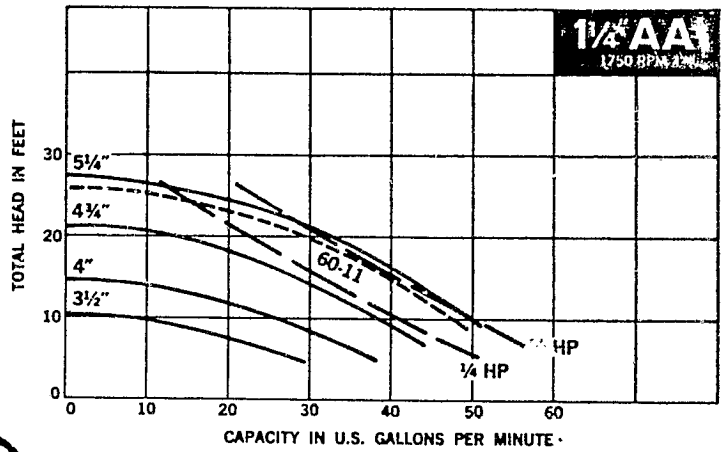
This page has been deleted because of copyright information. For information on Bell and Gossett, series 60 in-line pumps, contact Bell and Gossett (ITT), B200N Austin Ave., Morton Grove, Ill. 60053.

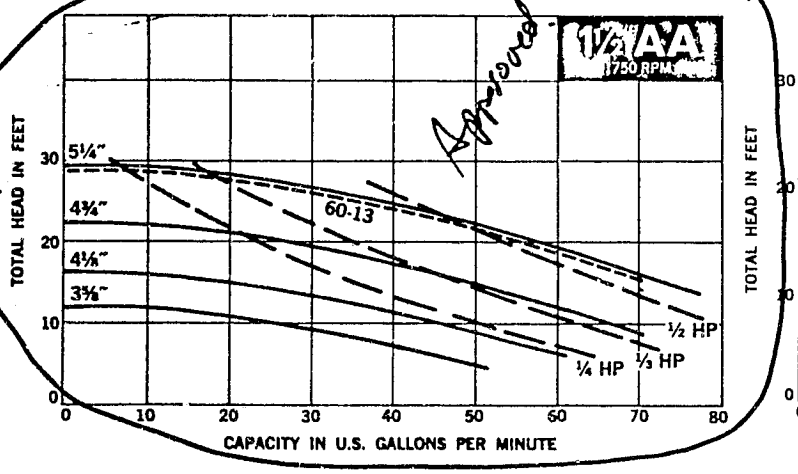
Series 60 Pumps can be furnished in bronze-fitted, all iron, or all bronze construction to suit your application

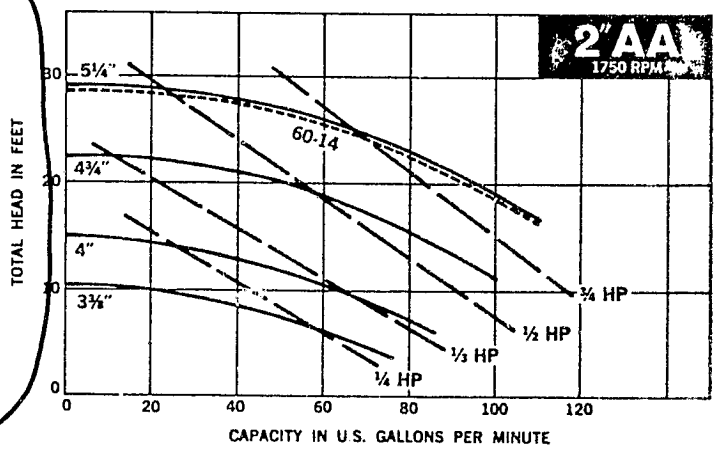
P3, P4, P5

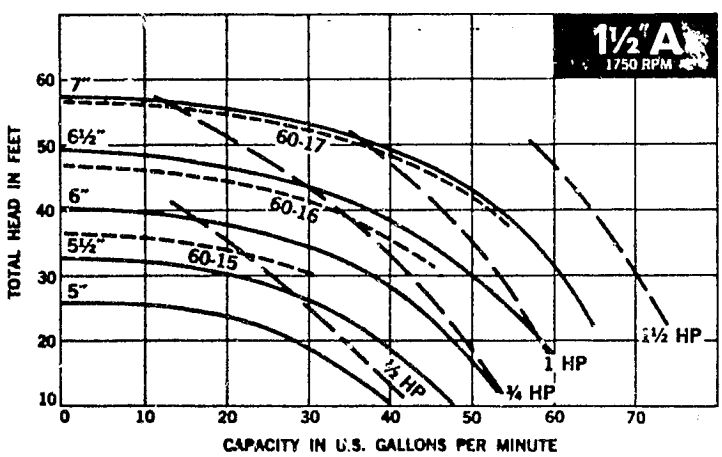
DOTTED-IN CURVES REPRESENT STOCK PUMP SELECTIONS

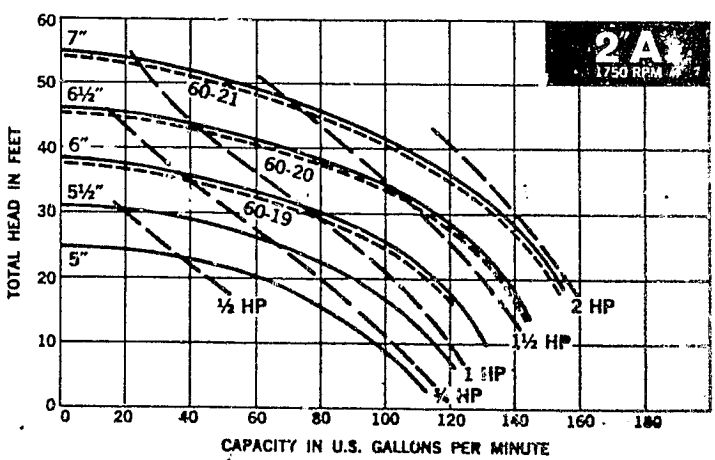












Curves based upon shop test using clear cold water
at a temperature of not over 85° F.
Horsepower curves do not include motor service factor.

Dimensions

FIG. 1 AA SIZES

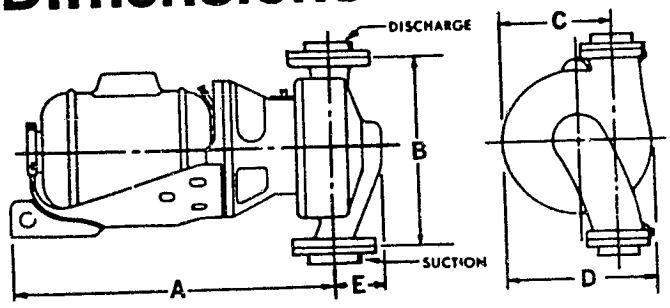
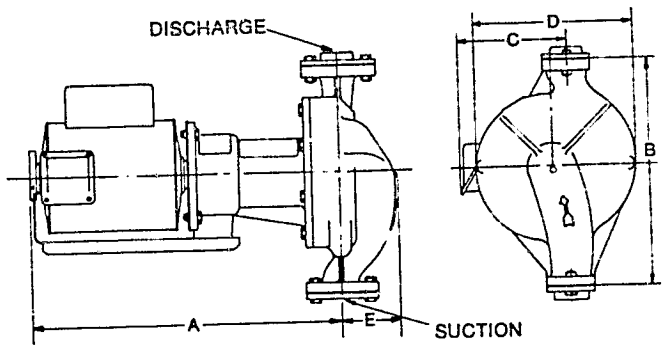


FIG. 2 A SIZES



STANDARD VOLTAGES
¼ HP, 1 PH, 115 Volts. ⅓ 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	15 13/16	11	4 3/8	6 1/8	3 7/16
—	1AA	⅓	1	16 13/16	11	4 3/8	6 1/8	3 7/16
60-11	1¼AA	¼	1¼	15 13/16	11	5	7½	3 7/16
—	1¼AA	⅓	1¼	16 13/16	11	5	7½	3 7/16
—	1¼AA	½	1¼	17 5/16	11	5	7½	3 7/16
—	1½AA	¼	1½	16	11½	5 1/8	7 7/8	3 5/8
—	1½AA	⅓	1½	17	11½	5 1/8	7 7/8	3 5/8
60-13	1½AA	½	1½	17½	11½	5 1/8	7 7/8	3 5/8
—	1½AA	¾	1½	18	11½	5 1/8	7 7/8	3 5/8
—	2AA	¼	2	16 1/8	11½	5 1/8	8	3¾
—	2AA	⅓	2	17 1/8	11½	5 1/8	8	3¾
—	2AA	½	2	17 5/8	11½	5 1/8	8	3¾
60-14	2AA	¾	2	18 1/8	11½	5 1/8	8	3¾
60-15	1½A	½	1½	20¼	13½	5 5/8	9½	3¼
60-16	1½A	¾	1½	21¾	13½	5 5/8	9½	3¼
60-17	1½A	1	1½	19¾	13½	5 5/8	9½	3¼
—	1½A	1½	1½	20 5/8	13½	5 5/8	9½	3¼
—	2A	½	2	21¼	14	5¾	9 7/8	3½
—	2A	¾	2	21¾	14	5¾	9 7/8	3½
60-19	2A	1	2	19¾	14	5¾	9 7/8	3½
60-20	2A	1½	2	20 5/8	14	5¾	9 7/8	3½
60-21**	2A	2**	2	21 3/8	14	5¾	9 7/8	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		

Pumps P1, P2, P6, P7, P8

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

ACTORY ORDER NUMBER: 9B7-12491

JOB:

ERVICE:

NGINEER:

CONTRACTOR:

OLD TO: NATKIN & CO. PO# 7499-1007

REFERENCE: P-1 HAMPTON SOLAR

PUMP

ONE NUMBER OF UNITS | 1½x2x9A 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 | FACTORY CHOICE MANUFACTURER

NOTE: MOTOR NOT MOUNTED AT FACTORY ON VERTICAL UNITS.

SPECIAL REQUIREMENTS

UMP:

RIVE:

ELECTRICAL:

CERTIFIED PRINT: SECTION: 340 PAGE: 251 CURVE NUMBER: 3PC-116 331

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: ☐

ELEASE FOR MANUFACTURING PER ATTACHED CHANGE ORDER: ☐

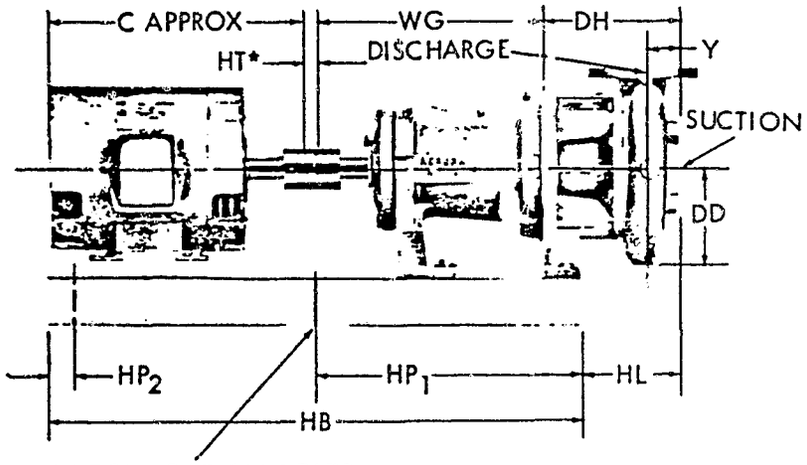
AUTHORITY:

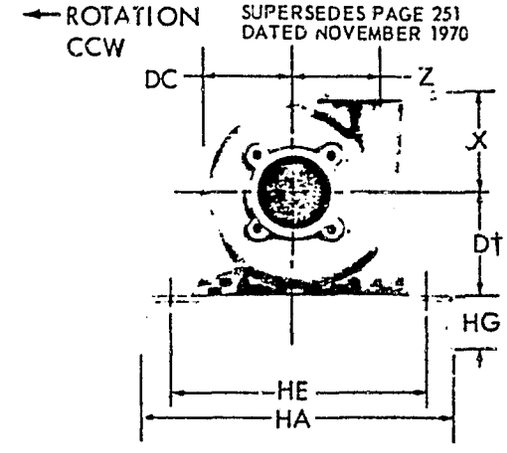
OFFICE:

DATE:

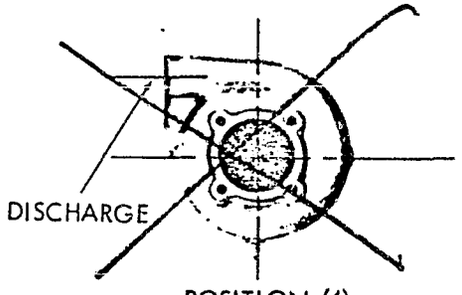
ON STEEL BASES

DATED **MARCH 1975**
SUPERSEDES PAGE 251
DATED NOVEMBER 1970





STANDARD POSITION (1)



POSITION (4)

NOTES

1. ALL DIMENSIONS IN INCHES.
2. DIMENSIONS MAY VARY ±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	HH		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	
4	18 x 42	18	42	16	4	4		1	1
5	18 x 44	18	44	15	4	4		1	
6	18 x 48	18	48	15	4	4		1	

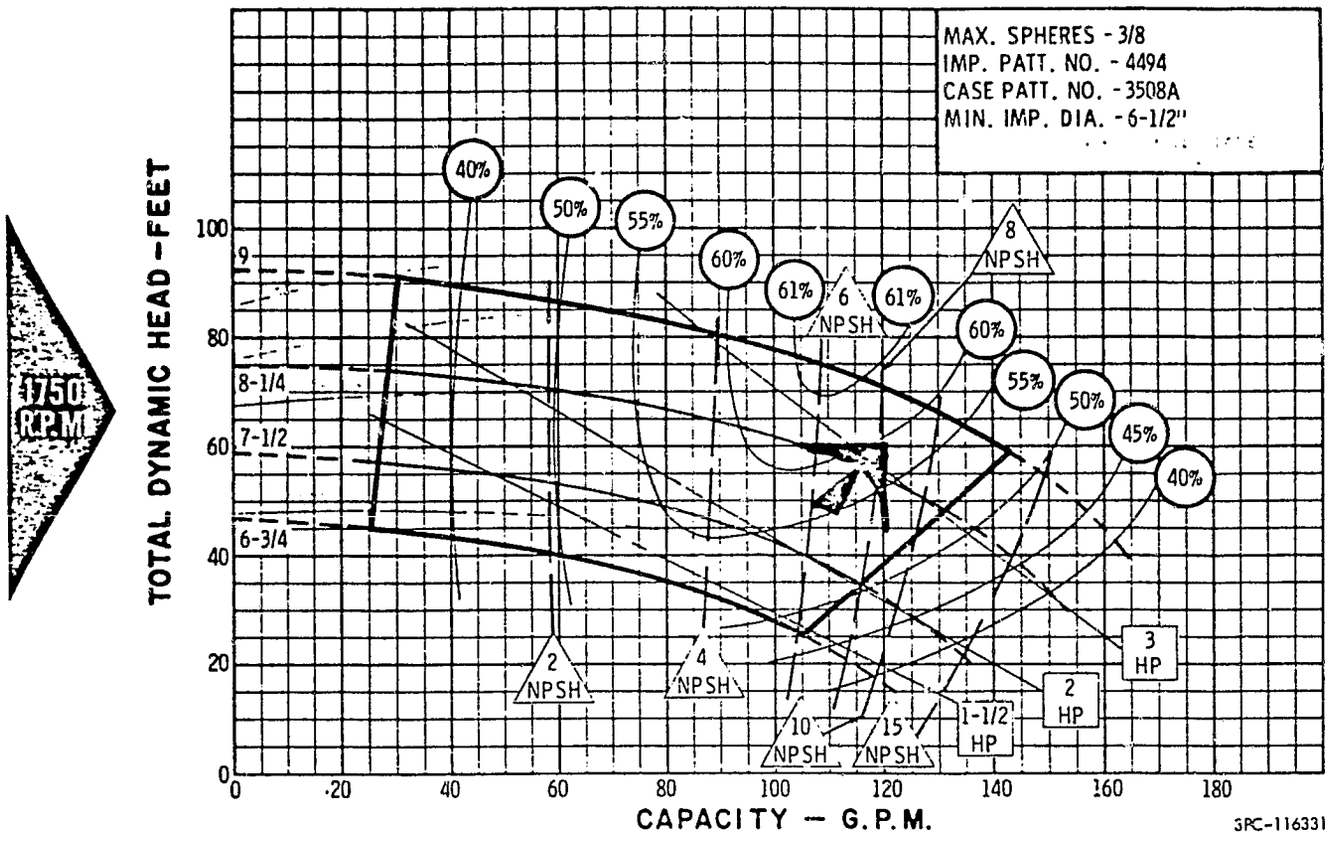
PUMPS WITH THREADED CONNECTIONS												
PUMP SIZE								DH		HL		
DISCHARGE	SUCTION	CASE BORE	X	Y	Z	DC	DD	FRAME 1	FRAME 2 & 3	FRAME 1	FRAME 2	FRAME 3
1	1	7	5	2	4	4	5	7	NA	4	NA	NA
1	1	9	6	2	5	6	6	7	NA	4	NA	NA
1	2	7	5	2	4	5	5	7	NA	4	NA	NA
1	2	9	6	2	5	6	6	7	8	4	6	NA
1	2	12	7	2	7	8	8	NA	8	NA	6	NA
PUMPS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

NOTE: WHEN TWO "D" DIMENSIONS ARE INDICATED ALWAYS USE THE LARGER FIGURE.		POWER FRAME	1	2	3
		WG	10	13	13
D	CASE BORE	7	5	6	–
		9	6	7	7
		12	–	7	7
MOTOR FRAME	C APPROX.	D	BASE NUMBER		
56	12		1	NA	NA
143T	11		1	NA	NA
145T	12		1	3	NA
182T	13		1	3	NA
184T	14		1	3	NA
213T	16	5	2	3	NA
215T	18	5	2	3	NA
254T	21	6	3	4	4
256T	23	6	NA	4	4
284T	24	7	NA	5	5
284TS	22	7	NA	5	5
286T	25	7	NA	5	5
286TS	24	7	NA	5	5
324T	26	8	NA	6	6
324TS	25	8	NA	6	6
326T	28	8	NA	6	6
326TS	26	8	NA	6	6
364T	29	9	NA	6	6
364TS	27	9	NA	6	6

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

C-2
DIMENSIONS

1-[illegible] x 2 x 9A SERIES 340 OR 3[illegible]J
ENCLOSED IMPELLER



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 # 852-93-7-1A
FACTORY ORDER NUMBER: 9K7-12488
JOB:
SERVICE:
ENGINEER:
CONTRACTOR:
SOLD TO: NATKIN & CO. PO # 7499-1007
REFERENCE: P-2 HAMILTON SOLAR

PUMP

ONE NUMBER OF UNITS | 2 x 2 ½ x 6 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
		☐ SPACER	☒ STANDARD	☐ FLANGE	☐ OIL
☒ STEEL	☐ _____	☒ GUARD	☐ _____	☐ 125 #	
☐ FABRICATED STEEL			☐ PACKING	☐ 250 #	
			☐ LANTERN RING	☐ _____	

MOTOR

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

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

SPECIAL REQUIREMENTS

PUMP:
DRIVE:
ELECTRICAL:

CERTIFIED PRINT: SECTION: 320 PAGE: 251 CURVE NUMBER: 31PC-10926
SPECIAL: MAINTENANCE:
BY: BB DATE: 9/29/77 OFFICE: AURORA

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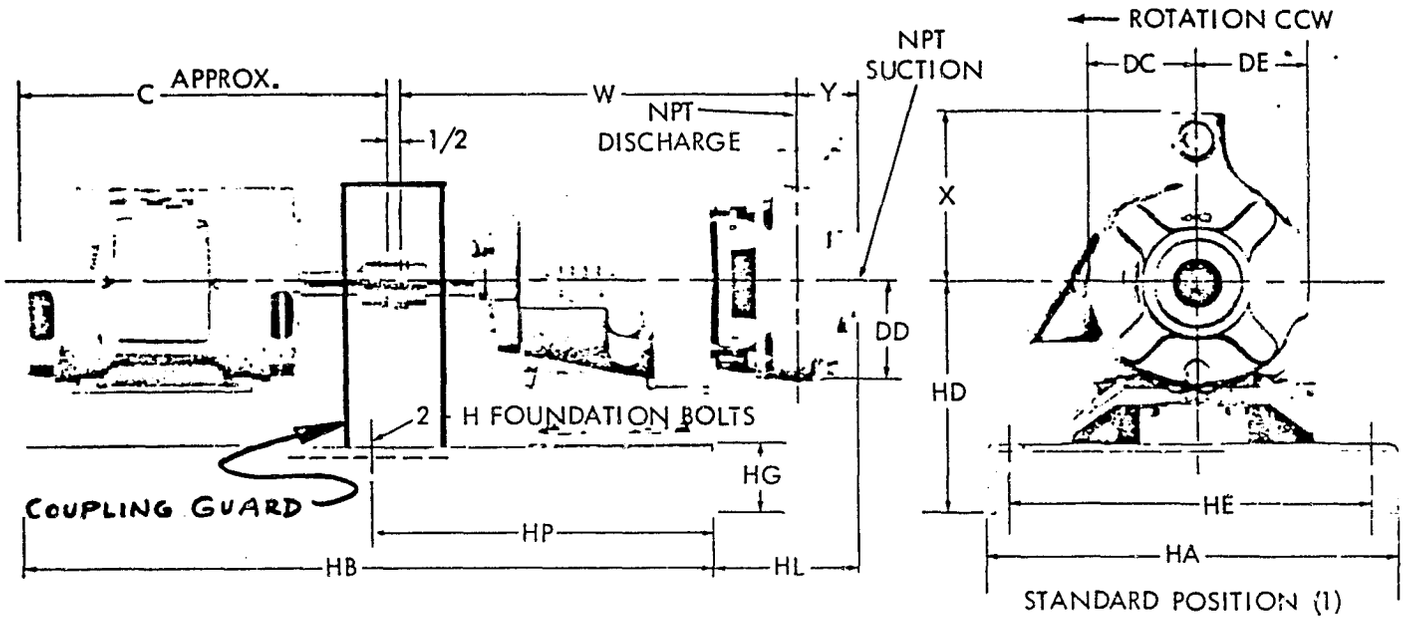
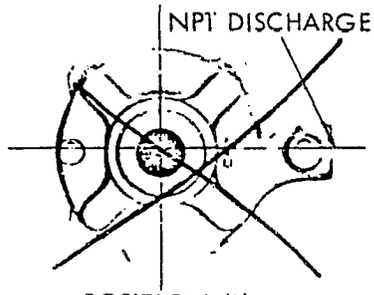
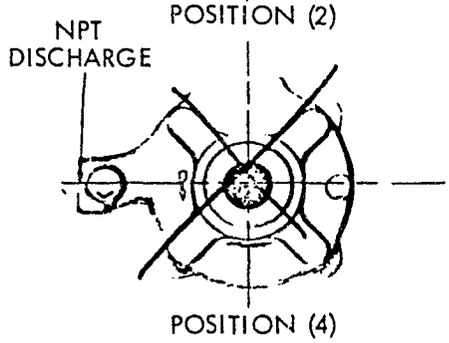
THIS ORDER CAN BE RELEASED FOR MANUFACTURING AS SHOWN: ☐
RELEASE FOR MANUFACTURING PER ATTACHED CHANGE ORDER: ☐
AUTHORITY:
OFFICE:
DATE:

SUPERSEDES PAGE 251
DATED APRIL 1973



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 5/8	12
184T	14	1/2	10	24	7 7/8	7	2 5/8	12
213T	16	1/2	12	27	8 1/4	9	3	13 1/2



