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FREZE-CEL

MODEL 5549
REMOTE UNIT

OPERATION & MAINTENANCE MANUAL

June 2002

Freze-Cel Remote Unit

Table of Contents

Section 1

Introduction

This manual provides a description of the Dole 5549 Freze-Cel Remote Unit. This unit, designed for freezing food products through direct contact of cold plates with product. The 5549 Freze-Cel Remote Unit is equipped with a direct-expansion thermostatic expansion valve and distributor assembly. It is designed for use with an external refrigeration condensing system, which is manufactured and supplied by others.

Since the remote unit can be supplied in a variety of sizes (6 or more stations), the external refrigeration system must be designed to assure efficient utilization of the plate surface area provided.

The unit is completely assembled and enclosed in an insulated fiberglass cabinet.

Section II

Description

A. Purpose of Freze-Cel

The 5549 Remote Unit, supported by an external refrigeration system, provides a means of freezing food products through direct contact or conduction, the most efficient of heat transfer methods. Since products are held firmly between cold plates, thickness and flatness of the freezer products can be controlled.

B. General

The Remote Unit consists essentially of an insulated cabinet, a number of cold plates, a manual hydraulic system for opening and closing plates, front and rear cabinet doors to simplify product loading and unloading, and appropriate valves and plumbing for feeding cold refrigerant to the plates.

The Remote Unit can be supplied in several configurations, depending on the product to be frozen and other specific requirements imposed on the freezing operation. Individual units are designed and built to provide the appropriate number of freezing stations and provisions for accommodating specified product thickness.

C. Cabinet

The cabinet is made of three (3) inch thick foamed in place urethane insulation sandwiched between two (2) gel coat layers. The resulting assembly provides an easy-to-clean surface and insures minimum losses during freezing operations.

To facilitate loading and unloading of trays of product, the cabinet is equipped with two hinged doors, front and rear. Door restraints are included to prevent inadvertent movement of open doors on shipboard installations.

D. Freze-Cel Plates

The Remote 5549 Freze-Cel uses plates that are 7/8 inch thick and have an effective freezing surface of 55 x 49 inches. Plate surfaces are 304 stainless steel. Three-quarter inch (3/4") square carbon steel tubes are used to form internal coils, which carry the refrigerant throughout the plate. The voids between the coils and surfaces of the plate are filled with a liquid having good heat transfer characteristics.

Remote units are furnished in a variety of configurations regarding the number of stations (spaces between plates) and product spacing. The unit uses pre-adjusted lifting bolts and nuts that provide for the maximum opening between adjacent plates. Aluminum angles run along the sides of each plate and serve the purpose of defining the minimum spacing (freezing position

"closed" position) of each station. These angles also serve to guide product trays upon insertion into the freezer.

E. Freze-Cel Refrigeration System

The Remote Unit Refrigeration System consists essentially of several parallel evaporators (the plates), valves for controlling the liquid flow to the evaporators, valves for isolating individual evaporators, and interconnecting plumbing.

An external refrigeration system is required to interface with the Remote Unit. This portion of the refrigeration system is supplied by others and should be capable of supplying sufficient cooling to meet product-freezing needs. Typical evaporator temperatures range from –35 degrees to –40 degrees Fahrenheit.

Figure 1 "Refrigeration Schematic" illustrates the components supplied with a Remote Unit. As was previously noted, each plate is essentially an evaporator having an effective heat transfer surface of 55 x 49 inches.

