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DOE/NASA CONTRACTOR REPORT

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DOE/NASA CR-150788

DESIGN PACKAGE FOR CONCENTRATING SOLAR COLLECTOR PANELS

Prepared from documents furnished by

Northrup, Inc.
302 Nichols Drive
Hutchins, Texas 75141

Under Contract NAS8-32251 with

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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16. ABSTRACT This report contains information used to evaluate the design of the Northrup concentrating collector. Included are the System Performance Specifications, the applications manual, and the detailed design drawings of the collector. The Northrup concentrating solar collector is a water/glycol/working fluid type, dipped galvanized steel housing, transparent acrylic Fresnel lens cover, copper absorber tube, fiber glass insulation and weighs 98 pounds. The gross collector area is about 29.4 ² per collector. A collector assembly includes four collector units within a tracking mount array.			
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APPLICATION MANUAL

FOR

NORTHROP CONCENTRATING SOLAR COLLECTOR PANELS

MF-NSC-P "ML" SERIES

MODEL NSC-01-0732

GENERAL DESCRIPTION: "ML Series" Solar Collector Panels comprise a complete packaged array consisting of collector panels, supporting framework, insulated fluid manifolding and tracking drive system, shipped from the factory in unassembled components for field erection. Each collector panel has four lenses, each having a net aperture of 10.75 ft² making a total of 43 ft² for each collector panel. Overall size of each collector panel is 58 3/8" x 133 5/8". Panels are spaced 10'-0" on center. Various components are described as follows:

Lens: Modified, Fresnel, prismatic lens extruded from acrylic. Transmissivity of acrylic is 0.95. Lenses have an 8" outside radius and short focal length with precision manufacturing for high efficiency. Concentration is 10 to 1.

Absorber Tube: Made of copper, formed to an elliptical shape for maximum collection for all seasons. Absorber tubes have selective coating having an absorbtivity of 0.95 and an emissivity of 0.12.

Collector Panel Housing: Constructed of galvanized steel, consisting of light trusses, heavy torque bar, and heavy end beams, all designed to provide a rigid panel. This framework is covered with light gauge galvanized steel to form the complete housing.

Insulation: The collector panel is insulated with fiberglass having a "k" factor of 0.28 at 200°F. Thickness of this insulation is 3" in bottom, 1 13/16" in ends and sides and 1" at each side of absorber tube, extending up 8".

Framing Supports: Each collector panel is supported by a double "A" frame, as shown on DWG. 01-05-122, constructed of heavy gauge galvanized steel to withstand loads as indicated on Figures 2 and 3. Frames and collector panels are spaced 10'-0" O.C. The frames are connected together with struts and braced by "X" wind bracing. All fastening devices are zinc plated and are furnished complete for the entire array. Dead load, live load and wind load reactions, resulting from design loads are shown in Figures 2 and 3.

Anchor bolts are not furnished, since structures on which arrays are mounted vary with each installation. Anchor bolts must be designed for loads given. REF DWG. 01-05-123

Manifolds: All fluid manifolds are type "M" copper and connect each collector panel together. They are contained in the manifold strut which acts as a structural member as well as a weather tight housing to protect the insulation. These manifolds are completely assembled and insulated with 1 1/2" to 2" of fiberglass having a "k" factor 0.30 at 200°F.

Expansion Compensation: Expansion in the manifold is compensated by flexible swivel connection in each manifold support to allow all differential expansion between copper lines and steel housing to be distributed to East and West ends of the array. Flexible expansion compensator as depicted in Figure 1 are field supplies and installed to compensate for this movement with system piping.

Tracking System: System is designed for east-west tracking, with axis of collectors mounted parallel to polar axis. Collector panels are linked together with a system of heavy, galvanized aircraft cable and pulleys. This system is driven by a mechanism consisting of a two directional motor, chain drive, stainless steel (Acme) screw and a "Delvin" drive nut which does not require lubrication. The two directional motor is controlled by photovoltaic cells through an integrated circuit to constantly maintain collector panels in focus on the sun. In this circuit is a low light level which directs the collector to track to East during night time, and stop at the proper position for sunrise. Tracking angle is set for four hours before and four hours after solar noon which is the optimum for non-shading between collector panels.

APPLICATION: These series of collectors are applicable to any system requiring fluid temperatures up to 240°. Water or a combination of water and ethylene glycol is recommended as the heat transfer fluid. (See Paragraph on Freeze Protection) Other solutions may be used, provided they are compatible with copper, ethylene propylene rubber, neoprene rubber and silicone rubber which are used in components of fluid system in the collector arrays.

These arrays are installed with the long axis of the lenses pointing to true north and tilted to face south at an angle to horizon (tilt angle) equal to the north latitude. In this manner the rotation for east-west tracking is always parallel to the polar axis of the earth.

Arrays are available with a minimum of two collector panels and a maximum of eleven collector panels in one array. When more than eleven panels are required (473 ft² net aperture), additional arrays are used, and installed with the same 10'-0" spacing between panels, but without connecting manifolds between arrays.

Standard models are available with tilt angles ranging from 10° to 55° in 5° increments. Other tilt angles between these are available on special order and a slight increase in price.

MODEL NUMBERS: Arrays are ordered by model numbers and coding is explained as follows:

Northrup Solar Collector	NSC-01-0000	Tilt Angle as indicated by last two digits of Model No.
"ML": Series		Number of Collector Panels in the Array

EXAMPLE: Model No. NSC-01-0732
"ML" Series
Seven Collector Panels
32° Tilt Angle
7 x 43 = 301 Net. Sq. Ft. in the array

MANIFOLD SIZES: Manifold sizes are arranged in a reverse return, with inlet to array at the southwest end and outlet at the northeast end. Sizes are as follows for south manifold starting from the east and are in reverse order for north manifold:

MODEL NO.	(EAST) <u>MANIFOLD SIZES (10'-0" LONG)</u> (WEST)
NSC-01-0200	1-3/4"
NSC-01-0300	2-3/4"
NSC-01-0400	2-3/4", 1-1"
NSC-01-0500	2-3/4", 2-1"
NSC-01-0600	2-3/4", 2-1", 1-1 1/4"
NSC-01-0700	2-3/4", 2-1", 2-1 1/4"
NSC-01-0800	2-3/4", 2-1", 2-1 1/4", 1-1 1/2"
NSC-01-0900	2-3/4", 2-1", 2-1 1/4", 2-1 1/2"
NSC-01-1000	2-3/4", 2-1", 2-1 1/4", 2-1 1/2", 1-2"

FLOW RATE: Recommended flow rate through each collector panel is 1.72 to 1.3 GPM. Figure 5 is actual pressure drop test through one collector panel at various flows. Pressure drop through manifolds can be determined by ASRAE standards. Manifold sizes listed above are selected to produce a pressure drop of not more than 3' head of water for 100'-0" equivalent feet of pipe @ 1.72 GPM per collector panel. Where manifolds change size every 10'-0", a reducing tee connects these pipes, with a 1/2" connection to flexible swivel of the collector panel.

FREEZE PROTECTION: This series of collectors are such that when system is drained, a small amount of fluid will be retained in the south absorber tube risers and in the south flexible swivel connections. Therefore a complete drain-down anti-freeze system is not applicable. In areas of infrequent days of freezing, warm water of the system may be circulated by means of an automatic low temperature sensor controlling pump of system during non-solar hours and/or below freezing periods.

In areas of frequent freezing periods an anti-freeze solution is required. Ethylene glycol is recommended for protection at various temperatures as follows:

<u>TEMP ° F</u>	<u>% ETHYLENE GLYCOL</u>
16	20
10	25
0	33
-12	40
-34	50
-62	60

Each collector panel has a total volume of 3 gallons. Volume of each 10'-0" copper manifold is as follows:

<u>MANIFOLD SIZE</u>	<u>GALS PER 10'-0" LENGTH</u>
3/4"	0.27
1"	0.46
1 1/4"	0.68
1 1/2"	0.95
2"	1.65

PIPING & FLUID SYSTEM: The following recommendations are made in the interest of providing viable system compatible with these systems.

Filtration: A strainer or filter is recommended ahead of the pump of the system to maintain system free of debris. This should be maintained frequently at start-up of system.

Valves and Controls: Figure 1 represents optimum of control valves and sensing devices. These arrays are designed for an operating pressure of 100 PSI at 240°F, with mechanical pressure relief at 125 PSI. Shut-off and balancing valves provide means to control the flow and to isolated array during repair. Temperature and pressure sensing wells provide means of balancing flow rate when more than one array is used. Drain valve provides a convenient method to make repairs to the array without affecting other system piping. An optional high limit control is available to defocus the collectors should temperature limit be exceeded.

SYSTEM TEMPERATURE CONTROL: Since function or application varies with each installation, temperature controls must be individually designed. It is recommended the manufacturer be consulted for recommendations regarding these controls.

SYMBOLS

- (A) Automatic air eliminator, furnished by manufacturer.
- * (B) Combination pressure and temperature measurement device.
"Petes Plug" or equal.
- * (C) Combination balancing and shut-off valve. Ball valve recommended.
- (D) Pressure relief valve, furnished by manufacturer.
- * (E) Flexible connection to provide East-West expansion of array piping,
+ 0.1" per 10'-0" of manifold piping.
- * (F) Drain cock with hose bibb connection.

*Not supplied by manufacturer

RECOMMENDED PIPING ACCESSORIES TO COLLECTOR PANEL ARRAY

Fig. 1

LOADS & REACTIONS:

DESIGN LOADS

D. L. = Actual operating dead weight of structure including water as the fluid.

L. L. = One inch of ice on all surfaces of each member, 4.67 lbs/S.F. of member surface.

W. L. = 70 mph wind, at 30' above ground surface.

REACTIONS(lbs, at every 10'-0" O. C. in East-West direction)

MODEL NSC-01-0732

Fig. 2

MODEL NSC-01-0732

Fig. 3

6

FIGURE 4

PRESSURE DROP THRU ONE, NORTHRUP
CONCENTRATING SOLAR COLLECTOR
PANEL (43 FT.² NET APERTURE)
MF-NSC-P-'ML' SERIES
(ONE PANEL CONSISTING OF 4 LENS
AND 4 ABSORBER TUBES)

FIGURE 5

MODELING

BOLT SETTING PLAN

01-05-123
DIT 02/58
5-0-0-0-0

BOLT SETTING PLAN

ME-NBC-P "ML" SERIES MODEL NBC-01-0732

PERMISSIBLE VARIATIONS FROM CENTER LINE DIMENSIONS OF BOLT SETTING PLAN.

- * (A) $\pm 1/32"$
- * (B) $\pm 1/32"$
- (C) $\pm 1/2"$
- (D) $\pm 1/2"$
- (E) $\pm 1/2"$
- (F) $\pm 1/2$ DEGREE
- * (G) $\pm 1/32"$

PERMISSIBLE VARIATIONS IN COLUMN BEARING POINTS FROM ONE EYE-PLANE.

ALONG N-S ϕ BETWEEN BOLTS 1 & 2	$\pm 1/32$
ALONG E-W ϕ BETWEEN ANY TWO SETS OF ADJACENT BOLTS 1 & 2	$\pm 1/4$
ALONG N-S ϕ BETWEEN BOLTS 3 & 4	$\pm 1/16$
ALONG N-S ϕ BETWEEN BOLTS 5 & 6	$\pm 1/16$
ALONG E-W ϕ BETWEEN BOLTS 3 & 5	$\pm 1/32$
ALONG E-W ϕ BETWEEN BOLTS 4 & 6	$\pm 1/32$
ALONG E-W ϕ BETWEEN ANY TWO SETS OF ADJACENT BOLTS 3 & 5 OR 4 & 6	$\pm 1/4$

DESIGNED ON USING 1/2" DIA. ANCHOR BOLTS

SUBSYSTEM PERFORMANCE SPECIFICATION

**Northrup, Incorporated
Concentrating Collector**

**Basic Issue 10/1/76
CCBD 301-76-0047**

**Revision 1 1/20/77
CCBD 301-77-0209**

**Revision 2 7/14/78
CCBD 301-78-0354**

SUBSYSTEM PERFORMANCE SPECIFICATION

1.0 INTRODUCTION

"This Performance Specification establishes the requirements for the design and performance of the subsystems for use with combined heating and cooling systems. It designates the Interim Performance Criteria applicable to each type subsystem and defines the deviations. The appendices specify the performance for each subsystem."

2.0 APPLICABLE DOCUMENT

2.1 Government Documents

Interim Performance Criteria for Solar Heating and Combined Heating Cooling Systems and Dwellings, January 1, 1975. U.S. Department of Housing and Urban Development.

Interim Performance Criteria for Commercial Solar Housing and Combined Heating/Cooling Systems and Facilities, Document No. 98M10001, Revision Basic, dated February 28, 1975. George C. Marshall Space Flight Center, National Aeronautics and Space Administration.

2.2 Contractor Documents

2.2.a. Application Manual for Northrup Concentrating Solar Panels MF-NSC-P "ML" Series Model NSC-01-0732.

2.2.b. Installation Instructions for Northrup Concentrating Collector Panels with Integral Manifold - Frame and Sub-Frames, MF-NSC-P "MF" Series Model NSC-01-0732, Northrup, Inc.

3.0 APPLICATION OF INTERIM PERFORMANCE CRITERIA BY TYPE OF SUBSYSTEM

"The application of each paragraph of the Interim Performance Criteria to each type subsystem is provided in the following table(s).

Table I - Residential Subsystems

Table II - Commercial Subsystems

4.0 DEVIATIONS FROM INTERIM PERFORMANCE CRITERIA

4.1 None

5.0 GOVERNMENT FURNISHED PROPERTY

5.1 None

6.0 GOVERNMENT DIRECTED REQUIREMENTS

No specific requirements have been directed by the Contracting Officer.

7.0 SUBSYSTEM APPENDICES

Appendix A Subsystem Identification

Specification
Revision
Date

SHC-3048

2

7/14/78

8.0 WARRANTY

Eighteen months from date of shipment under normal usage. Materials and workmanship.

TABLE I

SPECIFICATION NO. SHC-3048

REVISION _____

DATE 10-1-76

RESIDENTIAL SUBSYSTEMS. INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 1 OF 6SUBSYSTEM APPLICATION

A - APPLICABLE TO TYPE SYSTEMS INDICATED

NA - NOT APPLICABLE

TYPE SYSTEMS

H - HEATING

HC - HEATING AND COOLING

HW - HOT WATER

RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
1.1 H and HC Performance		NA		1.3.1 Collector Efficiency		A	
1.1.1 Heating Design Temperatures		NA		1.4 Thermal Storage		NA	
1.1.2 Cooling Design Temperatures		NA		1.4.1 Storage Capacity		NA	
1.1.3 Relative Humid- ity and Water Vapor Pressure		NA		1.5 Habitability of Occupied Spaces		NA	
1.1.4 Solar Contribution		NA		1.5.1 Heat or Humidity Transfer Effects		NA	
1.1.5 Operation Impairment		NA		1.6 Energy Transport Efficiency		NA	
1.2 HW System/Sub- system Performance		NA		1.6.1 Thermal Losses and Electrical Power		NA	
1.2.1 Water Design Temperature		NA		1.7 Control		NA	
1.2.2 Storage Design Capacity		NA		1.7.1 Installation and Maintenance		NA	
1.2.3 Solar Contribution		NA		1.7.2 Manual Adjustment		NA	
1.2.4 Operational Impairment		A		1.7.3 Inhabited Space Temperature		NA	
1.3 Collector Performance		A		1.7.4 Hot Water Temper- ature		NA	
				1.8 Auxiliary Energy		NA	
				1.8.1 Design Loads		NA	

TABLE I

 SPECIFICATION NO. _____
 REVISION 2
 DATE 7/14/78

RESIDENTIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 2 OF 6SUBSYSTEM APPLICATION

A - APPLICABLE TO TYPE SYSTEMS INDICATED

NA - NOT APPLICABLE

TYPE SYSTEMS

H - HEATING

HC - HEATING AND COOLING

HW - HOT WATER

RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
2.1 System Design Conditions		A		2.3.1 Pressure Test: Nonpotable Fluids		A	
2.1.1 Equipment Capabilities		A		2.3.2 Pressure Test: Potable Water		A	
2.1.2 Noise or Erosion - Corrosion		A		2.3.3 Air Transport Systems		NA	
2.1.3 Operating Conditions		A		2.4 Collector Adjustment		A	
2.1.4 Fluid Flow in Collectors		A		2.4.1 Orientation and Tilt		A	
2.1.5 Entrapped Air		A		2.4.2 Mutual Shadowing		A	
2.1.6 Thermal Expansion of Fluids		A		2.5 Subsystem Isolation		NA	
2.1.7 Pressure Drops		A		2.5.1 Shutdown in Multi-family Housing		NA	
2.1.8 Condensate Removal		NA		2.6 Heat Transfer Fluid Quality		NA	
2.2 Mechanical Stresses		A		2.6.1 Liquid Quality		NA	
2.2.1 Vibration Stress Levels		A		2.6.2 Air Quality		NA	
2.2.2 Vibration from Moving Parts		A		2.6.3 Fluid Quality		NA	
2.2.3 Water Hammer		NA		2.6.4 Freezing Protection		NA	
2.2.4 Vacuum Relief Protection		A		2.7 Piping Supports		NA	
2.2.5 Thermal Changes		A		2.7.1 Applicable Plumbing Standards		A	
2.2.6 Flexible Joints		A		2.8 Excessive Pressure and Temperature Protection		A	
2.3 Leakage Prevention		A		2.8.1 Relief Valves and Vents		A	
				3.1 Structural Design Basis		A	

TABLE I

SPECIFICATION NO. SHC-3048REVISION 2DATE 7/14/78

RESIDENTIAL SUBSYSTEMS. INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 3 OF 6SUBSYSTEM APPLICATION

A - APPLICABLE TO TYPE SYSTEMS INDICATED

NA - NOT APPLICABLE

TYPE SYSTEMS

H HEATING

HC HEATING AND COOLING

HW HOT WATER

RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
3.1.1 Applicable Standards		A		3.8.1 Foundation Settlement		A	
3.1.2 Service Loads		A		3.9 Ponding Condition		A	
3.2 Failure Loads and Load Capacity		A		3.9.1 Design Provisions		A	
3.2.1 Ultimate Load Combinations		A		4.1 Plumbing and Electrical Installation		A	
3.2.2 Ice Loads		A		4.1.1 Plumbing Codes		A	
3.2.3 Vehicular Loads		NA		4.1.2 Electrical Codes		A	
3.2.4 Load Capacity		A		4.2 Fail-Safe Controls		A	
3.3 Damage Control		A		4.2.1 System Failure Prevention		A	
3.3.1 Resistance to Damage		A		4.2.2 Automatic Pressure Relief Valves		A	
3.3.2 Glazing Design		A		4.3 Fire Safety		A	
3.4 Cyclic Loads		A		4.3.1 Applicable Fire Standards		A	
3.4.1 Deflection Limitations		A		4.3.2 Penetrations through Fire Rated Assemblies		NA	
3.5 Cutting of Structural Elements		NA		4.4 Toxic		NA	
3.5.1 Design Provisions		NA		4.4.1 Provisions of Catch Basins		NA	
3.6 Creep and Residual Deflection		NA		4.4.2 Detection of Toxic and Flammable Fluids		NA	
3.6.1 Deflection Limitations		NA		4.5 Safety		A	
3.7 Hail Resistance		A		4.5.1 Emergency Egress and Access		NA	
3.7.1 Hail Size and Loading		A		4.5.2 Identification and Location of Controls		A	
3.8 Constraint Loads		A					

TABLE 1

SPECIFICATION NO. SHC-3048REVISION 2DATE 7/14/78

RESIDENTIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 4 OF 6SUBSYSTEM APPLICATION

A APPLICABLE TO TYPE SYSTEMS INDICATED

NA NOT APPLICABLE

TYPE SYSTEMS

H HEATING

HC HEATING AND COOLING

HW HOT WATER

RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
4.6 Protection of Pot- able Water & Circulated Air		A		5.2.3 Thermal Cycling Stresses		A	
4.6.1 Contamination by Materials		A		5.2.4 Leakage		A	
4.6.2 Separation of Circulation Loops		NA		5.2.5 Deterioration of Gaskets and Sealants		A	
4.6.3 Backflow Prevention		NA		5.2.6 Transmission Loss- es Due to Outgassing		A	
4.6.4 Growth of Fungi		A		5.3 Chemical Compati- bility of Components		A	
4.7 Excessive Sur- face Temperatures		A		5.3.1 Materials/Transfer Fluid Compatibility		A	
4.7.1 Protection from Heated Components		A		5.3.2 Corrosion of Dis- similar Materials		A	
5.1 Effects of Ex- ternal Environment		A		5.3.3 Corrosion by Leach- able Substance		A	
5.1.1 Solar Degradation		A		5.3.4 Effects of Decom- position Products		A	
5.1.2 Soil Corrosion		NA		5.4 Components Involv- ing Moving Parts		A	
5.1.3 Airborne Pollutants		A		5.4.1 Wear and Fatigue		A	
5.1.4 Dirt Retention on Cover Plate Surface		A		6.1 Accessibility for Maintenance		A	
5.1.5 Abrasive Wear		A		6.1.1 Access for System Maintenance		A	
5.1.6 Fluttering by Wind		A		6.1.2 Access for System Monitoring		A	
5.2 Temperature & Pressure Resistance		A		6.1.3 Draining and Filling of Liquids		A	
5.2.1 Thermal De- gradation		A		6.1.4 Flushing of Liquids Subsystems		A	
5.2.2 Deterioration of Heat Transfer Fluids		A					

TABLE I

SPECIFICATION NO. SHC-3048
 REVISION 2
 DATE 7/14/78

RESIDENTIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 5 OF 6SUBSYSTEM APPLICATION

A - APPLICABLE TO TYPE SYSTEMS INDICATED

NA - NOT APPLICABLE

TYPE SYSTEMS

H - HEATING

HC - HEATING AND COOLING

HW - HOT WATER

RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
6.1.5 Filters		NA		7.2.2 Storage Area		NA	
6.1.6 Potable Water Shutoff		NA		7.2.3 Utility Chases		NA	
6.2 Installation, Operation and Maintenance Manual		A		7.3 Functioning of Dwelling Site		NA	
6.2.1 Installation Instructions		A		7.3.1 Space Use		NA	
6.2.2 Maintenance and Operation Instructions		A		7.3.2 Shading of Adjacent Structures		NA	
6.2.3 Maintenance Plan		A		7.3.3 Impact of Environment		NA	
6.2.4 Replacement Parts		A		7.3.4 View		NA	
6.3 Repair and Service Personnel		A		8.1 Interference with Mechanical Operation		NA	
6.3.1 Maintenance of H and HC Systems		NA		8.1.1 Blockage of Solar Subsystem		NA	
6.3.2 Maintenance of DHW System		NA		8.1.2 Shading of Collector		NA	
7.1 Design		NA		8.1.3 Sensor Location		NA	
7.1.1 Dwelling Design		NA		8.2 Mechanical & Electrical Functioning of Dwelling and Site		NA	
7.1.2 Mobile Home Design		NA		8.2.1 Exhaust and Venting		NA	
7.1.3 Site Design		NA		8.2.2 Utilities		NA	
7.1.4 Passive Use of Solar Energy		NA		8.3 Mechanical & Electrical Functioning of Connections		NA	
7.2 Adequate Space		NA		8.3.1 Plumbing Connections		NA	
7.2.1 Collector Area		NA					

TABLE 1

RESIDENTIAL SUBSYSTEMS. INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 6 OF 6

SUBSYSTEM APPLICATION

A APPLICABLE TO TYPE SYSTEMS INDICATED

NA NOT APPLICABLE

TYPE SYSTEMS

H HEATING

HC HEATING AND COOLING

HW HOT WATER

RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
8.1.2 Electrical Connections		NA		11.2.2 Heat and Moisture		A	
9.1 Structural Integrity		NA		11.2.3 Exterior Penetration		NA	
9.1.1 Movements in Adjacent Structures		NA		11.3 Durability and Reliability of Connections		NA	
9.2 Structural Integrity of Dwelling		NA		11.3.1 Material Compatibility		A	
9.2.1 Loads		NA		12.1 Maintainability of H, HC, HW Systems		NA	
9.2.2 Penetration of Structural Members		NA		12.1.1 Accessibility		NA	
9.3 Structural Connections		NA		12.1.2 Misuse		NA	
9.3.1 Structural Connections		NA		12.1.3 Permanent Maintenance Accessories		NA	
9.3.2 Brittle Subsystem		NA		12.2 Maintainability of Dwelling and Site		NA	
9.3.3 Strength and Stiffness		NA		12.2.1 Accessibility		NA	
Safety of Dwelling and Site		NA		12.2.2 Ice Dams		NA	
10.1.1 Fire		NA		12.3 Connections		NA	
10.1.2 Accidents		NA		12.3.1 Accessibility		NA	
11.1 Durability		NA		13.1 Visual Characteristics of Dwelling and Site		NA	
11.1.1 Vegetation		NA		13.1.1 Dwelling		NA	
11.2 Durability and Reliability of Dwelling and Site		NA		13.1.2 Neighborhood		NA	
11.2.1 Chemical Corrosion		A					