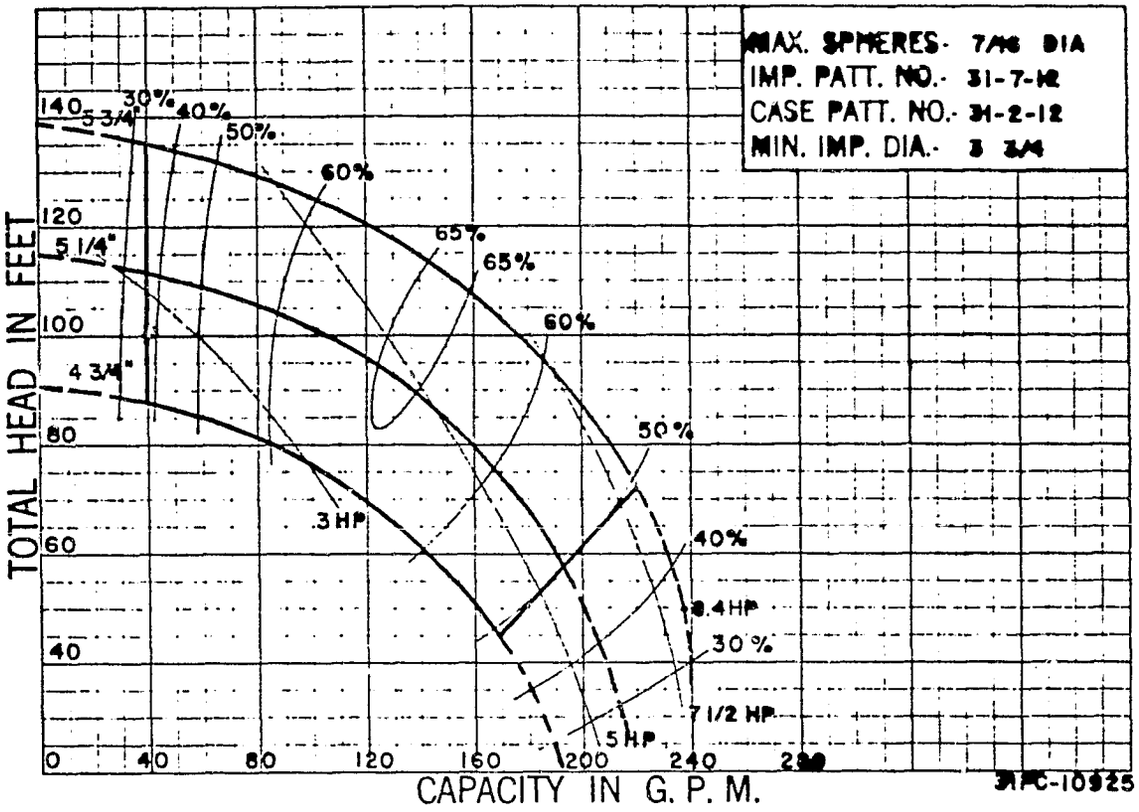


PUMP SIZE									
DISCHARGE	SUCTION	CASE BORE	W	X	Y	DC	DD	DE	HL
3/4	1	6	13 1/8	5 1/2	1 1/4	3 5/16	3 7/16	3 1/8	4 9/16
3/4	1	7	13 1/8	6 1/4	1 1/8	3 15/16	4	4 7/16	4 11/16
1	1 1/4	4	13 1/4	4 1/8	1 11/16	2 3/8	2 3/8	2 7/16	4 3/8
1	1 1/4	5	13 3/16	5	2	2 13/16	2 3/8	3	4 3/8
1	1 1/4	6	13 3/16	5 1/2	1 15/16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

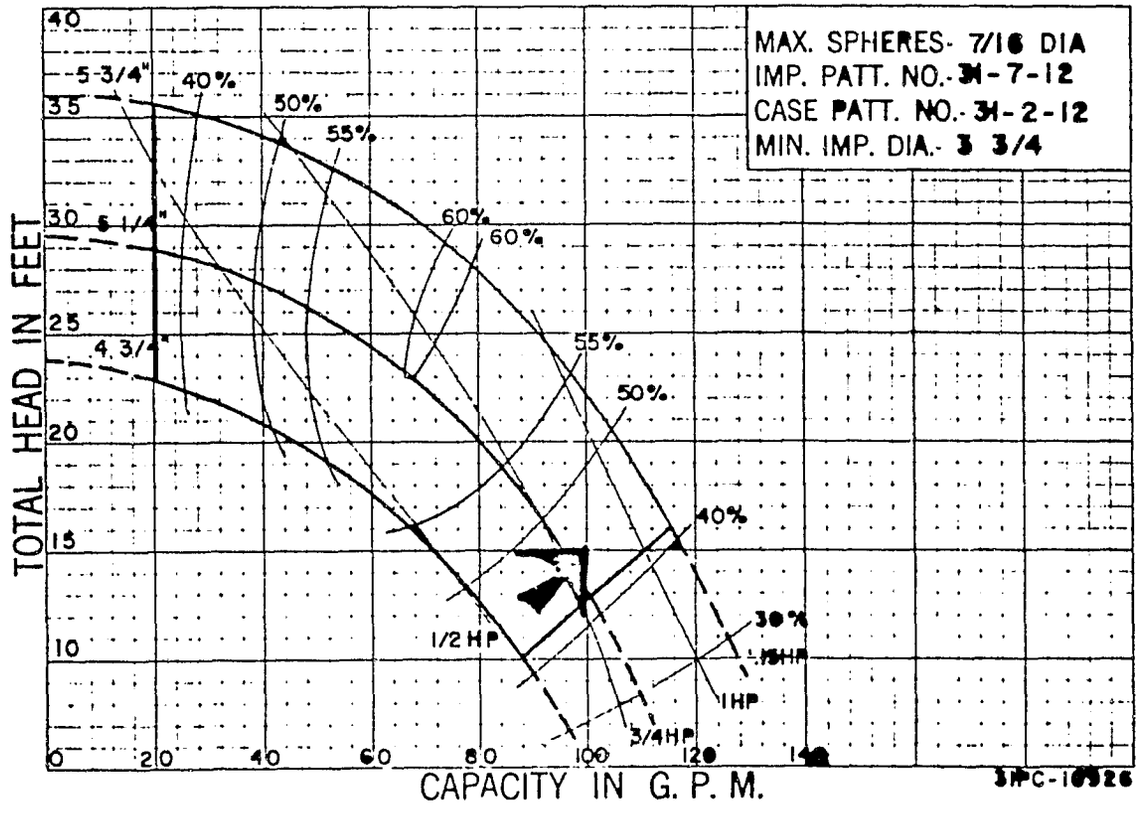
NOTES

1. ALL DIMENSIONS IN INCHES.
2. DIMENSIONS MAY VARY ± 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 PUMPS
AURORA PUMP
A UNIT OF GENERAL SIGNAL
800 AIRPORT ROAD · NORTH AURORA ILLINOIS · 60542



3500 R.P.M.



1750 R.P.M.

AURORA PUMPS

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 # 849-93-7-1A
FACTORY ORDER NUMBER: 9K7-12485
JOB:
SERVICE:
ENGINEER:
CONTRACTOR:
SOLD TO: NATKIN & CO. PO # 7449-1007
REFERENCE: P-6 HAMPTON SOLAR

PUMP

ONE NUMBER OF UNITS 2 x 2½ 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	☐ _____	

MOTOR

3/4 HP. 3 PHASE 60 HERTZ 208 VOLTS 1750 RPM 56 FRAME

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

SPECIAL REQUIREMENTS

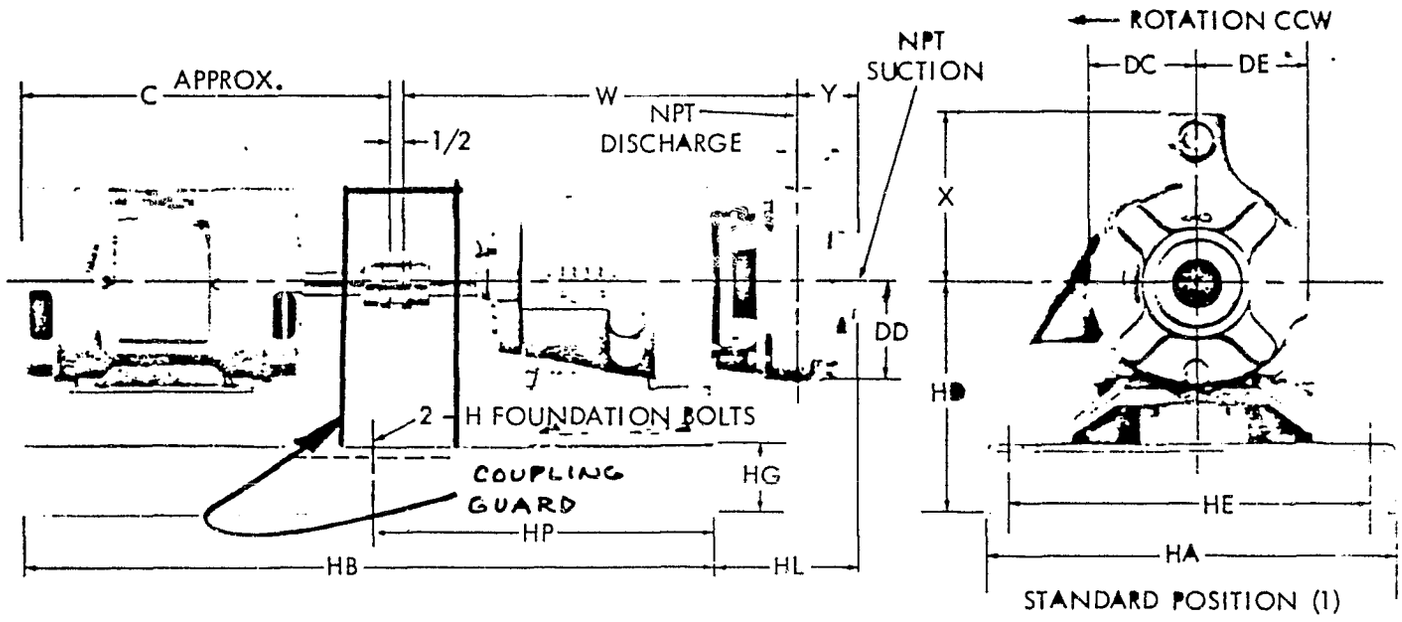
PUMP:
DRIVE:
ELECTRICAL:

CERTIFIED PRINT: SECTION: 320 PAGE: 251 CURVE NUMBER: 31PC-10926
SPECIAL: MAINTENANCE:
BY: KB DATE: 9/29/77 OFFICE: AURORA

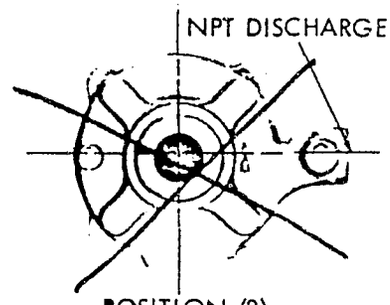
THIS ORDER WILL NOT BE PROCESSED FOR MANUFACTURING UNTIL APPROVAL IS RECEIVED. PRINTS ARE NOT TO SCALE AND ARE CERTIFIED CORRECT ONLY FOR THIS ORDER. ALL ORDERS SUBJECT TO ACCEPTANCE AT AURORA PUMP, NORTH AURORA, ILLINOIS.

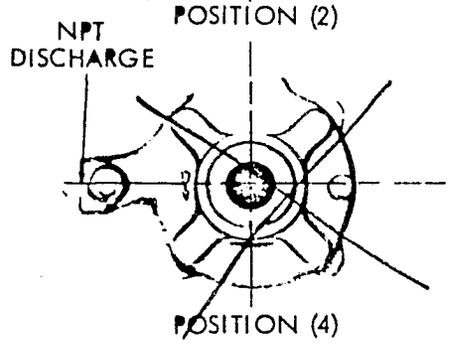
THIS ORDER CAN BE RELEASED FOR MANUFACTURING AS SHOWN: ☐
RELEASE FOR MANUFACTURING PER ATTACHED CHANGE ORDER: ☐
AUTHORITY:
OFFICE:
DATE:

SUPERSEDES PAGE 251
DATED APRIL 1973



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 5/8	12
184T	14	1/2	10	24	7 7/8	7	2 5/8	12
213T	16	1/2	12	27	8 1/4	9	3	13 1/2



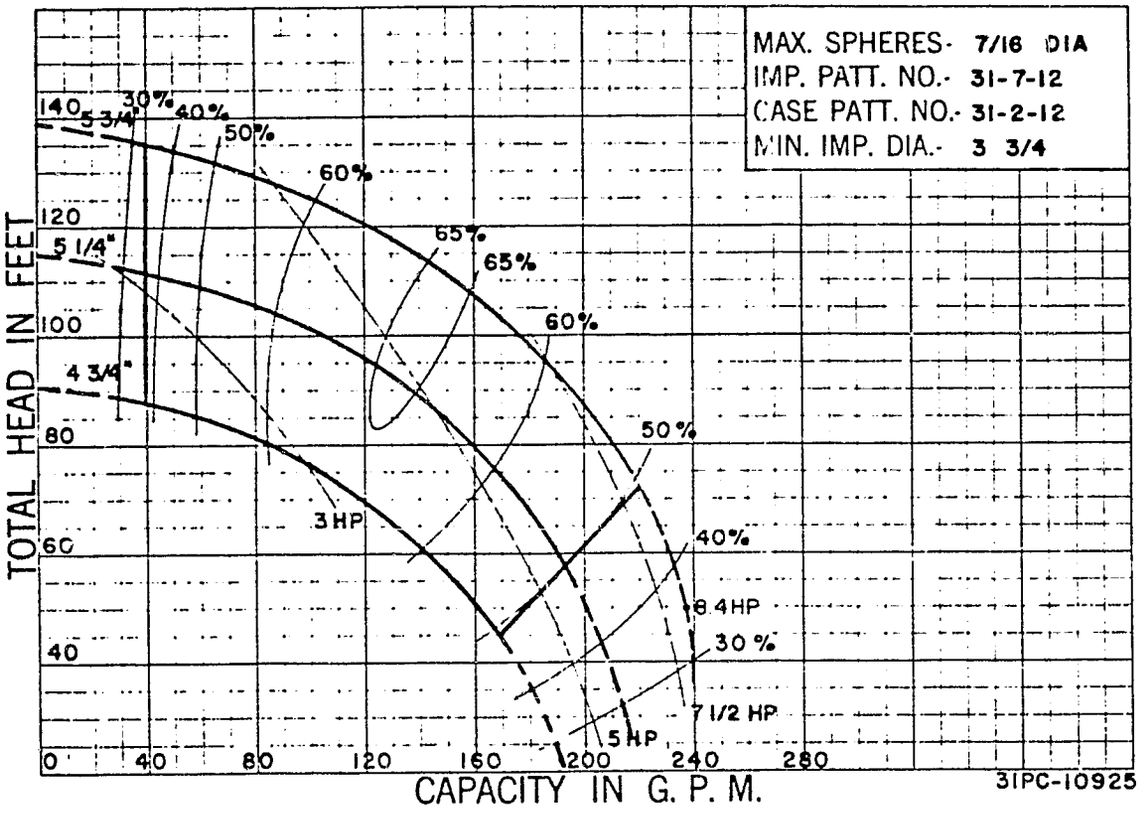


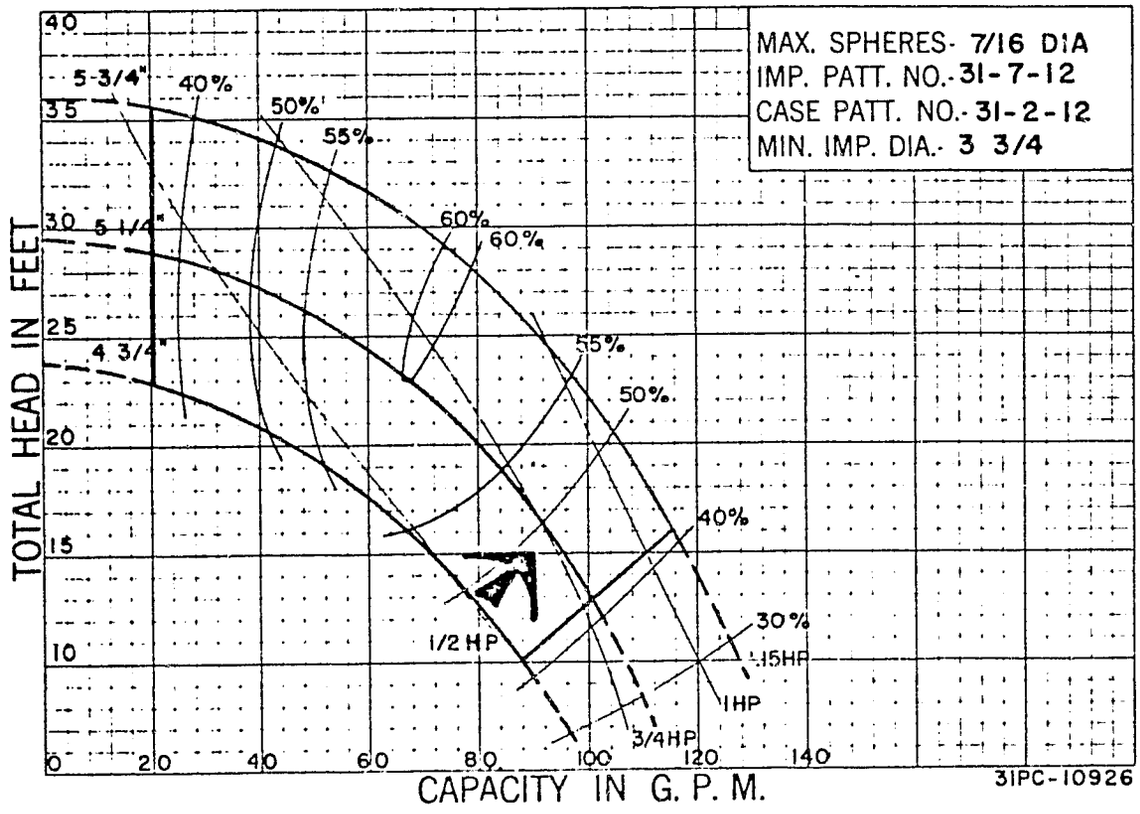
PUMP SIZE									
DISCHARGE	SUCTION	CASE BORE	W	X	Y	DC	DD	DE	HL
3/4	1	6	13 1/8	5 1/2	1 3/4	3 5/16	3 7/16	3 7/8	4 5/16
3/4	1	7	13 1/8	6 1/4	1 7/8	3 13/16	4	4 7/16	4 11/16
1	1 1/4	4	13 1/4	4 1/8	1 11/16	2 3/8	2 3/8	2 7/16	4 3/8
1	1 1/4	5	13 3/16	5	2	2 13/16	2 3/8	3	4 3/8
1	1 1/4	6	13 3/16	5 1/2	1 15/16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

NOTES

1. ALL DIMENSIONS IN INCHES.
2. DIMENSIONS MAY VARY ± 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	
17	FOR APPROVAL
	FINAL

SALES OFFICE: AURORA PUMP - DALLAS, T. PO# 850-93-7-1A
FACTORY ORDER NUMBER: 9K7-12486
JOB:
SERVICE:
ENGINEER:
CONTRACTOR:
SOLD TO: NATKIN & Co. PO# 7999-1007
REFERENCE: P-7 HAMILTON SOCAR

PUMP

ONE NUMBER OF UNITS 1½ × 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	☐ _____	

MOTOR

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

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

SPECIAL REQUIREMENTS

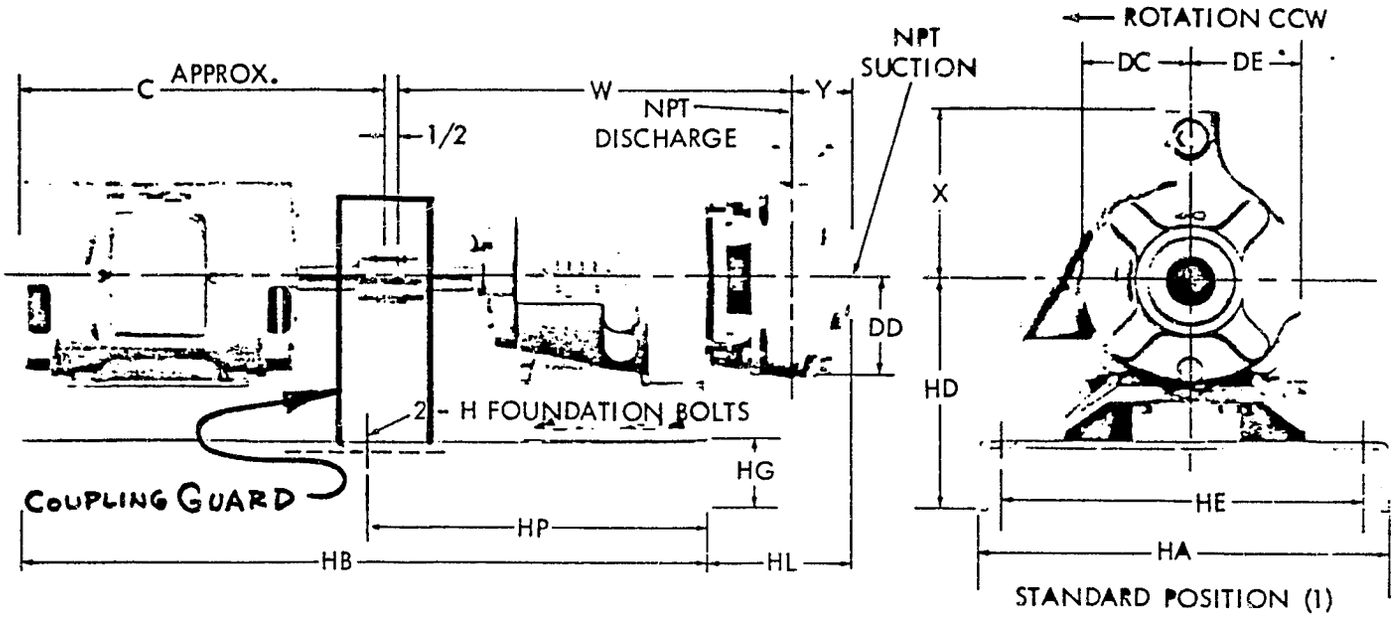
PUMP:
DRIVE:
ELECTRICAL:

CERTIFIED PRINT: SECTION: ____ PAGE: ____ CURVE NUMBER: 31PC-10933
SPECIAL: ____ MAINTENANCE: ____
BY: B B DATE: 9/29/77 OFFICE: AURORA, IL

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.