Each plate can be isolated, i.e. removed from service by closing manual valves on the inlet (liquid) and outlet (suction) side of the plate(s) to be removed from service. Such isolation may be desirable for one or more of the following reasons:

1. A leak develops in a circuit.

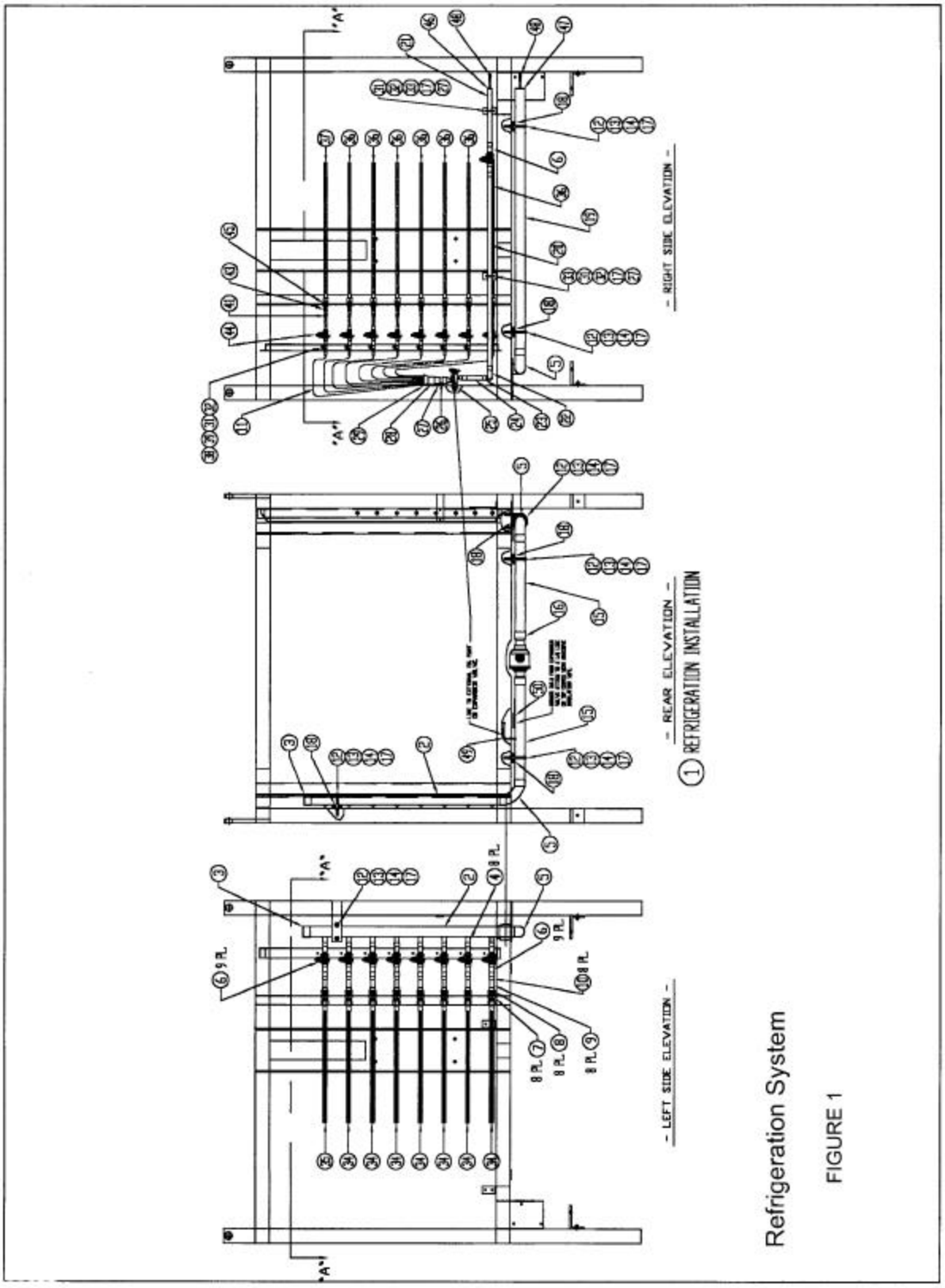
2. A freezing cycle is to be run with reduced product load

3. A different product is to be frozen that has greater cooling requirements.

4. Capacity of external refrigeration system is insufficient to utilize all freezing stations.

Each plate is fed by flexible stainless steel hoses, which are compatible with the selected refrigerant, the temperature regime (as low as – 40 F), and the motion induced when opening and closing stations.