TABLE II

SPECIFICATION NO. SHC-3048

REVISION

DATE 10-1-76

COMMERCIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 1 OF 6

APPLICATION

A - APPLICABLE TO SYSTEMS INDICATED

NA - NOT APPLICABLE

TYPE SYSTEMS

H - HEATING

HC - HEATING AND COOLING

HW - HOT WATER

COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
1.1 H and HC System Performance		NA		1.6 Energy Transport		NA	
1.1.1 Heating Design Temperature		NA		1.6.1 Thermal Losses and Electrical Power		NA	
1.1.2 Cooling Design Temperature		NA		1.7 Control		NA	
1.1.3 Relative Humidity		NA		1.7.1 Installation and Maintenance		NA	
1.1.4 Solar Contri- bution		NA		1.7.2 Manual Adjustment		NA	
1.2 HW System/Sub- system Performance		NA		1.7.3 Inhabited Space Temperature Control		NA	
1.2.1 Draw and Tem- perature Design Output		NA		1.7.4 Hot Water Tempera- ture		NA	
1.2.2 Non-Tap Temp- erature Design Output		NA		1.8 Auxiliary Energy		NA	
1.2.3 Solar Contribution		NA		1.8.1 Design Heat Loads		NA	
1.3 Collector Performance		A		1.8.2 Design Cooling Loads		NA	
1.3.1 Collector Efficiency		A		1.8.3 Impairment of Oper- ation		NA	
1.4 Thermal Storage Performance		NA		2.1 System Design Conditions		A	
1.4.1 Storage Capacity and Rate		NA		2.1.1 Equipment Capabilities		A	
1.5 Habitability of Occupied Spaces		NA		2.1.2 Noise or Erosion- Corrosion		A	
1.5.1 Heat or Humidity Transfer Effects		NA		2.1.3 Operating Conditions		A	
				2.1.4 Fluid Flow in Collectors		A	
				2.1.5 Entrapped Air		A	
				2.1.6 Thermal Expan- sion of Fluids		A	
				2.1.7 Pressure Drops		A	

TABLE II

SPECIFICATION NO. SHC-1048REVISION 2DATE 7/14/78

COMMERCIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 2 OF 6

APPLICATION

A - APPLICABLE TO SYSTEMS INDICATED
 NA - NOT APPLICABLE

TYPE SYSTEMS

H - HEATING
 HC - HEATING AND COOLING
 HW - HOT WATER

COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
2.1.8 Condensate Removal		NA		2.6.2 Air Quality		NA	
2.2 Mechanical Stresses		A		2.6.3 Fluid Treatment		NA	
2.2.1 Vibration Stress Levels		A		2.6.4 Freezing Protection		NA	
2.2.2 Vibration from Moving Parts		A		2.7 Piping Supports		NA	
2.2.3 Water Hammer		NA		2.7.1 Applicable Plumbing Standards		A	
2.2.4 Vacuum Relief Protection		A		2.8 Excessive Pressure and Temperature Protection		A	
2.2.5 Thermal Changes		A		2.8.1 Relief Valves and Vents		A	
2.2.6 Flexible Joints		A		3.1 Structural Design Basis		A	
2.3 Leakage Prevention		A		3.1.1 Service Loads		A	
2.3.1 Pressure Test: Non-Potable Fluids		A		3.2 Failure Loads and Load Capacity		A	
2.3.2 Pressure Test: Potable Water		A		3.2.1 Ultimate Load Combinations		A	
2.3.3 Air Transport System		NA		3.2.2 Ice Loads		A	
2.4 Collector Adjustments		A		3.2.3 Vehicular Loads		NA	
2.4.1 Orientation and Tilt		A		3.2.4 Load Capacity		A	
2.4.2 Mutual Shadowing		A		3.3 Damage Control		A	
2.5 Subsystem Isolation		NA		3.3.1 Resistance to Damage		A	
2.5.1 Shutdown in Multi-unit Facilitation		NA		3.4 Cyclic Loads		A	
2.6 Heat Transfer Fluid Quality		NA		3.4.1 Deflection Limitations		A	
				3.5 Cutting of Structural Elements		NA	
				3.5.1 Design Provisions		NA	

TABLE II

SPECIFICATION NO. SHC-3048

REVISION

DATE 10-1-76

COMMERCIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 3 OF 6

APPLICATION

A APPLICABLE TO SYSTEMS INDICATED

NA NOT APPLICABLE

TYPE SYSTEMS

H HEATING

HC HEATING AND COOLING

HW HOT WATER

COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
3.6 Creep and Residual Deflection		NA		4.3.2 Penetrations Through Fire-Rated Assemblies		NA	
3.6.1 Deflection Limitations		NA		4.4 Toxic and Flamm- able Fluids		NA	
3.7 Nail Resistance		A		4.4.1 Provision of Catch Basins		NA	
3.7.1 Nail Size and Loading		A		4.4.2 Detection of Toxic and Flammable Fluids		NA	
3.8 Constraint Loads		A		4.5 Safety Under Emergency Conditions		NA	
3.8.1 Foundation Settlement		NA		4.5.1 Emergency Egress and Access		NA	
3.9 Piling Condi- tions		A		4.5.2 Identification and Location of Controls		A	
3.9.1 Design Provi- sions		A		4.6 Protection of Water and Circulated Air		A	
4.1 Plumbing and Electrical Installation		A		4.6.1 Contamination by Materials		A	
4.1.1 Plumbing Codes and Standards		A		4.6.2 Separation of Circulation Loops		NA	
4.1.2 Electrical Codes and Standards		A		4.6.3 Backflow Prevention		NA	
4.2 Fail-Safe Controls		A		4.6.4 Growth of Fungi		A	
4.2.1 System Failure Prevention		A		4.7 Excessive Surface Temperature		A	
4.2.2 Automatic Pres- sure Relief Valves		A		4.7.1 Protection from Heated Components		A	
4.3 Fire Safety		A		5.1 Effects of External Environment		A	
4.3.1 Applic. of Fire Standards		A		5.1.1 Solar Degradation		A	
				5.1.2 Soil Corrosion		NA	
				5.1.3 Airborne Pollutants		A	

COMMERCIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

APPLICATION

A APPLICABLE TO SYSTEMS INDICATED
 NA NOT APPLICABLE

TYPE SYSTEMS

H HEATING
 HC HEATING AND COOLING
 HW HOT WATER

COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
5.1.1 Dirt Retention on Cover Plate Surfaces		A		5.4 Components Involving Moving Parts		A	
5.1.5 Abrasive Wear		A		5.4.1 Wear and Fatigue		A	
5.1.6 Fluttering by Wind		A		6.1 Accessibility for Maintenance and Servicing		A	
5.2 Temperature and Pressure Resistance		A		6.1.1 Access for System Maintenance		A	
5.2.1 Thermal Degradation		A		6.1.2 Access for System Monitoring		A	
5.2.2 Deterioration of Heat Transfer Fluids		A		6.1.3 Draining and Filling of Liquids		A	
5.2.3 Thermal Cycling Stresses		A		6.1.4 Flushing of Liquid Subsystems		A	
5.2.4 Leakage		A		6.1.5 Filters		NA	
5.2.5 Deterioration of Gaskets and Sealants		A		6.1.6 Water Shutoff		NA	
5.2.6 Transmission of Losses Due to Out- gassing		A		6.2 Installation, Operation and Maintenance Manual		A	
5.3 Chemical Compa- tibility of Components		A		6.2.1 Installation Instructions		A	
5.3.1 Materials/Trans- fer Fluid Compatibility		A		6.2.2 Maintenance and Oper- ating Instructions		A	
5.3.2 Corrosion of Dis- similar Materials		A		6.2.3 Maintenance Plan		A	
5.3.3 Corrosion by Leachable Substances		A		6.2.4 Replacement Parts		A	
5.3.4 Effects of Deco- mposition Products		A		6.3 Repair and Service Personnel		A	
				6.3.1 Servicing of H and HC Systems		A	
				6.3.2 Servicing of HW Systems		A	
				7.1 Design		NA	

TABLE II

SPECIFICATION NO. SHC-3048

REVISION _____

DATE 10-1-76

COMMERCIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 5 OF 6APPLICATION

A APPLICABLE TO SYSTEMS INDICATED

NA NOT APPLICABLE

TYPE SYSTEMS

H HEATING

HC HEATING AND COOLING

HW HOT WATER

COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
7.1.1 Design-Habit- able Facilities		NA		8.1.3 Sensor Location		NA	
7.1.2 Esthetics		NA		8.2 Mechanical and Elec- trical Functioning of Facility and Site		NA	
7.1.3 Materials				8.2.1 Exhaust and Venting		NA	
7.1.4 Passive Use of Solar Energy		NA		8.2.2 Utilities		NA	
7.2 Adequate Space		NA		8.3 Mechanical and Elec- trical Functioning of Connections		NA	
7.2.1 Solar Collector		NA		8.3.1 Plumbing Connections		NA	
7.2.2 Storage		NA		8.3.2 Electrical Connections		NA	
7.2.3 Interface Bet- ween Facility and H and HC Systems				8.3.3 Lightning Protection		NA	
7.2.4 Portability		NA		9.1 Structural Integrity of H, HC and HW Systems		NA	
7.3 Functioning of Facilities and Sites		NA		9.1.1 Movement of Adjacent Structures		NA	
7.3.1 Space Use		NA		9.2 Structural Integrity of Facilities		NA	
7.3.2 Shading		NA		9.2.1 Loads		NA	
7.3.3 Impact on En- vironment		NA		9.2.2 Penetration of Struc- tural Members		NA	
7.3.4 View		NA		9.3 Structural Connections		NA	
7.4 Compatibility with Conventional Systems		NA		9.3.1 Structural Connections		NA	
7.4.1 Utility Compati- bility		NA		9.3.2 Brittle Components		NA	
8.1 Interference with Mechanical Operation		NA		9.3.3 Strength and Stiffness		NA	
8.1.1 Blockage of Solar Solar Components		NA		10.1 Safety of Facility and Site		NA	
8.1.2 Shading of Collec-		NA		10.1.1 Fire		NA	
				10.1.2 Accidents		NA	

TABLE II

SPECIFICATION NO. SHC-3048

REVISION

DATE 10-1-76

COMMERCIAL SUBSYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

SHEET 6 OF 6

APPLICATION

A APPLICABLE TO SYSTEMS INDICATED

NA NOT APPLICABLE

TYPE SYSTEMS

H HEATING

HC HEATING AND COOLING

HW HOT WATER

COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			COMMERCIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
11.1 Durability and Reliability of H, HC and HW Systems		NA		12.1.1 Accessibility		NA	
12.1.1 Vegetation		NA		13.1 Visual Characteristics of Facility and Site		NA	
11.2 Durability and Reliability of Facili- ties and Sites		NA		13.1.1 Facility		NA	
11.2.1 Chemical Corrosion		A		13.1.2 Neighborhood		NA	
11.2.2 Heat and Moisture		A					
11.2.3 Exterior Penne- trations		NA					
11.3 Durability and Reliability of Connec- tions		A					
11.3.1 Material Com- patibility		A					
12.1 Maintainability of H, HC and HW Systems		NA					
12.1.1 Accessibility		NA					
12.1.2 Misuse		NA					
12.1.3 Permanent Main- tenance Accessories		NA					
12.2 Maintainability of Facility and Site		NA					
12.2.1 Accessibility		NA					
12.2.2 Ice Dams		NA					
12.3 Connections		NA					

APPENDIX A

A SUBSYSTEM IDENTIFICATION

This Appendix defined the thermal performance for collector, Northrup, Inc. Subsystem Model NSC-01-0732, MF-NSC-P "MF" Series.

A-1 SOLAR COLLECTOR

For Dallas, Texas, the single solar collector will collect a minimum of 1144 BTU/Ft²/Day of energy at an inlet fluid temperature of 190°F (water). The tilt angle at this performance basis will be equal to the latitude angle, azimuth of 0 degrees, average ambient dry bulb 100°F, wind velocity zero, August 21 date, direct normal noon solar flux of 283 BTU/Hr Ft², longitude of 97° and 32° latitude.

When used primarily for heating, a single collector will provide 1242 BTU/Ft² Day at an inlet fluid temperature of 150°F (water). The tilt angle at this performance basis is equal to the latitude angle, azimuth of 0 degrees, average ambient 50°F, wind velocity zero, February 21 date, direct normal noon solar flux of 316 BTU/Hr Ft², longitude of 97° and 32° latitude.

*ASHRAE Handbook of Fundamentals, American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., 345 East 47th Street, New York, NY, 1972.

SUBSYSTEM PERFORMANCE SPECIFICATION

APPENDIX A - TECHNICAL PERFORMANCE REQUIREMENTS

SPECIFICATION NO. SHC-3048

REVISION 1

DATE 1/20/77

FIGURE 1 EFFICIENCY AS A FUNCTION OF OPERATING CONDITIONS
 PERFORMANCE MUST BE ABOVE LINE

LIST OF MATERIALS

DATE: 1-16-76

NORTHROP CONCENTRATING SOLAR
COLLECTOR PANELS, MF-NSC-P "ML" SERIES

REV: B 1-16-78

NO. 01-05-076

MODEL NSC-01-0732

PAGE 1 OF 2

ITEM	QTY.	DRAWING OR PART NUMBER	DESCRIPTION
1	1✓	01-03-029	Tracking Control Box Assembly
4	7✓	01-04-004	Collector Panel Assembly
5	3✓	01-04-005	South Wind Bracing Assembly
6	3✓	01-04-006	Upper North Wind Bracing Assembly
7	7✓	01-04-007	Inclined Strut Assembly
8	1✓	01-04-008	Tracking Control Box Mount Assembly
9	2✓	01-04-009	Idler Pulley Mount Assembly
10	2✓	01-04-010	Manifold Strut Assembly 3/4" cu Manifold
11	2✓	01-04-011	Manifold Strut Assembly 3/4" cu Manifold
12	2✓	01-04-012	Manifold Strut Assembly 1" cu Manifold
13	2✓	01-04-013	Manifold Strut Assembly 1" cu Manifold
14	4✓	01-04-014	Manifold Strut Assembly 1 1/4" cu Manifold
19	2✓	01-03-002	South Manifold Support 3/4" x 3/4" connection
20	1✓	01-03-003	South Manifold Support 1" x 3/4" connection
21	1✓	01-03-004	South Manifold Support 1" x 1" connection
22	1✓	01-03-005	South Manifold Support 1 1/4" x 1" connection
23	2✓	01-03-006	South Manifold Support 1 1/4" x 1 1/4" connection
28	2✓	01-03-023	North Manifold Support (w/Bleeder) 3/4 x 3/4
29	1✓	01-03-024	North Manifold Support (w/Bleeder) 1 x 3/4
30	1✓	01-03-025	North Manifold Support (w/Bleeder) 1 x 1
31	1✓	01-03-026	North Manifold Support (w/Bleeder) 1 1/4 x 1
32	2✓	01-03-027	North Manifold Support (w/Bleeder) 1 1/4 x 1 1/4
37	6✓	01-04-024	North Wind Strut Assembly
A	7✓	01-03-032	North Column Assembly 32° Tilt Angle

LIST OF MATERIALS

DATE: 1-16-76

NORTHROP CONCENTRATING SOLAR
COLLECTOR PANELS, MF-NSC-P "ML" SERIES

REV: B 1-16-78

NO. 01-05-076

MODEL NSC-01-0732

PAGE 2 CF 2

ITEM	QTY.	DRAWING OR PART NUMBER	DESCRIPTION
B	3 ✓	01-04-035	Lower North Wind Bracing Assmb. 32° Tilt Angle
C	7 ✓	01-04-044	South Brace Assembly 32° Tilt Angle •
D	14 ✓	01-07-003	South Column Base Ls
E	1	01-04-057	Fluid Inlet Assembly 1 1/4" Manifold
F	1	01-04-062	Fluid Outlet Assembly 1 1/4" Manifold
G	2	01-04-065	Manifold End Closure 3/4"
H	1	01-04-072	Cable Drive Assemble 7 Collector Panels
I	5 ft ³	01-13-003	Loose Fill Insulation (1 bag - 7.5 ft. ³)
J	1	01-04-077	Sensor Attachment Assembly

PARTS LIST

INDEX

Products 01 = Solar Collector Panels "ML" Series

PART NUMBER	DESCRIPTION
01-01-000	Commodities (Steel, Copper Tubing, etc. in SWM (Gen Specs)
01-02-000	Shop Sub-Assemblies
01-03-000	Shop Final Assemblies
01-04-000	Field Sub-Assemblies
01-05-000	Field Final-Assemblies
00-06-000	Fabricated Sheet Metal Parts
00-07-000	Fabricated Heavy Metal (Struck, etc.)Parts, Extrusions
00-08-000	Fabricated Tubing and Pipe
00-09-000	Pipe Fittings, Valves, Exp. Comp., Air Vents, Flow Control Check Valves, Stops, Plugs, Pumps
00-10-000	Electrical Parts, Components, Solenoids, Fabricated Wire, Relays, P/C Boards, Contactors, Motors, Terminals, Wire
00-11-000	Heat Exchangers -- Coils, Etc.
00-12-000	Tanks and Vessels, Accumulators, Expansion Tanks
00-13-000	Insulation
00-16-000	Paints, Coatings, Sealants, Adhesives, Etc.
00-17-000	Hardware - Bolts, Nuts, Screws, Hinges, Bearings, Non-Electrical Cable, Clamps, Turn-Buckles, Rivets, Nails, Pins
00-18-000	Machine Parts (Special)
00-19-000	Packaging/Shipping
00-20-000	Glass Glazing Coverings
00-21-000	Weather Stripping, Non-Metallic Grommets, Sponge Rubber, Etc.
00-24-000	Tags, Stickers, Labels, Serial Numbers

*Indicates that no other drawings or specifications other than those contained herein are required.

**Indicates all fasteners, nuts, bolts, and washers are to conform to ANSI (American National Standards Institute).

M-01-000

COMMODITIES

01-000-(099) Steel

- 001 Steel-Galv.-Desg. G90 (1.25oz/S.F.Commercial)
Per ASTM A 525, A526, and A527, subject to ASTM A-90
standard method of test. 16 guage, .0636" (.0672 -
.0606 range) 2.65625 lbs/S.F.
- 002 Steel-Galv. Same as 01-01-001, except 20 Guage .0396
(.0425 - .0382 range) 1.65625 lbs/S.F.
- 004 Steel-Structural-ASTM A36.
- 005 Steel-Tubing-Cold Drawn-Seamless-ASTM A519, Mechanical
Grade
- 007 Steel-Galv. - Same as 01-01-001, except 28 Guage .0187
(.0195 - .0180 range) 0.78125 lbs/S.F.
- 010 Steel-Channel-3/4" x 3/8" x 1/8" .54 lbs/Ft., Structural
A-36.
- 011 Pipe, Steel, 1½" Nomanal, Sched 40, 2.72 lbs/L.F.
- 012 Steel, Rod 3/8", A-36 Struct. Steel.

01-100-(199) Copper

- 121 Tube, Type "M" Hard 5/8
- 122 Tube, Type "M" Hard 7/8
- 123 Tube, Type "M" Hard 1-1/8
- 124 Tube, Type "M" Hard 1-3/8
- 01-128 Refrig Tube 1/2 OD
- 0H35-0 Refrig Tube 3/16 OD

01-300-(399) Aluminum

- 301 Aluminum-Bar 5/16" x 1½" - 6061-T6, .551 lbs/L.F.
- 307 Aluminum, Tubing, 5/8" O.D., .527" I.D., 6061-T6.
- 310 Aluminum, Angle, 2" x 1" x 1/8", 6063-T5, 0.431 lbs/L.F.
- 311 Aluminum, Tubing 3/8" O.D., .277" I.D., 6061-T6.
- 312 Aluminum, Angle, 3½" x 2½" x ½", 6061-T6
Stand Amer. Shapes, 1.68 lbs/L.F.

01-500-(599) Welding & Brazing Materials

- 01-500 Brazing Rod
- 01-501 Welding Electrode

01-01-000

COMMODITIES (Continued)

01-600-(699) Lumber, Timber, Plywood & Other Wood Products

01-601 No. 3 Southern Pine, Dimensioned, 54S, Amercian Std., Spa.

01-601 Plywood, Sheath. Grade, DFPA

01-02-000 SUB -ASSEMBLIES

PART NUMBER

DESCRIPTION

01-02-001 Lens Acrylic 120" length. Clear Color.

01-02-002 Electrical Component Board

01-02-006 Manifold Support Column

01-02-007 End Beam - Collector Panel Housing

01-02-009 Torque Trussed Bar - Collector Panel Housing

01-02-010 Flanged Shaft - North End - Collector Panel Housing

01-02-011 Flanged Shaft - South End - Collector Panel Housing

01-02-012 Absorber Tube Assembly - Collector Panel Housing

01-02-016 Tracking Control Box Wiring Diagram 10062-12

01-02-018 * Wire Set

01-02-019 Truss - Interior Collector Housing

01-02-020 Truss - Exterior Collector Housing

01-02-022 * Insulation Set - Collector Housing

01-02-027 Pulley - 29" Dia See Drawing

01-02-029 North Manifold Flex Hose Assembly

01-02-030 South Manifold Flex Hose Assembly

01-02-031 Control Box Motor Assembly

01-02-032 Control Limit Switch Assembly

01-02-038 Manifold Conx. Assembly

01-03-000

SHOP FINAL ASSEMBLIES

PART NUMBER

DESCRIPTIONS

01-03-002

South Manifold Support- 3/4 x 3/4

01-03-003

South Manifold Support - 1 x 3/4

01-03-004

South Manifold Support - 1 x 1

01-03-005

South Manifold Support - 1 x 1 1/2

01-03-006

South Manifold Support - 1 1/2 x 1 1/2

01-03-012

South Brace (32°)

01-03-023

North Manifold Support W/Bleeder - 3/4 x 3/4

01-03-024

North Manifold Support - 1 x 3/4

01-03-025

North Manifold Support - 1 x 1

01-03-026

North Manifold Support - 1 x 1 1/2

01-03-027

North Manifold Support W/Bleeder - 1 1/2 x 1 1/2

01-03-032

North Column (32°)

01-03-043

Inclined Strut

01-03-044

Manifold Strut - 3/4"

01-03-045

Manifold Strut - 3/4"

01-03-046

Manifold Strut - 1"

01-03-047

Manifold Strut - 1"

01-03-048

Manifold Strut - 1 1/4"

01-03-049

Collector Panel Housing

01-03-050

North Wind Strut

01-03-051

End Enclosure - Lens

01-03-053

Solar Sensor Assembly

01-03-055

Absorber Tube

01-03-060

Bleeder Valve Assembly

01-03-063

Fluid Outlet 1 1/4"

01-03-000(Continued)

PART NUMBER	DESCRIPTION
01-03-066	Control Box Mount (East and West)
01-03-067	Idler Pulley Mount Assembly
01-03-068	Inlet & Outlet Closure Plate 1 $\frac{1}{2}$ "
01-03-069	Tracking Control Box (1" Power Screw)
01-03-073	Closure Plate

01-04-000

FIELD SUB-ASSEMBLIES

PART NUMBER

DESCRIPTION

01-04-004

Collector Panel

01-04-005

South Wind Bracing

01-04-006

North Upper Wind Bracing

01-04-007

Inclined Strut

01-04-008

Tracking Box Mounting

01-04-009

Idler Pulley Mounting

01-04-010

Manifold Strut - 3/4"

01-04-011

Manifold Strut - 3/4"

01-04-012

Manifold Strut - 1"

01-04-013

Manifold Strut - 1"

01-04-014

Manifold Strut - 1 1/4"

01-04-015

Manifold Strut - 1 1/4"

01-04-024

North Wind Strut

01-04-035

North Lower Wind Bracing (32°)

01-04-044

South Brace Assembly (32°)

01-04-057

Fluid Inlet Assembly 1 1/2"

01-04-062

Fluid Outlet 1 1/2"

01-04-065

Manifold End Closure 3/4"

01-04-067

Cable Drive 41 L.F.

01-04-068

Cable Drive 68 L. F.

01-04-069

Cable Drive 96 L.F.

01-04-070

Cable Drive 125 L.F.

01-04-071

Cable Drive 151 L.F.

01-04-072

Cable Drive 179 L.F.