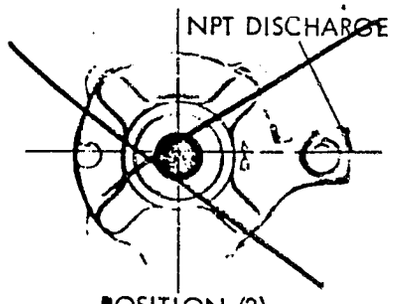
THIS ORDER CAN BE RELEASED FOR MANUFACTURING AS SHOWN: ☐
RELEASE FOR MANUFACTURING PER ATTACHED CHANGE ORDER: ☐
AUTHORITY: ____
OFFICE: ____
DATE: ____

SUPERSEDES PAGE 251
DATED APRIL 1973



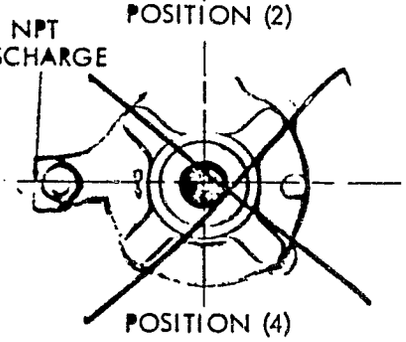
STANDARD POSITION (1)

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 5/8	12
184T	14	1/2	10	24	7 7/8	7	2 5/8	12
213T	16	1/2	12	27	8 1/4	9	3	13 1/2



POSITION (2)

NPT DISCHARGE



POSITION (4)

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

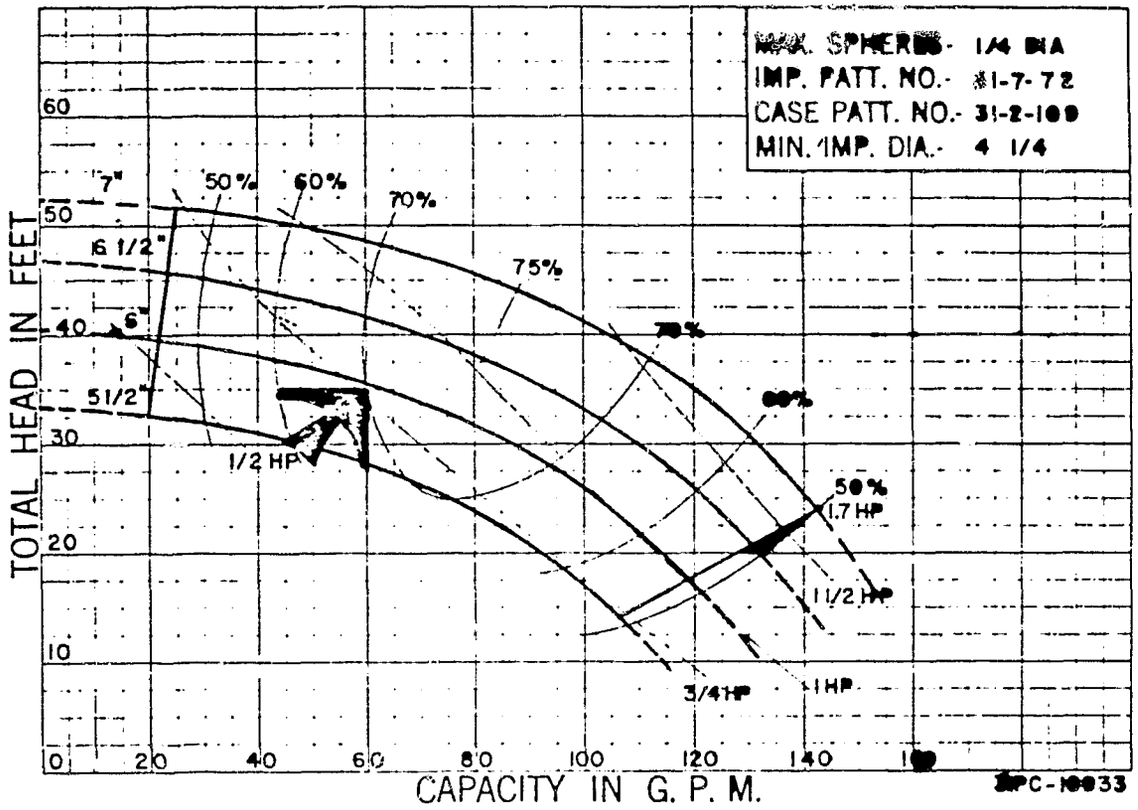
NOTES

1. ALL DIMENSIONS IN INCHES.
2. DIMENSIONS MAY VARY ± 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 PUMPS
AURORA PUMP
A UNIT OF GENERAL SIGNAL
800 AIRPORT ROAD · NORTH AURORA ILLINOIS · 60542

1-1/2 X 2 X [illegible] SERIES
ENCLOSED IMPELLER

1750 R.P.M.



AURORA PUMP
A UNIT OF GENERAL SIGNAL CORPORATION
AURORA · ILLINOIS

A-40076

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

NO. OF PRINTS	
12	FOR APPROVAL
	FINAL

SALES OFFICE: AURORA PUMP - DALLAS, T. PO # 851-93-7-1A
FACTORY ORDER NUMBER: 9K7-12487
JOB:
SERVICE:
ENGINEER:
CONTRACTOR:
SOLD TO: NATKIN & CO PO # 7449-1007
REFERENCE: 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

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

NOTE: MOTOR NOT MOUNTED AT FACTORY ON VERTICAL UNITS.

SPECIAL REQUIREMENTS

PUMP:

ORIGINAL PAGE IS POOR QUALITY

DRIVE:

ELECTRICAL:

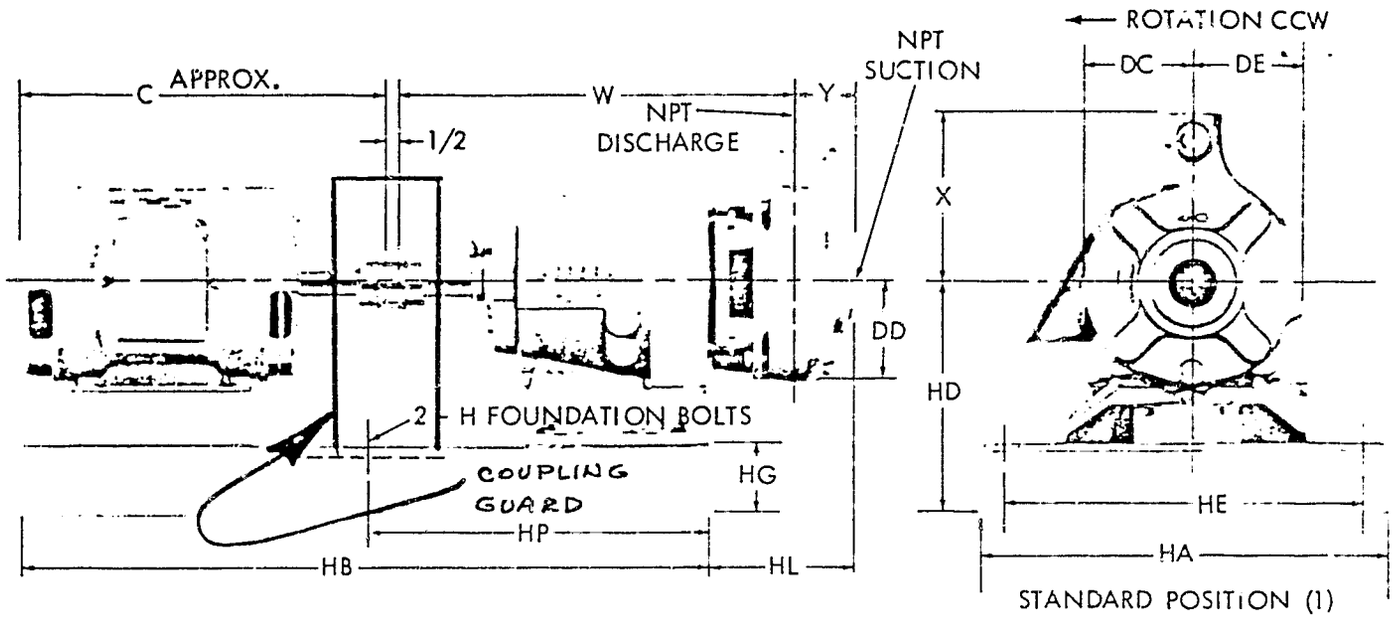
CERTIFIED PRINT: SECTION: 320 PAGE: 251 CURVE NUMBER: 31PC-122448
SPECIAL: MAINTENANCE:
BY: BB DATE: 9/29/77 OFFICE: AURORA

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.

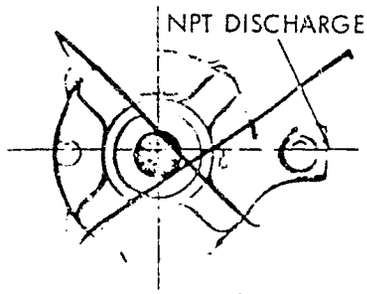
THIS ORDER CAN BE RELEASED FOR MANUFACTURING AS SHOWN: ☐
PLEASE RELEASE FOR MANUFACTURING PER ATTACHED CHANGE ORDER: ☐

AUTHORITY:
OFFICE:
DATE:

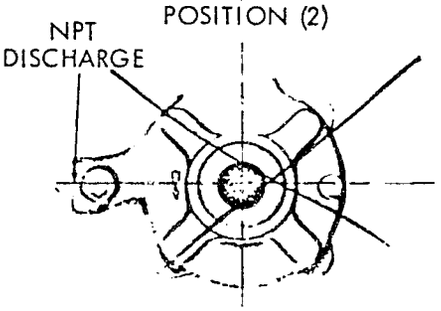
40130 (6-76)



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 5/8	12
184T	14	1/2	10	24	7 7/8	7	2 5/8	12
213T	16	1/2	12	27	8 1/4	9	3	13 1/2



POSITION (2)



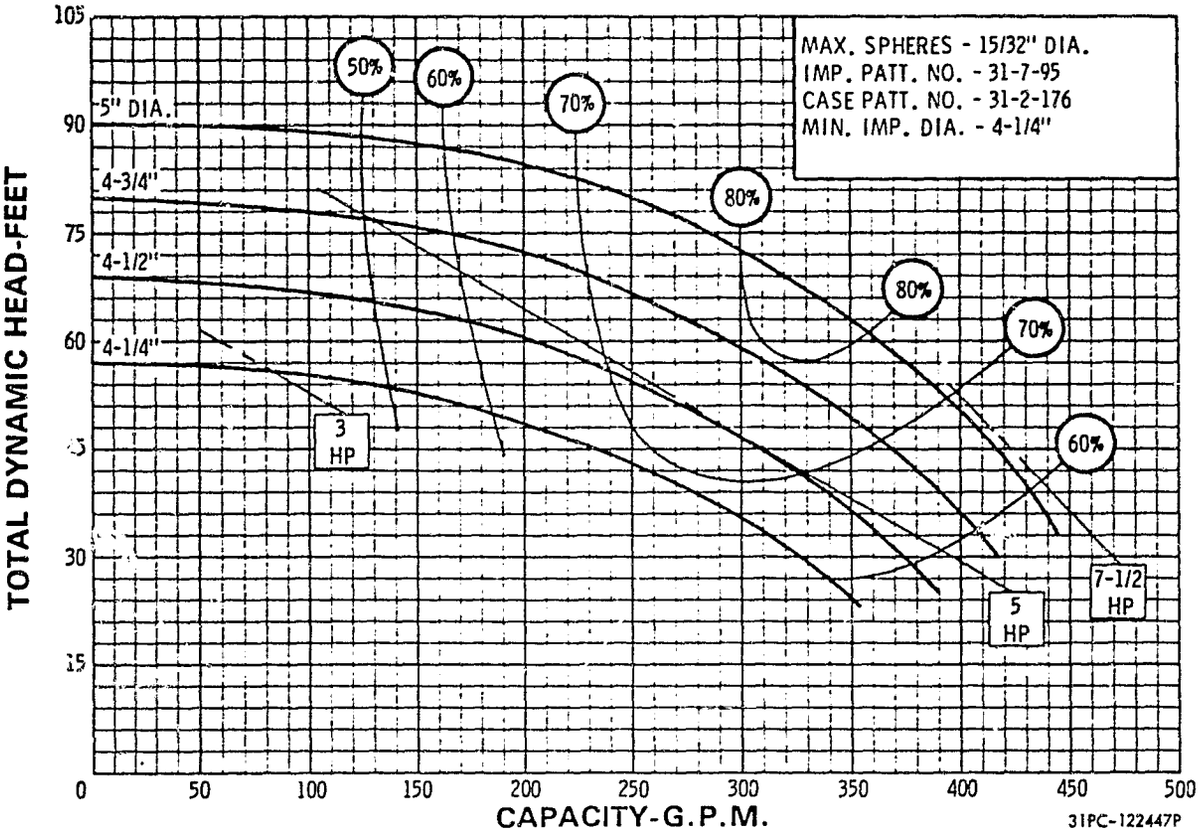
POSITION (4)

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

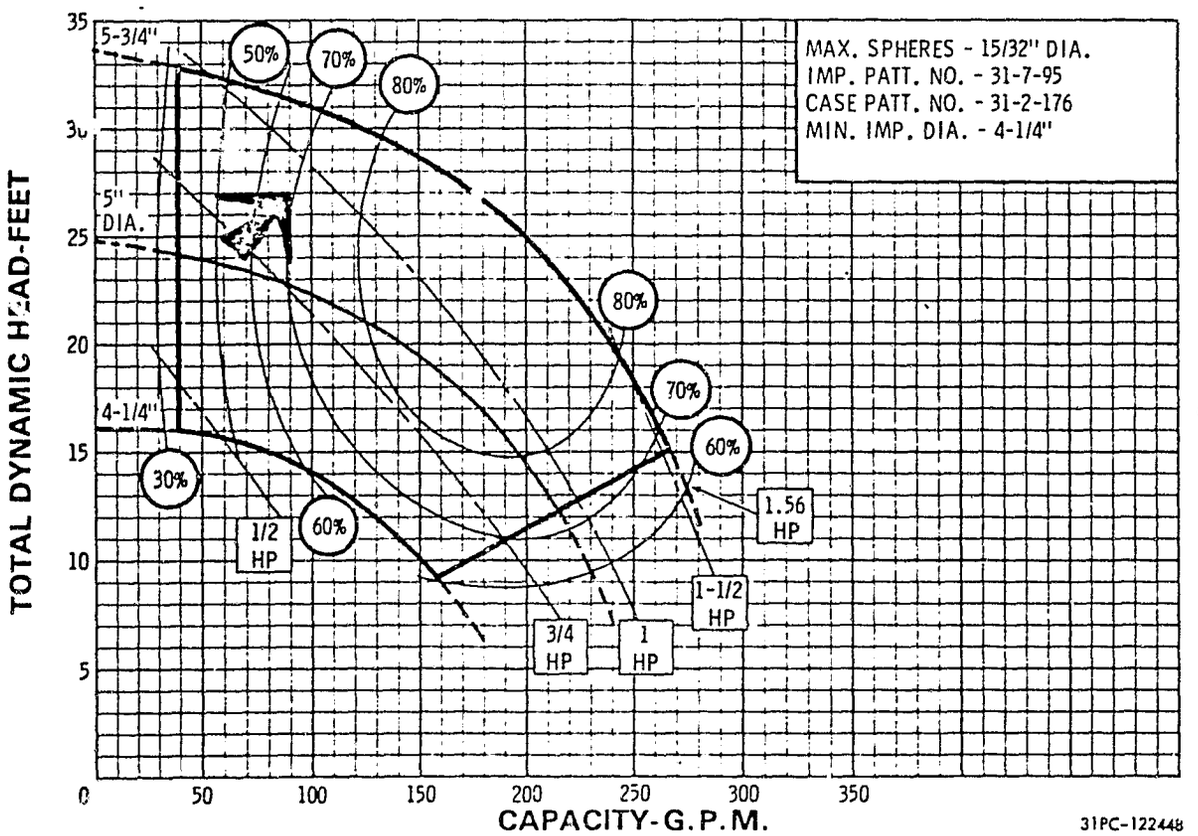
NOTES

1. ALL DIMENSIONS IN INCHES.
2. DIMENSIONS MAY VARY ± 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



3500 R.P.M.



1750 R.P.M.

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

Cooling Tower

BALTIMORE AIRCOIL MODEL VN, VI, VS, COOLING TOWERS

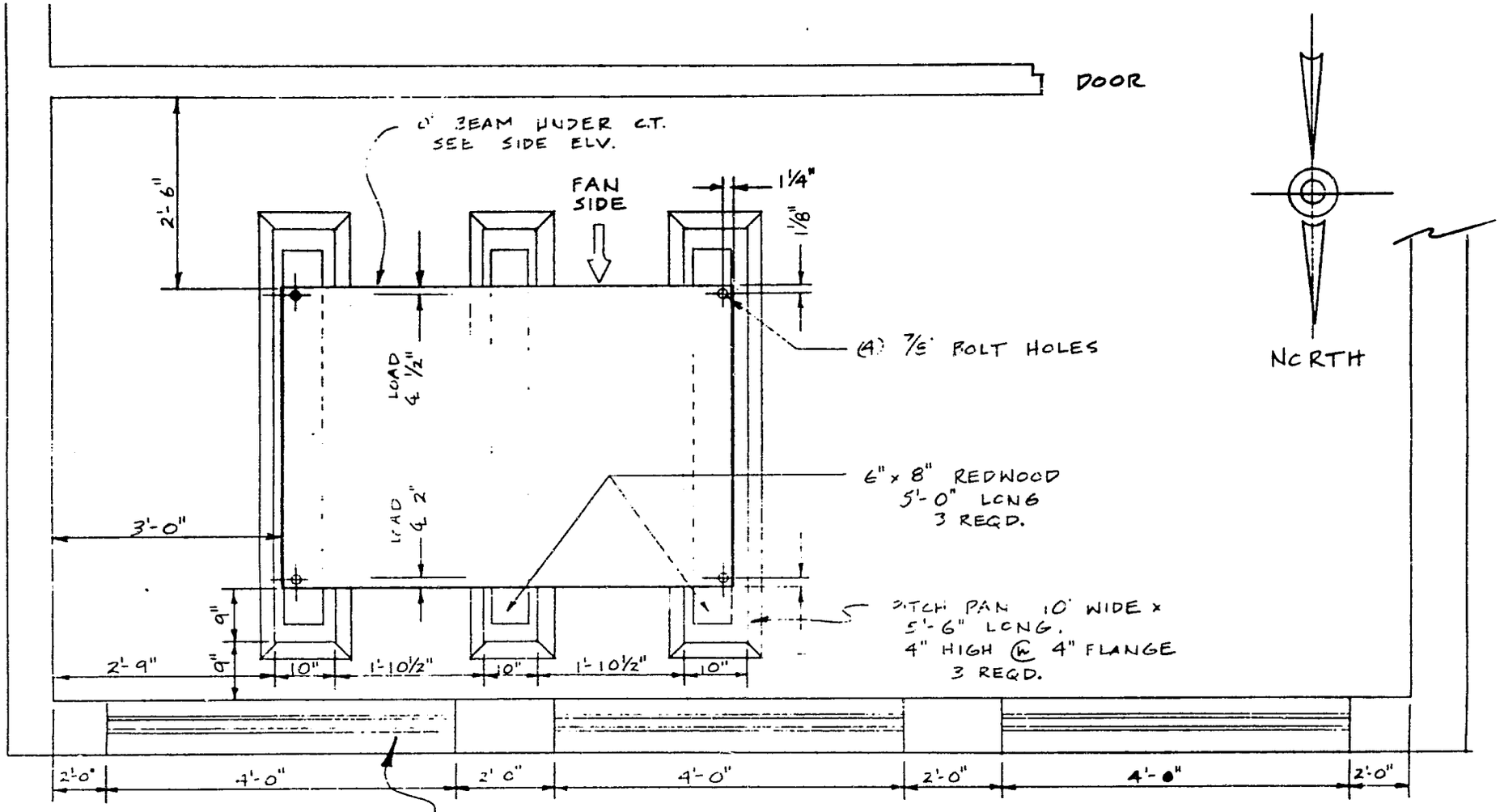
PROJECT Hampton Park Recreation Center Dallas, TX

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.
FAN-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	[X]	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.
	[X]	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 (NBA) 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.

Revised April 1977



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

DATE 9/29/77

NATKIN & COMPANY
HEATING – AIR CONDITIONING
PLUMBING – INDUSTRIAL PIPING

SCALE

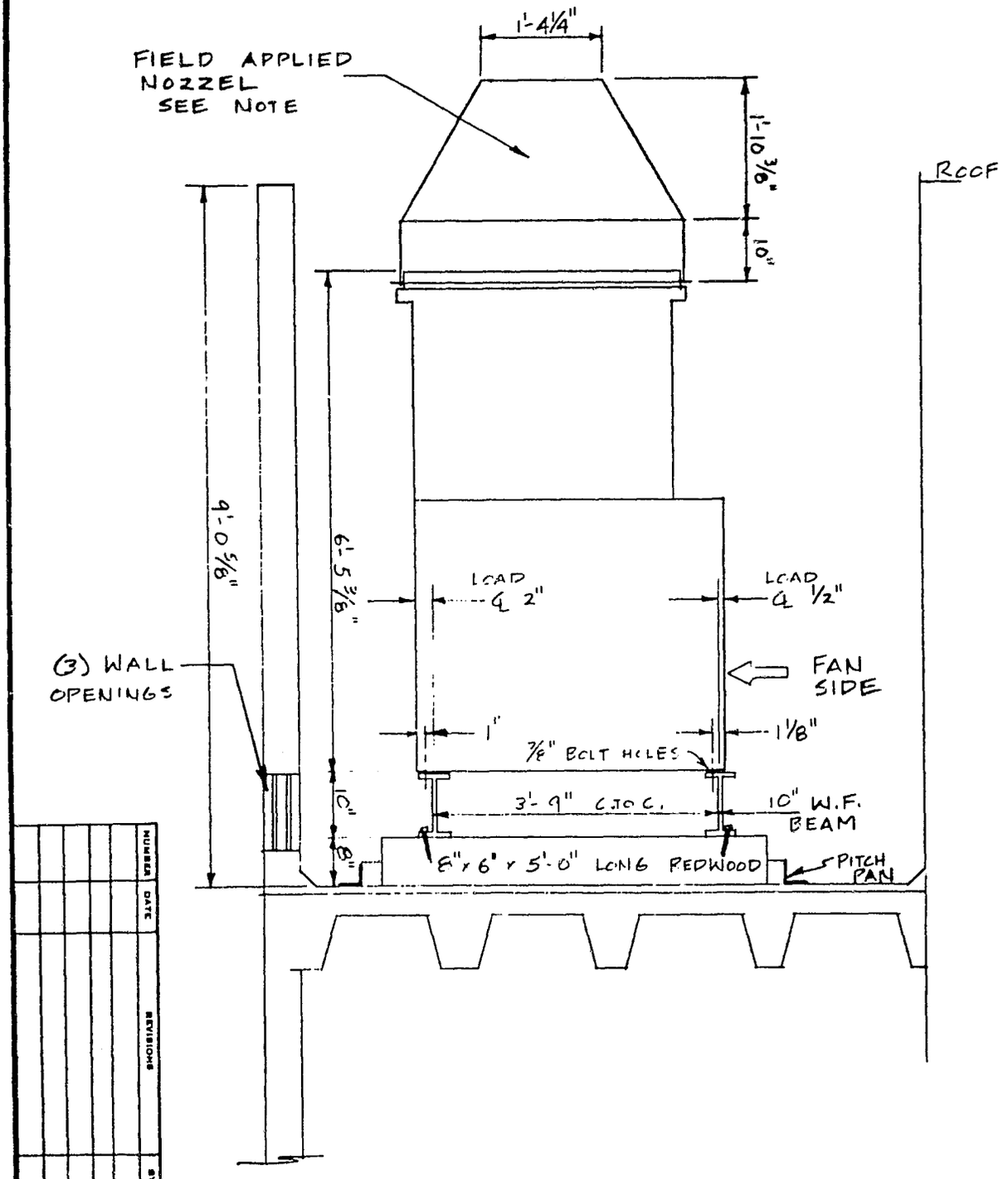
FILE NO 7449

DRAWN BY TFD

CHECKED BY

SHEET A

06



NOTE

NOZZEL ARRANGEMENT IS A FACTORY RECOMMENDATION FOR THIS JOB. TOWER AIR VOLUME WILL BE REDUCED 3% WITH STANDARD DRIVE AND MOTOR.