A distributor, sized for the cooling capacity and number of plates is used to provide an equal flow of refrigerant to each plate. This distributor is fed via a thermal expansion valve with external superheat adjustments, which throttles high-pressure liquid from the refrigeration condensing section. The high-pressure liquid is further controlled via a normally open liquid solenoid valve upstream of the expansion valve.



Refrigeration System

FIGURE 1

Refrigeration System Parts List (See Figure 1)

Find No.	Part No.	Description
1	108401-1	REFRIGERATION SYS. INSTALLATION
2	108401-2A	2 1/8 O.D. x 42 1/4" LG. COPPER TUBE
3	17-395	CAP, 2 1/8 COPPER
4	108401-4	3/4 O.D. x 2 1/4 LG. COPPER TUBE
5	17-168	ELBOW, 90 DEG. LR, 2 1/8 COPPER-W2072
6	28-954	VALVE, BALL, 7/8 ODS #900307
7	07-322	UNION, BULKHEAD, 3/4" W-NUT
8	26-357	NUT, TUBE, 3/4 DIA., 37 DEG. FLARE STL.
9	108401-9A	3/4 O.D. x 3 5/8" LG. COPPER TUBE
10	17-348	EXTENDED BUSHING, 7/8 x 3/4, FTG. x C.
11	108401-11	3/8 O.D. x 36" LG. COPPER TUBE
12	01-355	U-BOLT, 2 1/8 DIA., STL. STL.
13	02-013	3/8-16 HEX NUT STL. STL.
14	02-240	LOCKWASHER, 3/8 DIA., STL. STL.
15	108401-15	2 1/8 O.D. x 21 1/4" COPPER TUBE
16	28-956	VALVE. BALL, 2 1/8 ODS. #900617
17	15-086	LEAD FOIL TAPE, 1/2" WIDE x A/R
18	108401-18	UHMW SPACER, 1/2" x 2 1/4" x 1 3/8"
19	108401-19	2 1/8 O.D. x 56" LG. COPPER TUBE
20	108401-20	7/8 O.D. x 41 1/4" LG. COPPER TUBE
21	108401-21	7/8 O.D. x 12" LG. COPPER TUBE
22	17-026	ELBOW, 90 DEG, LR, 7/8 DIA. F-S, COPPER W2834
23	17-006	ELBOW, 90 DEG, SR, 7/8 DIA., S-S, COPPER W2034
24	108401-24	7/8 O.D. x 4 5/8" LG. COPPER TUBE
25	28-431	EXP. VALVE (HFES8HW35-EE) 7/8 x 1 1/8 ODF, S/T,SC
26	108401-26	1 1/8 O.D. x 2 5/8" LG. COPPER TUBE
27	108401-27	UHMW SPACER, 1/4" x 1 1/4" x 1 3/8"
28	17-306	COUPLING, REDUCER 1 3/8 x 1 1/8 S-S COPPER, W1056
29	31-612	DISTRIBUTOR, 11-6-10
30	01-356	U-BOLT, 1 1/8 DIA. STL. STL.
31	02-007	1/4-20 HEX NUT, STL. STL.
32	02-230	LOCKWASHER 1/4 MED. SPLIT, STL. STL.
33	01-354	U-BOLT, x 3/4 PIPE, STL. STL.
34	26-030-40.50	3/4" S.S. TELFON LINED BRAIDED HOSE W/3/4" 37 JIC FEMALE NUTS
35	26-030-40.875	3/4" S.S. TELFON LINED BRAIDED HOSE W/3/4" 37 JIC FEMALE NUTS
36	26-029-40.625	1/2" S.S. TELFON LINED BRAIDED HOSE W/1/2" 37 JIC FEMALE NUTS
37	26-029-41	1/2" S.S. TELFON LINED BRAIDED HOSE W/1/2" 37 JIC FEMALE NUTS
38	03-009	CLAMP, TUBE CUSHIONED, 3/8 DIA.
39	01-014	1/4 -20 x 3/4" LG. HEX HD BOLT, STL. STL.
40	108401-40	3/8 DIA. x 1" LG. COPPER TUBE
41	17-343	COUPLING REDUCER, 3/8" x 1/2" , S-S COPPER W1019
42	108401-42A	1/2" O.D. x 1 5/8 LG. COPPER TUBE
43	26-355	NUT, TUBE, 3/8 DIA. 37 DEG. FLARE
44	28-955	VALVE, BALL, 3/8 ODS, #900203
45	07-321	16 GA., 7/8 DIA., COPPER SHT.
46	108401-46A	16 GA., 7/8 DIA., COPPER SHT.
47	108401-47A	16 GA., 2 1/8 DIA. COPPER SHT.
48	28-105	1/4 DIA. SCHRADER VALVE
49	108401-49	1/4" O.D. x 82" LG. COPPER TUBE
50	15-040	INSULATION TAPE, RUBATEX, 1/8" x 2" WIDE