01-04-000 (Continued)

PART NUMBER	DESCRIPTION
01-04-073	Cable Drive 206 L.F.
01-04-074	Cable Drive 234 L.F.
01-04-075	Cable Drive 262 L.F.
01-04-076	Cable Drive 289 L.F.
01-04-077	Sensor Attachment TRD-3
01-04-083	Manifold Conx. Assembly $3/4 \times 3/4$
01-04-084	Manifold Conx. Assembly $1 \times 3/4$
01-04-085	Manifold Conx. Assembly 1×1
01-04-086	Manifold Conx. Assembly $1\frac{1}{2} \times 1$
01-04-087	Manifold Conx. Assembly $1\frac{1}{2} \times 1\frac{1}{2}$
01-04-088	North & South Manifold Support Assembly

01-05-000

FIELD FINAL ASSEMBLIES

PART NUMBER

DESCRIPTION

01-05-007

Field Assembly - NSC-01-07 (Seven Panel & Frame)

01-05-076

List of Materials NSC-01-07 (32⁰)

01-05-122

Field Assembly Section CC

01-05-123

Bolt Settling Plan NSC-01-0732

01-05-124

Spare Parts List

01-05-129

Illustrated Assembly - TYP Array Bay

01-06-000

FABRICATED SHEET METAL PARTS

PARTS NUMBER

DESCRIPTION

01-06-002	Electrical Component Board Wrapper 20 Ga. Galv. $4\frac{1}{2}" \times 15"$ (.47 Ft. ²)
01-06-003	Electrical Component Board Lid 20 Ga. Galv. $4" \times 3"$ (.22 Ft. ²)
01-06-007	Manifold Strut, End Clip Angle 16 Ga. Galv. $3" \times 4"$ (.09 Ft. ²)
01-06-009	Capacitor Mounting Strap 20 Ga. Galv. $3/4" \times 4\frac{7}{8}"$ (.03 Ft. ²)
01-06-010	Flange Stiffener 5", $5\frac{1}{8}"$, & $5\frac{1}{2}"$ Wide Struts 16 Ga. Galv. $6" \times 3"$ (.125 Ft. ²)
01-06-011	Flange Stiffener with Base Angle Connection 16 Ga. Galv. $5" \times 6"$ (.21 Ft. ²)
01-06-022	Flange Stiffener for 5" Wide Struts, See 01-06-010 16 Ga. Galv. $6" \times 3"$ (.125 Ft. ²)
01-06-023	Flange Stiffener for $5\frac{1}{2}"$ Wide Struts, See 01-06-010 16 Ga. Galv. $3" \times 6"$ (.125 Ft. ²)
01-06-024	Web Member (Wide) Collector Truss 20 Ga. Galv. $3\frac{7}{16}" \times 13\frac{7}{16}"$ (.32 Ft. ²)
01-06-025	Web Member (Narrow) Collector Truss 20 Ga. Galv. $3\frac{3}{8}" \times 13\frac{9}{16}"$ (.32 Ft. ²)
01-06-026	Cord Top and Bottom Collector Truss 20 Ga. Galv. $3\frac{3}{4}" \times 128\frac{3}{4}"$ (3.353 Ft. ²)
01-06-027	End Strut Collector Truss 20 Ga. Galv. $4\frac{1}{16}" \times 11"$ (.3 Ft. ²)
01-06-028	End Beam, Collector Panel 16 Ga. Galv. $16\frac{1}{2}" \times 58\frac{5}{16}"$ (6.58 Ft. ²)
01-06-029	Lens Guide 20 Ga. Galv. $3\frac{5}{8}" \times 66\frac{13}{16}"$ (1.682 Ft. ²)
01-06-030	Lens Retainer - Top End 16 Ga. Galv. $4\frac{1}{2}" \times 1\frac{1}{2}"$ (.047 Ft. ²)
01-06-032	North Manifold/Collector Connect Housing Wrapper 16 Ga. Galv. $11\frac{1}{8}" \times 32\frac{1}{2}"$ (1.8 Ft. ²)
01-06-033	Manifold/Collector Connect Housing Lid 16 Ga. Galv. $6\frac{1}{2}" \times 10"$ (.43 Ft. ²)
01-06-034	Manifold/Collector Connect Housing Bottom 16 Ga. Galv. $6" \times 10"$ (.42 Ft. ²)

01-06-000 (Continued)

PART NUMBER	DESCRIPTION
01-06-036	Manifold Support Column 16 Ga. Galv. 37½" x 15" (3.9 Ft. ²)
01-06-037	Manifold Strut 16 Ga. Galv. 114½" x 15" (11.93 Ft. ²)
01-06-038	Manifold Strut Cover 16 Ga. Galv. 114½" x 6½" (4.97 Ft. ²)
01-06-039	Inclined Strut 16 Ga. Galv. 12" x 144" (12 Ft. ²)
01-06-040	Bottom and Side Covering - Collector Panel Housing 26 G. Galv. 42" x 133 5/8" (39.97 Ft. ²)
01-06-041	Manifold Positioning Plate 3/4", 16 Ga. Galv. 3 7/8" x 7/8" (.19 Ft. ²)
01-06-042	Manifold Positioning Plate 1", 16 Ga. Galv. 3 7/8" x 7/8" (.19 Ft. ²)
01-06-043	Manifold Positioning Plate 1½", 16 Ga. Galv.
01-06-044	Manifold Positioning Plate 1½", 16 Ga. Galv.
01-06-045	Manifold Positioning Plate 2", 16 Ga. Galv.
01-06-046	Torque Bar-Top Right Hand 16 Ga. Galv. 6" x 133 15/16" (5.581 Ft. ²)
01-06-047	Torque Bar-Top Left Hand 16 Ga. Galv. 6" x 133 15/16" (5.581 Ft. ²)
01-06-048	Torque Bar-Bottom 16 Ga. Galv. 6" x 122 15/16" (5.122 Ft. ²)
01-06-049	Truss Connector-Torque Bar-Top 16 Ga. Galv. 1 3/4" x 3 7/16" (.042 Ft. ²)
01-06-050	Torque Truss Connector-Bar-Bottom 16 Ga. Galv. 1 3/4" x 5 9/16" (.068 Ft. ²)
01-06-051	End Connector-Trussed Torque Bar 20 Ga. Galv. 4 1/16" x 1" (.028 Ft. ²)
01-06-052	Flange Stiffener-Wind Bracing Connector 16 Ga. Galv. 3 x 6 (.125 Ft. ²)
01-06-053	Outlet Closure Plate - Blank 16 Ga. Galv. 4" x 7" (.2 Ft. ²)
01-06-056	Outlet Closure Plate - 1½" 16 Ga. Galv. 4" x 6½" (.17 Ft. ²)
01-06-059	Control Box Mount 16 Ga. Galv. 12" x 26" (2.17 Ft. ²)
01-06-061	Bridging-Cross-Collector Panel 16 Ga. Galv. 9/16" x 15½" (.061 Ft. ²)
01-06-062	Bridging-Top & Bottom Collector Panel 16 Ga. Galv. 1½" x 1 5/8" (.10 Ft. ²)
01-06-063	Bridging-Vertical Collector Panel 16 Ga. Galv. 1 5/8" x 11" (.12 Ft. ²)
01-06-064	Bridging-Connector-Torque Bar, Right Hand, Collector Panel 16 Ga. Galv. 1 5/8" x 1" (.011 Ft. ²)

01-06-000 (Continued)

PARTS NUMBER	DESCRIPTION
01-06-069	South Brace (32°) 16 Ga.Galv. 12 3/8" x 26 3/16" (2.25 Ft. ²)
01-06-075	South Manifold Connect Housing Wrapper. 16 Ga. Galv. 11 1/8" x 23 1/2" (1.8 Ft. ²)
01-06-079	Bridging Connector-Torque Bar-Left Hand, Collector Panel 16 Ga.Galv. 1 5/8" x 1" (.011 Ft. ²)
01-06-080	South Brace (32°) See 01-03-012. 16 Ga. Galv. 12 3/8" x 26 3/16" (2.25 Ft. ²)
01-06-081	Idler Pulley Wrapper 16 Ga.Galv. 5' x 16 11/16" (.58 Ft. ²)
01-06-082	North Wind Strut, See 01-03-150. 16 Ga.Galv. 119 1/2" x 12" (9.96 Ft. ²)
01-06-083	North Column (32°). See 01-03-032. 16 Ga. Galv. 3" x 6" (.125 Ft. ²)
01-06-104	Sensor Positioning Bracket 16 Ga.Galv. 4 1/2" x 1/2" (.015 Ft. ²)
01-06-107	Cap-Idler Pulley Mount 16 Ga. Galv. 5 1/16" x 5 7/8" (.21 Ft. ²)
01-06-109	High Limit Switch U-Fastener 16 Ga.Galv. 2 3/8" x 2 1/2" (.041 Ft. ²)
01-06-110	Solar Sensor Mount 16 Ga. Galv. 5" x 7 1/2" (.252 Ft. ²)
01-06-111	Absorber Tube Retainer 16 Ga. Galv. 2 3/16" x 3 3/4" (.06 Ft. ²)
01-06-112	End Plate. See 01-03-051. 16 Ga. Galv. 5 1/8" x 12" (.427 Ft. ²)
01--6-122	Wrapper-Tracking Control Box. 01-03-069. 16 Ga. Galv. 2 1/2" x 25 7/8" (3.86 Ft. ²)
01-06-123	End Panel-Tracking Control Box. 01-03-069. South End. 16 Ga.Galv. 7 1/4" x 8 15/16" (.45 Ft. ²)
01-06-124	End Panel-Tracking Control Box. 01-03-069. North End. 16 Ga. Galv. 7 1/4" x 8 15/16" (.45 Ft. ²)
01-06-125	Bracket-Bearing Box. 01-03-069. 16 Ga.Galv. 11 3/4" x 5 7/8" (.48 Ft. ²)
01-06-126	Cover for Limit Switch-Tracking Control Box 01-03-069, West Side. 20 Ga.Galv. 4 1/8" x 5 13/16" (.17 Ft. ²)
01-06-127	Cover for Limit Switch-Tracking Control Box 01-06-069, East Side 20 Ga. Galv. 4 1/8" x 5 13/16" (.17 Ft. ²)
01-06-132	Pulley Cable Clamp Plate. 16 Ga.Galv. 1/2" x 1 1/2" (.005 Ft. ²)
01-06-133	Tracking Control Box Cover 01-03-069. 16 Ga.Galv. 8 15/16" x 26 15/16" (1.67 Ft. ²)

01-06-000 (Continued)

PARTS NUMBER	DESCRIPTION
01-06-134	SHIM Control Box, Left Side, 16 Ga. Galv. STL. 4 5/8" x 3" (.096 Ft. ²)
01-06-135	SHIM Control Box, Right Side, 16 Ga. Galv. STL. 4 5/8" x 3" (.096 Ft. ²)
01-06-136	MTG Bracket-- Motor (01-03-069 Control Box) 16 Ga. Galv. 3" x 5 1/8" (.11 Ft. ²)
01-06-137	Lens End Closure Weather Strip Plate. 20 Ga. Galv. 4 1/16" x 12 1/4" 9.346 Ft. ²)
01-06-138	Lens Guide-Splicer. 20 Ga. Galv. STL 3 7/16" x 3" (.072 Ft. ²)
01-06-162	Flange Stiffener. 16 Ga. Galv. 3" x 6 1/2" (.135 Ft. ²)

01-07-000	FABRICATED HEAVY METAL (STRUCTURAL, ETC.) PARTS
PARTS NUMBER	DESCRIPTION
01-07-003	South Col. Base Angle, 3½" x 2½" x ¼" x 2'-11" 6061-T6 Alum. 1.681 lbs/L.F. (01-312)
01-07-017	Flange-Shaft Collector Panel ASTM A-36 Structural STL. ½" thick Plate.
01-07-023	Housing-Power Screw, East Side, Control Box, 01-03-069
01-07-024	Housing-Power Screw, West Side, Control Box, 01-03-069
01-07-025	Pulley Rim, See Drawing. ¾" x 3/8" x 1/8" x 104" ASTM A-36 Structural Steel Channel .54 lbs/Ft.
01-07-026	Pulley Top Spoke, See Drawing. ¾" x 3/8" x 1/8" x 13 17/32 ASTM A-36 Structural Steel.
01-07-027	Pulley Bottom Spoke, See Drawing. ¾" x 3/8" x 1/8" x 13 17/32" ASTM A-36 Structural Steel
01-07-028	Pulley Horizontal Spoke, See Drawing. ¾" x 3/8" x 1/8" x 13 17/32" ASTM A-36 Structural Steel
01-07-029	Pulley Hub, See Drawing. Schedule 40 black Steel Pipe x 13/8" Length.
01-07-030	Pulley Mount Angle, See Drawing. 2" x 1" x 1/8" x 0'-2½" Alum. Angle, 6063-T5.

01-08-000

FABRICATED TUBING & PIPE

PARTS NUMBER

DESCRIPTION

01-08-002 *	Manifold 3/4" x 119 11/32" Type "M" cu.
01-08-003 *	Manifold 3/4" x 118 3/4" Type "M" cu.
01-08-004 *	Manifold 1" x 119 3/32" Type "M" cu.
01-08-005 *	Manifold 1" x 118 7/16" Type "M" cu.
01-08-006 *	Manifold 1 1/4" x 118 13/16 Type "M" cu.
01-08-011 *	Tee, Bleeder Connecting Type "M" cu. 4" x 1/2"
01-08-012 *	Fluid Outlet Pipe 1 1/2 dia x 10". See 01-03-063. Type "M" copper.
01-08-017 *	Maid-O-Mist Lead Tube 1/2" Type "L" x 5"
01-08-018 *	Pressure Relief Valve Lead Tube, 3/4" x 2" "M"
01-08-019 *	Schrader Valve Connect Tube 3/16 O.D. "L" x 4 1/2 Soft Dr. Copper (00-01-135)
01-08-020 *	Absorber Tube (w/tubes & caps) Exterior, Type "M" copper. See 01-02-012.
01-08-021 *	Absorber Tube (w/tubes & caps) Interior, Type "M" copper. See 01-02-012.
01-08-023 *	Absorber Tube Manifold Pipe, Exterior 5/8" O.D. 1/2" nom x 6.313" Type "M" Copper
01-08-024 *	Absorber Tube Manifold Pipe, Interior 5/8" O.D. 1/2" nom x 6.125 Type "M" Copper
01-08-025 *	Absorber Tube Manifold Pipe North 5/8" O.D. 1/2" nom x 5.0" Type "M" Copper.
01-08-026 *	Absorber Tube Manifold Pipe, South 5/8" O.D. 1/2" nom x 3.625" Type "M" Copper.
01-08-027 *	Absorber Tube Manifold Riser 5/8" O.D. 1/2" nom x 2 13/32" Type "M" Copper

01-09-000

PIPE FITTINGS, VALVES, EXP. COM., AIR VENTS, FLOW CONTROL,
CK VALVES, STOPS, PLUGS, PUMPS, H₂O ACCESSORIES.

PART NUMBER

DESCRIPTION

01-09-001 *

Maid-O-Mist #74 W/½" FPT Auto-Vent, Air Eliminator

01-09-002 *

Pressure Relief Valve Watts #3L, 125 PSI Release, ASME,
¾" MPT Connector

01-09-004 *

Swivel Conn. GRA-TEK

01-09-005 *

Schrader Valve Insert

01-09-006 *

Adapter Cu. Tube ¾" O.D., ½" MPT, Cast Brass

01-09-007 *

Cap - Cu. Tube, Wrought Copper, 1 ¾" O.D.

01-09-008 *

Wrought Tee ½ x ¾ x ¾

01-09-009 *

Wrought Tee ½ x 1 x ¾

01-09-010 *

Wrought Tee ½ x 1 x 1

01-09-011 *

Wrought Tee ½ x 1 x 1½

01-09-012 *

Wrought Tee ½ x 1½ x 1½

01-09-014 *

Wrought Tee ½ x 1½ x 1½

01-09-016 *

Flex Hose GRA-TEK

01-09-017 *

Adapter, Wrought cu., ¾" O.D. Sweat x ½" MPT

01-09-018 *

Adapter, Wrought cu., 7/8" O.D. Sweat x ¾" MPT

01-09-019 *

Wrought Tee ½ x ½ x ½

01-09-020 *

½ Nom. Short Rad. (Ells) 90° Elbow, Wrought

01-09-021 *

½ Nom. Wrought Coupling W/Stop Lee

01-09-022 *

½ Nom. Male Adapter, Wrought

01-09-024 *

Schrader Valve ½" Ø Flare Adapter

01-09-060 *

Adapter Wrot., 5/8" x ½", LEE #15-101 or equal (MPT)

01-09-062 *

Plug. Wrot. Cu. to Fit 7/8" O.D. Fitting

01-10-000

ELECTRICAL PARTS, COMPONENTS, SOLENOIDS, FABRICATED WIRE,
RELAYS, P/C BOARDS, CONTACTORS, MOTORES, TERMINALS, WIRE

PART NUMBER

DESCRIPTION

01-10-002 *	Potted P/C Board
01-10-003 *	Relays
01-10-004	Transformer
01-10-005 *	Capacitor
01-10-006 *	Fuse
01-10-007	Limit Switch
01-10-008	Relay Receptacle (2) Socket
01-10-009	P/C Board Connector
01-10-010 *	Fuseholder
01-10-011	Solar Discs 2½" x 1 3/4" P.C. Board
01-10-012	Sensor Cells - Photovoltaic
01-10-015 *	Sensor Discs Wire 2" Length Black
01-10-017 *	Control Box Leads (1) Blu (1) Blk (1) Org, All 10'
01-10-018 *	High Limit Switch - Fenwal or Equal 10A1250A240VAC NON - IND.
01-10-019	High Limit Switch Bridge Fastener Bakelite
01-10-038	Motor, Gear, Tracking Box (01-03-069)

00-13-00

INSULATION

PART NUMBER

DESCRIPTION

01-13-002 *	Owens Corning Fiberglass Insulation, 1" Thk, RA 22
01-13-003 *	Fiberglasspouring insulation, Owens Corning 1 Bag = 7.5 Ft. ³
01-13-004 *	Batt - 1000°F Owens Corning AFU Solar 1000°
01-13-005 *	$\frac{1}{2}$ x 2 $\frac{1}{2}$ Du Pont Microform Insulation
01-13-006 *	$\frac{1}{2}$ x 3 $\frac{7}{8}$ Du Pont Microform Insulation
01-13-007 *	1" Thk Smooth Foil Back Duet Board Insulation

00-16-000

PAINTS, COATINGS SEALANTS, ADHESIVES, ETC.

PART NUMBER

DESCRIPTION

00-16-001

Z.R.C. Metal Conditioner

00-16-002

Z.R.C. Zinc Coating

00-16-003

Z.R.C. Zinc Coating Thinner

00-16-004 *

Selective Coating, NASA Black Chrome, Olympic

01-17-000 *

HARDWARE -- BOLTS, NUTS, SCREWS, HINGES, BEARINGS, NON-ELECTRICAL CABLE, CLAMPS, TURN-BUCKLES, NAILS, PINS

PARTS NUMBER

DESCRIPTION

01-17-002	Screw #4 x $\frac{1}{2}$ (40 TPI) Zinc
01-17-003	Stand off $\frac{1}{4}$ O.D. x $\frac{1}{2}$, Threaded (40 TPI) Alum.
01-17-004	#6 x 1 $\frac{1}{8}$ " (32 TPI), Slotted Head, Zinc Coated
01-17-008	#8 x $\frac{1}{2}$, S.D. & S.T. (Tek) Screw, 18 TPI
01-17-009	Pulley 12" O.D. x $1\frac{1}{2}$ " Bore with Cable Clamp Bale
01-17-010	$\frac{3}{8}$ x $\frac{3}{4}$ " Hex Bolt, Zinc Coated
01-17-011	$\frac{3}{8}$ " Hex Nut, Zinc Coated
01-17-012	$\frac{3}{8}$ " Lock Washer, Zinc Coated
01-17-013	$\frac{1}{2}$ " x $6\frac{1}{2}$ " Hex Bolt, Mach. Bolt, Zinc Coated
01-17-014	$\frac{1}{2}$ " Hex Nut UNC, Zinc Coated
01-17-015	$\frac{1}{2}$ " Lock Washer, Zinc Coated
01-17-016	Bearing $1\frac{1}{2}$ " Cast Iron, Set Screw
01-17-019	Cable Clamp $\frac{1}{2}$ " ϕ
01-17-021	SPLIT Lock Washer (#6) Zinc Coated
01-17-022	Nut, Hex #6 (32TPI) Zinc Coated
01-17-027	Bolt, Machine Hex Head, $\frac{1}{2}$ " x $\frac{1}{2}$ ", INC. Zinc Coated
01-17-028	Nut, Hex Head $\frac{1}{2}$ " UNC, Zinc Coated
01-17-029	Lock Washer $\frac{1}{2}$ ", Zinc Coated
01-17-030	Bolt Spacer $\frac{1}{2}$ " ϕ x 5 $\frac{3}{8}$ "
01-17-035	Cable, Aircraft, Galv. 7 x 7, $\frac{1}{4}$ " Dia. Preformed
01-17-036	Bolt Spacer $\frac{1}{2}$ " I.D. x $7\frac{7}{8}$ ", Alum. Tube (01-307)
01-17-037	Bolt Spacer $\frac{1}{2}$ " x 5, Alum. Tube (01-307)
01-17-039	Bolt Spacer $\frac{3}{4}$ " x 5 $\frac{3}{16}$ Alum. Tube (01-307)
01-17-041	$\frac{1}{2}$ " Flat Washer 12 Ga.
01-17-044	Pop Rivets $\frac{1}{8}$ " Alum. x $\frac{1}{4}$ " length
01-17-045	Pin, $\frac{1}{4}$ " x $2\frac{1}{2}$, Hex H.D.

01-17-000 (Continued)

PARTS NUMBER	DESCRIPTION
01-17-046	Heyman Mfg. Co. Wire - Ty W/Screw Hole. -8 Screw
01-17-049	Bolt Carriage 3/8" x 3/4" UNC (UNC)
01-17-050	Flange (1 1/2) 4-25-172
01-17-051	Nut, Hex 3/8" -16 TPI Zinc Coated
01-17-052	3/8" Lock Washer Zinc Coated
01-17-053	Bearing (1 1/2) Bearing
01-17-054	Locking Collars (1 1/2) Bearing
01-17-056	Fastner-Lock 1/2" (Timmerman) C12007-017, or Equal
01-17-057	Bolt-Mach. - 1/2 x 2 1/2 Hex H.D.
01-17-058	Spacer Bolt - 1/2 x 1 11/16, Alum. Tube (00-01-311)
01-17-059	Spacer Bolt - 1/2 x 1 13/16, Alum. Tube (00-01-311)
01-17-060	#6 - 32 x 3 1/8" Screw R.N. HD, Zinc Coated
01-17-061	#6 - 32 Hex Nut
01-17-062	Bolt Hex 1/2 x 1 1/2 UNC, Zinc Coated
01-17-063	Fastener Lock 1/2 x 4 (Timmerman) or Equal
01-17-065	5/8 Nut Zinc Coated
01-17-066	5/8 Bolt x 1 1/2 Zinc Coated
01-17-067	Lock Washer (5/8) Zinc Coated
01-17-072	3/8 Flat Washer Zinc Coated
01-17-073	Cable Thimble 1/2" Zinc Coated
01-17-074	Turnbuckle 3/8 x 6", Galv., Equal to Upson Walton H-62GJJ Galv. with 2-114 Lock Nuts
01-17-075	1/2" x 20, Hex Nut, Zinc Coated
01-17-076	1/2" Star Lock Washer, Zinc Coated
01-17-077	Turnbuckle for Wind Bracing, H31, 3/8 x 6" Upson/Walton-Galv. (No Eye, Hook or Jaws)
01-17-078	#4 40 TPI x 1/2" Bolt, Zinc Coated
01-17-079	#4 40 Nut, Zinc Coated
01-17-080	#4 Lock Washer, Zinc Coated

01-17-000 (Continued)

PARTS NUMBER	DESCRIPTION
01-17-081	#6 x 1/2, 32 TPI Slotted Round Head, Zinc Coated
01-17-082	#6 Hex Nut, 32 TPI, Zinc Coated
01-17-083	#6, Star Lock Washer, Zinc Coated
00-17-095	1/2" Dia. x 1/2", Mach. Bolt, Slotted, Rd. H.D., Unc., Zinc Coated
00-17-096	1/2" Dia., Hex Nut, UNC. Zinc Coated
00-17-098	Wind Brace Lower, 3/8" x 2'-0" A36 STL Rod W/ 6" Left Hand Thread, 3/8-16, Galv. After Fabrication.
00-17-099	North (Lower) End, Wind Brace, Upper, 3/8" x 9'-4" A36 Stl. Rod W/3/8"-16 TPI x 0'-6" R. H. Thread. Galv. After Fabrication
00-17-100	North & South (Upper) End Wind Brace, Upper, 3/8" x 7'-10" A36 St. Rod W/3/8 - 16TPI x 0'-6" R. H. Thread, Galv. After Fabrication
00-17-118	Bearing Flanged Cast Housing (Two Bolt) NTN Toyo Brg. Co. #UCFL 209, 1 3/4 I.D.
00-17-119	Sprocket, 3/8" Bore for No. 35 3/8" Pitch American Std. Roller Chain, Browning No. 359.
00-17-120	Sprocket, 1 3/4 Bore for No. 35 3/8" Pitch, American Std. Roller Chain, Browning No. 35B45
00-17-121	Roller Chain, 3/8" Pitch No. 35 Single Strand
00-17-122	Pin Stl. 1/2", Hex x 3"
00-17-123	Brazing Rod (01-500)
01-17-129	Steel Retainer Clip for Swivel
01-17-130	Screw, #8x 5/8, Hex HD, With Neoprene Washer Bonded to Metal Cap, S.D & S.T. Equal to TEK

01-18-000

MACHINED PARTS (SPECIAL)

PARTS NUMBERS

DESCRIPTION

01-18-005

Shaft-North End Collector Panel, Cold Drawn Seamless STL Tubing
ASTM 519 1½" O.D. x 0.109 Wall Thk x 3 7/8" Length

01-18-006

Shaft-South End Collector Panel Cold Drawn Seamless STL Tubing
ASTM 519 1½" O.D. x 0.109 Wall Thk x 2½" Length

01-18-009

Shaft - 1½ Dia. x 0.109 Wall Thk'ness Cold Drawn Seamless Steel
Tubing ASTM 519 Mech. Grade x 9½" Length

01-18-010

Power Screw and Nut, Tracking Control Box 01-03-069

01-18-014

Cable Guide (01-03-069 Control Box)

00-19-001

PACKAGING/SHIPPING

PARTS NUMBER

DESCRIPTION

01-19-008 *

Carton for NASA Prototype

00-20-000

GLASS, GLAZING COVERINGS

PARTS NUMBER

DESCRIPTION

00-20-001

Lens, Collector "ML" Series 133 5/8" x 8" Radius

01-20-002

End Cap 3" O.D. x 3/16" Black Acrylic

01-20-003

Solar Disc's Base 2 3/8" x 2 23/32" x 3/16" Plexiglass

01-20-004

Sensor Tube 3" O.D. x 2 3/4" Clear Plexiglass

01-21-000 *

WEATHER STRIPPING, NON-METALIC GROMMETS, SPONGE RUBBER, ETC.