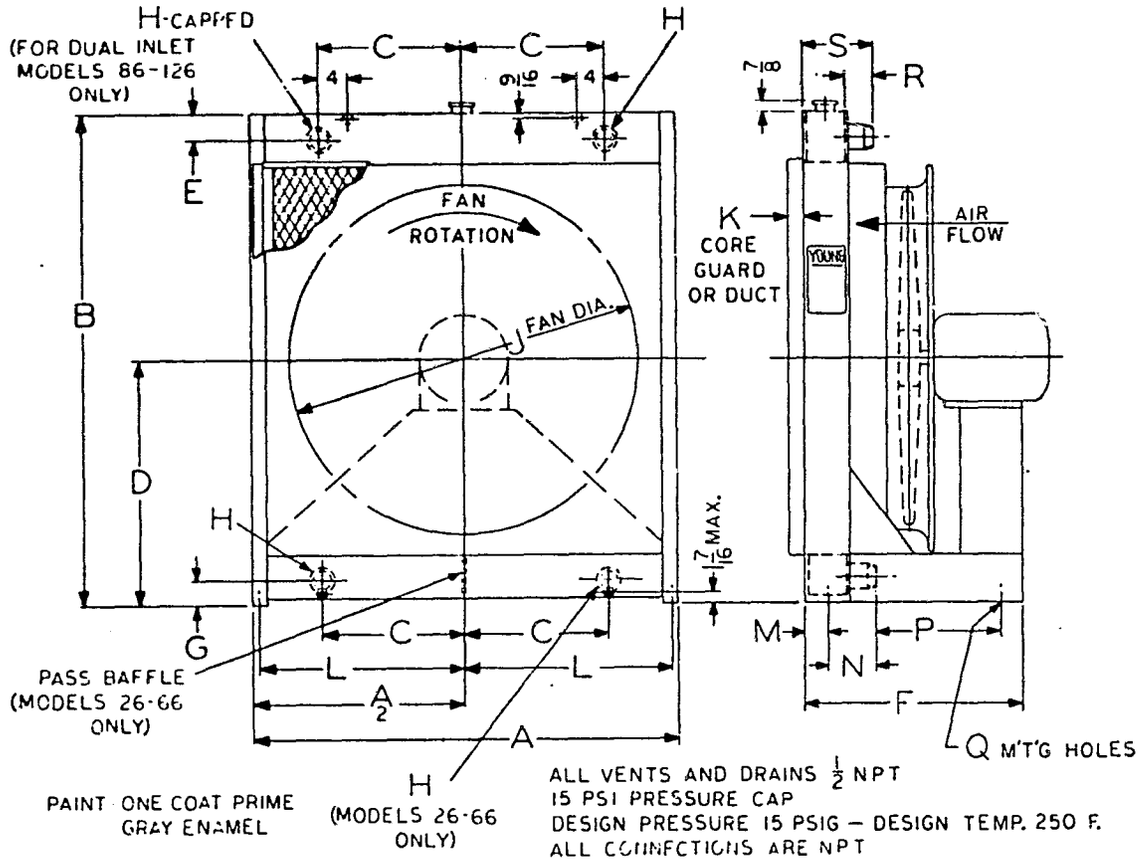
NUMBER	DATE	REVISIONS	BY

COOLING TOWER DETAIL

DATE 9/29/77
FILE NO. 7449
DRAWN BY TFD
CHECKED BY
SCALE
SHEET 13

NATKIN & COMPANY
HEATING-AIR CONDITIONING PLUMBING-INDUSTRIAL PIPING

Over Temperature Heat Exchanger



CUSTOMER REQUIREMENTS	DIMENSION DRAWING
	Customer: Watkin (Company
	Address: Dallas, Texas
	Cust. Order No.: 7449-1005
	Y. R. Co. Order No.: 3-152833
	Y. R. Co. Part No.: 201060
	Y. R. Co. Model No.: 4602
	Per: Dorothy Lutz
SPECIAL NOTE FOR MODELS 26D — 66D	Date: Sept. 21, 1977
2 PASS — USE BOTTOM TANK FOR INLET AND OUTLET	MOTOR DATA
1 PASS — USE TOP TANK FOR INLET, MANIFOLD BOTTOM TANK FOR OUTLET	2 HP 1750 RPM 1 SPEED 3 PH 60 Hz 200 V TEFC TYPE 145T FRAME

MODEL	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S
26D	31	35¼	10	17⅝	2⅜	19	2⅜	2½	24	2	14¾	3¼	6½	6	⅝	2⅝	8 13/16
46D	37	40¾	12	20⅝	2	19	2½	3	27	2	17¾	3¼	6½	6	⅝	3⅛	9⅝
66D	44⅝	48¼	15	24⅛	2½	20¼	2½	3	32	2	21 9/16	3¼	6½	7¼	⅝	3⅛	9⅝
86D	50 13/16	57⅛	18	29	2⅝	27¾	3½	4	36	2	24 21/32	3¼	6½	14¾	⅝	3⅛	9⅝
106D	57 1/16	63⅛	20	32	2⅝	32¾	3½	4	42	2	27 25/32	3¼	6½	18¾	⅝	3⅛	9⅝
126D	59 9/16	69⅜	20	34⅝	3⅝	35¼	3½	4	48	2	29½	3¼	6½	22¼	⅝	3⅛	9⅝

YOUNG RADIATOR COMPANY, RACINE, WISCONSIN 53404 | STANDARD MWC — DIRECT DRIVE | AM-8691

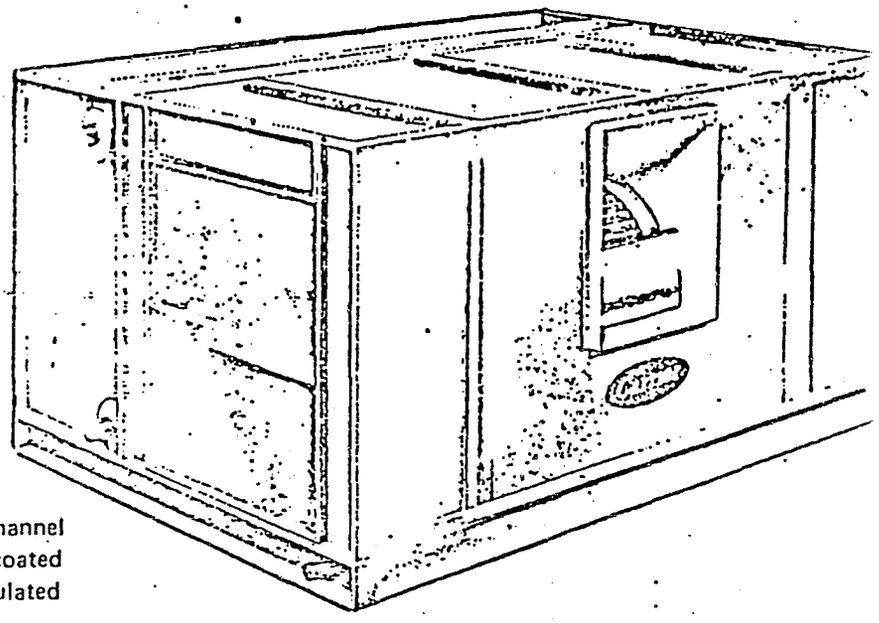
REV. 7-77

Air Conditioning Equipment

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
☐ _____
☐ _____
☐ _____
☐ _____

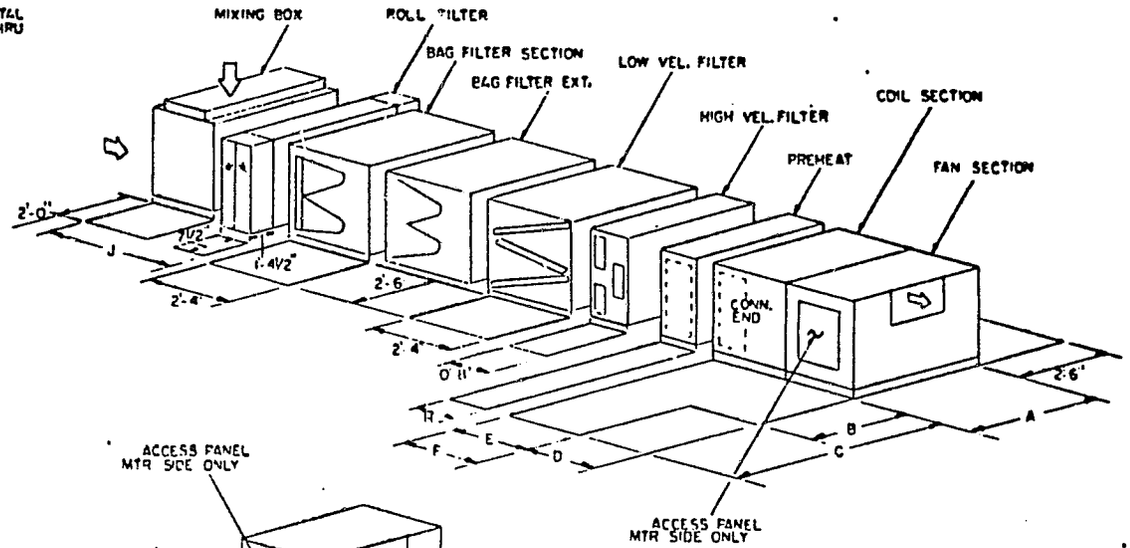
See attached drawing No.(s) _____

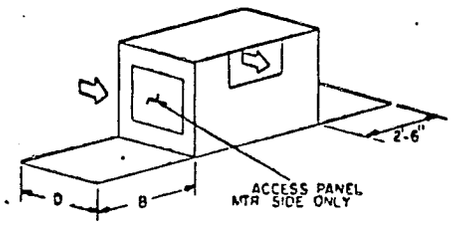
CAPACITY

O.K.

6,000	Total CFM
------	Outside Air CFM
------	Total S.P.
-------	E.S.P.
------	B.H.P.
-------	Motor H.P.
------	Volts _____ Phase _____ Hertz
269,900 ✓	BTUH Total Cooling
188,931 ✓	BTUH Sensible Cooling
81.9 ✓	°F. E.D.B.
67.6 ✓	°F. E.W.B.
53.1 ✓	°F. L.D.B.
52.97 ✓	°F. L.W.B.
6000 ✓	~~°F. E.W.T.~~ Coil CFM
522	~~°F. L.W.T.~~ Face Vel.
-------	G.P.M.
------- ✓	Ft. P.D.
R-22 ✓	Refrigerant
45.68	°F. Suction
6	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

HORIZONTAL DRAW-THRU

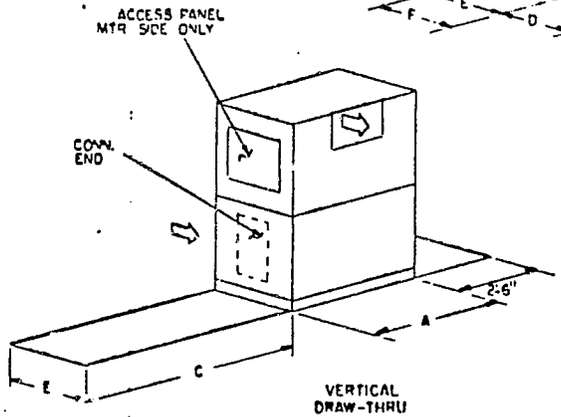




FAN ONLY

LEGEND

AIR FLOW SERVICE AREA



VERTICAL DRAW-THRU

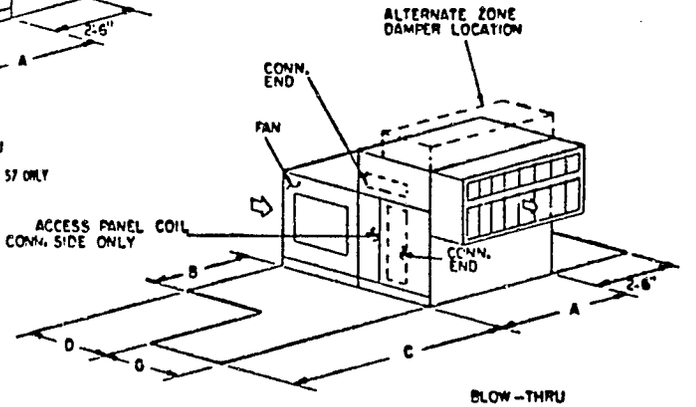
SIZES 08 THRU 57 ONLY

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

** ACCESS DOOR IS ON THE AIR ENTERING SIDE (EXTENDS 2'-0" ON BOTH SIDES OF FILTER)

DIM. (REF. FIG.)	UNIT SIZE													
	08	10	12	15	18	21	24	32	33	39	57	75	95
A	5'-3"	6'-3"	6'-3"	7'-7"	7'-7"	8'-3"	8'-3"	9'-0"	9'-9"	11'-9"	11'-9"	13'-3"	13'-3"
B **	3'-0"	3'-6"	3'-11"	4'-1"	4'-6"	4'-7"	4'-10"	5'-3"	5'-6"	6'-6"	6'-6"	7'-9"	7'-9"
C **	5'-3"	5'-3"	7'-11"	8'-3"	8'-6"	8'-6"	8'-6"	10'-10"	10'-10"	12'-10"	12'-10"	16'-6"	16'-6"
D **	2'-2"	2'-2"	2'-2"	3'-6"	3'-6"	3'-6"	4'-6"	4'-6"	4'-6"	5'-6"	6'-6"	7'-9"	7'-9"
E **	2'-2"	2'-2"	2'-2"	3'-6"	3'-6"	3'-6"	4'-6"	4'-6"	4'-6"	5'-6"	6'-6"	7'-9"	7'-9"
F **	2'-2"	2'-2"	2'-2"	3'-6"	3'-6"	3'-6"	4'-6"	4'-6"	4'-6"	5'-6"	6'-6"	7'-9"	7'-9"
G **	2'-2"	2'-2"	2'-2"	3'-6"	3'-6"	3'-6"	4'-6"	4'-6"	4'-6"	5'-6"	6'-6"	7'-9"	7'-9"
H	2'-6"	2'-6"	2'-6"	3'-6"	3'-6"	3'-6"	4'-6"	4'-6"	5'-6"	6'-6"	6'-6"	7'-9"	7'-9"
J	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
K	1'-7"	1'-7"	1'-7"	1'-7"	1'-7"	1'-7"	1'-7"	1'-7"	1'-7"	1'-7"	1'-7"	1'-7"	1'-7"

ALTERNATE ZONE DAMPER LOCATION



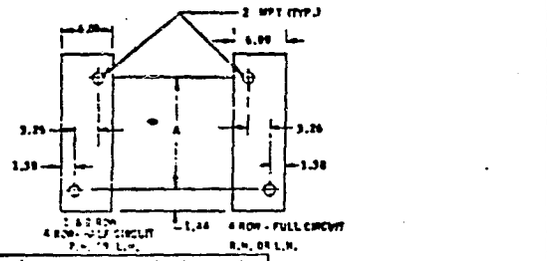
BLOW-THRU

DATE	SUPERSEDES	CENTRAL STATION WEATHERMAKER SERVICE AREA REQUIREMENTS	39E-203-13
3 9 76			

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

PRE/REHEAT ON DRAW THRU UNITS

PRE HEAT ON BLOW THRU UNITS



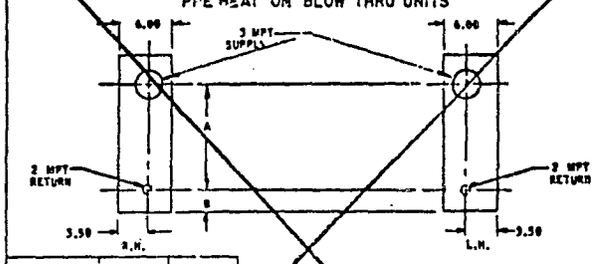
SIZE	"A" 1/2 O.D. TUBE	"A" 5/8 O.D. TUBE
09	19.62	17.62
10		
12	24.62	23.62
15	29.62	27.62
18	34.62	33.62
21		
24	44.62	41.62
32		
39 UPPER	24.62	23.62
39 LOWER	29.62	29.62
48 UPPER	29.62	29.62
48 LOWER	34.62	33.62
57 UPPER	29.62	29.62
57 LOWER	34.62	33.62
75 UPPER	34.62	33.62
75 LOWER	39.62	39.62
90 UPPER	44.62	41.62
90 LOWER	44.62	41.62

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)

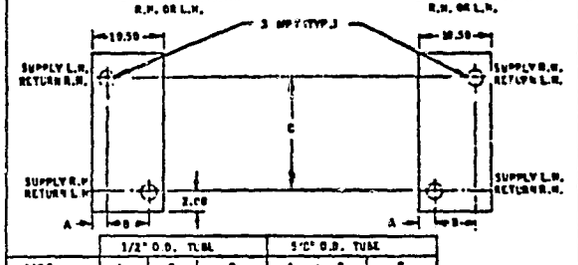
PRE/REHEAT ON DRAW THRU UNITS

PRE HEAT ON BLOW THRU UNITS



SIZE	A	B
09	15.50	2.74
10		
12	19.50	3.74
15	25.50	2.74
18	31.50	3.74
21		
24	39.50	3.74
32		
39 UPPER	19.50	3.74
39 LOWER	25.50	2.74
48 UPPER	19.50	3.74
48 LOWER	25.50	2.74
57 UPPER	25.50	2.74
57 LOWER	31.50	2.74
75 UPPER	31.50	2.74
75 LOWER	31.50	2.74
90 UPPER	39.50	3.74
90 LOWER	39.50	3.74

CHILLED WATER COILS (4, 6 & 8 ROW)



SIZE	1/2" O.D. TUBE A	1/2" O.D. TUBE B	1/2" O.D. TUBE C	5/8" O.D. TUBE A	5/8" O.D. TUBE B	5/8" O.D. TUBE C
09	2.54	5.42	18.50	2.66	5.38	16.50
10						
12			23.50			22.50
15			28.50			27.50
18			33.50			32.50
21						
24			43.50			40.50
32			43.50			41.50
39 UPPER			23.50			22.50
39 LOWER			28.50			27.50
48 UPPER			23.50			22.50
48 LOWER			28.50			27.50
57 UPPER			28.50			27.50
57 LOWER			33.50			32.50
75 UPPER			33.50			32.50
75 LOWER			38.50			37.50
90 UPPER			43.50			40.50
90 LOWER			43.50			41.50

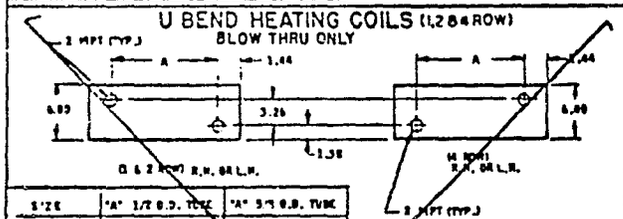
NOTES:
1. - WATER SUPPLY TO BE ON AIR LEAVING SIDE (COUNTER FLOW).

MARK FOR ACI LOCATION

DIMENSIONS IN INCHES

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

BLOW THRU ONLY

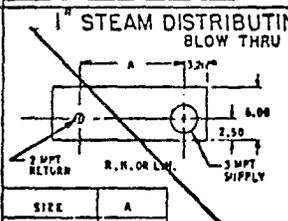


SIZE	"A" 1/2 O.D. TUBE	"A" 5/8 O.D. TUBE
09	14.62	11.62
10		
12	14.62	11.62
15	19.62	16.62
18	19.62	17.62
21		
24	24.62	21.62
32		
39	29.62	29.62
48	34.62	33.62
57	34.62	33.62
75	44.62	41.62
90	44.62	41.62

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)

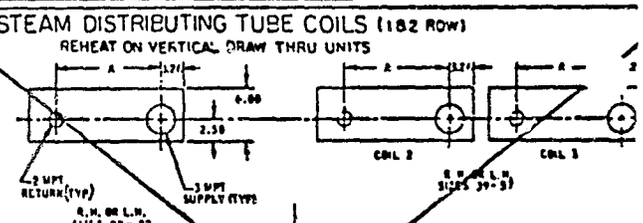
BLOW THRU ONLY



SIZE	A
09	9.50
10	
12	9.50
15	15.50
18	15.50
21	
24	19.50
32	
39	25.50
48	31.50
57	31.50
75	39.50
90	39.50

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

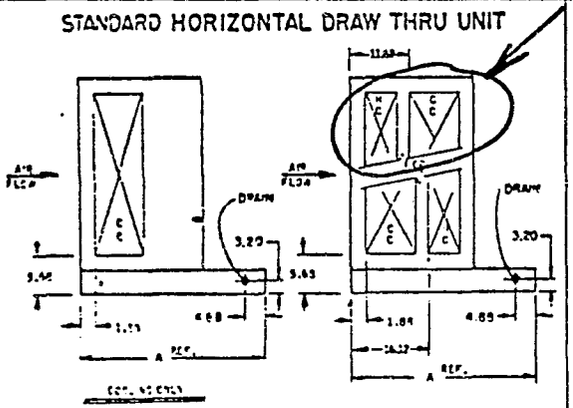
REHEAT ON VERTICAL DRAW THRU UNITS



SIZE	A
09	15.50
10	
12	19.50
15	25.50
18	31.50
21	
24	39.50
32	

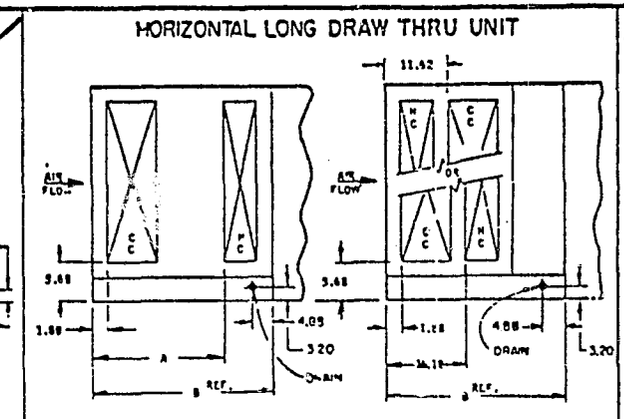
SIZE		A
39	COIL 1	19.50
	COIL 2	25.50
48	COIL 1	19.50
	COIL 2	25.50
57	COIL 1	25.50
	COIL 2	31.50

STANDARD HORIZONTAL DRAW THRU UNIT



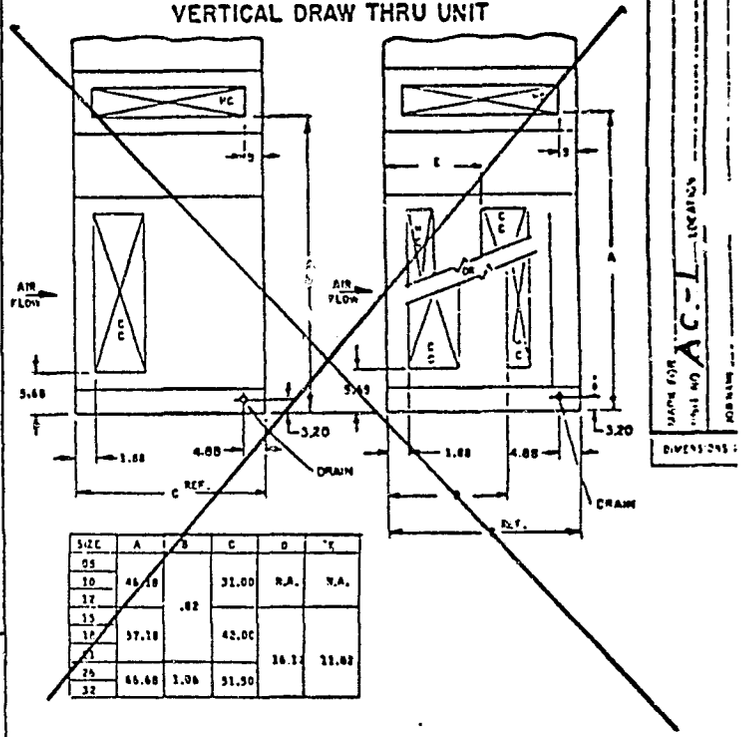
SIZE	A
05	
10	33.00
12	
15	
18	43.00
21	
26	53.50
32	

HORIZONTAL LONG DRAW THRU UNIT



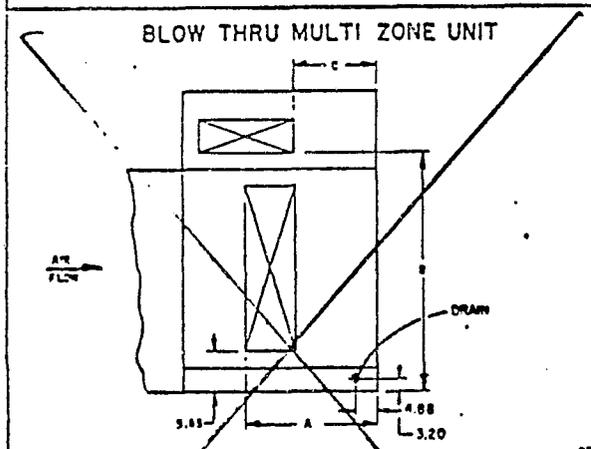
SIZE	A	B
05		
10	23.12	31.00
12		
15		
18	34.12	42.00
21		
26	43.62	51.50
32		

VERTICAL DRAW THRU UNIT



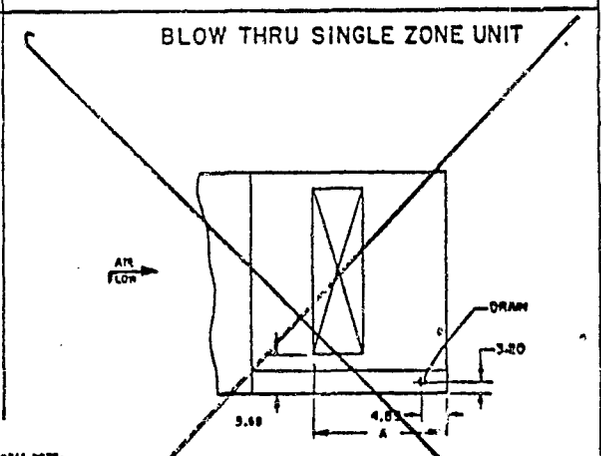
SIZE	A	B	C	D	E
05					
10	46.18	.82	31.00	N.A.	N.A.
12					
15					
18	57.18		42.00		
21				36.12	31.62
26	66.68	1.06	51.50		
32					

BLOW THRU MULTI ZONE UNIT



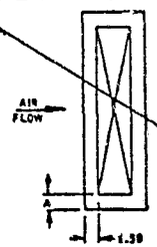
SIZE	A	B	C
05			
10	45.68	43.18	31.62
12			
15			
18	55.18	51.56	37.62
21			
26	67.68	63.18	43.62
32			

BLOW THRU SINGLE ZONE UNIT

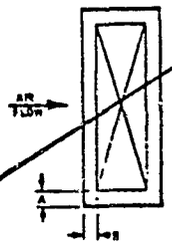


GENERAL NOTE:
INSTALLATION AND REMOVAL OF COILS ONLY ON SIDE OF COIL CONNECTIONS.