The external condensing units normally used with Remote Units have suction accumulators which collect liquid fed back through the system suction lines and prevent that liquid from entering and damaging the compressor. When liquid levels rise to a specific level, detected by a sensor, a refrigerant pump sends the liquid to the evaporators through a check valve just downstream of the thermal expansion valve and immediately prior to the distributor. The system, therefore, has two methods of delivering liquid refrigerant, a constant feed due to receiver pressure and intermittent lower pressure feed supplied by the liquid pump. Additionally, the liquid temperatures of some condensing systems can be as low as –10 degrees Fahrenheit, which impacts the actual capacity of the selected thermostatic expansion valves and may require special valve selections. Please contact Dole Engineering Department for special requirements.

A suction header and individual isolation valves for the main suction line and two liquid delivery lines complete the system.

A customer interface exists just adjacent to and above the lower insulated cabinet panel. This opening in the lower panel should be sealed with appropriate insulating material subsequent to completing the connection of external liquid and suction lines.

F. Freze-Cel Hydraulic System

To freeze product in the Remote Unit it is necessary that the top and bottom of the product be in direct contact with the surfaces of the Freze-Cel plates. It is most desirable that this contact be as close to 100 percent as is possible to assure maximum heat transfer efficiency and minimum freezing times. It is also necessary that the plates be opened to a point where product can be inserted as well as removed after freezing. The hydraulic system serves the following two purposes:

1. To open (raise) plates to permit placement of product in or removal from the unit.

2. To close (lower) plates to and to provide firm plate and product contact necessary for most efficient freezing.

Figure 2 “Hydraulic System Schematic” illustrates the components provided in the Remote Unit. The system is self-contained and is manually operated.

Two side mounted double acting hydraulic actuators provide the means of raising and lowering plates. The upper plate and the rod ends of the actuators are tied to the pressure plate. The piston ends of the actuators are attached to the unit’s frame. The top Freze-Cel plate is bolted to the pressure plate; the bottom plate is bolted to the frame. Intermediate plates are linked together by a lifting bolt and nut at each of the four corners of a plate. It is