PARTS NUMBER

DESCRIPTION

01-21-001

Grommets "Rubber" Atlantic India, #2856 or Equal

01-21-004

Weatherstripping self-adhesive, 3/4 x 3/16 Cleotex

01-21-005

Grommet North Manifold Atlantic India #2903 or Equal

01-21-006

Silicon Sealant Equal to GE RTV White

01-21-019

Silicon Sealant Equal to GE RTV Black

01-21-021

Viton "O" Ring

SHOP FINAL
ASSEMBLY

PART / ASSEMBLY

NORTHROP CORPORATION

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

L161 OF 1 MATERIALS

01-03-009

DATE 3-28-73

①

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

TRACKING CONTROL

BOX

REV

SHT. 1 of 2

PART. NO. / REV / DESCRIPTION

01-03-009

TRACKING CONTROL BOX

01-06-122

WRAPPER 16 GA. GALV. 21 1/2" X 25 1/8" (3.86#)

01-06-123

SOUTH-END PANEL 16 GA. GALV. 7 1/2" X 8 5/8" (.45#)

01-06-124

NORTH-END PANEL 16 GA. GALV. 7 1/2" X 8 5/8" (.45#)

01-06-133

COVER 16 GA. GALV. 8 5/8" X 26 1/8" (1.67#)

01-02-031

MOTOR ASSEMBLY

01-06-136

MOUNTING BRACKET 16 GA. GALV. 3" X 5 1/8" (.11#)

01-10-038

MOTOR GEAR

01-02-002

ELECTRICAL COMPONENTS ASSEMBLY

01-10-002

WRAPPER 20 GA. GALV. 4 1/2" X 15" (.47#)

01-06-003

WRAPPER LID 20 GA. GALV. 4" X 9" (.23#)

01-10-010

FUSEHOLDER

01-10-002

FUSE

01-21-001

GROMMET RUBBER-ATLANTIC INDIA #23566 OR EQUAL

01-10-008

SOCKET, RELAY

01-10-009

RECEPTACLE, P/C BOARD

01-10-004

TRANSFORMER

01-10-005

CAPACITOR

01-06-009

CAPACITOR STRAP 20 GA. GALV. 3 1/4" X 4 1/8" (.03#)

01-02-018

WIRE SET

01-02-032

LIMIT SWITCH ASSEMBLY

01-10-007

LIMIT SWITCH

01-06-126

WEST SIDE COVER 20 GA. GALV. 4 1/8" X 5 1/8" (.17#)

01-06-127

EAST SIDE COVER 20 GA. GALV. 4 1/8" X 5 1/8" (.17#)

01-18-010

POWER SCREW AND NUT

01-07-023

EAST SIDE POWER SCREW HOUSING

01-07-024

WEST SIDE POWER SCREW HOUSING

01-18-014

CABLE GUIDE

01-06-125

BEARING BRACKET 16 GA. GALV. 11 3/4" X 5 1/8" (.48#)

00-17-113

BEARING 1 3/4" NTN #U5FL 209-1 3/4" G (G) OR EQUAL

00-17-119

SPROCKET 3/8" BORE BROWNING #359 OR EQUAL

00-17-120

SPROCKET 1 3/4" BORE BROWNING #35B45 OR EQUAL

00-17-121

CHAIN 3/8" PITCH, BROWNING #35 OR EQUAL

01-10-002

P/C BOARD - POTTED W/RTV

01-10-003

RELAYS

01-21-001

GROMMET RUBBER-ATLANTIC INDIA #23566 OR EQUAL

00-17-122

STRIKE PIN

00-17-056

FASTENER-LOCK 1/4" (TINERMAN) C12007-017 OR EQUAL

01-17-062

BOLT HEX 1/2" ϕ X 1 1/2" - 13 UNC ZINC

01-17-015

LOCKWASHER 1/2" ϕ ZINC

01-17-014

HEX NUT 1/2" ϕ - 13 UNC ZINC

01-17-010

BOLT HEX 3/8" ϕ X 3/4" - 16 UNC ZINC

01-17-012

LOCKWASHER 3/8" ϕ ZINC

01-17-011

HEX NUT 3/8" ϕ - 16 UNC ZINC

01-17-027

BOLT HEX 1/4" ϕ X 1/2" - 20 UNC ZINC

01-17-029

LOCKWASHER 1/4" ϕ ZINC

01-17-028

HEX NUT 1/4" ϕ - 20 UNC ZINC

01-17-031

SCREW - #2 X 1/2 - 32 SLOT HEAD, ZINC

01-17-002

SCREW - #4 X 1/2 - 40 SLOT HEAD, ZINC

01-17-003

STAND OFF 1/4" ϕ X 1/2" THREADED, H.H. SMITH #3489 OR EQUAL

01-03-069
DATE 3-28-73

①

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

TRACKING CONTROL

BOX

REV

ENT. 2 OF 2

PART. NO. / REV / DESCRIPTION

55	01-17-003	SCREWS - #8 - 1/2 S.D. & E.T.
2	01-17-013	SCREW - #4 - 1/2 (40 T.F.I.) ZINC
2	01-17-011	NUT HEX #4 - 40 ZINC
2	01-17-020	LOCKWASHER #4 ZINC
9	01-17-044	RIVET, POP - 1/8" φ ALUM
4	01-17-004	SCREW #6 x 1 - 32 SLOT HEAD, ZINC
4	01-17-022	NUT, HEX #6 - 32 ZINC
4	01-17-021	LOCKWASHER SPLIT #6 ZINC

NORTHROP	WRAPPER FOR			01-06-122
	TRACKING (01-03-069)			CHK
	CONTROL BOX			REV
	NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141			9-13-78

Approved

REVISION	REASON	BY
A	11-2-77 REPAIR	RB
B	1-30-78 REV. 1/2"	RS
C	3-14-78 REPAIR	W

ELECTRICAL COMPONENT BR.

20GA. GALV. REED (01-01-002)
 GEAR G12 15.0 x 15.0 (4)
 ALL BENDS 90
 TAPE D-19

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

ELECTRICAL COMP. BOARD

01-06-002	
DRN RB	CHK
11-1-77	REV A

REVISIONS			
Δ	HOLE DIM	10-6-77	RB
NOTES			
B	MODIFICATION PER FABRICATION	1-6-78	RB
C	REDRAWN	3-14-78	bg

ELECTRICAL COMPONENT BOARD LID

SCALE 1:3

20 GA. GALV. STL REQ'D. (01-01-002)

6 HOLE SIZE : 8 3/8 X 3 5/16

REF 01-02-002

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

HOUSING-POWER
SCREW, TRK. CONTRL
BOX 01-02-069

01-07-023

01-07-024

DRN FW CHK

2/4/78 REV

CABLE GUIDE

"DELKIN" PLASTIC (DU-PONT) #500
2 EA. REQ'D PER ASS'Y

ORTHORUP

ORTHORUP INCORPORATED 303 NICHOLS DRIVE MICHIGAN TAYLOR, TEXAS 75781

CABLE GUIDE

01-B-C14

DRN	RDS	CHK	FW
			REV

MAKE ALL (A) DIMS. EQUAL $\frac{3}{4}$ " $\pm$ OUT TO OUT

COVER
 TRACKING CONTROL BOX
 10 GA GALV. STL. (9-001)
 8 15/16" x 26 15/16" 1.67 FT²
 ALL BENDS 90°
 1. BRAZE ALL CORNERS
 2. PAINT BRAZING WITH .002"
 P.003 COATING OF Z.R.C.
 ZINC COATING PER MFG.
 SPECS

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

COVER FOR
TRACKING CONTROL BOX
 01-03-069

01-06-133	
DRN ^{ADS}	CHK FW
3-23-78	REV

SOUTH 01-06-123
NORTH 01-06-124

NORTHROP

IRTHRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

END PANEL - N S S
TRK CTR'L BOX
01-03-069

01-06-12	
01-06-12	
DRN FW	CHK
3-13-78	REV

11 3/4" x 5 7/8" 16 GA. GALV STL. (01-001)
0.48 FT²

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

BRACKET-BEARING,
TRK'G CONTR BOX
(01-03-069)

01-06-125		
DRN	FW	CHK
3-13-78	REV	

UCFL2

Set Screw Type
Normal Duty

Shaft Dia. in.	Complete Flanged Unit Number	Nominal Dimensions in.										Bearing Number	Basic Load Rating lbs.		Housing Number
		a	c	g	l	s	b	z	Bi	n	Dyn. C		Static Co		
1 1/4	UCFL 209-1 1/2 G 6	7 1/8	5 1/4	3/4	1 1/2	.57	4 1/4	2.06	1.937	.748	UC 209-1 1/2	5650	4000	FL209G 6	

Flanged Units Cast Housing (Two Bolt)

UCFL

Set Screw

UCFL 2 (for light load)

The bearing housing, each side thereof being rhombic, is to be secured to the frame with two bolts. Its form allowing side by side mounting in a narrow space, this type is recommended where a limit is set on the mounting pitch.

REF. 01-03-069

FORNORIP

THRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CONTROL BOX
BEARINGS

01-17-118

DRN	CHK
-----	-----

100-70	REV
--------	-----

MOTOR MOUNTING BRACKET

16 GA. GALV. (01-01-001)
 ALL BENDS 90°
 BLANK = 3" x $5\frac{1}{8}$ " .12 S.F.

JOINTHURUP

JOINTHURUP, INCORPORATED 302 Nichols Drive Hutchins Texas 75141

MOTOR MTG. BRACKET
 FOR TRACKING MOTOR
 (01-02-001)

A	REV. MOTOR MTG. HOLES	4/4/78	RE
DRN	RDE	CHK	FW
2	2	2	REV

OUT TO OUT DIMENSIONS

NOTE:

01-06-126 - WEST SIDE CONTROL
BOX AS SHOWN

01-06-127 - EAST SIDE CONTROL
BOX, BREAK OFF HAND

4 1/8" x 5 13/16" 20 GA GALV STL (01-01-002)
0.17 FT²

WORTH RUP

RUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

COVER-LIMIT SW.
TRK, CONTROL BOX
01-03-069

01-06-126	
01-06-127	
DRN	CHK
FW	
3-17-78	REV

NORTHROP

CAPACITOR MOUNTING STRAP

01-06-009	REV	EB	AK
7.24.77	REV

CAPACITOR MOUNTING STRAP

SCALE FULL SIZE

20 GA. ALU. RECD (01-01-002)

STRAP SIZE = .75 X 4.815

ALL BENDS 90°

REF. 01-02-002

MATERIAL:

BROWNING STEEL TYPE "B"
 #35B45 1 3/4" BORE, 45 TEETH,
 SPROCKET. W/ SET SCREW.
 TO BE USED W/ #35 AMERICAN
 STANDARD ROLLER CHAIN.

REF. 01-03-069

WORMHURST

WUP, INCORPORATED 332 Nichols Drive, Hutchins, Texas 75141

CONTROL BOX
 DRIVE SPROCKET

01-17-120	
DRN 69	CHK
4-26-78	REV

SECTION

MATERIAL

BROWNING #369 STEEL
SINGLE STRAND SPROCKET
W/9 TEETH AND 3/8" Ø BORE.
ALSO W/ SET SCREW.
TO BE USED W/ #35 AMERICAN
STANDARD ROLLER CHAIN.

REF. 01-03-069.

NORRIS

NORRIS, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

DRIVE MOTOR
SPROCKET

01-17-119		
DRN	b9	CHK
4-26-78	REV

Roller Chain

SINGLE STRAND CHAIN

Chain Pitch P	Chain No.	CHAIN		DIMENSIONS							
		Average Tensile Strength Lbs.	Average Weight per Ft. Lbs.	Connecting Links		Rollers		Pins	Side Plates		
				A	B	D	E		G	H	T
STANDARD											
• 3/8	35	2,100	.23	.223	.288	.200	3/16	.141	.344	.050

Single Strand—Riveted

MATERIAL

DROWING ROLLER CHAIN
No 35 AMERICAN STANDARD

ORINBORO

IUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CONTROL BOX
DRIVE CHAIN

01-17-12	
DRNT	CHK
59	
4-26-78	REV

F-345X
FILAMENT
TRANSFORMER
PR. 115/230V.
50/60 HZ.
SEC. 24 VCT
C 1.0 A. RMS
HORIZONTAL
CHANNEL
MOUNTING

TRANSFORMER

REF. 01-02-002

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

TRANSFORMER
TRACKING MECHANISM

01-02-002
REV Bb
7-28-77

STANDARD
RANGE

AMPHENOL Industries

SOLDER

TYPE "MIP"
SOCKETS

WIRE WRAP

PRINTED CIRCUIT

X = $\frac{1}{2}$ on MIP-4-5-6-7S + 7L
X = .145 on MIP-8-9-11-12
Y = $\frac{1}{4}$ on MIP-4-5-6-7S
Y = $\frac{1}{8}$ on MIP-7L-20
Y = $\frac{1}{4}$ on MIP-11-12

High dielectric bakelite body with molded in steel plate except (1)
Mica-filled phenolic socket. *Requires $\frac{1}{8}$ " hole for mounting. All
others mount in $\frac{1}{2}$ " hole. Shpg. wt., 2 oz.

SOLDER TYPES

Stock No.	Type	Prongs	1-49	50-99	100-249	250-999	1000-2499
38F840	77MIP4	4	.24	.22	.195	.151	.135
42F822	77MIP4T	4	.29	.24	.216	.167	.149
38F841	77MIP5	5	.29	.24	.218	.166	.147
38F842	77MIP6	6	.31	.26	.235	.182	.163
38F843	77MIP7S	7S	.34	.28	.252	.195	.174
38F845	77MIP8	Octal	.24	.22	.196	.152	.136
38F846	*88-8	Octal	.29	.24	.220	.170	.150
38F847	*88-8X	Loktal	.44	.37	.330	.254	.226
38F848	77MIP9	9	.30	.25	.224	.173	.156
38F849	77MIP11	11	.31	.26	.232	.180	.160
39F1244	77MIP11T	11	.40	.34	.302	.233	.207
38F850	77MIP12	12	.36	.30	.269	.208	.185
39F149	77MIP20	20	.70	.59	.527	.410	.363

PRINTED CIRCUIT TYPES

Stock No.	Type	Prongs	1-49	50-249	250-499	500-999	1000-2499
42F825	77MIP8W-0125	8	.35	.29	.264	.205	.182
42F826	77MIP9W-0125	9	.40	.33	.295	.228	.205
42F827	77MIP11W-0125	11	.42	.36	.317	.246	.219

WIRE WRAP TYPES

Stock No.	Type	Prongs	1-49	50-249	250-499	500-999	1000-2499
42F828	77MIP8W-0500	8	.39	.33	.295	.228	.203
42F829	77MIP9W-0500	9	.44	.37	.327	.253	.225
42F830	77MIP11W-0500	11	.49	.41	.367	.285	.253

RELAY SOCKET

REF. 01-02-002

FROM NEWARK CAT.

WIRTHORUP

WIRTHORUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

RELAY SOCKET
TRACKING MECHANISM

01-10-002

REV E6

REV

WIRE SET
ELECTRICAL COMPONENT ASSEMBLY
REICH ASSOCIATES, INC.

P. O. Box 73, Plano, Texas 75074

(214) 424-7904

October 27, 1977 Rev. 1(11/11/77) Rev. 2(11/18/77), Rev. 3(12/12/77)Rb
Rev. 4(3/38/78) FW

Model 10062

Cut Wire List Racker Electronics Sub Assembly

WIRE NO.	QUANTITY	COLOR	LENGTH	REMARKS	FROM	TO
1	1	Black	10"		Inside	Outside 120V
2	1	Black	9"		F1/2	J2/1
12	1	Black	26"		J1/1	Outside Solar Sensor
22	1	Black	5"		J2/3	J3/1
8	1	Black	15"		TP1	Outside(motor)
5	1	Blue	10"		Inside	Outside 120V
13	1	Orange	26"		J1/2	Outside Solar Sensor
14	1	Blue	26"		J1/3	Outside Solar Sensor
18	1	Blue	18"	Flag 1 End	J2/2	Outside Limit Switch
21	1	Blue	5"		J2/7	J1/12
15	1	Green	5"		J1/4	JP2
16	1	Green	21"	Flag 1 End	TP2	Outside Limit Switch
19	1	Red	21"	Flag 1 End	J3/2	Outside Limit Switch
20	1	Red	5"		J3/7	J1/6
23	1	Yellow	15"	Flag 1 End	C1/1	Outside(motor)
24	1	Yellow	8"	Flag 1 End	J2/6	C1/1
25	1	Red	15"	Flag 1 End	C1/2	Outside(motor)
26	1	White	8"	Flag 1 End	J3/6	C1/2
17	1	Green	18"	Flag 1 End	TP2	Outside Limit Switch

NOTE: All wire 18 gauge. Cut to specified length and strip ends

NORTHROP

SHOP SUB-ASSEMBLY
ELECTRICAL COMPONENT BOARD

01-02-00
1-6-75
1-28-71

SHOP SUB-ASSEMBLY - ELECTRICAL COMPONENTS BOARD -

BILL OF MATERIALS PER ASSEMBLY

QTY	PART #	DESCRIPTION	QTY	PART #	DESCRIPTION
1	01-06-002	COMPONENT BOARD	1	01-10-006	CAPACITOR
1	01-06-003	COMPONENT BOARD LID	1	01-06-009	CAPACITOR MOUNTING STRAP
3	01-17-008	#8 SHEET METAL SCREWS	1	01-10-004	TRANSFORMER
1	01-10-006	FUSE	2	01-10-008	RELAY SOCKET
3	01-11-001	WIRE GROMMET RUBBER	1	01-10-009	P/C BOARD CONNECTOR
9	01-17-044	POP RIVETS 1/8 ALUM	1	01-10-010	FUSEHOLDER
1	01-02-018	WIRE SET	2	01-17-018	#4 x 1/2 (40 TPI) SCREW
			2	01-17-019	#4 NUT (40 TPI)
			2	01-17-020	#4 LOCKWASHER

REVISION
Δ REDESIGN
1-6-75 RB

NORTHROP
NORTHROP, INCORPORATED, 2000 Northrop Drive, Hawthorne, Texas 75111

REICH ASSOCIATES, INC. Plano, Tx.

SCALE: N/A APPROVED BY: ER DRAWN BY: ER
DATE: 7/29/77 REVISED:

TRACKING SYSTEM P/C BOARD
ASSEMBLY

DRAWING NUMBER: 1
01-10-002

(3) CHG. CONNECTOR NUMBERS.

(1) ADD IN4148 ACROSS EACH RELAY COIL:

U₁, U₂ CA747E

CR1-CR7 IN4148 or IN914; CR8-CR11 IN4004; CR12, CR13 1N4742

Notes: Last R36, C6, CR13, U2, P1, Q6

NORTHROP

NORTHROP, INCORPORATED 302 Michale Drive, Murchina, Texas 75141

REVISIONS			Reich Associates Inc. Plano, Tx.		
NO.	DATE	BY	DRAWN BY	SCALE	MATERIAL
1	10/10/77	ER		N/A	
2	10/27/77	ER		N/A	
			CHK'D	DATE	DRAWING NO.
			CR	7/25/77	01-10-002
			TRACED	APP'D	2

01-10-009
REV. 10/74
1-25-17/10

PC BOARD CONNECTOR
TRACKING MECHANISM

AMPHENOL

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

AMPHENOL

Printed Circuit Connectors

SERIES 261 WIRE-WRAP PC CONNECTORS

.100" CENTER

Stock No.	Type	No. Contacts	Dimensions											EACH				
			A	B	C	D	E	F	G	H	I	J	K	1-49	50-99	100-249	250-999	1000-Up
29F3350	261-10015-2	15	2.474	1.400	1.720	1.874	2.156							2.44	2.03	1.72	1.47	1.30
29F3351	261-10018-2	18	2.774	1.700	2.020	2.174	2.458							2.80	2.34	1.97	1.68	1.49
29F3352	261-10022-2	22	3.174	2.100	2.420	2.574	2.858							3.27	2.74	2.29	1.97	1.74
29F3353	261-10030-2	30	3.974	2.900	3.220	3.374	3.658	200	.627	.735	.494	.465	.343	4.09	3.42	2.87	2.46	2.18
29F3354	261-10036-2	36	4.574	3.500	3.820	3.974	4.258							4.75	3.97	3.30	2.86	2.53
29F3355	261-10043-2	43	5.274	4.200	4.520	4.674	4.958							5.53	4.62	3.88	3.32	2.95

PC BOARD CONNECTORS

REF 01-02002
FROM NEWARK CATALOG

Wiring Diagram

WIRING DIAGRAM

Connection for Clockwise (CW) or Counter-clockwise (CCW) rotation facing output shaft; connect 115 VAC, 60 Hz power supply as illustrated.