PREHEAT / REHEAT SECTION

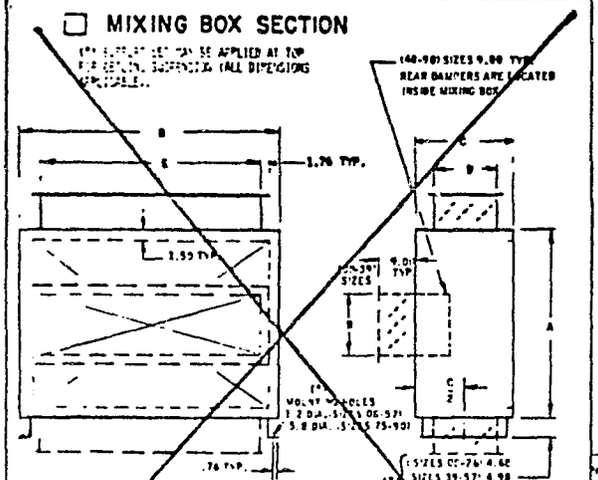


CONDENSER SECTION



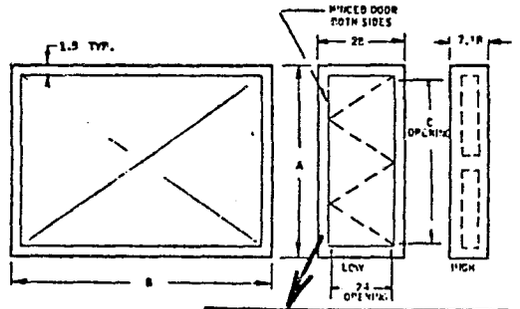
SIZE	A	B
05		
10		
12	.82	3.50
15		
18		
21		
26	1.06	3.99
32		

☐ MIXING BOX SECTION



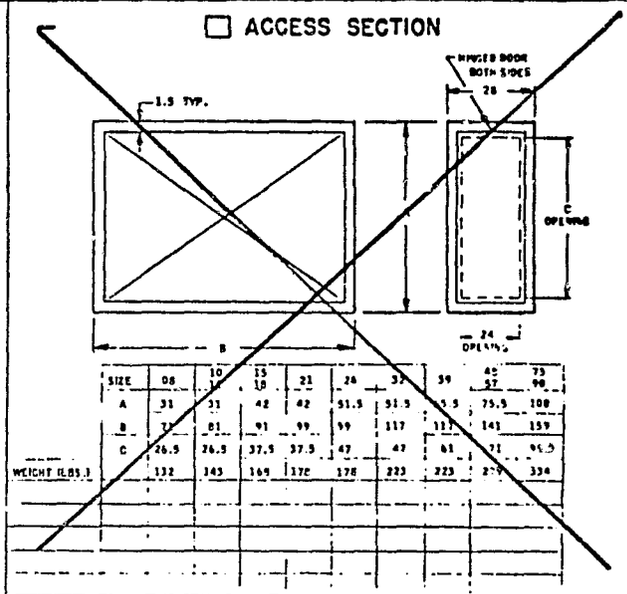
SIZE	08	10 12	15 18	21	26	32	39	48 57	75 90
A	31	31	42	42	51.5	51.5	65.5	75.5	100
B	71	81	91	99	117	117	141	141	159
C	26.5	26.5	37.5	37.5	47	47	61	71	95.5
D	15	16	23.32	23.32	23.32	30.64	30.64	37.96	52.60
E	54.36	54.36	74.36	82.36	82.36	100.36	100.36	124.36	136.36
WEIGHT LBS	241	272	424	455	455	495	545	748	1174

☐ LOW ☑ HIGH VELOCITY FILTER SECTION



SIZE	08	10 12	15 18	21	26	32	39	48 57	75 90
A	31	31	42	42	51.5	51.5	65.5	75.5	100
B	71	81	91	99	117	117	141	141	159
C	26.5	26.5	37.5	37.5	47	47	61	71	95.5
NO. 16"X25"X2" FILTERS L.V.	8	10	15	18	24	28	40	48	72
NO. 16"X25"X2" FILTERS H.V.	4	5	7	9	12	14	20	24	36
WEIGHT LBS LESS FILTERS L.V.	163	171	226	234	283	312	373	451	564
WEIGHT LBS LESS FILTERS H.V.	58	75	96	93	97	122	160	191	239

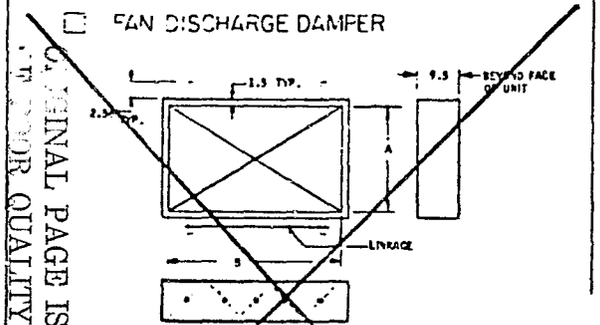
☐ ACCESS SECTION



SIZE	08	10 12	15 18	21	26	32	39	48 57	75 90
A	31	31	42	42	51.5	51.5	65.5	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	95.5
WEIGHT LBS	132	143	169	176	178	223	223	279	334

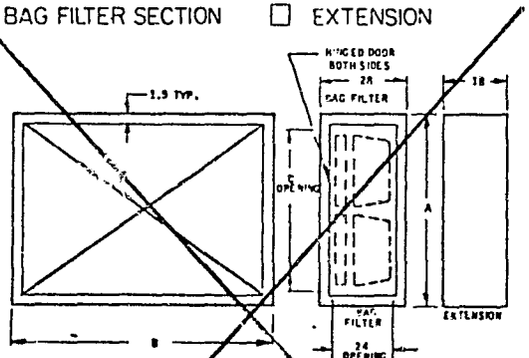
MARK FOR _____ LOCATION _____
UNIT NO _____ JOB NAME _____
JOB LOCATION _____
BUYER _____ DATE _____
BUYER NO _____ CUSTOMER'S ORDER NO _____
DIMENSIONS IN INCHES

☐ FAN DISCHARGE DAMPER



SIZE	08	10 12	15 18	21	26	32	39	48 57	75 90
A	19.38	19.38	26.14	26.14	36.14	36.14	36.14	36.14	49.14
B	19.38	26.00	26.00	26.00	30.39	37.20	37.20	40.00	
	2	3	3	3	4	5	5	5	
	29	36	43	55	55	73	73	87	

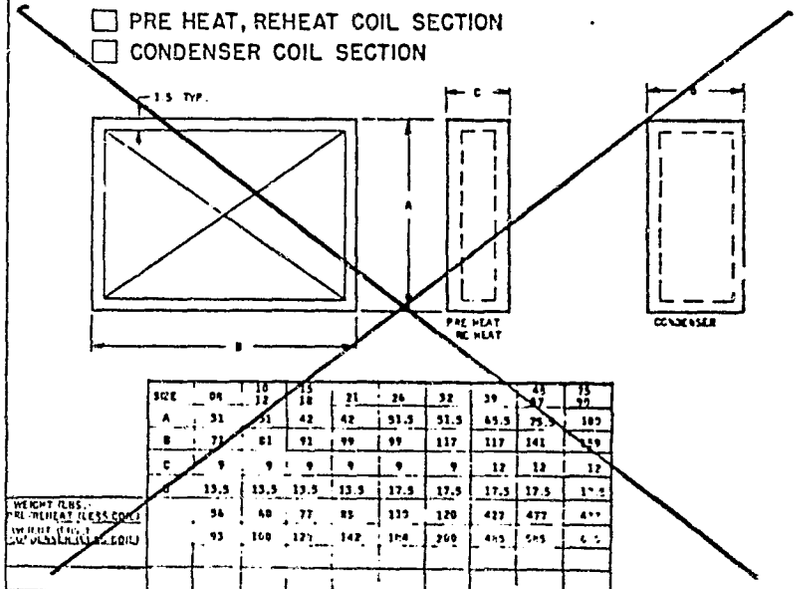
☐ BAG FILTER SECTION ☐ EXTENSION



NOTE: USE EXTENSION FOR BAG FILTERS OVER 21 INCHES DEEP.

SIZE	08	10 12	15 18	21	26	32	39	48 57	75 90
A	31	31	42	42	51.5	51.5	65.5	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	95.5
NO. OF 24"X24" BAG FILTERS	2	3	3	4	4	6	6	8	12
NO. OF 12"X24" 24"X24" BAG FILTERS	1	0	4	4	0	2	4	3	4
WEIGHT LBS BAG FILTER SECTION	122	126	178	202	211	263	322	401	519
WEIGHT LBS EXTENSION	21	29	35	111	111	133	137	179	203

☐ PRE HEAT, REHEAT COIL SECTION
☐ CONDENSER COIL SECTION



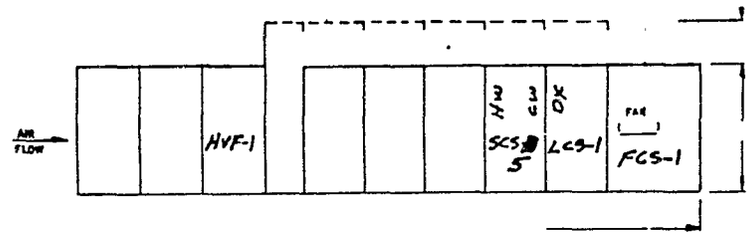
SIZE	08	10 12	15 18	21	26	32	39	48 57	75 90
A	31	31	42	42	51.5	51.5	65.5	75.5	100
B	71	81	91	99	99	117	117	141	159
C	9	9	9	9	9	9	12	12	12
	13.5	13.5	13.5	13.5	17.5	17.5	17.5	17.5	17.5
WEIGHT LBS PRE HEAT (LESS COIL)	56	60	77	85	119	126	122	172	177
WEIGHT LBS CONDENSER (LESS COIL)	93	100	121	142	196	200	195	285	295

DATE _____ SUPERSEDES _____

CENTRAL STATION WEATHERMAKER ACCESSORIES
SIZES 08-90

39E-203-1 5

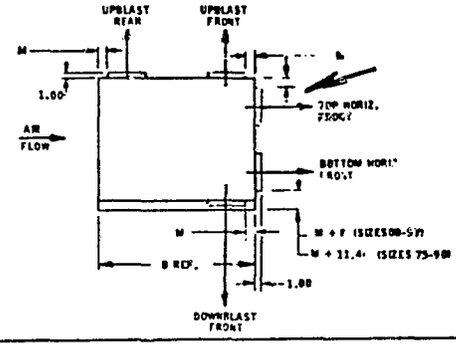
COMPONENT SEQUENCE



DIRECTION OF AIR FLOW			
COIL CONNECTIONS		FAN MOTOR	
RH	HW & DX	RH	✓
LH	CW	LH	

Diagram No. 5

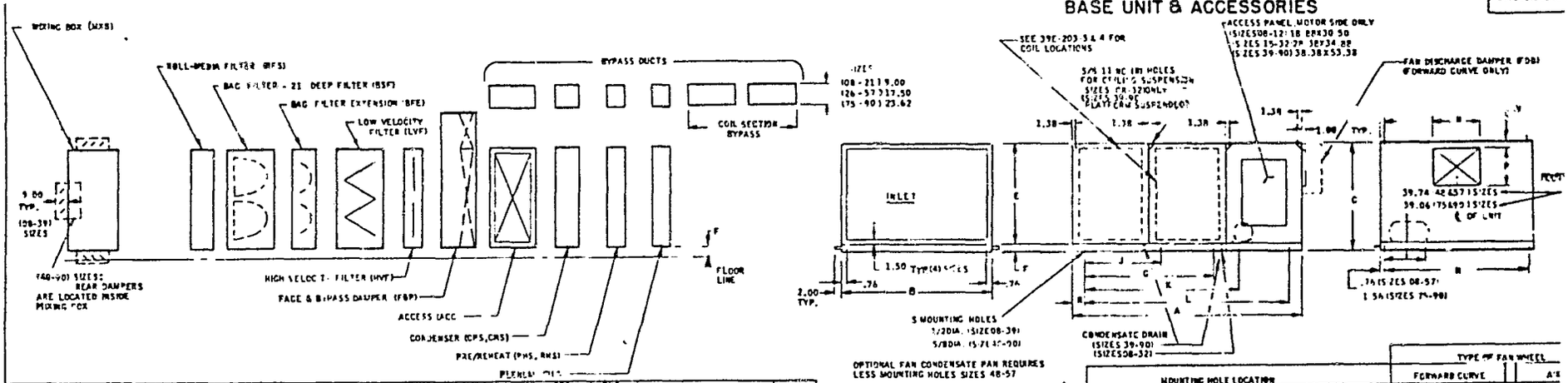
FAN DISCHARGE



MARK FOR UNIT NO. AC-1 LOCATION JOB NAME

DIMENSIONS IN

BASE UNIT & ACCESSORIES



SIZE	MXB	RFS	BFS	BFE	LVF	HVF	FBP	ACC	CPS CRS	PHS RHS	PLN	CSB	FDD
08	19.52	16.00	28.00	28.00	28.00	7.31	14.00	28.00	13.50	9.00	9.00	24.00	9.50
10													
12												31.00	
15	26.84												
18												42.00	
21													
24							17.50		17.50		17.50		
27	34.16											51.50	
30													
33												65.50	
36	41.48	18.75								12.00			
42												75.50	
48													
54	56.12						25.00				25.00	73.00	NOT AVAILABLE
60													

SIZE	A	B	C	D	E	F	G	H	J	K	L	R	S
08	86.00	71.00	35.68	31.00	31.00		52.00	69.50					
10		81.00						79.50				83.00	
12													
15	108.00	91.00	46.68	42.00	42.00	4.68	63.00	89.50				105.00	1.50
18													
21		99.00						97.50					
24	127.00		56.18	51.50	51.50		72.98					124.00	
27		117.00						115.50					
30	179.00		70.44	65.50	65.50		110.50		48.00			176.00	
36						4.94							8 (10R 10 H/PAN)
42	199.00	141.00	83.44	75.50	75.50		117.50	139.50	48.00	123.50	193.00		
48												3.00	
54	268.00	159.00	103.44	97.00	100.00	3.44	90.00	155.88	48.00	97.05	181.00		12
60													

SIZE	TYPE OF FAN WHEEL: FORWARD CURVE M	N	P	AIRFOIL M
08	3.92	14.64	12.32	3.32
10	3.82	14.58	15.82	
12		18.58		
15		17.76		6.39
18	3.59	19.76	24.76	4.16
21		22.76		2.59
24	2.72	26.76	31.25	4.84
27		31.76		2.66
30	8.84	34.46	36.46	7.38
36	5.44	36.88	42.16	2.74
42	NOT AVAILABLE			3.32
48				
54				
60				

HORIZONTAL DRAW-THRU CENTRAL STATION WEATHERMAKER 6-9" TSP SIZES 08-90

39E-20

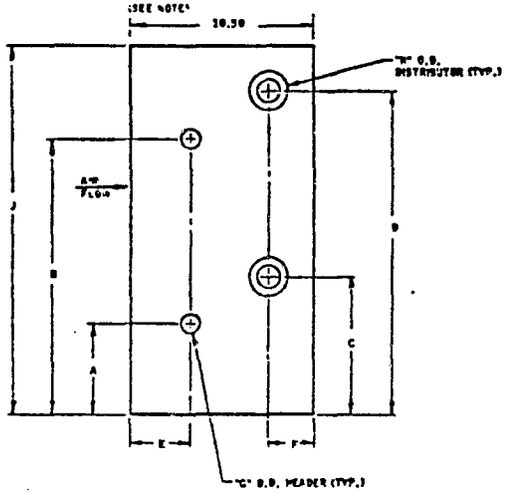
100

CODE NO. CATALOG NO 563-029

39E

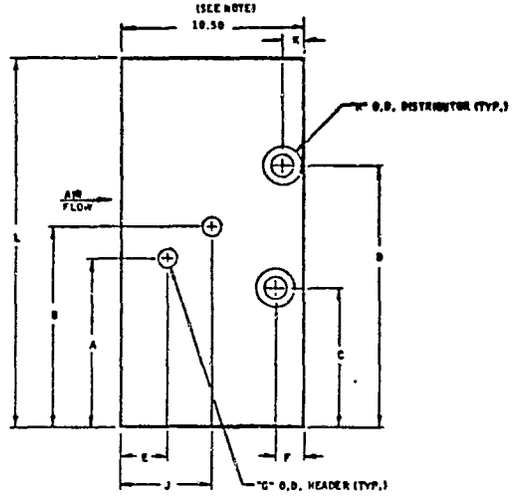
FACE SPLIT

(SEE NOTE)



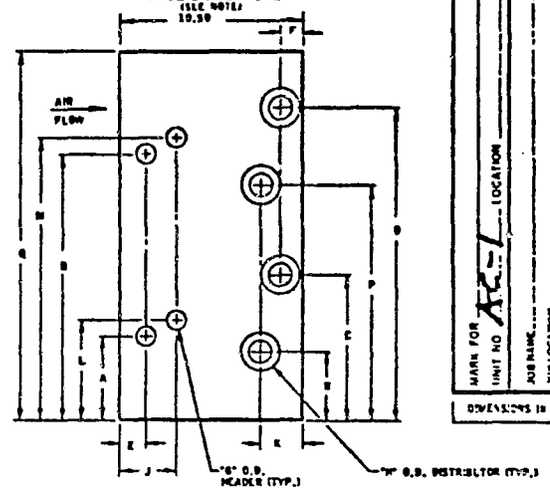
ROW SPLIT

(SEE NOTE)



DOUBLE CIRCUIT FACE OR ROW SPLIT

(SEE NOTE)



MARK FOR UNIT NO ACL LOCATION
JOB NAME
JOB LOCATION
BUYER
BUYER NO
CARR. NO

DIMENSIONS IN INCHES

UNIT SIZE	ROW	CIRCUIT	A	B	C	D	E	F	G	H	J	
08 & 10	4	QUARTER	9.94	15.94	6.56	16.56	3.62	2.00	7/8	7/8		22.50
		HALF							1 1/8			
		FULL			9.76	18.76			1 1/8	1 1/8		
	6	QUARTER	9.94	15.94	6.56	16.56	2.94	4.18	7/8	7/8		
		HALF							1 1/8			
		FULL			4.39	14.39			1 1/8	1 1/8		
	8	HALF	9.94	15.94	5.18	15.56	1.48	3.10	1 1/8	7/8		
		FULL			4.39	14.39			1 1/8	1 1/8		
12	4	HALF	8.44	19.44	7.26	20.04	3.62	2.00	1 1/8	7/8		27.50
		FULL	7.32	19.06	7.00	21.00			1 1/8	1 1/8		
	6	HALF	8.44	19.44	6.76	19.06	2.54	4.18	1 1/8	7/8		
		FULL	7.32	19.06	5.50	19.32			1 1/8	1 1/8		
	8	FULL	7.32	19.06	5.62	19.32	1.46	3.10	1 1/8	1 1/8		
15	4	HALF	8.44	23.44	9.32	24.06	3.62	2.00	1 1/8	7/8		33.50
		FULL			11.06	24.26			1 1/8	1 1/8		
	6	HALF	8.44	23.44	9.76	24.06	2.54	4.18	1 1/8	7/8		
		FULL			6.50	23.62			1 1/8	1 1/8		
	8	FULL	7.32	23.06	6.62	23.62	1.46	3.10	1 1/8	1 1/8		
18 & 21	4	HALF	10.94	25.56	5.62	27.44	3.62	2.00	1 1/8	7/8		38.50
		FULL	9.82	27.58	7.82	25.62			1 1/8	1 1/8		
	6	HALF	10.94	25.56	11.56	26.56	2.54	4.18	1 1/8	7/8		
		FULL	9.82	27.58	8.12	25.62			1 1/8	1 1/8		
	8	FULL	9.82	27.58	8.12	25.62	1.46	3.10	1 1/8	1 1/8		
26 & 32	4	HALF	12.82	29.06	10.62	33.12	3.62	2.00	1 1/8	1 1/8		47.50
		FULL	12.18	29.06	10.62	33.12			1 1/8	1 1/8		
	6	HALF	12.82	29.06	10.62	33.12	2.54	4.18	1 1/8	1 1/8		
		FULL	12.18	29.06	10.62	33.12			1 1/8	1 1/8		
	8	FULL	12.18	29.06	10.62	33.12	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	15.32	9.06	14.06	2.38	2.56	7/8	7/8	4.88	1.46	22.50
		HALF	4.06	17.07			2.32		1 1/8				
		FULL	10.32	11.56					1 1/8	1 1/8	4.94		
	6	QUARTER	6.56	15.32	9.06	14.06	1.30	4.68	7/8	7/8	3.80	3.62	
		HALF	2.82	14.06			2.32		1 1/8				
		FULL	9.06	12.82			1.24		1 1/8	1 1/8	3.86		
	8	HALF	9.06	12.82	9.06	14.06	1.46	3.62	1 1/8	7/8	3.46	2.56	
		FULL	11.56						1 1/8	1 1/8			
12	4	HALF	7.32	19.06	10.03	16.56	2.38	2.56	1 1/8	7/8	4.88	1.46	27.50
		FULL	13.82	14.06			2.32		1 1/8	1 1/8	4.94		
	6	HALF	11.56	15.32	11.56	16.56	1.30	4.68	1 1/8	7/8	3.82	3.62	
		FULL	11.56	15.32			1.24		1 1/8	1 1/8	3.86		
	8	FULL	14.75	15.32	11.56	16.56	1.46	3.62	1 1/8	1 1/8	3.46	2.56	
15	4	HALF	12.32	21.56	14.06	19.06	2.38	2.56	1 1/8	7/8	4.88	1.46	33.50
		FULL	15.30	15.58			2.32		1 1/8	1 1/8	4.94		
	6	HALF	14.06	22.80	14.06	19.06	1.30	4.68	1 1/8	7/8	3.80	3.62	
		FULL	14.06	17.82			1.24		1 1/8	1 1/8	3.86		
	8	FULL	16.56	17.82	14.06	19.06	1.46	3.62	1 1/8	1 1/8	3.46	2.56	
18 & 21	4	HALF	12.82	24.06	16.56	21.56	2.32	2.56	1 1/8	7/8	4.94	1.46	38.50
		FULL	17.80	19.06			2.24		1 1/8	1 1/8	5.02		
	6	HALF	16.56	20.32	16.56	21.56	1.34	4.68	1 1/8	7/8	3.86	3.62	
		FULL	16.56	20.32			1.10		1 1/8	1 1/8	3.94		
	8	FULL	19.06	20.32	16.56	21.56	1.46	3.62	1 1/8	1 1/8	3.52	2.56	
26 & 32	4	HALF	17.82	29.06	21.56	26.56	2.32	2.56	1 1/8	1 1/8	4.95	1.46	47.50
		FULL	22.80	24.06			2.24		1 1/8	1 1/8	5.03		
	6	HALF	21.56	25.30	21.56	26.56	1.34	4.68	1 1/8	1 1/8	3.86	3.62	
		FULL	21.56	25.32			1.10		1 1/8	1 1/8	3.94		
	8	FULL	21.56	22.82	21.56	26.56	1.46	3.62	1 1/8	1 1/8	3.52	2.56	

UNIT SIZE	ROW	CIRCUIT	A	B	C	D	E	F	G
08 & 10	8	DOUBLE	9.94	15.94	8.76	18.76	1.46	3.10	1 1/8
12	4	DOUBLE	5.32	17.82	10.03	22.53	2.33	2.00	1 1/8
	8		7.32	19.68	10.03	23.53	1.46	3.10	1 1/8
15	4	DOUBLE	6.56	21.56	11.26	26.26	2.33	2.00	1 1/8
	8		8.44	23.44	11.26	26.26	1.46	3.10	1 1/8
18 & 21	4	DOUBLE	7.82	25.32	12.50	32.22	2.94	2.00	1 1/8
	8		9.68	27.18	12.50	32.22	1.46	3.10	1 1/8
26 & 32	4	DOUBLE	10.32	32.82	15.00	37.50	2.94	2.00	1 1/8
	8		21.18	26.68	15.03	37.50	1.46	3.10	1 1/8

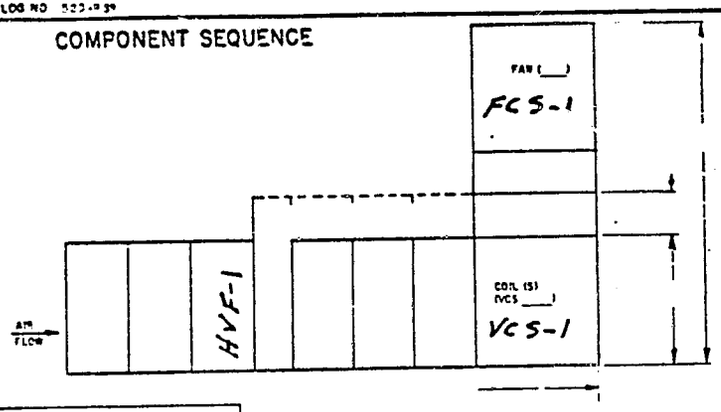
UNIT SIZE	ROW	CIRCUIT	H	J	K	L	M	N	P	Q	
08 & 10	8	DOUBLE	1 1/8	3.16	4.19	8.44	19.44	3.76	22.76	22.50	
12	4	DOUBLE	1 1/8	4.70	3.10	7.82	23.32	5.32	17.32	27.50	
	8		1 1/8	3.16	4.19	9.68	27.18	5.32	17.32		
15	4	DOUBLE	1 1/8	4.70	3.10	9.06	29.06	6.26	21.26	32.90	
	8		1 1/8	3.16	4.19	11.06	29.06	6.26	21.26		
18 & 21	4	DOUBLE	1 1/8	4.70	3.10	10.32	32.82	7.50	25.32	37.50	
	8		1 1/8	3.22	4.18	12.18	29.68	7.50	25.32		
26 & 32	4	DOUBLE	1 1/8	4.70	3.10	12.82	35.32	10.00	32.50	47.50	
	8		1 1/8	3.22	4.18	14.68	32.18	10.00	32.50		

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

DATE	SUPERSEDES		
3-1-74	39E-203-6 DATED 9-20-73	CENTRAL STATION WEATHERMAKER ACCESSORIES DX COIL DIMENSIONS SIZES 08-32	39E-203-6

CODE 201 . CATALOG NO 533-P39

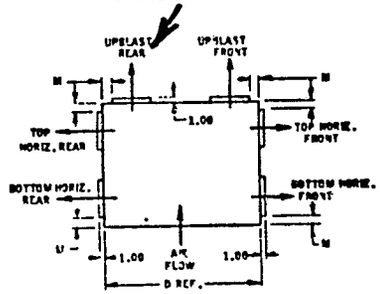
COMPONENT SEQUENCE



IN DIRECTION OF AIR FLOW			
COIL CONNECTIONS		FAN MOTOR	
RH	✓	RH	✓
LH		LH	

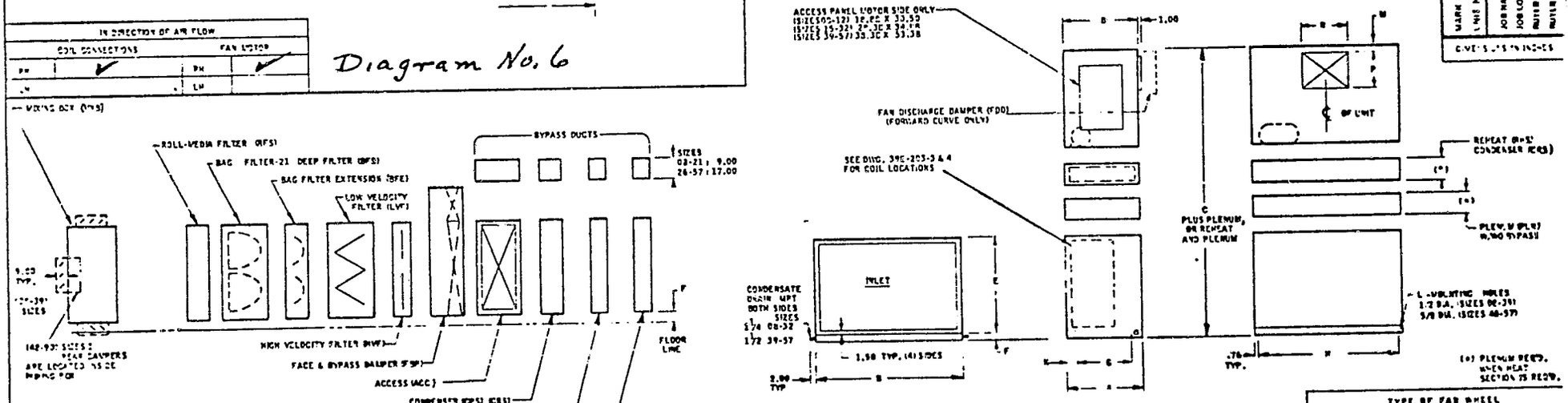
Diagram No. 6

FAN DISCHARGE



MARK FOR AC-Z LOCATION
JOB NAME
JOB LOCATION
BUYER
BUYER NO
DIMENSIONS IN INCHES

BASE UNIT & ACCESSORIES



SIZE	MXB	RFS	BFS	BFE	LW	HVF	FBP	ACC	CRS	PHS RHS	PLN	FDD
08	19.32	16.09	28.09	18.00	28.09	7.18	14.00	29.00	13.50	9.00	9.00	9.50
10												
12												
15	29.84											
18												
21												
26												
32	34.16						17.50		17.50	12.00	17.50	
39		32.75										
48	41.48											
57												

SIZE	A	C	C	B	E	F	G	H	K	L
08	31.00	71.00	66.68	31.00	31.00	4.68	29.00	69.50	1.50	4
10		81.00						79.50		
12										
15	42.00	91.00	88.68	42.00	42.00		39.00	89.50		
18										
21		99.00						97.50		
26	51.50		107.68	51.50	51.50		48.50			
32		117.00						119.50		
39	65.50		135.94	65.50	65.50		62.50			
48	75.50	141.00	155.94	75.50	75.50	4.94	69.50	139.50	3.00	6
57										

TYPE OF FAN WHEEL								
FORWARD CURVE				AIR FOIL				
M	N	P		M	N	P		
9.92	14.64	13.35		4.50	15.54			
3.22	16.56	15.82		3.32	21.00			
	18.59				23.02			
	17.76			4.00	25.44			
2.50	19.76	24.76		4.16	27.44			
	22.76			2.50	32.14			
2.72	24.24	31.25		4.56	35.62			
	33.26			2.65	39.56			
6.24	34.46	38.44		7.30	43.36			
5.44	36.86	43.14		2.74	53.12			

SEE DWG. 39E-203-1 THRU 39E-203-3 FOR ACCESSORY AND COIL DETAILS.
SEE DWG. 33A-9.2-1 FOR ROLL MEDIA FILTER DETAILS.
(*) ACCESS/DRY LEG PLENUM WHEN ACCESSORY LENGTH EXCEEDS 41.00. DO NOT INCLUDE MIXING BOX.

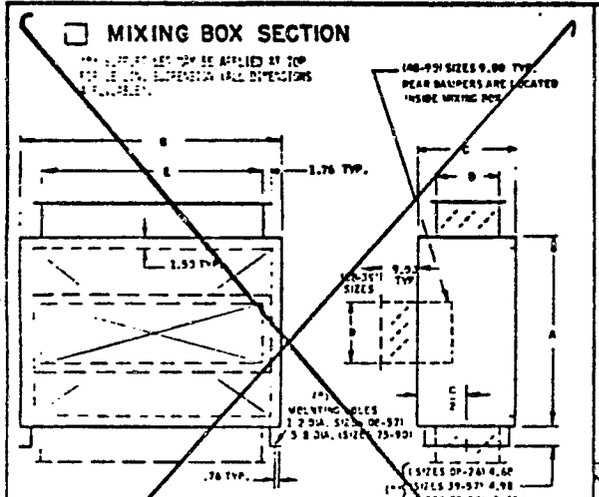
DATE | SUPERSEDES

VERTICAL DRAW-THRU CENTRAL STATION WEATHERMAKER

39E-202-3

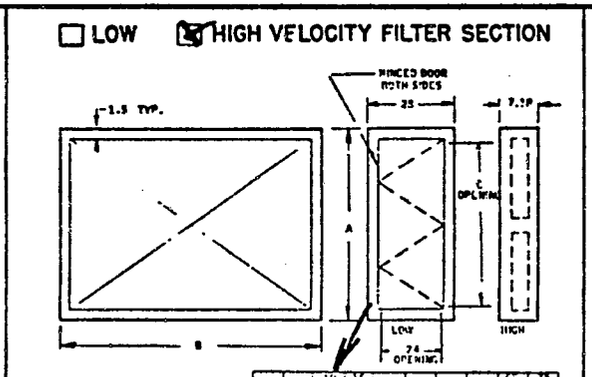
102

☐ MIXING BOX SECTION



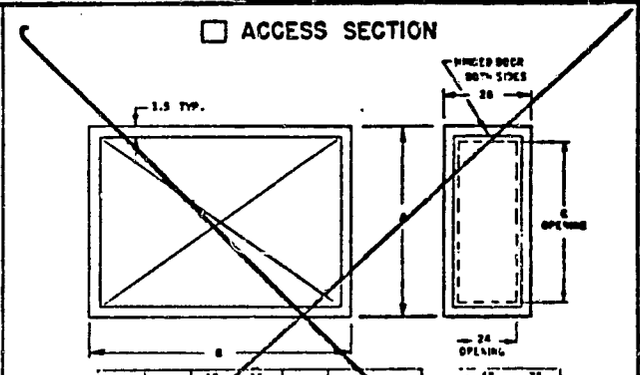
SIZE	08	10 12	15 18	21	26	32	39	48 57	75 90
A	31	31	42	42	51.5	51.5	65.5	75.5	100
B	71	81	91	99	99	117	117	141	159
C	26.52	26.52	26.74	26.84	26.84	34.16	34.16	41.48	56.12
D	14	16	23 32	23.32	23.32	30.64	30.64	37.96	52.60
E	94.36	94.36	94.36	92.36	92.36	100.36	100.36	124.36	136.36
WEIGHT (LBS)		221	277	429	455	455	495	545	745	1174

☐ LOW ☒ HIGH VELOCITY FILTER SECTION



SIZE	08	10 12	15 18	21	26	32	39	48 57	75 90
A	31	31	42	42	51.5	51.5	65.5	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	95.5
NO. 16"X25"X22" FILTERS L.V.		8	10	15	20	24	28	36	48	60
NO. 16"X25"X22" FILTERS H.V.		4	6	9	5	12	14	18	24	30
WEIGHT (LBS) LESS FILTERS L.V.		163	171	226	274	263	312	333	454	564
WEIGHT (LBS) LESS FILTERS H.V.		58	74	78	93	97	122	140	191	249

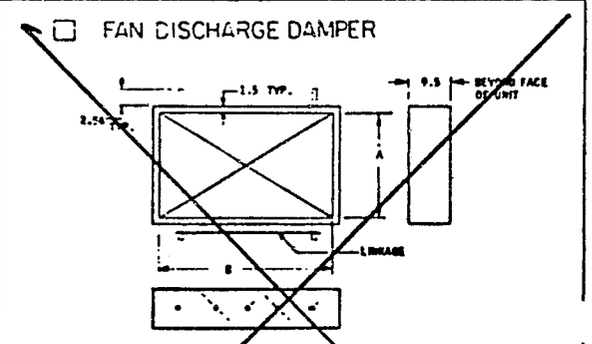
☐ ACCESS SECTION



SIZE	08	10 12	15 18	21	26	32	39	48 57	75 90
A	31	31	42	42	51.5	51.5	65.5	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	95.5
WEIGHT (LBS)		132	143	169	178	178	223	225	279	334

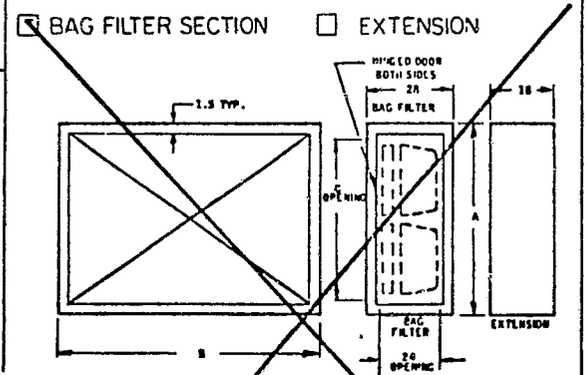
MARK FOR AC-2 LOCATION
UNIT NO
JOB NAME
JOB LOCATION
BUYER
BUYER NO
DATE
DIMENSIONS IN INCHES

☐ FAN DISCHARGE DAMPER



SIZE	03	10 12	15 18	21	26	32	39	48 57
A	18 39	18.39	26.14	26.14	36.14	36.14	36.14	49.14
B	16.00	26.00	26 09	34.00	30.36	37.70	37.70	40.00
	2	3	4	4	6	8	8	8
	28	34	43	55	55	73	73	87

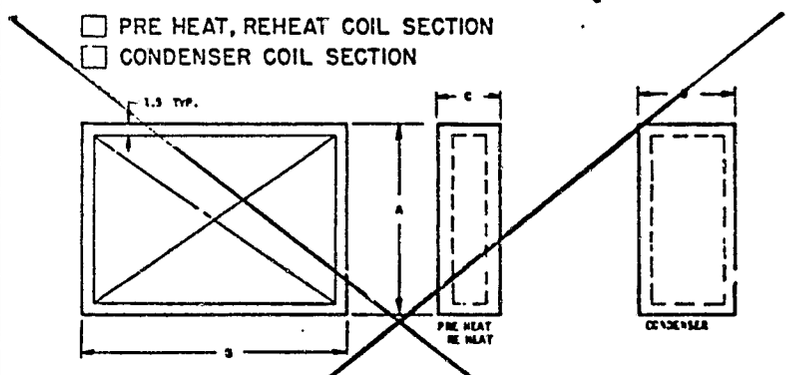
☐ BAG FILTER SECTION ☐ EXTENSION



NOTE: USE EXTENSION FOR BAG FILTERS OVER 21 INCHES DEEP.

SIZE	03	10 12	15 18	21	26	32	39	48 57	75 90
A	31	31	42	42	51.5	51.5	65.5	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	95.5
NO. 07 12"X24"		1	0	4	4	0	2	4	5	4
BAG FILTERS 24"X24"		2	1	3	4	4	4	4	5	8
NO. 07 12"X24"		1	0	4	4	0	2	4	5	4
PRE-FILTERS 24"X24"		2	3	3	4	8	8	8	10	16
WEIGHT (LBS) BAG FILTER SECTION		133	202	270	287	311	363	427	509	644
WEIGHT (LBS) EXTENSION		21	29	39	111	111	135	133	187	293

☐ PRE HEAT, REHEAT COIL SECTION
☐ CONDENSER COIL SECTION

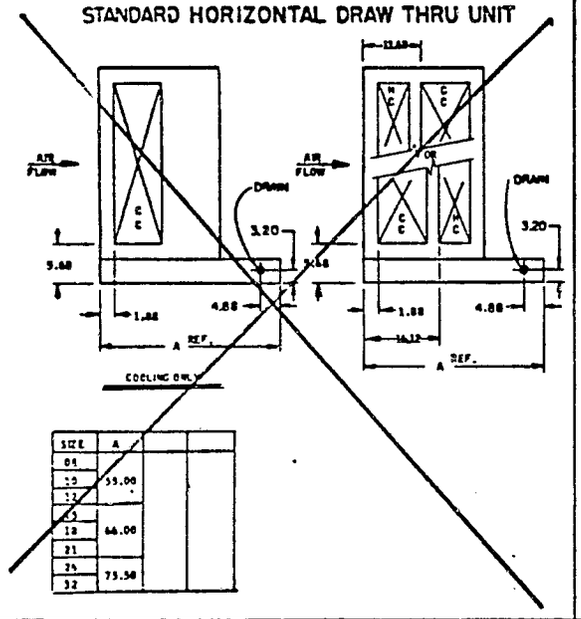


SIZE	08	10 12	15 18	21	26	32	39	48 57	75 90
A	31	31	42	42	51.5	51.5	65.5	75.5	100
B	71	81	91	99	99	117	117	141	159
C		9	9	9	9	9	12	12	12
D	13.5	13.5	13.5	13.5	17.5	17.5	17.5	17.5	17.5
WEIGHT (LBS) PRE HEAT OR REHEAT COIL		54	68	77	85	119	139	227	277	407
WEIGHT (LBS) CONDENSER COIL		93	100	125	142	196	208	465	585	615

CENTRAL STATION WEATHERMAKER ACCESSORIES

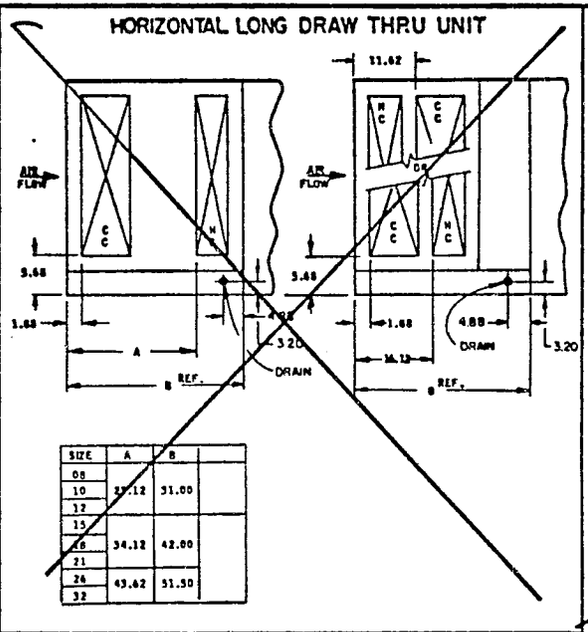
39E-203-1 REV P

STANDARD HORIZONTAL DRAW THRU UNIT



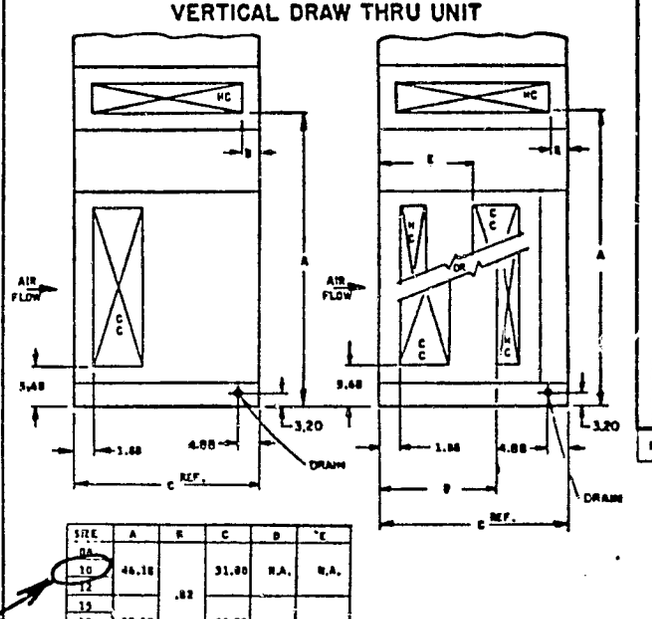
SIZE	A
08	
10	55.00
12	
15	
18	66.00
21	
24	75.50
32	

HORIZONTAL LONG DRAW THRU UNIT



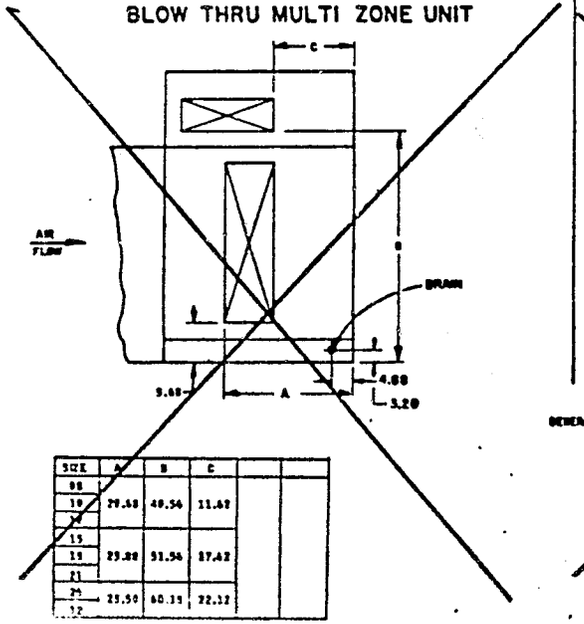
SIZE	A	B
08		
10	27.12	31.00
12		
15		
18	34.12	42.00
21		
24	43.62	51.50
32		

VERTICAL DRAW THRU UNIT



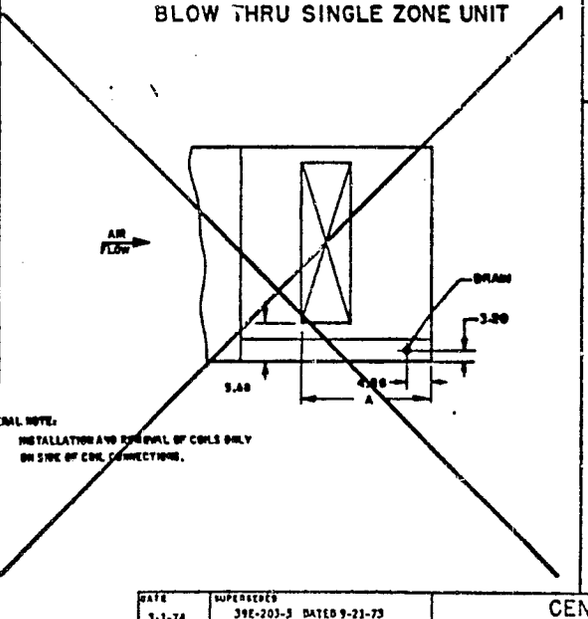
SIZE	A	B	C	D	E
08					
10	46.18	.82	31.00	N.A.	N.A.
12					
15					
18	37.18		42.00		
21				16.12	11.62
24					
26	66.68	1.06	51.50		
32					

BLOW THRU MULTI ZONE UNIT



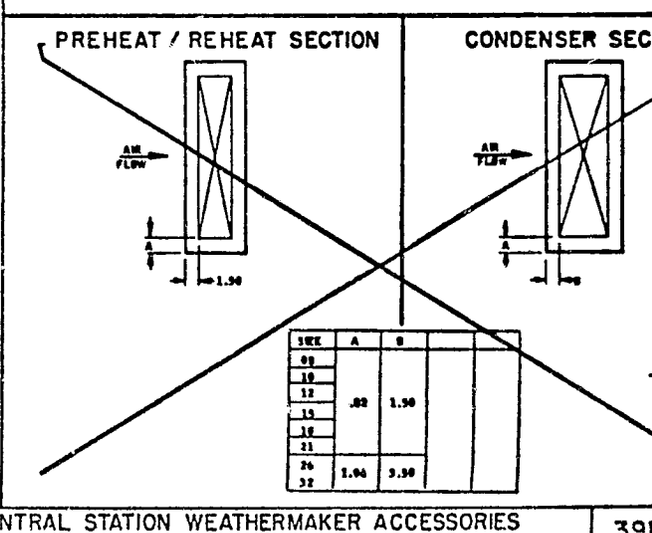
SIZE	A	B	C
08			
10	29.68	40.56	11.62
12			
15			
18	29.88	51.56	17.62
21			
24	25.50	60.31	22.12
32			

BLOW THRU SINGLE ZONE UNIT



GENERAL NOTE:
INSTALLATION AND REMOVAL OF COILS ONLY
ON SIDE OF COIL CONNECTIONS.