STYLE 21

STYLE 22

STYLE 23

STYLE 24

ORDER GUIDE ROLLER LEVER

Characteristics: O.F. — Operating Force;
R.F. — Release Force; P.T. — Pretravel;
O.T. — Overtravel; D.T. — Differential Travel;
O.P. — Operating Position; F.P. — Free Position

Recommended For	Style No.	Electrical Data Ref.	Typical Catalog Listing	O.F. max. (ounces)	R.F. min. (ounces)	P.T. max. (inches)	O.T. min. (inches)	D.T. (inches)	O.P. (inches)	F.P. max. (inches)
Up to 20 ampere load handling	23	G	BA-2RV-A2	2.5	0.50	.625	.078	.109 max.	.750 ±.030	—
Up to 25 ampere load handling	23	H	BE-2RV-A4	2.5	0.50	.625	.078	.109 max.	.750 ±.030	—

LIMIT SWITCH

REFER 01-02003

FROM MICRO SWITCH CATALOG

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Mutchins, Texas 75141

LIMIT SWITCH
TRACKING MECHANISM

01-10-007

REV 2/6

72877 REV

Assembl.	Parts/ Assembl.	K SHOP FINAL ASSEMBLY - PART		List of Materials	
		K SHOP SUB-ASSEMBLY - PART		01-03-049	
		K PART		Collector Housing Assembly	
				1-31-78	
				REV	
				LNT. 1 CC	
PART. NO. / REV / DESCRIPTION					
	2	01-03-049	Collector Housing Assembly		
		01-06-040	Cover sides & bottom 42" X 133-5/8".		
			26 Ga. Galv. (01-001) 39.97 Ft2		
	54	01-17-008	#8 X 1/2 Screw Zinc Coated		
	16	01-06-061	Bridging Cross 16 Ga. Galv. Steel, 9/16"		
			X 15-1/2 (.061 Ft 2)		
	16	01-06-062	Bridging Top & Bottom, 16 Ga. Galv. Steel,		
			1-1/4" X 1-5/8" (-10 Ft2)		
	64	01-17-027	1/4 X 1/2 Bolt Zinc Coated		
	64	01-17-028	1/4 Nut, Zinc Coated		
	64	01-17-029	1/4 Lockwasher, Zinc Coated		
	24	01-06-109	Insulation Cap Fastener 2" X 40" (.55 Ft2)		
			20 Ga. Galv., 01-002		
	24	01-13-002	1" Thick RA-22 Owen Corning Fiberglass		
			Insulation, 4 pcs - 19-3/4 X 44", 8 pcs -		
			19-3/4 X 42-1/2" and 12 pcs - 12" X 44-3/16"		
	1	01-13-004	Batt Insulation Owen Corning AFU - Solar		
			1000° (52 cu. ft. reg.)		
	1	01-13-005	1/4 X 2-1/2 X 6 DuPont Micro Form Insulation		
	1	01-13-006	1/4 X 2-1/2 X 3-7/8 DuPont Micro Form		
			Insulation		
	8	01-13-007	1" Thick Smooth Foil Back Duct Board		
			Insulation, 4 pcs @ 9-5/8" X 16" and 4 pcs		
			@ 9-5/8" X 14"		
	72	01-17-008	No. 8 X 1/2 Screws, Zinc Coated		
	1	01-21-006	Silicon Sealant GE RTV or Equal		
2		01-02-007	End Beam Sub-Assembly		
	2	01-06-028	End Beam 16 Ga. Galv. Steel, 16-1/4 X 58-5/16"		
			(6.58 Ft 2)		
	8	01-06-027	End Strut 20 Ga. Galv. Steel 4-1/16" X 11"		
			(.3 Ft2)		
	4	01-06-051	End Strut 20 Ga. Galv. Steel 4-1/16" X 1"		
			(.028 Ft2)		
	80	01-17-008	#8 X 1/2 Screw, Zinc Coated		
1		01-02-010	Flanged Shaft Assembly - North End		
	1	01-07-017	Flange ASTM, A36 Stl 1/4" Thick Plate		
	1	01-18-005	Flanged Shaft, 1-1/2 O.D. X .109 Wall Thk. Cold		
			Drawn Seamless Tube 3-7/8" Length, North		
	6	01-17-010	Bolt, 3/8 X 3/4, Zinc Coated		
	6	01-17-011	Nut, 3/8, Zinc Coated		
	6	01-17-012	Lockwasher 3/8, Zinc Coated		
1		01-02-011	Flanged Shaft Assembly - South End		
	1	01-07-017	Flange ASTM A36 Stl, 1/4" Thick Plate		
	1	01-18-006	Flanged Shaft, 1-1/2 O.D. X .109 Wall Thk, Cold		
			Drawn Seamless Tube 2-1/2 Length, South		
	6	01-17-010	Bolt, 3/8 X 3/4, Zinc Coated		
	6	01-17-011	Nut, 2/8 Zinc Coated		
	6	01-17-012	lockwasher, 3/8, Zinc Coated		
2		01-02-019	Collector Truss (interior) Sub-Assembly		
2		01-06-138	Lens Guide 20 Ga. Galv Steel 3-7/16" X 3"		
			(.072 Ft2) SPLICE		
4		01-06-029	Lens Guide 20 Ga. Galv. Steel 3-5/8" X 66 3/16"		
			(7.03 Ft2)		
16		01-06-024	Web Member (wide) 20 Ga. Galv. Steel 3-7/16" X		
			13-9/16" (.32 Ft2)		

Assembly	Parts/ Assembly	FIELD SUB-ASSEMBLY - PART		List of Materials	
		SHOP FINAL ASSEMBLY - PART		01-03-049	
		SHOP SUB-ASSEMBLY - PART		Collector Housing Assembly	
		PART		1-31-78	
				REV	SHT. 2 CC 4
PART. NO. / REV / DESCRIPTION					
14		01-06-025	Web Member (narrow) 20 Ga. Galv. Steel 3-3/8" X 13-9/16" (.32 Ft2)		
4		01-06-026	Chord Top & Bottom 20 Ga. Galv. Steel 3-3/4" X 128-3/4" (3.353 Ft2)		
8		01-06-063	Vertical Bridging 16 Ga. Galv. Steel 1-5/8" X 11" (.12 Ft. 2)		
11		01-17-008	#8 X 1/2 Screw, Zinc Coated		
8		01-17-057	Bolt, 1/4 X 2-1/4 Zinc Coated		
8		01-17-028	Nut, 1/4, Zinc Coated		
8		01-17-029	Lockwasher, 1/4, Zinc Coated		
4		01-17-059	Spacer Bolt 1/4 X 1-13/16, Zinc Coated (01-311)		
4		01-17-058	Spacer Bolt 1/4 X 1-11/16, Zinc Coated (01-311)		
24		01-17-045	Pin, 1/4 X 2-1/4, Zinc Coated		
24		01-17-056	Fastener Lock, 1/4 Tinnerman or Equal		
2		01-02-020	Collector Truss (exterior) Sub-Assembly		
2		01-06-138	Lens Guide 20 Ga. Galv. Steel 3-7/16 X 3" (.072 Ft2)		
4		01-06-029	Lens Guide 20 Ga. Galv. Steel 3-5/8" X 133-5/8" (3.36 Ft2)		
16		01-06-024	Web Member (wide) 20 Ga. Galv. Steel 3-7/16" X 13-9/16" (.32 Ft2)		
14		01-06-025	Web Member (narrow) 20 Ga. Galv. Steel 3-3/8 X 13-9/16" (.32 Ft2)		
4		01-06-026	Chord Top & Bottom 20 Ga. Galv. Steel 3-3/4" X 128-3/4" (3.353 Ft2)		
4		01-06-063	Vertical Bridging 16 Ga. Galv. Steel 1-5/8" X 11" (.12 Ft2)		
11		01-17-008	#8 X 1/2 Screw, Zinc Coated		
8		01-17-057	Bolt, 1/4 X 2-1/4, Zinc Coated		
8		01-17-028	Nut, 1/4, Zinc Coated		
8		01-17-029	Lockwasher, 1/4, Zinc Coated		
4		01-17-059	Spacer Bolt 1/4 X 1-13/16, Zinc Coated		
4		01-17-058	Spacer Bolt 1/4 X 1-11/16, Zinc Coated		
24		01-17-045	Pin, 1/4 X 2-1/4, Zinc Coated		
24		01-17-056	Fastener Lock, 1/4 Tinnerman or Equal		
1		01-02-009	Torque Tube Assembly		
1		01-06-138	Lens Guide Splice 20 Ga. Galv. Steel 3-7/16 X 3" (.072 Ft2)		
2		01-06-029	Lens Guide, 20 Ga. Galv. Steel 3-5/8 X 133-5/8" (3.36 Ft2)		
2		01-06-026	Chord Top & Bottom 20 Ga. Galv. Steel 3-3/4" X 128-3/4" (3.353 Ft2)		
1		01-06-046	Torque Bar Right Side 16 Ga. Galv. Steel 6" X 133-15/16" (5.581 Ft2)		
1		01-06-047	Torque Bar Left Side 16 Ga. Galv. Steel 6" X 133-15/16" (5.581 Ft2)		
1		01-06-048	Torque Bar Bottom 16 Ga. Galv. Steel, 6" X 122-15/16 (5.581 Ft2)		
16		01-06-049	Truss Connector Torque Bar Top 16 Ga. Galv. Steel 1-3/4" X 3-7/16" (.042 Ft2)		
4		01-06-064	Bridging Connector Right Hand 16 Ga. Galv. Steel 1-5/8" X 1" (.011 Ft2)		
4		01-06-079	Bridging Connector Left Hand 16 Ga. Galv. Steel 1-5/8" X 1" (.011 Ft2)		

Assembl:

Parts/
Assembl:

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

List of Materials

01-03-049

Collector Housing Assembly

1-31-78

REV . . . LHT. 3 OF

PART. NO. / REV / DESCRIPTION

16		01-06-050	Truss Connector Torque Tube Bar, 16 Ga, Galv. Steel 1-3/4" X 5-9/16" (.068 Ft2)
145		01-17-008	#8 X 1/2 Screw, Zinc Coated
4		01-17-057	Bolt 1/4 X 2-1/4 Zinc Coated
4		01-17-028	Nut 1/4 Zinc Coated
4		01-17-029	Lockwasher 1/4, Zinc Coated
4		01-17-058	Spacer Bolt 1/4 X 1-11/16, Zinc Coated
12		01-17-045	Pin, 1/4 X 2-1/4, Zinc Coated
12		01-17-056	Fastener Lock 1/4 Tinnerman or Equal
1	01-02-01		Absorber Tube Sub-Assembly
2		01-08-020	Exterior Absorber Tube 1-1/8" ϕ X 131" Type "M" Cu, Tube
8		01-09-007	Cap 1-1/8 I.D., Cu, Tpe "M"
4		01-08-023	Exterior Manifold Pipe 5/8 ϕ X 6, 131", Cu,
2		01-08-021	Interior Absorber Tube 1-1/8 ϕ X 131", Type "M", Cu, Tube 01-09-007 I.D.,
4		01-08-023	Exterior Manifold Pipe 5/8" ϕ X 6, 131" Cu, Type "M" Tube
4		01-08-024	Interior Manifold Pipe 5/8 ϕ X 6, 125", Cu, Type "M" Tube
2		01-09-019	Tee 1/2 X 1/2 X 1/2 WROT
2		01-08-027	Manifold Riser 5/8" ϕ X 2-23/32", Cu., Type "M" Tube
2		01-09-020	Elbow 1/2 WROT 90° Short rad.
1		01-08-025	Manifold Pipe North End 5/8" ϕ X 5", Cu., Type "M" Tube
1		01-08-026	Manifold Pipe South End 5/8 ϕ X 3, 625", Cu, Type "M" Tube
2		01-09-022	Male Adapter 1/2 WROT
1		01-16-004	Selective Coating, Black Chrome, Olympic, NASA Spec.
8		01-06-111	Absorber Tube Retainer 16 Ga., Galv. Steel 2-3/16 X 4-1/2 (.088 Ft2)
8		01-17-063	Fastener Lock 1/4 X 4 Tinnerman or Equal
1		*01-10-018	High Limit Switch, Fenwal or Equal 10A 1205 A 240 VAC Non-Ind.
1		*01-10-019	High Limit Switch Bridge Fastener 1/2 X 2-1/2 3-3/16 Bakelite Board
1		*01-06-108	High Limit Switch - U-Fastener 16 Ga, Galv. Steel 2-3/8 X 2-1/2 (.041 Ft2)

* - Optional Equipment

Assembly

Parts/
Assembly

FIELD SUB-ASSEMBLY - PART

← SHOP FINAL ASSEMBLY - PART

← SHOP SUB-ASSEMBLY - PART

← PART

List of Materials

01-03-049

Collector Housing Assembly

1-31-78

REV

LHT. 4 OF 4

PART. NO. / REV / DESCRIPTION

PART. NO.	REV	DESCRIPTION
*01-017-081		#6 X 32 X 1/2 Slotted Round head Screw, Zinc Coated
*01-017-022		#6 X 32 Hex Nut Zinc Coated
*01-017-021		#6 Split Lockwasher, Zinc Coated
* - OPTIONAL EQUIPMENT

1. ELECTRIC ARC WELD ($\frac{1}{8}$ " FILE)
ALL SPOKES TO RIM & HUB, AND
WELD RIM SPICE AS NOTED,
PER A.W.S.
2. HOT DIP GALVANIZE AFTER ALL STL.
FABRICATION, & PRODUCE A TIGHT
COAT OF PRIME SPECTER OF
NOT LESS THAN 1.25 OZ. PER SQ. FT.

			BILL OF MATERIAL		
			QTY.	PART NO.	DESCRIPTION
2	17-25	NO. 6 32 HEX-NUT	1	21-07-025	PULLEY RIM
2	17-321	NO. 6 SPLIT LOCKWASHER	2	21-07-026	TOP PULLEY SPOKE
			2	21-07-027	BOTTOM PULLEY SPOKE
			2	21-07-028	HORIZ. PULLEY SPOKE
			1	21-07-029	PULLEY HUB
			4	21-07-030	PULLEY MOUNT ANGLE
			1	21-06-02	PULLEY CABLE CLAMP PLATE
			8	17-025	1/2 DIA. 1/2 R.H.M.S. BOLT
			8	17-026	1/2 DIA. HEX NUT
			2	17-25	NO. 6 32 SPLIT LOCKWASHER
			2	17-25	NO. 6 32 R.H.M.S. BOLT

CABLE CLAMP

16 GA. GALV. ETL. (01-001)

1/2 X 1 1/2 (.005 FT²)

SCALE: 1" = 1 1/2"

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

PULLEY CABLE
CLAMP PLATE

01-06-132	
DRN RFE	CHK FW
REV

PULLEY MOUNT ANGLE

2'x1'x1/8"x2 1/4" ALUM ANGLE (01-310)

6063-T5 0.491 LBS/FT. SQ CORNERS

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

PULLEY MOUNT ANGLE

01-07-30

DRN RDS

CHK FW

1 01-10 REV

NOTE:
 COLD ROLL CHANNEL
 TO 29" INSIDE DIA.
 ALLOW TO OVERLAP
 AS INDICATED, AND
 CUT FOR 29" I.D.

PULLEY RIM

$\frac{3}{4}" \times \frac{3}{8}" \times \frac{1}{8}"$ CHANNEL $\times 104"$ (01-010)
 .54 LBS/FT. A-36 STR. STL.

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

PULLEY RIM

01-07-025

DRN RDS CHK FW

3-21-78 REV

$\frac{3}{16}$ " ϕ HOLES
 2 REQ'D.
 01-07-027
 ONLY

$\frac{3}{16}$ " ϕ HOLES
 2 REQ'D.
 01-07-028
 ONLY

NOTE:
 NO HOLES REQ'D.
 IN 01-07-026

PULLEY SPOKE

$\frac{3}{4}$ " x $\frac{3}{8}$ " x $\frac{1}{8}$ " - A-36 STR. STL.
 254 LBS/FTS (01-010)
 TOP SPOKE 01-07-026
 BOTTOM SPOKE 01-07-027
 HORIZ. SPOKE 01-07-028

01-07-026
 01-07-027

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

PULLEY SPOKE

01-07-028	
DRN	CHK
ROS	FW
REV

PULLEY HUB

SCHEDULE 40, BLACK STEEL PIPE
 2.72 LBS/L.F. (01-011)
 1½" NOM. SIZE 1.9" O.D., 1.61" I.D.

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

PULLEY HUB

01-07-029

DRN	RDS	CHK	FW
-----	-----	-----	----

2-01-72 REV

SHOP FINAL
ASSEMBLY

PARTS/ASSEMBLY

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS
01-03-051

DATE 1/31/78

FIELD SUB-ASSEMBLY - PART
 SHOP FINAL ASSEMBLY - PART
 SHOP SUB-ASSEMBLY - PART
 PART

LENS END CLOSURE

REV 641. 1 OF 1

PART. NO. / REV / DESCRIPTION

8

01-03-051 Lens End Closure ASSEMBLY

1

01-21-004 Weather Stripping 3/4 x 3/16, Adhesive Back, Length as Req'd.

108

01-17-008 #8 x 1/2 Screws Zinc coated

8

01-06-112 END PLATE 16 GA. GALV. STEEL. 5 1/8" x 12" (.51 FT²)

01-06-137 LENS END CLOSURE WEATHER STRIP PLATE 16 GA.
GALV. STEEL. 4 1/8" x 12 1/4" (.346 FT²)

NOTE: ASSEMBLE BOTH PARTS SUCH THAT WEATHER STRIP IS BETWEEN THE TWO PARTS. FASTEN TOGETHER @ SLOTTED HOLE. 3 PILOT HOLE LOCATIONS LOOSELY WITH 3/8 x 1/2 SCREWS (01-17-08). THEN ATTACH ASSEMBLY TO COLLECTOR AND MAKE ADJUSTMENTS.

NORTHROP NORTHROP, INCORPORATED 302 Nichols Drive, Mutchins, Texas 75141	LENS END CLOSURE ASSEMBLY		01-03-051
	REV.	DATE	REV.
	3-27-75		REV.

MATERIAL: 20 GA. GALV (01-002)
 SHEAR SIZE: $5\frac{1}{8} \times 12$ " (.427 FT.)

NORTHROP	LENS END CLOSURE		01-06-112	
	END PLATE		DRN BY CLK	
NORTHROP, INCORPORATED 302 Nichols Drive, Wichita, Texas 76141		3-27-78		REV

MATERIAL: 20 GA. GALV. (01-002)
 SHEAR SIZE 4 1/16" x 12 1/4" (.346 FT.)

01-016-137	
DRN 69	CHK
3-27-78	REV
LENS END CLOSURE WEATHER STRIP PLATE	
NORTHRIUP NORTHRIUP, INCORPORATED 303 Nichols Drive, Mutchins, Texas 75141	

APPROXIMATE FACETS

COLLECTOR LENS

FULL SIZE
 MAT'L: ACRYLIC
 CLEAR COLOR
 LENGTH: $120 \pm 1/16$

SHEET 1 OF 2

Collector
 Lens

2-15-71 ELS
2-9-78 REV A
01-20-001

NORTHROP

No.	X ₁	Y ₁	X ₂	Y ₂	R	α
1	0	7.785"	1.204"	7.818"	22.1"	0.0°
2	1.195	7.692	1.700	7.725	25.1	4.3
3	1.686	7.600	2.076	7.633	28.2	6.2
4	2.059	7.507	2.392	7.539	32.5	7.6
5	2.373	7.414	2.670	7.446	37.6	8.7
6	2.647	7.321	2.917	7.353	flat	9.8
7	2.893	7.227	3.144	7.258	flat	10.8
8	3.118	7.133	3.354	7.164	flat	11.7
9	3.326	7.038	3.550	7.069	flat	12.6
10	3.520	6.943	3.734	6.973	flat	13.4
11	3.702	6.848	3.907	6.878	flat	14.2
12	3.873	6.752	4.072	6.782	flat	14.9
13	4.037	6.656	4.228	6.685	flat	15.7
14	4.191	6.559	4.378	6.588	flat	16.4
15	4.340	6.463	4.521	6.490	flat	17.1
16	4.481	6.366	4.658	6.393	flat	17.7
17	4.616	6.268	4.790	6.295	flat	18.4
18	4.747	6.170	4.917	6.196	-43.7	19.1
19	4.872	6.071	5.040	6.097	-37.7	19.7
20	4.993	5.972	5.158	5.997	-34.9	20.3
21	5.110	5.873	5.271	5.898	-31.7	20.9
22	5.222	5.773	5.382	5.797	-27.7	21.5
23	5.331	5.673	5.488	5.696	-26.1	22.2
24	5.436	5.572	5.592	5.595	-24.3	22.7
25	5.538	5.471	5.692	5.493	-21.8	23.4
26	5.636	5.369	5.789	5.391	-21.1	23.9
27	5.732	5.267	5.883	5.288	-19.7	24.5
28	5.825	5.165	5.974	5.185	-18.2	25.1
29	5.914	5.061	6.062	5.081	-17.2	25.7

01-14-001

SHEET 2 OF 2

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

SCALE: FULL	TOLERANCE UNLESS OTHERWISE SPECIFIED	DRAWN BY SW
DATE: 1-31-77	ANGULAR ±1/20 FRACTIONAL ±1/32	REV A 2-9-78

ACRYLIC LENS (.090"±.020")
8.000" RADIUS, 12.000" FOCAL LENGTH

MATL ACRYLIC	SHEAR SIZE NA	DRAWING NUMBER 01-20-001
-----------------	------------------	-----------------------------

MATERIALS:

16 GA GALV. STL (01-001)
4 1/2" x 1 1/2" (.047 FT²)

REF. (A) REDRAWN

ORINORUP

IP, INCORPORATED 302 Nicho's Drive, Hutchins, Texas 75141

LENS RETAINER
TOP

01-06-030	
DRN <i>ba</i>	CHK
2-2-70	REV A

BOTTOM PLAN VIEW

SECT. A-A

SECT. B-B

COMMON PARTS

- (E) 01-17-045, PIN - 1/4 X 2 1/4, 20 REQ'D.
- 01-17-050, FASTNER LOCK - 1/4, 20 REQ'D.
- (B) 01-17-027, BOLT, 1/4 X 1/2, 32 REQ'D.
- 01-17-028, NUT, 1/4, 32 REQ'D.

- (W) 01-17-008, NUT 8 X 1/2 X 1/2, 88 REQ'D.
- (A) 01-17-010 BOLT 3/8 X 3/4 (12 REQ'D)
- (C) 01-17-011 NUT 3/8 (12 REQ'D)
- 01-17-012 LOCK WASHER 3/8 X 1/2 REQ'D

END VIEW NORTH AND SOUTH

- (1) 01-13-002-BA22 OWEN CORNING FIBERGLASS INSULATION, 1" THICK.
- (2) 01-13-004-OWEN CORNING AFUGULAR THERM BATT INSULATION.
- (3) 01-13-005-1/4 X 2 1/2 DUPONT MICRO-FORM INSULATION. (INSIDE SHAFT)
- (4) 01-13-006-1/4 X 3/8 DUPONT MICRO-FORM INSULATION. (INSIDE SHAFT)
- (5) 01-13-007-1" THICK SMOOTH FOIL BACK DUCT BOARD INSULATION.
- (6) 01-06-109 INSULATION CAP FASTENER

NORTHROP
NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

COLLECTOR HOUSING ASSEMBLY

01-03-049	
DRN	CHK
01-24-79	REV.

14-1

5/32 ϕ HOLES (4)

MATERIAL

20 GA. GALV STL. 01-01-001
2 x 40 (.55 ft²)

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

01-06-051

11-1-77	REV
---------	-----

COMMON PARTS -

- ⑦ 01-017-008, N° 8 x 1/2 SCREW, 6 REQ'D.
 (X) 01-017-057, BOLT - 1/4 x 2 1/4, 2 REQ'D
 01-017-028, NUT - 1/4, 2 REQ'D
 01-017-029, LOCK WASHER - 1/4, 2 REQ'D
 01-017-059, SPACER-BOLT - 1/4 x 3 1/2, 2 REQ'D.
 (Y) 01-017-057, BOLT - 1/4 x 2 1/4, 2 REQ'D.
 01-017-028, NUT - 1/4, 2 REQ'D.
 01-017-029, LOCK WASHER - 1/4, 2 REQ'D.
 01-017-058, SPACER-BOLT - 1/4 x 1 1/2, 2 REQ'D.
 (Z) 01-017-045, PIN - 1/4 x 2 1/4, 12 REQ'D.
 01-017-050, FASTENER LOCK - 1/4, 12 REQ'D.

COLLECTOR TRUSS SUB-ASSEMBLY

NOTE:

- REF: 01-03-049 COLLECTOR HOUSING ASSEMBLY
 4 COLLECTOR TRUSS SUB-ASSY REQ'D PER COLLECTOR

- 01-02-19 INTERIOR TRUSSES 2 REQ'D
 01-02-20 EXTERIOR TRUSSES 2 REQ'D
 4 TOTAL

NORTHROP
 NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75451

COLLECTOR TRUSS SUB-ASSEMBLY

01-02-020	
01-02-019	
DRN	CHK
26	
1-25-75	REV.

MTL 20 GA GALV. STL (01-01-002)
 35 1/2 x 66 3/16" (1.682 FT²)

REV B, 3-29-78 GEN. by
 REV. A, 3-27-78 GEN. by

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LENS GUIDE

COLTR PANEL

01-06-029

DRN	FW	CHK
12-1-77	REV	B

MATERIAL: 20 GA GALV. 6TL
 (01-00.2)
 $3\frac{7}{16} \times 3'$ (.072 FT²)

DIRTHORUP

INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LEND GUIDE SPLICE

COLLECTOR PANEL

01-06-138

DRN *by* CHK

2-2-70 REV

MATERIAL: 16 GA. GALV. STL. (01-01-001) $1 3/4" \times 3 7/16"$ 0.042 FT²

REV 4 3-30-78 DWM. bc

NORTHROP

THRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

TRUSS CONNECTOR-
TORQUE BAR-TOP

01-06-049

DRN FW CHK

11-1-77 REV A

ABSORBER TUBE SUB-ASSEMBLY

SECT. A

SECT. B

NOTE:
HOLD ALL DIMENSIONS TO $\pm .02$ "

NOTE:
① DO NOT BRAZE UNTIL ABSORBER TUBE HAVE BEEN PLATED AND ARE READY FOR FINAL SHOP ASSEMBLY

REV. A 3-30-78 DIM. NOTE 29

NORTHROP
NORTHROP, INCORPORATED 302 Nichols Drive, Murching, Texas 75141

ABSORBER TUBE
SUB-ASSEMBLY

01-02-012	
DPN BG	CHK
1-7-78	REV.