PREHEAT / REHEAT SECTION



CONDENSER SECTION

SIZE	A	B
08		
10		
12	.82	1.90
15		
18		
21		
24	1.06	3.30
32		

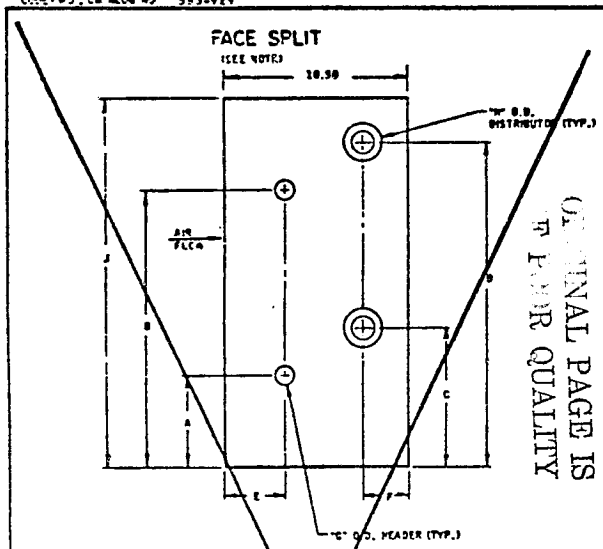
MARK FOR UNIT NO. ACCT. LOCATION
JOB NAME
JOB LOCATION
BUYER
DIMENSIONS IN INCHES

DATE	SUPERSEDES	CENTRAL STATION WEATHERMAKER ACCESSORIES	
3-1-74	39E-203-3 DATED 9-21-73	COIL LOCATIONS SIZES 08 - 32	39E-203-3

CODE-NO., CATALOG NO 383-929

FACE SPLIT

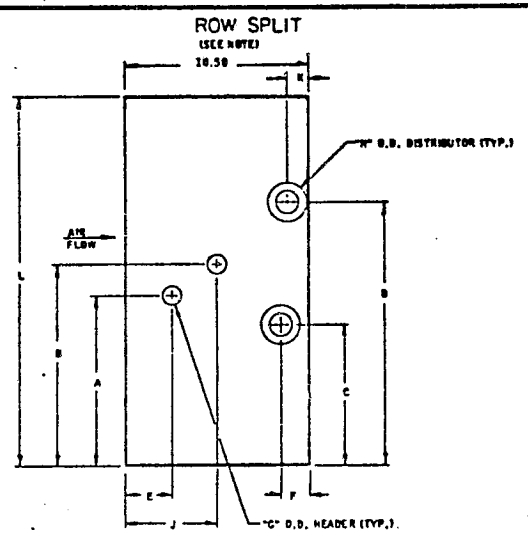
(SEE NOTE)



UNIT SIZE	ROW	CIRCUIT	A	B	C	D	E	F	G	H	J
08 & 10	4	QUARTER	5.94	15.94	6.56	16.56	3.62	2.00	7/8	7/8	22.50
		HALF							1 1/8		
		FULL			9.76	19.76			1 1/8	1 1/8	
	8	QUARTER	5.94	15.94	6.56	16.56	2.56	4.12	7/8	7/8	
		HALF							1 1/8		
		FULL			9.76	19.76			1 1/8	1 1/8	
	12	HALF	5.94	15.94	9.06	19.06	1.46	3.12	1 1/8	7/8	
		FULL			10.62	20.62			1 1/8	1 1/8	
12	4	HALF	8.44	18.44	7.76	17.76	3.62	2.00	1 1/8	7/8	27.50
		FULL			10.00	20.00			1 1/8	1 1/8	
	8	HALF	8.44	18.44	9.06	19.06	2.56	4.12	1 1/8	7/8	
		FULL			10.62	20.62			1 1/8	1 1/8	
	12	HALF	8.44	18.44	9.06	19.06	1.46	3.12	1 1/8	7/8	
		FULL			10.62	20.62			1 1/8	1 1/8	
15	4	HALF	8.44	23.44	9.06	24.06	3.62	2.00	1 1/8	7/8	32.50
		FULL			10.62	25.62			1 1/8	1 1/8	
	8	HALF	8.44	23.44	9.06	24.06	2.56	4.12	1 1/8	7/8	
		FULL			10.62	25.62			1 1/8	1 1/8	
	12	FULL	8.44	23.44	10.62	25.62	1.46	3.12	1 1/8	1 1/8	
18 & 21	4	HALF	13.94	28.94	9.06	29.06	3.62	2.00	1 1/8	7/8	38.50
		FULL			10.62	30.62			1 1/8	1 1/8	
	8	HALF	13.94	28.94	12.56	29.06	2.56	4.12	1 1/8	7/8	
		FULL			14.12	30.62			1 1/8	1 1/8	
	12	FULL	13.94	28.94	14.12	30.62	1.46	3.12	1 1/8	1 1/8	
26 & 32	4	HALF	18.44	33.44	12.56	34.06	3.62	2.00	1 1/8	7/8	47.50
		FULL			14.12	35.62			1 1/8	1 1/8	
	8	HALF	18.44	33.44	14.06	34.06	2.56	4.12	1 1/8	7/8	
		FULL			15.62	35.62			1 1/8	1 1/8	
	12	FULL	18.44	33.44	15.62	35.62	1.46	3.12	1 1/8	1 1/8	

ROW SPLIT

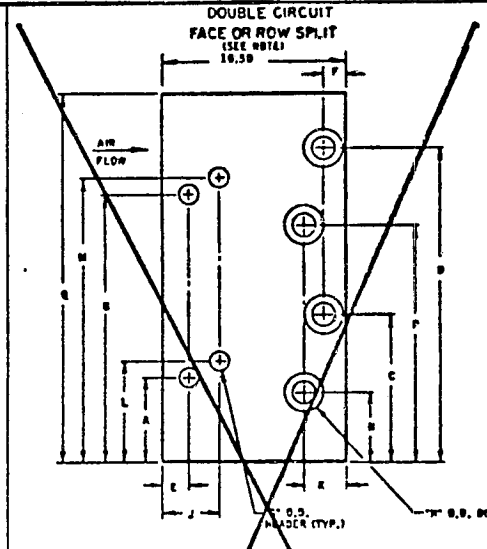
(SEE NOTE)



UNIT SIZE	ROW	CIRCUIT	A	B	C	D	E	F	G	H	J	K	L
08 & 10	4	QUARTER	6.56	15.32	9.06	14.06	2.36	2.56	7/8	7/8	4.88	1.46	22.50
		HALF	4.06	12.82					1 1/8				
		FULL	13.30	11.56			2.32		1 1/8	1 1/8	4.94		
	8	QUARTER	6.56	15.32	9.06	14.06	1.30	4.68	7/8	7/8	3.80	2.62	
		HALF	7.90	14.08					1 1/8				
		FULL	9.06	12.82			1.24		1 1/8	1 1/8	3.86		
	12	HALF	9.06	12.82	9.06	14.06	1.46	3.62	1 1/8	7/8	3.46	2.56	
		FULL	11.56						1 1/8	1 1/8			
12	4	HALF	7.82	12.76	10.00	16.56	2.36	2.56	1 1/8	7/8	4.88	1.46	27.50
		FULL	12.80	14.06			2.32		1 1/8	1 1/8	4.94		
	8	HALF	11.56	15.32	11.56	16.56	1.30	4.68	1 1/8	7/8	3.80	3.62	
		FULL	11.56	15.32			1.24		1 1/8	1 1/8	3.86		
	12	FULL	14.06	15.32	11.56	16.56	1.46	3.62	1 1/8	1 1/8	3.46	2.56	
15	4	HALF	10.32	21.91	14.06	19.06	2.36	2.56	1 1/8	7/8	4.88	1.46	32.50
		FULL	15.35	16.56			2.32		1 1/8	1 1/8	4.94		
	8	HALF	14.06	17.00	14.06	19.06	1.30	4.68	1 1/8	7/8	3.80	3.62	
		FULL	14.06	17.82			1.24		1 1/8	1 1/8	3.86		
	12	FULL	16.56	17.82	14.06	19.06	1.46	3.62	1 1/8	1 1/8	3.46	2.56	
18 & 21	4	HALF	12.82	24.06	16.56	21.56	2.32	2.56	1 1/8	7/8	4.94	1.46	38.50
		FULL	17.80	19.06			2.24		1 1/8	1 1/8	5.00		
	8	HALF	16.56	20.32	16.56	21.56	1.24	4.68	1 1/8	7/8	3.86	3.62	
		FULL	16.56	20.32			1.18		1 1/8	1 1/8	3.94		
	12	FULL	19.06	20.32	16.56	21.56	1.46	3.62	1 1/8	1 1/8	3.32	2.56	
26 & 32	4	HALF	17.32	29.06	21.56	26.56	2.32	2.56	1 1/8	7/8	4.94	1.46	47.50
		FULL	22.80	24.06			2.24		1 1/8	1 1/8	5.00		
	8	HALF	21.56	25.30	21.56	26.56	1.24	4.68	1 1/8	1 1/8	3.86	3.62	
		FULL	21.56	25.32			1.18		1 1/8	1 1/8	3.94		
	12	FULL	21.56	25.82	21.56	26.56	1.46	3.62	1 1/8	1 1/8	3.32	2.56	

DOUBLE CIRCUIT FACE OR ROW SPLIT

(SEE NOTE)



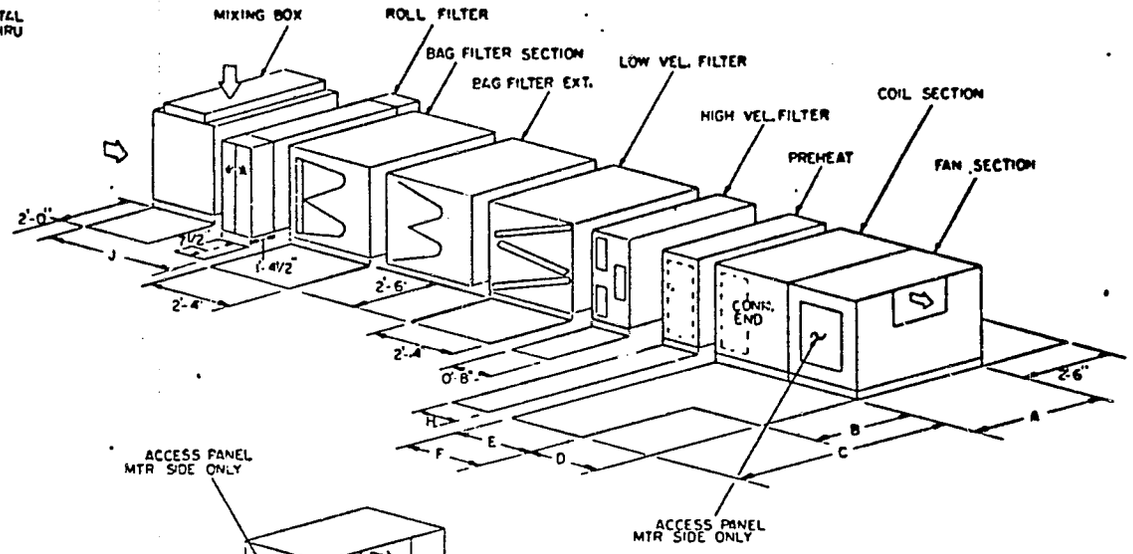
UNIT SIZE	ROW	CIRCUIT	A	B	C	D	E	F	G
08 & 10	8	DOUBLE	5.94	15.94	9.76	19.76	1.46	3.12	1 1/8
12	4	DOUBLE	5.94	17.82	10.00	22.56	3.22	2.00	1 1/8
	8		7.18	19.68	10.00	22.65	1.46	3.20	1 1/8
15	4	DOUBLE	6.56	21.56	11.26	26.26	3.22	2.32	1 1/8
	8		8.44	23.44	11.26	26.26	1.46	3.32	1 1/8
18 & 21	4	DOUBLE	9.82	25.32	12.52	29.32	2.94	2.32	1 1/8
	8		9.68	27.18	12.52	29.32	1.46	3.32	1 1/8
26 & 32	4	DOUBLE	10.32	32.92	15.00	37.51	2.54	2.93	1 1/8
	8		21.18	34.68	15.00	37.56	1.46	3.10	1 1/8

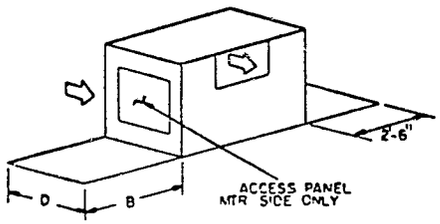
UNIT SIZE	ROW	CIRCUIT	H	J	K	L	M	N	P	Q
08 & 10	8	DOUBLE	1 1/8	3.16	4.69	8.44	19.76	3.76	23.76	22.50
12	4	DOUBLE	1 1/8	4.78	3.19	7.93	22.56	5.22	27.82	27.50
	8		1 1/8	3.16	4.19	9.69	22.65	5.22	27.82	
15	4	DOUBLE	1 1/8	4.78	3.19	9.06	26.26	4.26	31.26	32.50
	8		1 1/8	3.16	4.19	10.56	26.26	4.26	31.26	
18 & 21	4	DOUBLE	1 1/8	4.78	3.19	10.32	31.32	7.26	38.58	38.50
	8		1 1/8	3.22	4.18	12.18	29.68	7.26	36.83	
26 & 32	4	DOUBLE	1 1/8	4.78	3.19	12.82	35.32	10.26	45.58	47.50
	8		1 1/8	3.22	4.18	14.68	37.18	10.32	47.50	

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

MARK FOR UNIT NO AC-3 LOCATION
JOB NAME
JOB LOCATION
BUYER
BUYER NO
DIMENSIONS IN INCHES

DATE	SUPERSEDES	CENTRAL STATION WEATHERMAKER ACCESSORIES DX COIL DIMENSIONS	SIZES 08-32	39E-203-6	REV A
3-1-74	39E-203-6 DATED 9-20-73				

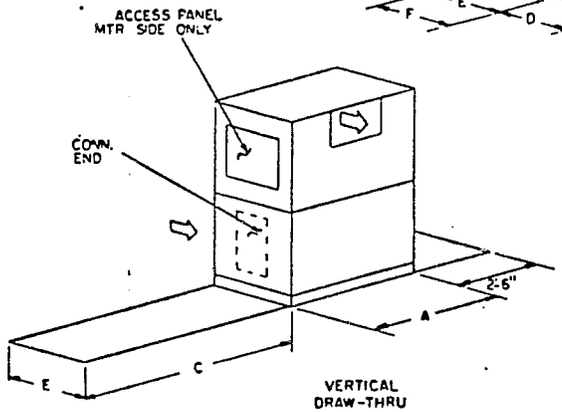




FAN ONLY

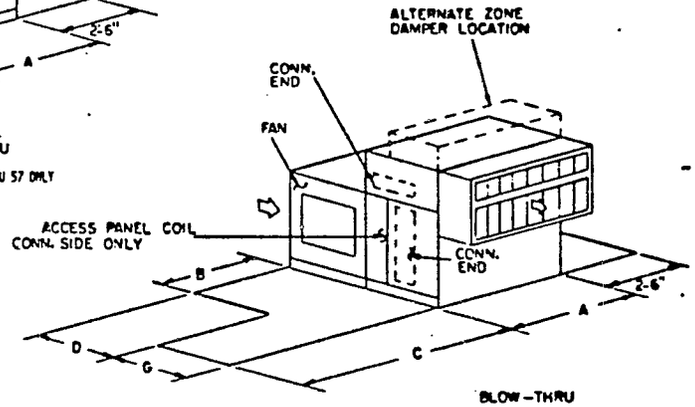
LEGEND

AIR FLOW SERVICE AREA



VERTICAL
DRAW-THRU

SIZES 08 THRU 57 ONLY



BLOW-THRU

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

** ACCESS DOOR ON THE AIR ENTERING SIDE (EXTENDS 2'-6" ON BOTH SIDES OF FILTER)

TYP.	UNIT SIZE													
STANDARD	08	10	12	15	18	21	25	32	39	48	57	75	90
A	5'-2 1/2"	6'-0"	6'-6"	7'-2"	7'-7"	8'-3"	8'-3"	8'-9"	9'-9"	11'-9"	11'-9"	13'-3"	13'-3"
B	3'-1"	3'-4"	3'-11"	4'-1"	4'-6"	4'-7"	4'-10"	5'-3"	5'-6"	6'-6"	6'-6"	7'-8"	7'-8"
C	2'-1"	2'-7"	2'-10"	3'-0"	3'-0"	3'-6"	3'-6"	4'-0"	4'-0"	5'-0"	5'-0"	6'-0"	6'-0"
D	2'-1"	2'-7"	2'-7"	3'-5"	3'-5"	3'-6"	3'-6"	4'-6"	4'-6"	5'-6"	6'-6"	7'-8"	7'-8"
E	2'-2"	2'-7"	2'-7"	3'-6"	3'-6"	3'-6"	3'-6"	4'-6"	4'-6"	5'-6"	6'-6"	7'-8"	7'-8"
F	2'-1"	2'-6"	2'-7"	2'-7"	2'-7"	2'-7"	2'-6"	2'-7"	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"
G	2'-1"	2'-6"	2'-7"	3'-6"	3'-6"	3'-6"	4'-6"	4'-6"	5'-6"	6'-6"	6'-6"	7'-5"	7'-5"
H	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
J	3'-1"	3'-4"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-6"	3'-7"	3'-7"	3'-7"	3'-7"

DATE 9-8-76 | SUPERSEDES

CENTRAL STATION WEATHERMAKER SERVICE AREA REQUIREMENTS | 39E-203-13

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.

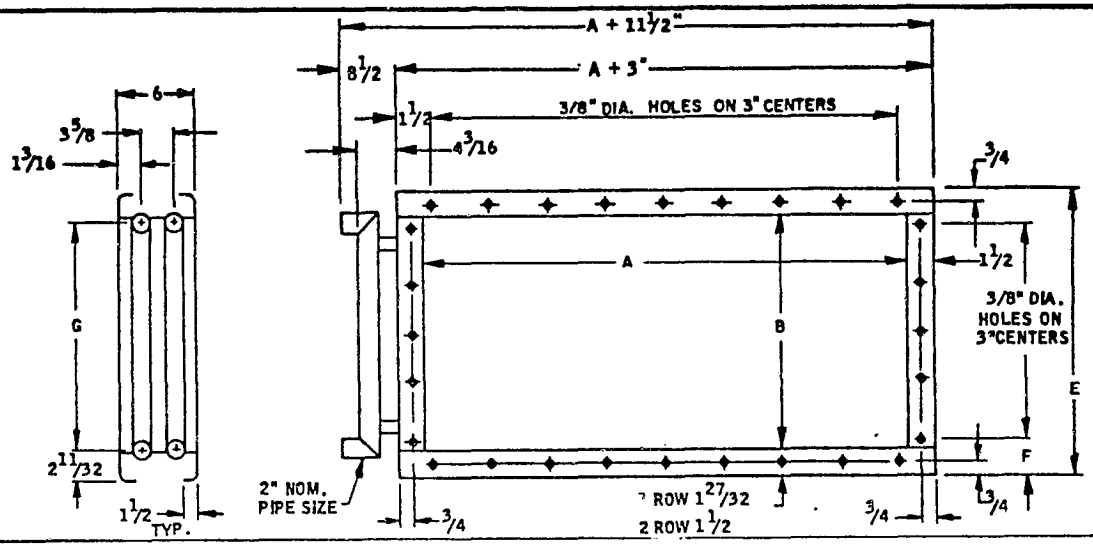
Desig	CFM	FA	FV	Total	Sensible	EAT	GPM	PD
Zone-2	3700	8.53	434	142,000	102,213	82/68	22.2	3.5'
Zone-3	1574	3.83	411	54,100	41,123	82/68	8.0	.9'

R/F	TFXNTL
6/8	.24 x 36
6/8	16 x 24

CODE MO & OC, CATALOG NO. 582-826

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.

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	S	U	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 7/8	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

△ P - PRESSURE DROP

QTY.	IDENT.	COIL NUMBER	FACE AREA (SQ.FT.)	SCFM	FACE VEL.	AIR △P IN-WG	AIR TEMP.°F ENT.	AIR TEMP.°F LVG.	CAP. MBH	SAT. STEAM PRESS PSIG	SAT. STEAM TEMP. °F	COND. RATE LBS/HR.	WATER TEMP.°F ENT.	WATER TEMP.°F LVG.	GPM	WATER △P FT-WG

JOB NAME_____

JOB LOCATION_____

BUYER_____

BUYER NO._____ CARRIER NO._____

DIMENSIONS CERTIFIED BY_____ DATE_____

DATE	SUPERSEDES	28SU U BEND HEATING COILS (1 & 2 ROW)	28S-202-2	REV.
5-29-73	28S-20? ATED 4-15-71			A

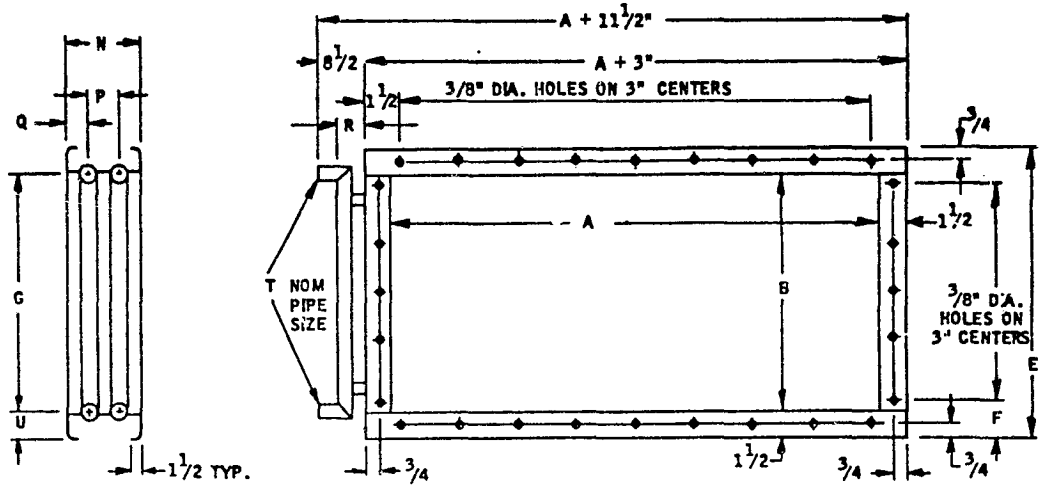
Carrier

CARRIER AIR CONDITIONING COMPANY

28S

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.