MATERIALS:

10 GA. GALV. STL. (01-01-001)
 $2 \frac{3}{16} \times 4 \frac{1}{2}$ (-068.FT²),

REV. B. 5-1-78 DIM. by
 REV. A. 3-30-78 DIM. by

JOINTHORUP

JOINTHORUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

ABSORBER TUBE
 RETAINER

01-06-111	
DRN BG	CHK
1-27-78	REV B

TYPE	QTY
CROSSOVER EXT.-	8
" INT.-	4
" NORTH-	1
" SOUTH-	1
RISER	2

NOTE: ALL TUBING 5/8" O.D, 1/2" NOM.
CU. TYPE "M". (01-01-121)

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

ABSORBER TUBE(S)
CROSSOVER AND
RISER

REV. A 3-30-78 DIM. 69

01-08-023 TO 01-08-027	
DRN	CHK
01-26-78	REV A

MATERIAL:

16 GA. GALV. (01-01-001)

$2\frac{3}{8} \times 2\frac{1}{2}$ (.041 ft²)

1 REQ'D

TO BE USED WITH 01-10-019

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

HIGH LIMIT SWITCH
U-FASTENER

01-06-108

DRN BG CHK

1-31-78 REV

MATERIAL:

1/2 x 2 1/2 x 1/4 BAKELITE BOARD
 1 REQ'D
 TO BE USE WITH 01-06-108

ORTHORUP

RUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

HIGH LIMIT SWITCH
 BRIDGE FASTENER

01-10-019

DRN BG CHK

1-31-73 REV A

NORMENBURG

TORQUE BAR
BOTTOM

01-03-048	CHK	DRN FW
	REV A	11-1-77

REV A. 3-30-78 HALL: 1-11-78

MATERIAL: 16 GA. GALV. STL. (01-01-001) 6" x 133 5/16" 5.531 FT²

01-06-064	R.H. AS SHOWN
01-06-079	L.H (OPPOSITE)

MATERIAL: 16 GA. STL
GALV. (01-01-001)
SHEAR SIZE 1 5/8" x 1 (.01 ft²)
ALL BENDS 90°, .016

JOINTHURUP

JOINTHURUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

BRIDGING CONNECTOR
TO TORQUE BAR
COLLECTOR PANEL

01-06-064	
01-06-079	
DRN	CHK
EG	REV. A
11-13-78	

COMMON PARTS -

- (W) 01-17-008, N° 8 SCREW, 70 REQ'D
- (Y) 01-17-057, BOLT $\frac{1}{4} \times 2\frac{1}{4}$, 4 REQ'D
- 01-17-028, NUT - $\frac{1}{4}$, 4 REQ'D
- 01-17-029, LOCKWASHER - $\frac{1}{4}$, 4 REQ'D
- 01-17-058, SPACER BOLT - $\frac{1}{4} \times 1\frac{1}{2}$, 4 REQ'D
- (Z) 01-17-045, PIN - $\frac{1}{4} \times 2\frac{1}{4}$, 12 REQ'D
- 01-17-056, FASTENER LOCK - $\frac{1}{4}$, 12 REQ'D

01-06-050 TRUSS CONNECTOR
TORQUE BAR BOT, EA. SIDE.
(16 REQ'D PER ASSY)

01-06-040 TORQUE
BAR BOT. SIDE

NORTH END

01-06-046 R.H. AND 01-06-047 L.H.
TORQUE BAR SIDES. (1 EA. REQ'D PER ASSY)

01-06-049 TRUSS CONNECTOR @
TORQUE BAR TOP, EA. SIDE.
(16 REQ'D PER ASSY)

01-06-158 LENS GUIDE SPLICE
01-06-029 LENS GUIDE
(2) REQ'D PER ASSY

01-06-026 CHORD TOP & BOT.
(TOP). 2-REQ'D PER ASSY.

01-06-004 R.H. AND 01-06-079 L.H.
BRIDGING CONNECTOR @ TOP & BOT.
EA. SIDE. (4 EA. R.H. & L.H. REQ'D PER ASSY)

NOTE: REF 01-03-049 COLLECTOR
HOUSING ASSEMBLY.

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NORTHROP, INCORPORATED 302 Nichols Drive, Mutchins, Texas 75141

REV. A 3-30-78. SPICER CHG. - 13A on

TORQUE TUBE
SUB-ASSEMBLY

01-06-009
REV. A
1-25-78

NOTE: MAKE (A) = (B) $7\frac{1}{8}" \pm$

20 GA. GALV. STL. (01-01-002)

$3\frac{7}{16}" \times 13\frac{9}{16}" .32 \text{ FT}^2$

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

REV A. 3-30-78 (DIM? NOT 2) log

WEB MEMBER-WIDE
COLLECTOR TRUSS

01-06-024	
DRWN FW	CHKD
10-14-77	REV A

NOTE: MAKE (A) = (B) $7\frac{1}{8}" \pm$

MTL: 20 GA. GALV STL (01-01-002) .32. FT²
 $3\frac{3}{8}" \times 13\frac{9}{16}"$

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

WEB MEMBER-NARROW
 COLL'TR TRUSS

01-06-025

DRN FW CHK

10-27-77 REV

MAKE (A) = (B) 1" ±

MTL. 20 GA GALV. STL. (01-01-002)
3 3/4" x 128 3/4" 3.353 FT²

REV. B 3-30-78 by

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CHORD-TOP & BOTTOM
COLLECTOR TRUSS

01-06-026

DRN FW/ CHK

10-28-77 REV (A) 12-1-77

MATERIAL:

16 GA. STL GALV. (01-01-001)
SHEAR SIZE 15 1/8 X 11 (0.12 ft²)

REV. A. 3-30-78 DIM. 69.

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

BRIDGING-VERTICAL
COLLECTOR
PANEL

01-06-063

DRN PG CHK

1-13-78 REV A

MTL: 20 GA. GALV STEEL (01-01-002)
4 1/16" x 11" .3 FT²

REV. A 2-30-79 Dm. 100

JOINTHORUP

JOINTHORUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

END STRUT

COLL'TR. TRUSS

01-06-027

DRN FW CHK

10/28/77

REV A

END BEAM SUB-ASSEMBLY

COMMON PARTS -

(W) 01-017-008, No 8 SCREW, 80 REQ'D.

NOTE: REF: 01-03-049 (COLLECTOR HOUSING AND Y LOCATION)

JOINTHORUP

HRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

END BEAM
SUB-ASSEMBLY

126

01-02-007	
DRN 04	CHK
01-25-75	REV

MATERIAL: 16 GA. STL GALV. (01-01-00)
SHEAR SIZE 9/16 x 15 1/2 (0.061 ft²)

REV. A. 3-30-78 DWM. 69

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

BRIDGING-CROSS
COLLECTOR
PANEL

01-00-001

DRN **EG** CHK

1-13-72 REV A

MATERIAL: 16 GA. STL
 GALV. (01-01-001)
 SHEAR SIZE $1\frac{1}{4} \times 11\frac{5}{8}$ (0.10 ft²)
 ALL BENDS 90° , -R16

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

BRIDGING TOP & BOT.
 COLLECTOR
 PANEL

01-00-002	
DRN 06	CHK
1-13-78	REV

* ALL INSIDE DIMENSIONS

MTL: 28 GA. GALV. STL. (01-01-007)
 42" x 133 5/8" 39.97 FT²

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

COVER-SIDES & BOT

COL'TR PANEL

REV. A. GEN. 3-29-78 ba

01-06-040

DRN FW/ CHK

12-1-77 REV A

MATERIAL: COLD DRAW, SEAMLESS STEEL TUBING, ASTM A-519, MECH. GRADE (P/N 01-01-005) 1 1/2" O.D. x 0.109" WALL THK.

FABRICATION: GRIND TO INDICATED O.D. WITH CENTERLESS GRINDER, CUT TO LENGTH ON LATHE OR BY SAWING. DEBURR EACH END. DRILL PULLEY SET HOLE IN NORTH END, -005 ONLY.

01-18-005 NORTHEND
01-18-006 SOUTH END

NORTHROP

HRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

SHAFT-N.E.S. END
COLL'TR PANEL

01-18-005 & 006		
DRN	EW	CHK-
10/22/77	REV	A

01-07-017

01-18-005 FOR
01-02-010 NORTH END
01-18-006 FOR
01-02-011 SOUTH END

1/8" FILLET WELD
ALL AROUND

	P/N	QUANT.		DESCRIPTION
		01-02-010	01-02-011	
	01-07-017	1	1	FLANGE
	01-18-005	1	NONE	SHAFT
	01-18-006	NONE	1	SHAFT
	01-01-501	.08 IN ²	.08 IN ³	WELD.G.ELECTRODE
	01-16-001	.001 GAL	.001 GAL	MET. CONDITIONER, ZRC
	01-16-002	.004 GAL	.004 GAL	ZINC COATING, ZRC.
	01-16-003	.001 GAL	.001 GAL	THINNER, ZRC

FABRICATION & FINISH: WELD PER AWS & AISC. REMOVE LOOSE RUST AND FLUX WITH POWER STEEL BUFFER. CLEAN SURFACES WITH MET. CONDITIONER PER 01-16-001. COAT ALL SURFACES WITH ZINC COATING (.002" TO .003" THK) AND CURE PER 01-16-002 & 01-16-003. STORE, HANDLE & SHIP IN SUCH MANNER AS TO PREVENT DENTS NICKS, FLUX OR DAMAGE TO OUTSIDE SURFACE OF SHAFT.

01-02-010 NORTH END
01-02-011 SOUTH END

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

FLANGED SHAFT ASSBY. 01-02-010 & 011
NORTH & SOUTH END
COLLECTOR PANEL

DRN	FW	CHK
10-26-77	REV	A

MAT'L: P/N 01-01-004, ASTM A-36 STRUCTURAL STL., $1/4"$ THICK.

FABRICATION: PUNCHED OR DRILLED HOLES, SHEARED OR SAWED EDGES. ϕ HOLES $\pm 1/64"$, OUTSIDE DIMENSIONS $\pm 1/32"$.

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

**FLANGE-SHAFT
COLL'TR PANEL**

01-07-01		
DRN	FW	CHK
10/26/77	REV	

Z.R.C. METAL CONDITIONER

- DE-OXIDIZES — NEUTRALIZES RUST
- DE-GREASES — REMOVES GREASES & OILS
- PHOSPHATIZES — FOR MAXIMUM ADHESION

3 STEPS IN ONE EASY OPERATION...

Z.R.C. Metal Conditioner is a new concept in metal surface preparation. Although formulated as a metal pre-treatment for Z.R.C. Cold Galvanizing Compound, it is equally effective to pre-clean and prepare any type of metal surface (ferrous or non-ferrous) for any type of painting.

In one easy operation Z.R.C. Metal Conditioner will:

1. Neutralize rust oxides on any ferrous or non-ferrous metal surface. Because of these de-oxidizing properties, it also acts as an excellent brightener for aluminum, zinc and copper surfaces (including aluminum truck bodies).

2. Removes residual oils and greases by its unique detergent action
3. Slightly etch the metal surface and leave a phosphate deposit that will maximise the adhesion properties of any top-coat.

As an additional convenience and cost saving feature... Z.R.C. Metal Conditioner needs no rinsing or neutralizing — simply...

(A) APPLY (B) ALLOW TO SET 5 MINUTES (C) WIPE the surface is now pre-treated and ready for top-coating

APPEARANCE Blue liquid (very slight solvent odor)
PACKAGING Gallons — Packed 6 Polyethylene jugs per case (shipping weight 53 lbs. per case)
Quarts — Packed 12 Polyethylene bottles per case (shipping weight 27 lbs. per case)

Z.R.C. Metal Conditioner meets and exceeds the requirements of Federal Specification MIL-C-10578 (Type II)

01-16-001

ZRC CHEMICAL PRODUCTS CO.

21 NEWPORT AVE., QUINCY, MASS. 02171 TEL. 617/328-6700

Z.R.C. is a liquid compound containing 95% zinc in the dried film, that fuses to clean iron, steel or aluminum through electrochemical action to provide maximum protection against rust and rust creepage.

Z.R.C. vs. PAINT

It is important that there is an understanding of the conceptual difference between Z.R.C. and paint.

While all types of paints provide only a "skin" protection, Z.R.C. imparts cathodic action against corrosion — i.e., in the presence of moisture its metallic zinc content becomes an anode and the underlying surface a cathode. Corrosion attacks the zinc leaving the base metal untouched.

If the "skin" of a paint is broken, in any way, it will rust in that area and also allow rust creepage under the break. However, if Z.R.C. is scratched to the bare metal the zinc will form an insoluble zinc salt on the exposed area. This heals the break and continues to protect the surface against any corrosion.

Thus — Z.R.C. will not allow rust creepage.

Color: Matte flat light gray.

Packaging: 3-1/2 gallon pails, gallons, quarts, half-pints and aerosol cans.

- One package • No premixing • Unlimited pot-life
- Unlimited shelf-life • Ready to apply

APPLICATION METHODS - COVERAGE

APPLICATION. Z.R.C. may be applied by brush, spray, dip or roller.

SPRAY (Low pressure compressor type). Atomizing pressure 50 p.s.i. Orifice of tip 0.080 ($80\frac{1}{1000}$ ths) ± 5 . Viscosity — Reduce Z.R.C. in ratio of 4 parts Z.R.C. to 1 part XXX Thinner*.

SPRAY (Airless type). Pressure 650-750 p.s.i. Orifice of tip 0.013-0.023 ($13\frac{1}{1000}$ to $23\frac{1}{1000}$). 0.018 ($18\frac{1}{1000}$) generally delivers optimum performance. Viscosity — No reduction required.

BRUSH OR ROLLER — No reduction required. Apply as received from container.

DIPPING — Reduce Z.R.C. in ratio of 3 parts Z.R.C. to 1 part XXX Thinner*.

DRYING — When Z.R.C. is air dried, it is set to touch in 20-30 minutes and may be re-coated in 12 hours.

CURING — Z.R.C. requires curing before being exposed to severe service. When air-dried, it cures progressively up to 14 days. Curing may be accelerated to a matter of minutes if heat is applied. Suggested cycle for full cure is 300°F for 30 minutes.

FLASH POINT — Z.R.C. has a safe flash point of 104°F and thereby enables its use freely around welding operations.

COVERAGE — 400-500 square feet per gallon. An average brush coat of Z.R.C. will deposit 1.5-2.0 mils (dry film thickness). This is generally sufficient for "regular" environment exposure. Two coats are suggested for severe exposure conditions.

*XXX Thinner is our special solvent — available in drums,

01-16-002 AND 01-16-003

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

METAL CONDITIONER-
ZINC COATING AND
THINNER

01-16-001, -002 & -003	
DRN FW	CHK -
10/26/77	REV

NOTE: HOT DIP GALV. (.125 OZ OF
SPLTER PER/FT²) AFTER
FABRICATION.

MATERIAL = 3/8" DIA. A36 STL. ROD
LENGTH PRIOR TO BEND 2'-0"
(CO-01-012)

REF. 01-04-005, 01-04-006 & 01-04-025

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

WIND BRACE LOWER

TOP LOWER END FOR ALL
WIND BRACE ASSEMBLY

01-17-098

DRN: JG CHK

3-1-73 REV

NOTE: HOT DIP GALV. (.125 OZ OF
SPELTER PER/FT²) AFTER
FABRICATION.

MATERIAL: 3/8" DIA., A36, STL ROD.
LENGTH PRIOR TO BEND 7'-11"
(00-01-012)

REF. 01-04-005 AND 01-04-006

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

NORTH AND SOUTH (UPPER)
END
WIND BRACE.

01-17-100	
DRN 69	CHK
3-1-73	REV

NOTE: HOT DIP GALV. (.125 OZ. OF
SPELTER PER/FT²) AFTER
FABRICATION

MATERIAL: 3/8" DIA, A36, STL. ROD
LENGTH PRIOR TO BEND. 9'-5"
(00-01-012)

REF. 01-04-035

NORTHROP

THRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

NORTH (LOWER)
UPPER WIND BRACING.

01-17-099	
DRN ₂₁	CHK
2-1-73	REV

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-043

DATE 1-10-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

INCLINED STRUT

REV

SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-043 INCLINED STRUT

1	01-06-039	STRUT - 16 GA. GALV. 12x144 (12#)
6	01-06-022	FLANGE STIFFENER, 16 GA. GALV (.125#) 6x3
30	01-11-008	SCREWS - #8x1/2 S.D. & ST.

DATHRUP

INCLINED STRUT
ASSEMBLY

⑦

01-03-043	DRN	2b	CHK	RFV
-----------	-----	----	-----	-----

INCLINED STRUT

NOT TO SCALE

6 GA. GALV. REQ'D (01-01-002)

SHEAR SIZE 144.0 X 12.0

POST FORM DIMENSION

REF GHT/DRWG# 01-03-043
FOR WORK THIS SHEET

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

INCLINED TREST

01-06-02A

DRN

CHK

REV

SHOP FINAL
ASSEMBLY

PART/ASSEMBL

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

01-03-066

DATE 1-14-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

CONTROL BOX
MOUNT

REV A CHG. 1 OF 1

PART. NO. / REV / DESCRIPTION

2

01-03-066 CONTROL BOX MOUNT.

1

01-06-059 CONTROL BOX MOUNT, 16 GA. GALV. 12X26 (2.17 FT²)
(01-001)

3

01-06-010 FLANGE STIFFENERS, 16 GA. GALV. 6X3 (.125 FT²)
(01-001)

18

01-17-003, SCREWS, #2 X 1/2 S.D. & S.T.

2

01-06-134, SHIM, CONTROL BOX, EAST SIDE, 16 GA GALV. (01-001)
45/8 X 3 (.096 FT²)

2

01-06-135, SHIM, CONTROL BOX, WEST SIDE, 16 GA GALV. (01-001)
45/8 X 3 (.096 FT²)

9

01-17-010 3/8 DIA. X 3/4, BOLT, HEX

9

01-17-011 3/8 DIA. NUT, HEX

9

01-17-012 3/8 DIA. , LOCK WASHER

FRONT

LEFT

RIGHT

FLANGE STIFFENER (01-06-010)
W/6 - #8 SCREWS (01-07-008)

BACK

SECTION A.

NOTE: 1 ASSEMBLY FITS EITHER
SIDE OF CONTROL BOX

REV (4) REDRAWN 3-24-78

JOINTHORUP

JOINTHORUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CONTROL BOX MOUNT

FINAL SHOP ASSEMBLY

01-03-066

DRN RB, CHK

1-17-70 REV 1

CONTROL BOX MOUNT

NOT TO SCALE

16 GA. GALV. (01-01-001)
SHEAR SIZE 12x28 (2.17FT)

NOTE: 1 ASSEMBLY FITS EITHER EAST OR WEST SIDE OF CONTROL BOX. 2 ASSEMBLYS REQ'D TO MOUNT CONTROL BOX.

REV. 3-24-74 REVISION 2

JOINTHORUP

THURP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

Control Box Mount

01-06-059		
DRN	RB	CHK
1-11-78	REV A	

9/16 DIA. (5)

MATERIAL

16 GA. GALV STL
4 5/8 x 3 (-096)

JOINTHORUP

JOINTHORUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

SHIM
CONTROL BOX
EAST SIDE

01-06-134

DRN bg CHK

2-55-72 REV A

Hand

MATERIAL

16 GA. GALV. STL
4 5/8 X 3 (.096)

ORTHORUP

RUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

SHIM
CONTROL BOX
WEST SIDE

01-06-135

DRN dg CHK

2-25-74 REV

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-067

DATE 2-1-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

IDLER PULLEY

MOUNT ASSEMBLY

REV

SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-067 IDLER PULLEY MOUNT ASSEMBLY

1	01-06-081	WRAPPER, 16 GA. GALV. 5 X 16 1/16 (.58 FT ²)
4	01-17-050	PLATES, CADMIUM PLATED STEEL
4	01-17-049	CARRIAGE BOLTS 3/8-16 X 3/4" ZINC PLATED
4	01-17-052	LOCKWASHER 3/8" DIA. ZINC
4	01-17-051	NUTS, HEX 3/8-16 ZINC PLATED (UNC)
2	01-17-053	BEARING 1/4" I.D.
2	01-06-107	CAP IDLER PULLEY MOUNT 5/16 X 5 7/8 16 GA. GALV. STL. (0.21 FT ²)
32	01-17-008	#8 X 1/2 S.D. S.T. SCREWS, ZINC.

TYP. SIDE

SECT A-A

REV (A) REDRAWN 3-25-78 by

NORTHROP

IDLER PULLEY
MOUNT ASSEMBLY

01-03-067

DRN RDJ

CHK RD

MATERIAL $1\frac{1}{4}''$ O.D. x $\frac{.095}{.109}$ COLD
DRAWN SEAMLESS TUBING SPEC
A-519 MECH. GRADE.

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

IDLER PULLEY
 SHAFT

REF. 01-04-009

01-18-009	
DRN b9	CHK
1-75-72	REV

MAKE (A) = (B) 6 7/8"

MATERIAL:

16 GA. GALV. STL

SHEAR 212E 5X16 11/16 (.53 FT²)

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

WAPPER
IDLER PULLEY

01-06-031	
DRN 69	CHK
3-25-73	REV

ASPFL 2

Set Screw Type
Normal Duty

Shaft Dia. in.	Complete Flanged Unit Number	Nominal Dimensions in.									Max. Radial Load Recom- mended lbs.	Bearing Number	Basic Load Rating lbs.		Housing Number
		a	e	g	s	l	b	Bi	n	F (min.)			Dyn. C	Static Co	
1 1/4	ASPFL 206-1 1/4	4 1/4	3 1/4	.205	.433	1/4	3 1/4	1.142	.315	2 1/2	1100	AS 206-1 1/4	3350	2250	PFL 206

Flanged Units Pressed Steel Housing (Two Bolt)

Set Screw

ASPFL 2 (for light load)

With two mounting bolt holes, this like its cast iron counter-part is designed for the least possible mounting space. The bearing housing being separable, this type of unit can be mounted very easily.

NOTE:

FLANGES TO BE ZINC COATED

WORMBORUP

WORMBORUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

IDLER PULLEY
MOUNT BEARING

01-17-053

DRN *ba* CLK

4-7-74 REV

MATERIAL:
 16 GA GALV. STL (01-001)
 5 1/16 x 5 7/8 (0.21 FT²)

ORTHORUP

IP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CAP
 IDLER PULLEY MOUNT

01-06-107	
DRN b9	CHK
2-25-70	REV

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-044

DATE 1-10-18

FIELD SUB-ASSEMBLY - PART
 ↳ SHOP FINAL ASSEMBLY - PART
 ↳ SHOP SUB-ASSEMBLY - PART
 ↳ PART

MANIFOLD STRUT
 3/4" (Nom) # 10

REV SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-044 MANIFOLD STRUT

1	01-00-031	STRUT, 16 GA. GALV, 11 1/2 x 15 (11.93#)
1	01-00-038	STRUT COVER, 16 GA. GALV, 11 1/2 x 6 1/4 (4.71#)
72	01-11-008	SCREWS #8 x 1/2, S.D. & ST.
1	01-13-008	INSULATION T-5 FT ³
1	01-03-002	MANIFOLD, COPPER TYPE "M", 3/4 x 11 1/2 x 1/2
4	01-00-041	POSITIONING PLATE, 16 GA. GALV, 3 1/8 x 7 1/8 (.19#)
4	01-00-001	CLIPS, 16 GA. GALV, 3 x 4 (.09)
1	01-21-004	WEATHER STRIPPING 31 INCHES
2	01-11-046	WIRE-TY

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-045

DATE 1-10-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

MANIFOLD STRUT

3/4" (10M) #11

REV

SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-045 MANIFOLD STRUT

01-00-031 STRUT, 16 GA. GALV, 11 1/2 x 15 (11.93#)

01-00-032 STRUT COVER, 16 GA. GALV, 11 1/2 x 6 1/4 (4.71#)

01-11-008 SCREWS #8 x 1/2, S.D. & S.T.

01-13-003 INSULATION 1.5 FT3

01-00-003 MANIFOLD, 3/4" x 1 3/4" TYPE M COPPER

01-00-041 POSITIONING PLATE, 16 GA. GALV, 3 1/2 x 1 1/8 (.14#)

01-00-001 CLIPS, 16 GA. GALV, 3 x 4 (.09)

01-21-004 WEATHER STRIPPING 31 INCHES REQ'D

01-17-046 WIRE-TY

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-046

DATE 1-10-18

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

MANIFOLD STRUT

1 ϕ #

(12)

REV

QTY. 1 of 1

PART. NO. / REV / DESCRIPTION

01-03-046 MANIFOLD STRUT

1 01-00-031 STRUT, 16 GA. GALV, 11 1/2 x 15 (11.93 ϕ)

1 01-00-033 STRUT COVER, 16 GA. GALV, 11 1/2 x 6 1/4 (4.71 ϕ)

72 01-11-008 SCREWS #3 x 1/2, S.D. & S.T.

1 01-13-008 INSULATION 1.5 FT³

1 01-03-004 MANIFOLD, 1 ϕ (1/8") x 11 3/32 TYPE M COPPER

4 01-00-042 POSITIONING PLATE, 16 GA. GALV, 3 1/8 x 1 1/8 (.19 ϕ)

4 01-00-001 CLIPS, 16 GA. GALV, 3 x 4 (.09)

1 01-21-004 WEATHER STRIPPING 3 INCHES REQ'D

2 01-17-046 WIRE-TY

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-041

DATE 1-10-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

MANIFOLD STRUT

1" ϕ (NOM) #13

REV

QTY. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-041

MANIFOLD STRUT

1

01-00-031

STRUT, 16 GA. GALV, 11 1/2 x 15 (11.93#)

1

01-00-033

STRUT COVER, 16 GA. GALV, 11 1/2 x 6 1/4 (4.71#)

72

01-11-008

SCREWS #8 x 1/2, S.D. & G.T.

1

01-13-008

INSULATION 1.5 FT³

1

01-03-008

MANIFOLD, 1" (NOM) x 113 7/16 TYPE M COPPER

4

01-00-042

POSITIONING PLATE, 16 GA. GALV, 3 7/8 x 1 1/8 (.19#)

4

01-00-001

CLIPS, 16 GA. GALV, 3 x 4 (.09)

1

01-21-024

WEATHER STRIPPING 51 INCHES REQ'D

2

01-17-046

WIRE TY

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-048

DATE 1-10-18

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

MANIFOLD STRUT

1/4" ϕ (NOMINAL) # 14

REV

SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-048 MANIFOLD STRUT

1 01-00-031 STRUT, 16 GA. GALV, 11 1/2 x 15 (11.93#)

1 01-03-033 STRUT COVER, 16 GA. GALV, 11 1/2 x 6 1/4 (4.71#)

72 01-11-008 SCREWS #8 x 1/2, S.D. & G.T.

1 01-13-003 INSULATION 1.5 FT³

1 01-03-006 MANIFOLD, 1/4" ϕ (NOM) x 11 1/2" 16 TYPE M COPPER

4 01-00-043 POSITIONING PLATE, 16 GA. GALV, 3 1/2 x 1 1/8 (.19#)

4 01-03-001 CLIPS, 16 GA. GALV, 3 x 4 (.09)

1 01-21-024 WEATHER STRIPPING 31 INCHES REQ'D.

2 01-17-046 WIRE-TY

NOTES:
LOCATION OF FASTENERS
DETERMINED BY PILOT
HOLES IN STRUT (FOR
POSITIONING PLATES AND
STRUT COVER).

DETAILS NOT TO SCALE

by REV. A 3-27-76 REDR...

VOITHORUP

THRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

MANIFOLD STRUT

01-03-044 THRU 01-03-048	
DRN 26	CHK
10-27-77	REV 1

NOBILGROUP

MANIFOLD
STRUT COVER

CI-06-038	CHK
DRN Pb	REV
0-23-77

STREUT LID

REF. 01-03-044 THRU-048
16 CS. GALV. REDD(01-01-001)
SHEAR SIZE 114.625 X 80
ALL BENDS 90°

THRUP

MANIFOLD POSITIONING
PLATE

01-06-041 TO-041	DRN	01-06-041
	RB	CHK
	REV

Δ DIA.	PART #	ASSY #
.938	01-06-041	01-03-044
1.188	01-06-042	01-03-046
1.438	01-06-043	01-03-047
1.688	01-06-044	01-03-048
2.108	01-06-045	01-03-049

MANIFOLD POSITIONING PLATE

REF 01-03-044 THRU -048
 16 GA. GALV RECD (01-01-001)
 ALL BENDS UP 90°
 SHEAR SIZE 3.815 X 7.125

NORTHROP

MANIFOLD
STRUT

DRN	10-06-037
REB	
CHK	
REV	

REV. A 4-8-78

MANIFOLD STRUT

16 GA. GALV. REQ'D (01-01-001)
ALL BENDS UP 90°
CLEAR SIZE 114.50 x 15

REV. A REMOVED FLATS 2/10/78 RDS

REVISION		REORAWN	KDS
A	1-30-75		
B	3-27-78	GEM.	09

MANIFOLD CONNECTING CLIP

SCALE: 1"=1"

16 GA. GALV. REQ'D (01-01-001)

CHEAR SIZE 4 x 3

NORTHROP

161

COPPER
MANIFOLD

NOTE: SHOP TO PLACE IDENTIFICATION NO.
ON EA. END OF MANIFOLD TUBE WITH
BLACK MARKER

PART #	MANIFOLD DIAMETER					IDENTIFICATION NO.	
	3/4	1	1 1/4	1 1/2	2	#	
01-08-002	X					10	
01-08-003	X					11	
01-08-004		X				12	
01-08-005		X				13	
01-08-006			X			14	
01-08-007			X			15	
01-08-008				X		16	
01-08-009				X		17	
01-08-010					X	18	

COPPER MANIFOLD

REF 01-03-023 TO -026
E 01-03-044 TO -048

TYP. M COPPER REOD (01-01-101)

01-08-002 TO -010	CHK
01-08-007	REV

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS
01-03-002

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

SOUTH MANIFOLD
SUPPORT CONNECTION

(19)

REV A 3-27-78 SH. 1 OF 1

PART NO. / REV / DESCRIPTION

01-04-005 SOUTH MANIFOLD SUPPORT FIELD ASSEMBLY

01-03-002 SOUTH MANIFOLD SUPPORT

01-00-075 HOUSING WRAPPER, 16 GA GALV. 11 1/8 X 23 1/2 (1.8)

01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (.43)

01-06-034 HOUSING BOTTOM, 16 GA. GALV. 6 X 10 (.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (.1)

01-17-016 BEARING, 1 1/2 I.D. CAST IRON.

01-17-066 BOLT, 5/8 DIA. HEX, UNC, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UNC, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GROMMET, RUBBER, ATLANTIC INDIA #2903

01-17-008 #8 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-06-036 SUPPORT COLUMN, 16 GA, GALV. 37 1/2 X 15 (3.9)

01-06-023 STIFFENER 16 GA. 3 X 16 (.125)

01-17-008 #8 X 1/2 S.D., S.T. HEX SCREWS ZINC COATED.

01-02-030 SOUTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GRATE

01-09-016 HOSE, FLEX. GRATE

01-04-083 MANIFOLD CONX. FIELD ASSEMBLY

01-02-038 MANIFOLD CONX. ASSEMBLY

01-09-008 TEE, WROT, I.D. 1/8 X 1/2 X 3/2

01-09-000 ADAPTER WROT 1/8 X 1/2 LEE. 15-101 02 EQUAL (MPT)

01-17-123 ROD, BRAZING AS REQUIRED (01-500)

ASSEMBLY

PARTS / ASSEMBLY

A NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

01-03-003

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

SOUTH MANIFOLD
SUPPORT CONNECTION

(20)

REV A 3-27-78 ENT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-04-085 SOUTH MANIFOLD SUPPORT FIELD ASSEMBLY

01-03-003 SOUTH MANIFOLD SUPPORT

01-06-075 HOUSING WRAPPER, 16 GA GALV. 11 1/4 X 23 1/2 (1.8)

01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (1.43)

01-06-034 HOUSING BOTTOM, 16 GA GALV. 6 X 10 (.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (.1)

01-17-016 BEARING, 1 1/2 I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UNC, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UNC, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GROMMET. RUBBER, ATLANTIC INDIA #2903

01-17-008 #8 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-06-036 SUPPORT COLUMN, 16 GA. GALV. 37 1/2 X 15 (3.9)

01-06-023 STIFFENER 16 GA. 3 X 16 (.125)

01-17-008 #8 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-030 SOUTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GRA-TEK

01-09-016 HOSE FLEX GRA-TEK

01-04-084 MANIFOLD CONX FIELD ASSEMBLY

01-02-038 MANIFOLD CONX ASSEMBLY

01-09-009 TEE, WROT, I.D. 1 1/8 X 1 1/8 X 5/8

01-09-060 ADAPTER WROT 5/8 X 1/2, LEE #15-101 OR EQV (147)

01-17-123 ROD, BRAZING AS 160 Q.D. (01-500)

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS
01-03-004

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

SOUTH MANIFOLD
SUPPORT CONNECTION

(21)

REV A 3-27-78 CHT. 1 OF 1

PART NO. / REV / DESCRIPTION

01-04-085 SOUTH MANIFOLD SUPPORT FIELD ASSEMBLY
01-03-004 SOUTH MANIFOLD SUPPORT CONNECTION.

01-06-075 HOUSING WRAPPER, 16 GA GALV. 11 1/8 X 23 1/2 (1.5)

01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (1.43)

01-06-034 HOUSING BOTTOM, 16 GA. GALV. 6 X 10 (1.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (.1)

01-17-016 BEARING, 1 1/2 I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UNF, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UNF, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GROMMET, RUBBER, ATLANTIC INDIA #2903

01-17-008 #8 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-06-036 SUPPORT COLUMN, 16 GA. GALV. 3 1/2 X 15 (3.9)

01-06-023 STIFFENER 16 GA. 3 X 16 (.125)

01-17-008 #8 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-030 SOUTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GRA-TEK

01-09-010 HOSE FLEX GRA-TEK

01-04-085 MANIFOLD CONX. FIELD ASSEMBLY

01-02-008 MANIFOLD CONX. ASSEMBLY

01-09-010 TEE, WROT, I.D. 1/8 X 1/8 X 5/8

01-09-060 ADAPTER, WROT, 5/8 X 1/2, LEE #15101 OR EQUIV (MPT)

01-17-123, ROP, BRAZING AND RECD (01-500)

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS
01-03-005

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

SOUTH MANIFOLD
SUPPORT CONNECTION

(22)

REV A 3-27-78 OUT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-02-008 SOUTH MANIFOLD SUPPORT FIELD ASSEMBLY
01-03-005 SOUTH MANIFOLD SUPPORT CONNECTION.

1	01-06-075	HOLDS HU WRAPPER, 16 GA. GALV. 11 1/4 X 23 1/2 (1.8)
1	01-06-033	HOLDS HU LID, 16 GA. GALV. 6 1/4 X 10 (1.43)
1	01-06-034	HOLDS HU BOTTOM, 16 GA. GALV. 6 X 10 (1.42)
1	01-06-035	POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (.1)
1	01-17-016	BEARING, 1 1/2 I.D. CAST IRON.
1	01-21-003	GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8
4	01-17-066	BOLT, 5/8 DIA. HEX, UNC, ZINC COATED.
4	01-17-065	NUT, 5/8 DIA. HEX, UNC, ZINC COATED.
4	01-17-067	LOCKWASHER, 5/8 DIA. ZINC COATED.
1	01-21-005	GROMET. RUBBER, ATLANTIC INDIA #2903
22	01-17-008	#8 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.
1	01-02-006	SUPPORT COLUMN.
2	01-06-036	SUPPORT COLUMN, 16 GA. GALV. 37 1/2 X 15 (3.9)
12	01-06-023	STIFFENER 16 GA. 3 X 6 (.125)
1	01-17-008	#8 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.
1	01-02-030	SOUTH MANIFOLD FLEX HOSE ASSEMBLY
1	01-09-004	SWIVEL GRATEK
1	01-09-016	H.O.F. FLEX GRATEK
1	01-04-086	MANIFOLD CONX FIELD ASSEMBLY
1	01-02-038	MANIFOLD CONX ASSEMBLY.
1	01-09-011	TEE, WROT I.D. 1 3/8 X 1 1/8 X 5/8
1	01-09-060	ADAPTER WROT 2 1/8 X 1 1/2 LEE #1501 OR EQUAL (WPT)
1	01-17-123	ROD, BRASSING AS REQ'D (01-500)

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS
01-03-006

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

SOUTH MANIFOLD
SUPPORT CONNECTION

(23)

REV A 3-27-78/INT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-04-008 SOUTH MANIFOLD SUPPORT FIELD ASSEMBLY

01-03-006 SOUTH MANIFOLD SUPPORT CONNECTION

01-06-075 HOUSING WRAPPER, 16 GA. GALV. 11 1/8 X 23 1/2 (1.5)

01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (.43)

01-06-034 HOUSING BOTTOM, 16 GA. GALV. 6 X 10 (.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (.1)

01-17-016 BEARING, 1/2 I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UHC, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UHC, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GROMMET. RUBBER, ATLANTIC INDIA #2903

01-17-008 #8 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-06-036 SUPPORT COLUMN, 16 GA. GALV. 3 1/2 X 15 (3.9)

01-06-023 STIFFENER 16 GA. 3 X 6 (.125)

01-17-008 #8 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-030 SOUTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GATE

01-09-011 HOSE FLEX GATE

01-04-087 MANIFOLD CONX. FIELD ASSEMBLY

01-02-008 MANIFOLD CONX. ASSEMBLY

01-09-012 TEE, WROT, I.D. 1 1/8 X 1 3/8 X 5/8

01-09-060 ADAPTER, WROT, 5/8 X 1/2, LEE #15-101 OR EQUIV (MPT)

01-17-123, ROD, BRAZING AS REQ'D (01-500)

ASSEMBLY

PARTS / ASSEMBLY

INVENTOR

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS
01-03-023

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

NORTH MANIFOLD
SUPPORT CONNECTION

(28)

REV A 3-27-78/CHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-04-033 NORTH MANIFOLD SUPPORT FIELD ASSEMBLY
01-03-023 NORTH MANIFOLD SUPPORT CONNECTION.

01-06-032 HOUSING WRAPPER, 16 GA GALV. 11 7/8 X 23 1/2 (1.8)

01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (1.43)

01-06-034 HOUSING BOTTOM, 16 GA GALV. 6 X 10 (.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (.1)

01-17-016 BEARING, 1 1/2 I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UNC, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UNC, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GROMMET. RUBBER, ATLANTIC INDIA #2903

01-17-008 #8 X 1 1/2 S.D., S.T., HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-06-026 SUPPORT COLUMN, 16 GA GALV 37 1/2 X 15 (3.9)

01-06-023 STIFFENER 16 GA. 3 X 6 (.125)

01-06-052 STIFFENER 16 GA. 3 X 6 (-125)

01-17-008 #8 X 1 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-029 NORTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GRA-TEK

01-09-016 HOSE FLEX GRA-TEK

01-04-033 MANIFOLD CONX FIELD ASSEMBLY

01-03-038 MANIFOLD CONX FIELD ASSEMBLY

01-09-008 TEE, WROT, I.D. 1/8 X 1/8 X 5/8

01-09-009 ADAPTER WROT 5/8 X 1/2 LEE #15-101 OR EQUIV (INPT)

01-03-011 TEE, BLEEDER CONNECTING-TYPE "M"
COPPER 4" X 1/4 D.

01-03-060 BLEEDER VALVE ASSEMBLY

01-09-005 SCHRAUDER VALVE INSERT

01-09-024 SCHRAUDER VALVE W/ 1/4 FLARE ADAPTER

01-09-019 3/4" O.D. 3" LEE LEAD PIPE X 1 1/2"

01-17-123 20 27 X 2 1/2 X 1/2 27 X 2 1/2 X 1/2 01-500

ASSEMBLY

PARTS / ASSEMBLY

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

01-03-024

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

NORTH MANIFOLD
SUPPORT CONNECTION

(29)

REV A 3-27-78 ENT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-02-000 NORTH MANIFOLD SUPPORT FIELD ASSEMBLY
01-03-024 NORTH MANIFOLD SUPPORT CONNECTION.

01-06-033 HOUSING WRAPPER, 16 GA GALV. 11/8 X 23 1/2 (1.8)

01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (1.43)

01-06-034 HOUSING BOTTOM, 16 GA. GALV. 6 X 10 (1.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (.1)

01-17-016 BEARING, 1 1/2 I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UNF, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UNF, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GROMMET. RUBBER, ATLANTIC INDIA #2903

01-17-008 2 X 1 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-06-036 SUPPORT COLUMN, 16 GA. GALV. 3 1/2 X 15 (3.9)

01-06-023 STIFFENER 16 GA. 3 X 6 (.125)

01-06-052 STIFFENER 16 GA. 3 X 6 (.125)

01-17-008 2 X 1 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-029 NORTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GRATEK

01-09-016 FLEX HOSE GRATEK

01-04-084 MANIFOLD CONX. FIELD ASSEMBLY.

01-02-038 MANIFOLD CONX. ASSEMBLY.

01-09-004 TEE, WROT, I.D. 1 1/8 X 1 3/8 X 5/8

01-09-000 ADAPTER WROT 5/8 X 1 1/2 LEE'S 101 OR EQUIV (MPT)

01-08-011 TEE, BLEEDER CONNECTING-TYPE M
COPPER 4 1/4 X 1/4 D.

01-03-000 BLEEDER VALVE ASSEMBLY

01-09-005 SCHRADER VALVE INSERT

01-09-024 SCHRADER VALVE W/ 1/4 FLARE ADAPTER

01-16-015 3/16 COPPER LEAD TUBE X 4 1/2"

01-17-123 20 B.P.A. 1/2 X 1/2 X 1/2 01-500

ASSEMBLY

PART / ASSEMBLY

NORTHUP, INCORPORATED

302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-025

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

NORTH MANIFOLD
SUPPORT CONNECTION

(30)

REV A 3-27-78/HT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-04-088 NORTH MANIFOLD SUPPORT FIELD ASSEMBLY

01-03-025 NORTH MANIFOLD SUPPORT CONNECTION.

01-06-032 HOUSING WRAPPER, 16 GA. GALV. 11 1/8 X 23 1/2 (1.8)

01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (1.43)

01-06-034 HOUSING BOTTOM, 16 GA. GALV. 6 X 10 (1.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (1)

01-17-016 BEARING, 1 1/2 I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UNF, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UNF, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GRAMMET. RUBBER, ATLANTIC INDIA #2903

01-17-008 #8 X 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-06-036 SUPPORT COLUMN, 16 GA. GALV. 3 1/2 X 15 (3.1)

01-06-023 STIFFENER 16 GA. 3 X 6 (1.25)

01-06-052 STIFFENER 16 GA. 3 X 6 (1.25)

01-17-008 #8 X 1/2 S.D., S.T. HEX. SCREWS ZINC COATED.

01-02-029 NORTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GEAR TEK

01-09-016 HOSE FLEX, GEAR TEK

01-04-085 MANIFOLD CONX. FIELD ASSEMBLY

01-02-035 MANIFOLD CONX. ASSEMBLY

01-09-010 TEE, WROT, I.D. 1 1/8 X 1 1/8 X 5/8

01-09-060 ADAPTER WROT 5/8 X 1/2 LEE #15-101 OR EQUAL (MPT)

01-08-011 TEE, BLEEDER CONNECTING-TYPE "M"
COPPER 4" X 1/4 D.

01-03-060 BLEEDER VALVE ASSEMBLY

01-09-005 SCHRAEDER VALVE INSERT

01-09-024 SCHRAEDER VALVE W/ 1/4 FLARE ADAPTER

01-08-019 3/16 O.D. COPPER LEAD TUBE X 4 1/2"

01-17-123 20 BEARING AS READS. 01-5001

01-02-026

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

NORTH MANIFOLD
SUPPORT CONNECTION

(31)

REV A 3-27-78 CHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-04-088 NORTH MANIFOLD SUPPORT FIELD ASSEMBLY

01-03-026 NORTH MANIFOLD SUPPORT CONNECTION

01-06-032 HOUSING WRAPPER, 16 GA GALV. 11 1/8 x 23 1/2 (1.8)

01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 x 10 (.43)

01-06-034 HOUSING BOTTOM, 16 GA. GALV. 6 x 10 (.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 x 4 1/2 (.1)

01-11-016 BEARING, 1 1/2 I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 x 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UHC, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UHC, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GROMMET. RUBBER, ATLANTIC INDIA #2903

01-17-008 3/8 x 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-06-036 SUPPORT COLUMN, 16 GA. GALV. 37 1/2 x 15 (3.9)

01-06-073 STIFFENER 16 GA. 3 x 6 (.125)

01-06-052 STIFFENER 16 GA. 3 x 6 (.125)

01-17-008 3/8 x 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-029 NORTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GRATE

01-09-016 HOSE FLEX GRATE

01-09-086 MANIFOLD CONX FIELD ASSEMBLY

01-02-038 MANIFOLD CONX ASSEMBLY

01-09-011 TEE WROT, I.D. 1 3/8 x 1 1/8 x 5/8

01-09-066 ADAPTER WROT 5/8 x 1/2 LEE #15101 OR #15102 (NOT)

01-03-011 TEE, BLEEDER CONNECTING-TYPE "M"
COPPER 4 1/4 x 1/4 D.

01-03-060 BLEEDER VALVE ASSEMBLY

01-09-005 SCHRAEDER VALVE INSERT

01-01-024 SCHRAEDER VALVE W/ 1/4 FLARE ADAPTER

01-01-019 3/16 O.D. COPPER LEAD TUBE x 4 1/2"

01-17-123, 200, BIRA LINES AS USED. 01-500

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS
01-03-027

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

K SHOP FINAL ASSEMBLY - PART

K SHOP SUB-ASSEMBLY - PART

K PART

NORTH MANIFOLD
SUPPORT CONNECTION

(32)

REV A 3-27-78/MT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-04-088 NORTH MANIFOLD SUPPORT FIELD ASSEMBLY
01-03-027 NORTH MANIFOLD SUPPORT CONNECTION

01-06-033 HOUSING WRAPPER, 16 GA GALV. 11 1/8 X 23 1/2 (1.8)

01-06-033 HOUSING LID, 16 GA. GALV. 6 1/4 X 10 (1.43)

01-06-034 HOUSING BOTTOM, 16 GA GALV. 6 X 10 (1.42)

01-06-035 POSITIONING PLATE 20 GA. GALV. 3 X 4 1/2 (1)

01-17-016 BEARING, 1 1/2 I.D. CAST IRON.

01-21-003 GASKET, 1/16 NEOPRENE 5 1/8 X 5 1/8

01-17-066 BOLT, 5/8 DIA. HEX, UNC, ZINC COATED.

01-17-065 NUT, 5/8 DIA. HEX, UNC, ZINC COATED.

01-17-067 LOCKWASHER, 5/8 DIA. ZINC COATED.

01-21-005 GROMMET. RUBBER, ATLANTIC INDIA #2903

01-17-008 #8 X 1 1/2 S.D., S.T., HEX SCREW ZINC COATED.

01-02-006 SUPPORT COLUMN.

01-06-036 SUPPORT COLUMN, 16 GA GALV. 37 1/2 X 15 (3.9)

01-06-023 STIFFENER 16 GA. 3 X 6 (.125)

01-06-052 STIFFENER 16 GA. 3 X 6 (.125)

01-17-008 #8 X 1 1/2 S.D., S.T. HEX SCREW ZINC COATED.

01-02-029 NORTH MANIFOLD FLEX HOSE ASSEMBLY

01-09-004 SWIVEL GRATEK

01-09-016 HOSE FLEX, GRA-TEK

01-04-087 MANIFOLD CONX. FIELD ASSEMBLY.

01-02-038 MANIFOLD CONX. FIELD ASSEMBLY.

01-09-012 TEE, WROT, I.D. 1 3/8 X 1 3/8 X 5/8

01-09-000 ADAPTER, WROT, 5/8 X 1/2 LEE # 6-10100000 (WPT)

01-03-011 TEE, BLEEDER CONNECTING-TYPE M
COPPER 4 1/4 X 1/4 D.

01-03-060 BLEEDER VALVE ASSEMBLY

01-09-005 SCHROEDER VALVE INSERT

01-09-004 SCHROEDER VALVE 1/4 FLARE ADAPTER.

01-03-019 3/16 O.D. LEAD TUBE 1/2

01-17-123 200, 3/8 FLEX ASSEMBLY 01-5000

01-03-002
THRU
01-03-005
01-03-023
THRU

REV A. DRAWN 4321-70.