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	2.91	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	4.79	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	—	—

TUBE FACE	B	E	F	G 2, 2½ & 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 1/8	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	1½	4 11/16	2½	2 11/32
6	HALF	10	5 1/32	2	4 3/16	2	2 11/32
	FULL	10	6 1/32	2	4 11/16	2½	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	2½	2 11/32
	DOUBLE	12	7 7/32	2 3/8	6 5/16	4	3 7/32

*

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

△P - PRESSURE DROP

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

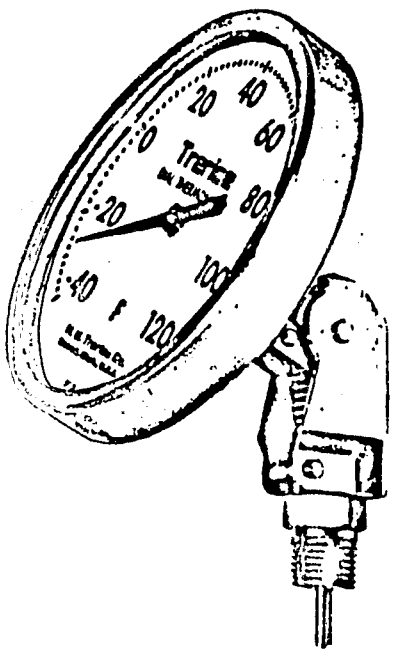
JOB NAME
JOB LOCATION
BUYER
BUYER NO. CARRIER NO.
DIMENSIONS CERTIFIED BY DATE

DATE	SUPERSEDES		REV
3-1-76	28S-202-3A DATED 5-23-73	28SW CHILLED WATER COILS (4, 6 & 8 ROW)	28S-202-3 B

Thermometers

Trerice

DIAL THERMOMETERS ADJUSTABLE ANGLE BI-METAL TYPE



B3600 - Series
Head Diameter

B3600 - Series
Head Diameter

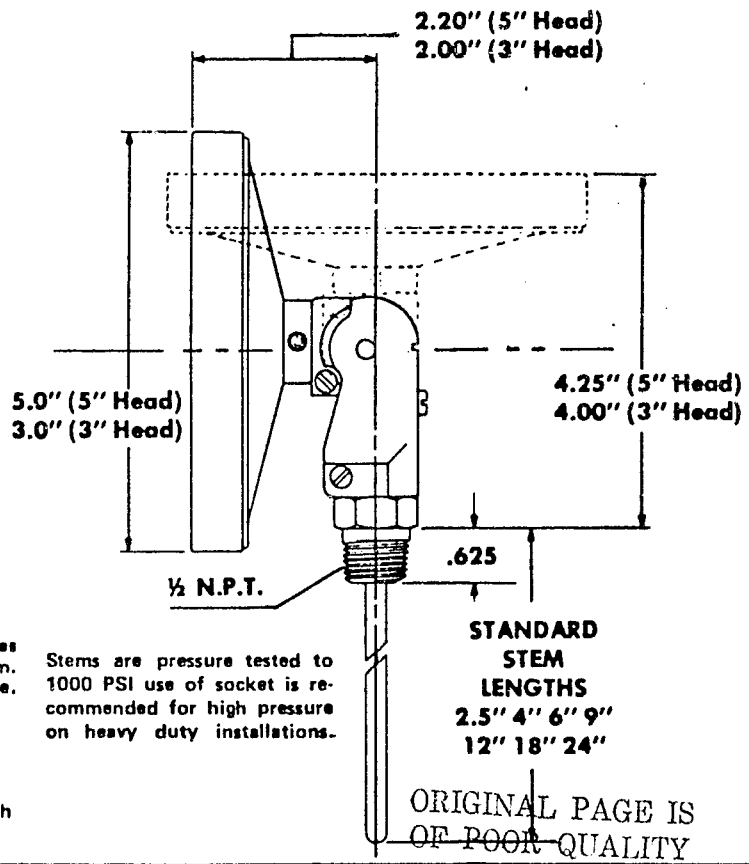
ADJUSTABLE FOR VIEWING AT ANY ANGLE.

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: ½" N.P.T. standard.
- Stem diameter: ¼". Standard stem lengths: 2½", 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 STEM LENGTHS
2.5" 4" 6" 9" 12" 18" 24"

Stems are pressure tested to 1000 PSI use of socket is recommended for high pressure on heavy duty installations.

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°	½°
**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 2½" 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:

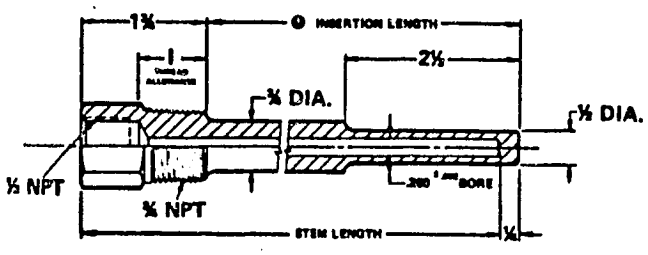
State quantity, Catalog number, name, range, stem length and separable socket specification, if required.

Catalog Number	Nominal Stem Length (Including Thread)	Catalog Number	Nominal Stem Length (Including Thread)	Catalog Number	Nominal Stem Length (Including Thread)
B85602	2½"	B85609	9"	B85624	24"
B85604	4"	B85612	12"		
B85606	6"	B85618	18"		

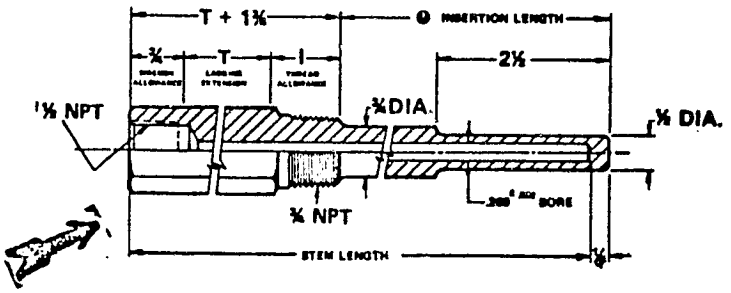
Trerice

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

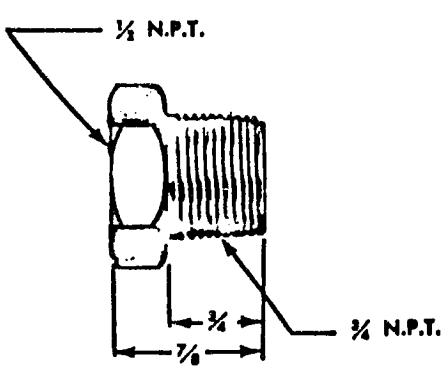
Nominal Thermometer Stem Length	Socket Ⓤ Insertion Length	Extension Neck Ⓣ Length	MATERIAL		
			Brass	Stainless Steel 304	Stainless Steel 316
4"	2½"	None	76-4G2	76-4G5	76-4G6
6"	4½"	None	76-4J2	76-4J5	76-4J6
6"	2½"	2"	76-4JC2	76-4JC5	76-4JC6
9"	7½"	None	76-4M2	76-4M5	76-4M6
9"	4½"	3"	76-4MC2	76-4MC5	76-4MC6
12"	10½"	None	76-4R2	76-4R5	76-4R6
12"	7½"	3"	76-4RC2	76-4RC5	76-4RC6
18"	16½"	None	76-Wa2	76-Wa5	76-Wa6
18"	13½"	3"	76-WaC2	76-WaC5	76-WaC6
24"	22½"	None	76-Wk2	76-Wk5	76-Wk6
24"	19½"	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

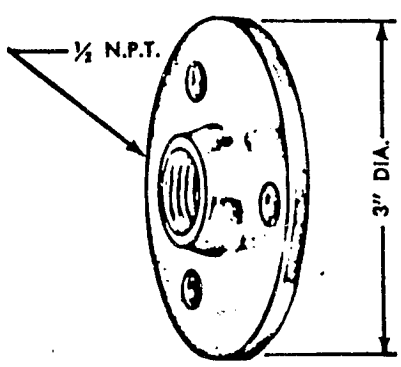
MATERIAL	TEMPERATURE – °F.						
	70°	200°	400°	600°	800°	1000°	1200°
BRASS	5000	4200	1000	-----	-----	-----	-----
A.I.S.I. – 304	7000	6200	5600	5400	5200	4500	1650
A.I.S.I. – 316	7000	7000	6400	6200	6100	5100	2500

ADAPTER HUB
For connecting ½" N.P.T. conn. to ¾" N.P.T.



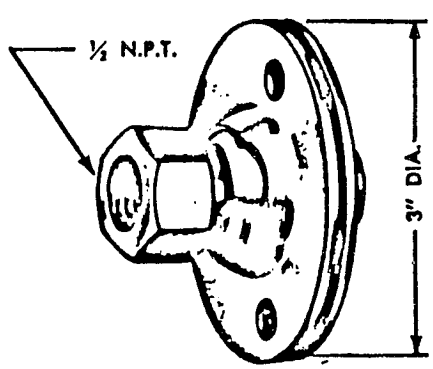
No. 75-4-2 Brass
No. 75-4-5 Stainless Steel

FIXED FLANGED
For mounting thermometers

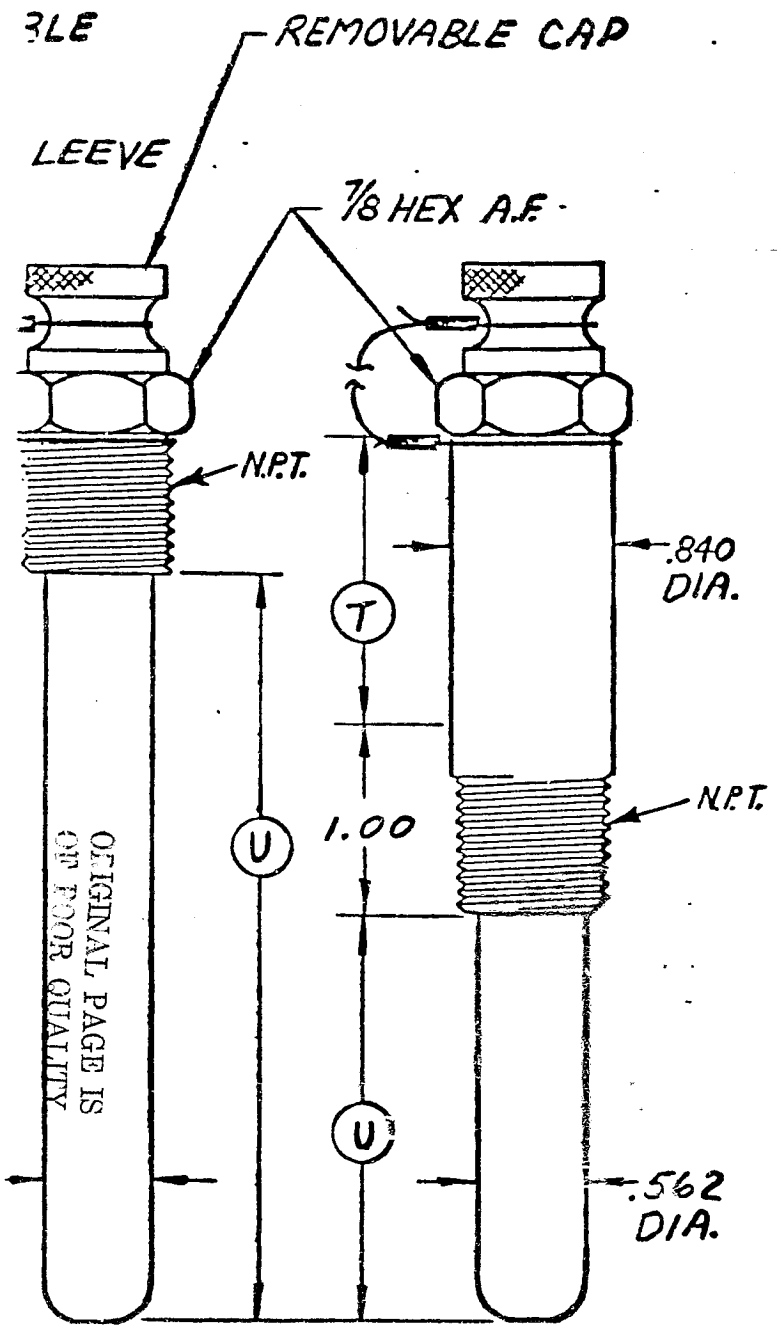


No. 77-3 Steel

SWIVEL FLANGE
For adjusting viewing angle



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



CATALOG NO.	INSERTION LENGTH (U)	EXT NECK (T) LENGTH	N.P.T.	MATER
5571	2 1/16	—	1/2"	BRAS
5572	2 1/16	—	1/2"	303 ST. S
5573	3 13/16	—	1/2"	BRAS
5574	2 1/16	1 7/16	1/2"	BRAS
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"	BRAS
5579	3 13/16	1 1/2	1/2"	BRAS
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

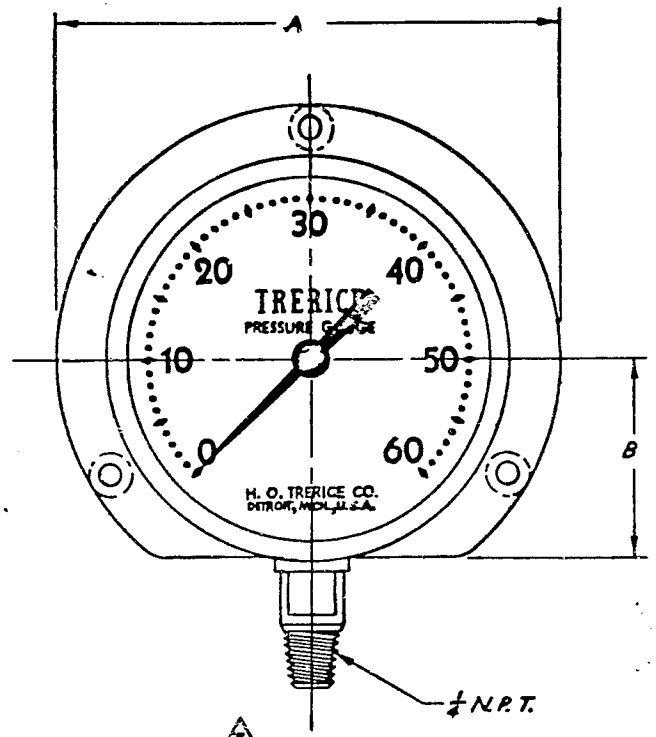
ISSUED
MAY 7 1974
ENGINEERING DEPT.
H. O. TRERICE CO.

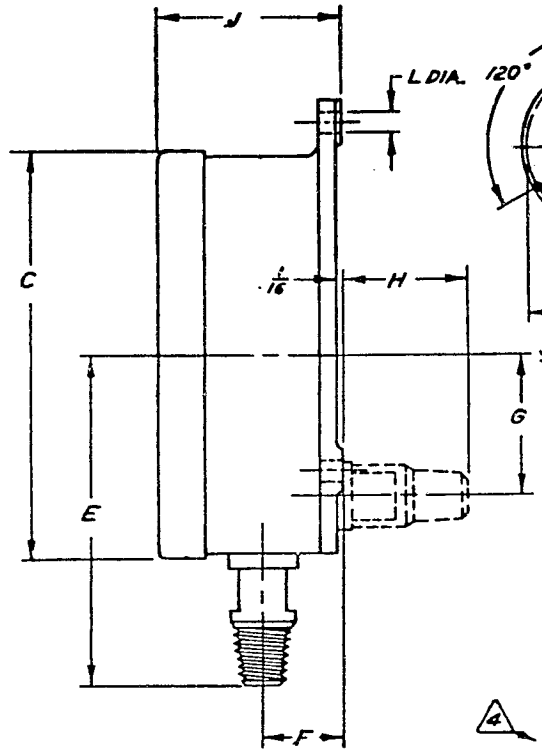
NOTE- FOR PART BREAKDOWN REFER TO DWG. #169-1A

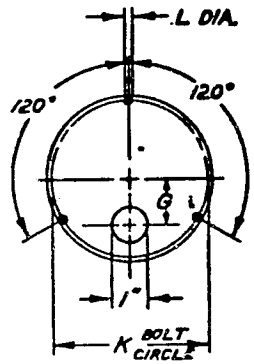
DATE	NO.	REVISION RECORD
4-24-74	5	ADDED . CAT. NOS. 5582-5586
3-9-73	4	REDRAWN AND REVISED

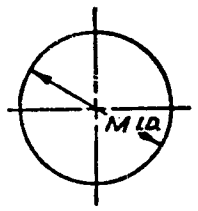
H. O. Trerice Co.
Detroit, Mich., U.S.A.

NAME
TEST WELLS









FLUSH MOUNTED

SURFACE MOUNTED

TUBE & SOCKET MATL.	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
4 POINTER - BLACK MICROMETER TYPE.
MOVEMENT - ST. STL., ROTARY TYPE DELRIN PINION & BUSHINGS.
ACCURACY - ½ OF 1% OF SCALE RANGE

3

NO. 500 X PRESS. GAUGE DIMENSIONAL DATA

DIAL SIZE	A	B	C	E	F	G	H	J	K	L	M
4½"	5 7/8	2 29/64	4 13/16	3 53/64	15/16	1 5/8	1 7/16	2 1/8	5 3/8	7/32	5 1/8
6"	7 5/8	3 9/64	6 5/16	4 37/64	15/16	1 5/8	1 7/16	2 1/8	7	9/32	6 5/8
8½"	10 1/4	4 3/8	8 3/4	5 13/16	31/32	1 5/8	1 11/32	2 1/4	9 5/8	9/32	9 1/8

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 5,000#
0 TO 100#	0 TO 10,000#
0 TO 160#	

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

NOTE: Flangeless case

DATE	NO.	REVISION RECORD	BY
8-31-67	4	WAS MONEL	
7-1-66	3	WAS 5½ - 7 5/16 - 10	
8-16-65	2	REDRAWN NO CHANGE	

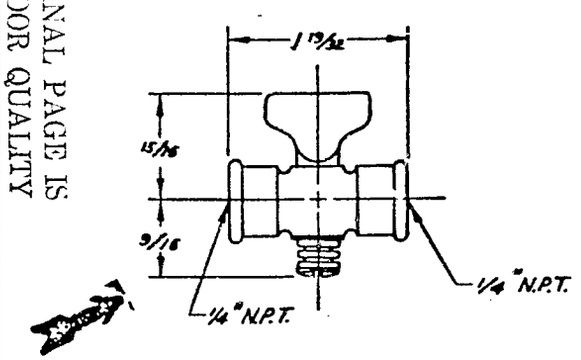
H. O. Trerice Co.
Detroit, Mich., U.S.A.

NAME: DIMENSION DRAWING OF NO. 500 X PRESS. GAUGE

DWN. W.L. | APVD. MYERS | NO. 127-323 | REV. 8-31-

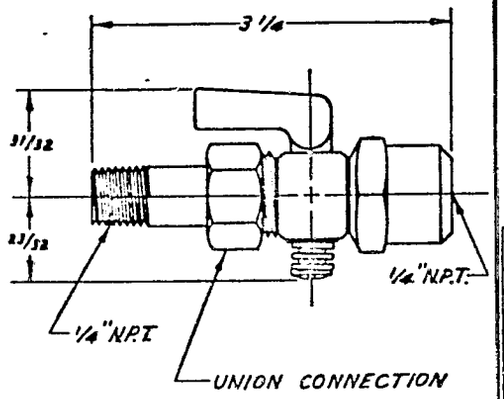
DATE 2-27-61 | SCALE ~

TOLERANCE, 2 PLACE DECIMALS ± .01, 3 PLACE DECIMALS ± .005, ANGLES ± 1° UNLESS OTHERWISE SPECIFIED | DO NOT SCALE



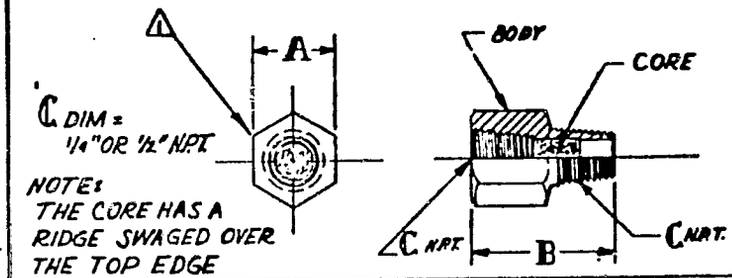
MATERIAL - BRASS
MAX. PRESS. - 150 P.S.I. OF STEAM OR AIR
300 P.S.I. HYDRAULIC

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. 880 TRERICE LEVER
HANDLE GAUGE COCK



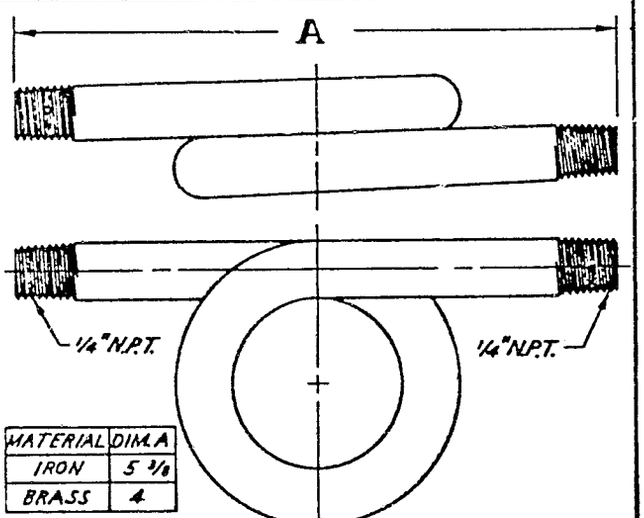
NOTE:
THE CORE HAS A
RIDGE SWAGED OVER
THE TOP EDGE

NO. 872 TRERICE PRESSURE SNUBBER

PART NO.	MATERIAL		DIMENSIONS 1/4 N.P.T.		DIMENSIONS 1/2 N.P.T.		MAX. PRESS.	SERVICE RECOMMENDATION
	BODY	CORE	A	B	A	B		
872-1	BRASS	BRONZE	3/4	1 1/4	1 1/2	1 7/8	5,000 P.S.I.	AIR, GASES
872-2								GASOLINE, LIGHT OILS, STEAM, WATER
872-3								LUBRICATING & HEAVY OILS
872-4	STAIN-LESS STEEL	STAIN-LESS STEEL	3/4	1 1/4	1 1/2	1 7/8	10,000 P.S.I.	AIR, GASES
872-5								GASOLINE, LIGHT OILS, STEAM, WATER
872-6								LUBRICATING & HEAVY OILS

NO. 870 TRERICE IMPULSE DAMPENER

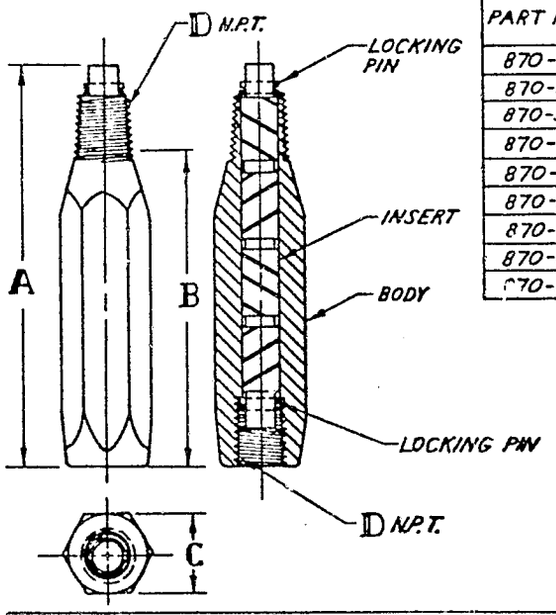
PART NO.	"D" N.P.T.	MATERIAL BODY	MATERIAL INSERT	DIMENSIONS A	DIMENSIONS B	DIMENSIONS C	MAX. PRESS.	SERVICE RECOMMENDATION
870-1	1/4	BRASS	BRASS	3 15/16	3 3/16	3/4	12,000 P.S.I.	AIR, WATER, STEAM, GASES
870-2								GASOLINE & LIGHT OILS
870-3								LUBRICATING & HEAVY OILS
870-7	1/4	STAIN-LESS STEEL	STAIN-LESS STEEL	3 1/2	3 9/16	1	25000 P.S.I.	AIR, WATER, STEAM, GASES
870-8								GASOLINE & LIGHT OILS, AMMONIA
870-9								LUBRICATING & HEAVY OILS
870-10	1/2						50,000 P.S.I.	AIR, WATER, STEAM, GASES
870-11								GASOLINE & LIGHT OILS, AMMONIA
870-12								LUBRICATING & HEAVY OILS



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 SYPHON



DATE	NO.	REVISION RECORD	BY	CK
12-12-68	3	ADDED STEAM TO #872-2 & #872-5	TRK	
11-22-68	2	Moved M, O to #872-2 & #872-5	TRK	
6-19-68	1	REDESIGNED NC PTZ		

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

NAME
PRESSURE GAUGE ACCESSORIES

DWN J. LEESE	APVD	NO. 127-444
DATE 3-17-68	SCALE —	

TOLERANCE, 2 PLACE DECIMALS ± .010 3 PLACE DECIMALS ± .005, ANGLES ± 1° UNLESS OTHERWISE SPECIFIED — DO NOT SCALE