01-03-002 T7412U

200-8210

L-70-03-03-03-03

69	CK
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25. 1.	25. 1.
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NORTH ATLANTIC MANAGED
by J. J. J. J.
(19) THRU (22)

NORTHERN

.12" ASSEMBLY
LENGTH

(01-09-014)

GRATEK - FLEX HOSE

- ① -40° TO +385° F
150 PSI MAX. WORK PRESSURE
- ② DACRON GLASS FIBER BRAID,
GLASS INNER BRAID.
- ③ ETHYLENE PROPYLENE CORE,
-40° TO +200° F

(01-17-129)
STEEL CLIP
RETAINER

(01-02-029)
NORTH END (ONLY)
HOSE ASSEMBLY
TO HAVE 1/4" Ø X 1"
CU. TUBE FOR BLEEDER
ASSEMBLY CONX.
(01-08-011)

(01-09-004)
GRA-TEK SWIVEL

(01-21-021) VITON O RING.

NOOUTH - 01-02-030

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

SWIVEL
(FLEX HOSE)
ASSEMBLY

01-02-029	
DRN	GK
5-1-75	REV

QTY	TEE PART NO	NUMBER	TEE SIZE	ADAPTER PART NO
2	01-09-008	19	3/4 X 3/4	01-09-060 ↑
1	01-09-009	20	1 X 3/4	
1	01-09-010	21	1 X 1	
1	01-09-011	22	1 1/4 X 1	
2	01-09-012	23	1 1/4 X 1 1/4	
2	01-09-008	28	3/4 X 3/4	
1	01-09-009	29	1 X 3/4	
1	01-09-010	30	1 X 1	
1	01-09-011	31	1 1/4 X 1	
2	01-09-012	32	1 1/4 X 1 1/4	01-09-060

JOINTHROP

HRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

MANIFOLD CONX.
ASSEMBLY

0-02-038

DRN 69 CK

3-1-78 REV

NORTHROP

MANIFOLD SUPPORT COLUMN - FINAL SHOP ~~DRY~~

REF. 01-02-002 THRU -C10 & 01-03-022 THRU -024

BILL OF MATERIALS PER ASSEMBLY		
QTY	PART #	DESCRIPTION
1	01-06-036	COLUMN
1	01-06-023	FLANGE STIFFENER
1	01-06-052	" " W/ WIND BRG CONNECT'N
12	01-17-008	#8 G.D. & S.T. SCREWS

A- REPOSITION FLANGE STIFFENER (01-06-023) -RDS

B- " " " " " " RDC

MANIFOLD SUPPORT
COL. - SHOP ~~DRY~~

01-02-006	DRN	RB	CHK	REV	A
	11-2-77				

THRUUP

176

MANIFOLD GAINST
HOUSING BOTTOM

MANIFOLD/CONNECT HOUSING BOTTOM

16 GA. GALV REQ'D (01-01-001)
BENDS UP 90°
GUESS SIZE 60 X 9.0625

REVISIONS			
A	GEN. REVISION	2-10-78	RDS
B	GEN. REVISION	3-21-78	69
C	GEN. REVISION	4-12-78	69

DRN	RB	CHK	REV
01-06-034

TYP. SECTIONS

MANIFOLD SUPPORT COLUMN

16 GA. GALV. REQ'D (01-01-001)

ALL BENDS 90°

SHEAR SIZE 15x37.5

REVISIONS

REV	DESCRIPTION	DATE
A	REDRAWN	ROG 2-15-73
B	REDRAWN	bg 3-21-78
C	DIM. CHG.	bg 4-14-78

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

MANIFOLD SUPPORT COLUMN

01-06-036

DRN RB CHK FW

11-3-77 REV A

Flanged Units Cast Housing (Four Bolt)

UCF2

Set Screw Type
Normal Duty

Shaft Dia. in.	Complete Flanged Unit Number	Nominal Dimensions in.								Bearing Number	Basic Load Rating lbs.		Housing Number
		a	e	g	l	s	z	Bi	n		Dyn. C	Static Co	
1 1/2	UCF 208-1 1/2	5 1/2	4	3/4	1 1/2	.63	2.02	1.937	.748	UC 208-1 1/2	5050	3500	F 208

Flanged Units Cast Housing (Four Bolt)

Set Screw

UCF 2 (for light load)

The housing is square and can be conveniently secured to, for instance, the side wall of a machine with 4 bolts. Simple in bearing construction and easy to mount, this is the most widely used of all types of units-with-flange.

WORTHINGTON

WORTHINGTON, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

NORTH & SOUTH
MANIFOLD SUPPORT
BEARING

01-17-016
DRN: 09 CHK
42573 REV

FLANGE STIFFENER

16 GA. GALV REED (A-01-001)

SHEAR SIZE 6.5 X 3 (.135 F32)

ALL BENDS 90°

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

FLANGE STIFFENER
W/ CONNECTION TO
WIND BRACING

01-06-052

DRN Rb CHK

11/2/77 REV

ALL HOLES .156 Ø (6 REQ'D)

P/N	DESCRIPTION	(A)	(B)
01-06-00	FOR 5.0 EM. WIDTH	5.125	.543±
01-06-02	5.125	5.25	.485±
01-06-03	5.25	5.315	.423±

NOTE: TOLERANCE PER DIMENSION
(A) = $\begin{matrix} +.024 \\ -.0 \end{matrix}$

FLANGE STIFFENERS

1/8 GA. GALV. REQ'D. (01-01-001)

SHEAR SIZE 12X20.0 (30 PER BLANK)

ALL BENDS 90°

TAPE C1

01-06-010	DRN	REV
	Pb	CIK
	20-12	

NORTHROP, INCORPORATED 302 Nichols Drive, Muehlin, Texas 75141

NORTHROP

SOUTH MANIFOLD CONNECT HOUSING

DRN	01-00-075
CHK	
REV	1-13-78

181

MANIFOLD CONNECT HOUSING

REF 01-03-002 THRU-010
16 GA. GALV. STL. REQ'D (A-A-001)
ALL RENDS 90°, .016
SHEAR SIZE 23.5 X 11.125

REV. A., ADDED 1/8 DIA. HOLES 3-24-78 BCU

TRUP

182

NORTH MANIFOLD
CONNECT HOUSING

DRN	01-06-032
RS	
CHK	
REV

MANIFOLD CONNECT HOUSING

REF. 01-02-023 THEN -031.
KODAK CALV. REQ'D (01-01-001)
ALL BENDS 90°
SHEET SIZE 23.6" x 11.125"

REV A - MANIFOLD (21/4) HOLES 11/3/77 RB
REV B - SPEC'D NORTH MANIFOLD 11/15/77 KODAK
REV C - BLANK SIZE REV. 2-10-78 RDS
REV. D - ADDED 1/8 DIA. HOLES 3-24-78 BQ

NORTHROP

Housing Lid

.1875 DIA REQD

Housing Lid

REF. 01-03-002 THRU -010
 10 GA. GALV. REQD. (01-01-001)
 ALL BENDS UP 90°
 SHEAR STR 10.0 X 6.25
 BRZE ALL CORNERS

REV. A - INSIDE DIMS. REV. 2-10-78 RDS

01-06-033
DRN RB CHK
REV A

Flanged Units Cast Housing (Four Bolt)

UCF2

Set Screw Type

Normal Duty

Shaft Dia. in.	Complete Flanged Unit Number	Nominal Dimensions in.								Bearing Number	Basic Load Rating lbs.		Housing Number
		a	e	g	l	s	z	Bi	n		Dyn. C	Static Co	
1/4	UCF 201- 1/4	3 3/8	2 1/8	1/4	1	.47	1.31	1.220	.500	UC 201- 1/4	2220	1390	F 204
5/16	UCF 202- 5/16	3 3/8	2 1/8	1/4	1	.47	1.31	1.220	.500	UC 202- 5/16	2220	1390	F 204
3/8	UCF 203- 3/8	3 3/8	2 1/8	1/4	1	.47	1.31	1.220	.500	UC 203- 3/8	2220	1390	F 204
1/2	UCF 204- 1/2	3 3/8	2 1/8	1/4	1	.47	1.31	1.220	.500	UC 204- 1/2	2220	1390	F 204
5/8	UCF 205- 5/8	3 3/8	2 1/8	1/4	1 1/4	.47	1.41	1.339	.563	UC 205- 5/8	2430	1560	F 205
3/4	UCF 206- 3/4	4 1/4	3 1/8	1/2	1 1/2	.47	1.58	1.500	.626	UC 206- 3/4	3350	2250	F 206
1	UCF 207- 1	4 1/4	3 1/8	1/2	1 1/2	.55	1.75	1.689	.689	UC 207- 1	4450	3050	F 207
1 1/8	UCF 208- 1 1/8	5 1/4	4 1/8	3/4	1 3/4	.63	2.02	1.937	.748	UC 208- 1 1/8	5050	3500	F 208

BEARING/HOUSING UNIT

REFER A-03002 THRU A-03000
FROM NTN CATALOG # 2596

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

BEARING UNIT AT
MANIFOLD CONNECTION

01-17-016

DRN RB

REV

MECHANICAL

F. Solar System

1. GENERAL:

This Section valid only when considered in total with other Contract Documents. Cross references are for convenience of reader and their inclusion in or omission from any particular Section in no way limits scope of particular Section or intent of any Contract Document.

2. WORK SPECIFIED HEREIN:

- A. Complete installed solar collection system as shown on the drawings.
- B. Erection, and connection of solar collectors and collector support systems.

3. RELATED WORK:

Specified in other Sections:

- A. Electrical power wiring and conduit (in Electrical Division).

4. MATERIALS & EQUIPMENT:

- A. Solar Collectors and Structural Supports:

1. Solar Collectors:

Each collector consists of fresnel lens (12" wide x 116 1/2" net aperture), insulated housing, selective coated copper absorber tube with hollow end shafts and 1/4" MPT connections through each shaft to the absorber tube. Components of each collector consist of the following:

- a. Factory assembled housing, interior insulation, end (north and south) 1 1/4" O.D. hollow shafts, absorber tube, 1/4" absorber tube connections through end of each shaft,

01-21-001

GROMMET - WIRE

REF # 01-02002

01-03-052

FROM ATLANTIC INDIA RUBBER
COMPANY CATALOG

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

GROMMET-WIRE
TRACKING MECHANISM

01-21-001

001 RB

10-7-77

NORTHROP

MANIFOLD

CONNECTING TEE

01-09-008 thru 01-09-015 AND 01-09-023	DRN	RB	CHK	REV
10-28-77				

PART #	SIZE / O.D.			ASST #	MUELLER PART #
	1	2	3		
01-09-008	1/2"	1/2"	5/8"	01-03-002	W-4033
01-09-009	1/2"	1/2"	5/8"	01-03-003	W-4058
01-09-010	1/2"	1/2"	5/8"	01-03-004	W-4051
01-09-011	1/2"	1/2"	5/8"	01-03-005	W-4076
01-09-012	1/2"	1/2"	5/8"	01-03-006	W-4011
01-09-013	1/2"	1/2"	5/8"	01-03-007	W-4094
01-09-014	1/2"	1/2"	5/8"	01-03-008	W-4088
01-09-015	2/8"	1/2"	5/8"	01-03-009	W-4014
01-09-023	2/8"	2/8"	5/8"	01-03-010	W-40101

MANIFOLD CONNECTING TEE

REF. 01-03-002 THRU 01-03-010 & 01-03-023 (03)
FROM STREAMLINE PRODUCTS CAT. # R-175

ALL FITTINGS CONFORM TO ANSI B16.22
STANDARDS.

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-060

DATE 1-10-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

BLEEDER VALVE ASSEMBLY

REV

SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-060 BLEEDER VALVE ASSEMBLY

01-09-005 SCHRODER VALVE INERT

01-09-004 SCHRODER VALVE / 1/4 FLARE ADAPTER

01-03-019 LEAD TUBE 3/16 OD. ^{1/4"} COPPER, TYPE "L", SOFT DRAWN
(00-CL-135)

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

NORTHROP

BLEEDER VALVE
ASSEMBLY

01-03-060

DRN

RB

CHK

1-10-78

REV

189

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

01-03-050

DATE 1-31-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

NORTH WIND STRUT

REV

SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-050 NORTH WIND STRUT

01-06-082 STRUT, 16 GA. GALV, 11 1/2 x 12, (9.96 #) SEE 01-03-050

01-06-010 FLANGE STIFFENER, 16 GA. GALV, 6 x 3 (.125 #)

01-11-008 SCREWS #8 x 1/2 S.D. & S.T.

NORTHROP, INCORPORATED 302 Nichols Drive, Muehlen, Texas 75141

NORTHROP

North Wind Street

191

NORTH WIND STREET

NOT TO SCALE

16 CO. CAV. (01-01-001)

GEAR CASE 12x 119 1/2

MACHINE BLANK

01-06-082

01-06-082	DRN	01-03-050
1-31-78	REV	01-03-050

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-032

DATE 1-10-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

NORTH COL
ASSEMBLY

REV

SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-032 NORTH COL

1	01-06-083	NORTH COL, 16 GA. GALV., 12x80 ³ / ₄ (6.73 FT ²)
3	01-06-010	FLANGE STIFFENER 16 GA. GALV., 3x6 (.125)
1	01-06-011	FLANGE STIFFENER W/ BASE L, 16 GA. GALV., 5x6 (.21 FT ²)
2A	01-11-008	SCREWS #8x1/2 S.D. & S.T.

NO RTTHORUP

STRUCTURAL INFORMATION FOR STEELER: THIS DRAWING SHALL BE USED AS A GUIDE ONLY.

193

NORTH COLUMN
ASSEMBLY
(A)

DRN	01-03-032
CB	CHK
REV	

01-06-083

NORTH COLUMN (A) (32°)
 NOT TO SCALE
 16 GA. GALV. REOD (01-01-001)
 SHEAR SIZE 80 3/4" x 12" (6.73 FT²)

01-06-01

26

10-14-77

3

16 CS. GALV. REQ'D (01-01-00)
SHEAR SIZE 5.0x6.0 (.21 FT²)
ALL BENDS 90°
REFER 0103-033 THRU -042

REV. (A) 3-30-78 (NEW) 69

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NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

01-03-012

DATE 1-20-78

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

SOUTH BRACE
ASSEMBLY

REV

SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

01-03-012 SOUTH BRACE ASSEMBLY

1	01-06-069	SOUTH BRACE, $12\frac{3}{8} \times 26\frac{9}{16}$ (2.28M) SEE 01-03-012
2	01-06-073	FLANGE STIFFENER, 6×3 (.125 FT ²)
12	01-17-008	SCREWS - $\frac{3}{8} \times 1\frac{1}{2}$ A.D.E.S.T.

MATERIAL

16 GA. GALV. REOD (01-01-001)
SHEAR SIZE 12 3/8 x 26 9/16 2.28 FT²

REV A REDESIGN 1-26-78 RB

NORTHROP
ORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

**SOUTH BRICE
ASSEMBLY**

01-06-069

01-03-012	
DRN	CHK
BA	REV

NORTHROP

FLANGE
STIFFENER

ALL HOLES 5/32" (6 REQ'D)

FLANGE STIFFENERS

1/6 GA. G.S.W. REQ'D. (01-01-001)
SHEAR SIZE 3" X 6 1/2" (.135 FT²)
ALL BENDS 90°

NOTE: TOLERANCE PER DIMENSION
Ⓐ = +.031
-1.0

01-06-10	DRN	09	CIK
4-13-78	REV		

NOBRIHOKUP

SOUTH COLUMN
BASE ANGLES D

01-07-003	DRN
10-11-77	REV A

SOUTH COL. BASE ANGLES (D)
 MADE FROM 3 1/2" x 2 1/2" x 1/4"
 6061-T6 ALUM. (01-312)
 1.68 LBS/L.F.

(D)

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-063

DATE

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

FLUID INLET
ASSEMBLY

(E)

REV

SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

1	01-03-063	FLUID INLET ASSEMBLY
1	01-09-018	VALVE ADAPTER 7/8 I.D. SWEAT X 3/4 F.P.T.
1	01-09-013	LEAD TUBE 3/4 NOM. X 2" TYPE "M" COPPER. (01-122)
1	01-09-012	FLUID INLET PIPE, 1 1/4 I.D. X 10", TYPE "B" COPPER. (01-124)
1	01-17-123	ROD, 3/8" DIA. AS REQ'D (01-500)

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-063

DATE

FIELD SUB-ASSEMBLY - PART

SHOP FINAL ASSEMBLY - PART

SHOP SUB-ASSEMBLY - PART

PART

FLUID OUTLET
ASSEMBLY

(F)

REV

GHT. 1 of 1

PART. NO. / REV / DESCRIPTION

01-03-063 FLUID OUTLET ASSEMBLY

01-09-018 ADAPTER - 1/8 ID SWEAT X 3/4 F.P.T.

01-09-017 ADAPTER - 3/8 I.D. SWEAT X 1/4 M.P.T.

01-08-018 LEAD TUBE - 3/4 ID X 2", TYPE M, COPPER

01-08-017 LEAD TUBE - 1/4 ID. X 6", TYPE M, COPPER

01-08-012 FLUID OUTLET PIPE - 1/4 ID. X 10", TYPE M, COPPER

01-17-123 ROD, BRASS, AS REQ'D. 01-500.

FOR THRU P

FLUID INLET OR OUTLET
(AS NOTED)
ASSEMBLY

01-03-063

DRN RB CHK

1-10-75 REV

(01-09-018)
1/8" SOLDER X 3/4" F.P.T.
A.S.A. B16-122
ASTM B-18
@ INLET PIPE ONLY

BRAZE CONNECTION

LEAD TUBE (01-03-013)
3/4" NOM X 2", TYPE "M",
COPPER
@ INLET PIPE ONLY

BRAZED CONNECTION
@ INLET PIPE

FLUID INLET OR OUTLET
1 1/4" I.D. X 10", TYPE "M"
COPPER (01-03-012)

1/8" D

3/8" D

10"

ADAPTER, 3/8" O.D. SWEAT X 1/4" M.P.T.
(01-09-011) @ OUTLET PIPE ONLY

BRAZED CONNECTION

LEAD TUBE (01-03-017)
3/8" O.D. X 5", TYPE "L", COPPER
@ OUTLET PIPE ONLY (01-110)

BRAZED CONNECTION
@ OUTLET PIPE

FLUID INLET OR OUTLET ASSEMBLY
NOT TO SCALE

REF DRWG/GHT # A-03063
FOR WORK THIS SHEET

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LEAD TUBE

01-08-017

DRN

CHK

REV

CLOSURE PLATE 3/4 MAN.

NO SCALE

10 GA. GALV. (01-A-001)

CLAMP SIZE 4 x 6 1/4 (-170 FT²)

ORTHURUP

ORTHURUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CLOSURE PLATE
1 1/4 MANIFOLD (E)
(F)

01-06-056

DRN RB CHK

115-18 REV

NORTHROP	REV. A 3-30-73 G.F. 13 69	
	INLET OR OUTLET	
	CLOSURE PLATE	
DRN RDS		CHK RB

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

LIST OF MATERIALS

01-03-009

DATE 2-2-78

FIELD SUB-ASSEMBLY - PART

← SHOP FINAL ASSEMBLY - PART

← SHOP SUB-ASSEMBLY - PART

← PART

CLOSURE PLATE (G)

REV

SHT. 1 OF 1

PART. NO. / REV / DESCRIPTION

1 01-03-073 CLOSURE PLATE 16 GA. GALV. 4x6 1/4 (.170 FT²)

1 01-06-059 CLOSURE PLATE 16 GA. GALV. 4x7 (.28)

1 01-21-004 WEATHER STRIPPING 17 1/2 INCHES REQ'D

CLOSURE PLATE

NORINBORUP

CLOSURE PLATE

01-03-073

DRN RDS CHK R2

MATERIAL 16 GA. 01-001
 4 x 6 1/4 (-170 FT²)

WORTHROP
 WORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CLOSURE PLATE
 BLANK ©

01-000-053	
DRN 69	CHK
2-2-70	REV

01-18-004
CABLE GUIDE

01-17-022 & 021
#6 RHD. SCREW, WASHER
& LOCKWASHER.

01-06-173
CABLE GUIDE BKT.

DIRTHORUP

INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

CABLE GUIDE
BRACKET
ASSEMBLY

01-03-032	
DRG 39	CHK.
DATE 1-1-74	APP.

MATERIAL 16 GA GALV. (01-001)
 CHE&R SIZE 2X 3 3/16

ASSEMBLY
PARTS/ASSEMB

SENSOR ASSEMBLY

TRD-3

DATE: 1/31/78

REV.

SHEET 1 OF 1

P/N	REV	DESCRIPTION
00-04-077		Solar Sensor Mounting Field Subassembly TRD-3 sensor
1 01-03-053		SENSOR ASSEMBLY
2 01-10-012		Sensor Cells - Photovoltaic
1 01-20-004		Sensor Tube 3" O.D. x 2 3/4" Clear Plexiglass
* 1 01-10-011		Solar Discs 2 1/2" x 1 3/4" P.C. Board
2 01-20-002		End Cap 3" O.D. x 3/16" Black Acrylic
1 01-20-003		Solar Discs Base 2 3/8" x 2 23/32 x 3/16 Plexiglass
2 01-10-15		Sensor Discs Wire 2" length blk
1 01-10-017		Control Box Leads (1) blue (1) blk (1) orange 10'
3 01-17-060		#6 - 32 x 3 1/8" Screw Zinc Coated
3 01-17-022		#6 - 32 Hex Nut Zinc Coated
1 01-17-061		1/2" - 20 x 4" slotted RN.HD Stove Bolt
2 01-17-075		Hex Nut 1/2" - 20 Zinc Coated
2 01-17-076		Star Lock Washer 1/2" Zinc Coated
1 01-06-104		Sensor Positioning Bracket

*00-10-039 May be substituted for 01-10-11

- ① 01-20-004 SENSOR TUBE (1)
- ② 01-10-011 SOLAR DISC (2)
- ③ 01-20-003 END CAP (2)
- ④ 01-20-002 SOLAR DISC BRACKET (1)
- ⑤ 01-17-006 SCREW #6x3/8 (3)
- ⑥ 01-17-022 NUT, HEX #6-32 (3)
- ⑦ 01-17-001 SLOTTED R.H. HD SCREW 1/4-20 x 4 (1)
- ⑧ 01-17-075, HEX. NUT. 1/4-20 (2)
- ⑨ 01-17-076, STAR LOCK WASHER (2)
- ⑩ ⑪ ⑫ 01-10-017, CONTROL BOX LEADS. (3)
- ⑬ 01-10-115 SOLAR DISC WIRE - 2' LONG (2) (NOT SHOWN)
- ⑭ 01-10-012, SENSOR CELL. (2)

NOTE: KNOT CONTROL BOX LEADS.
KNOT INSTALLED TO INSIDE.

APPLY SILICONE (CLEAR) SEALANT,
② OPENING WHERE LEADS EXIT,
AFTER FINAL ASSEMBLY.

NORTHROP
NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

SOLAR SENSOR
SUB-ASSEMBLY

01-53-553	
22-26	22-26
1-28-75	22-26

MATERIAL

16. GA. GALV. REOD
SHEAR SIZE 5 X 7.25 (.252H²)

3-31-78

JOINTHURUP
JOINTHURUP, INCORPORATED 300 N. 10TH ST. MINNEAPOLIS, MINN. 55401

SOLAR SENSOR
MOUNT

01-06-110	
DRN BG	CHK
REV

MATERIAL:

16 GA. ALUM. REQD (01-01-001)

WH62612E 4 1/2" x 1 1/2" (.015 GA. FT.)

ALL BENDS 90°, .016

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

SENSOR POSITIONING
BRACKET
(TRINITY)

03-06-104

DRN BG CHK

1-18-78 REV

NORTHROP

THRUP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

SENSOR TUBE

01-20-004

DRN BG

CHK

REV

MATERIAL:

CLEAR PLEXIGLAS $2\frac{3}{8} \times 2\frac{3}{8} \times \frac{1}{16}$

3-13-73 REV A.

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Macheson, Texas 75455

TRD-3
SOLAR DISCS
BASE

01-10-015

DRN BG CHK

REV

NOTE:

CUT ENDS OFF FIRST
THEN CUT UNIT IN HALF.

NORTHROP

THORP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

SOLAR DISCS
FOR TRD-3

00-10-011

DRN 69	CHK
3-9-73	REV

MATERIALS: PC BOARD
AND CONDUCTOR.

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

SOLAR SENSOR
DISCS

REV. 3-9-79

01-10-639	
DRN bg	CHK
1-7-79	REV 1

MATERIAL:

BLACK PLEXIGLAS (ACRYLIC)

NORTHROP

NORTHROP, INCORPORATED 302 Nichols Drive, Hutchins, Texas 75141

TRD-3
SOLAR SENSOR
END CAP

01-20-00

DRN 06	CHK
REV	