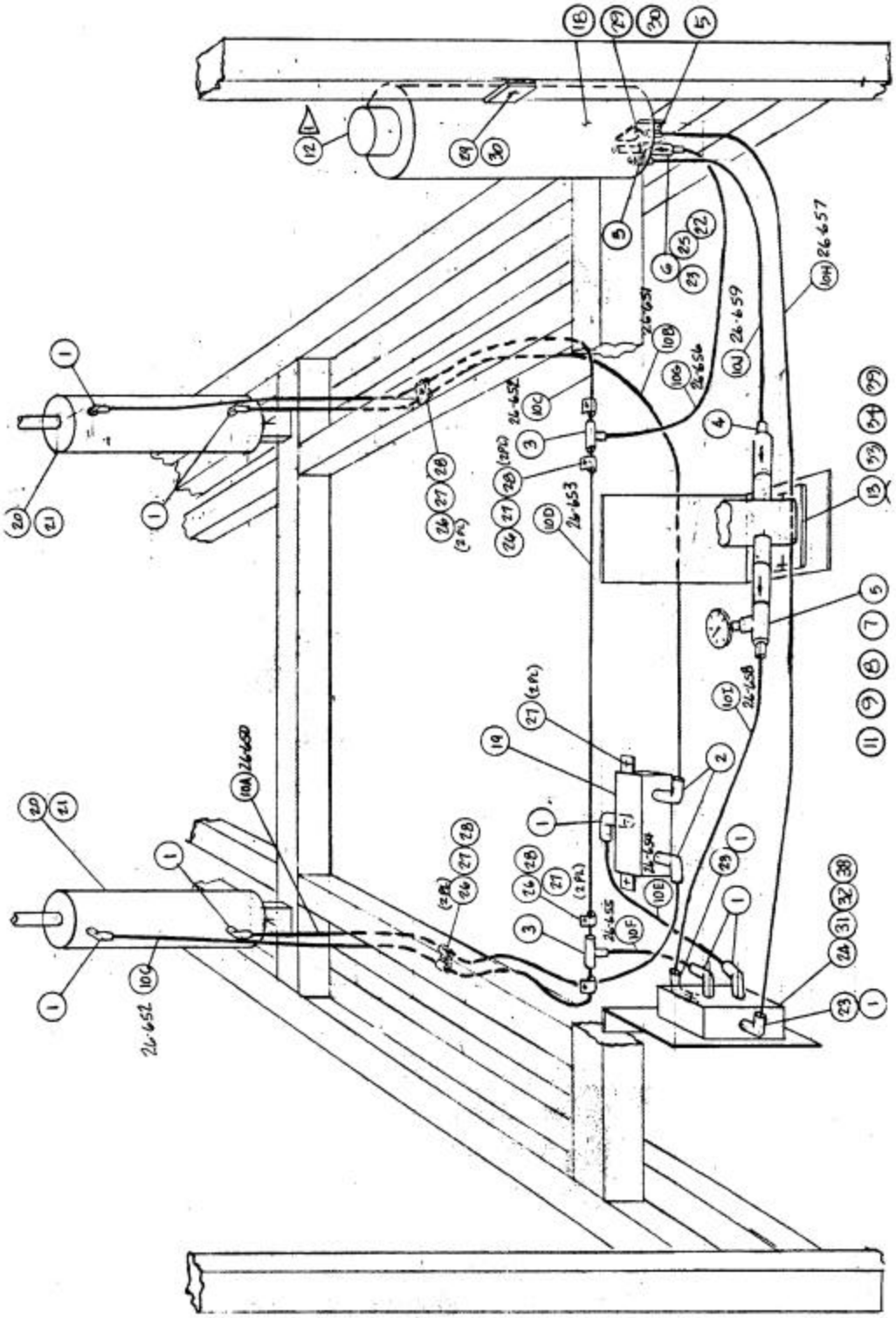


FIGURE 2 - REMOTE TEENAGER - HYDRAULIC DIAGRAM

Hydraulic System Parts List (Refer to Figure 2)

Find No.	Description
1	17-606 -149F-6-8 Elbow 90* - 1/2" MPT x 3/8" FL 45* (5)
2	17-607 - 249F-6-6 Elbow 90* - 3/8" MPT x 3/8" FL 45* (5)
3	17-608 - 144F-6 Union Tee 3/8" x 3/8" x 3/8" FL 45* (5)
4	17-609 - 48F-6-12 Male Connector 3/4" MPT x 3/8" FL 45* (5)
5	17-610 - 48F-6-6 Male Connector 3/8" MPT x 3/8" FL 45* (5)
6	17-611 - 46F-6-6 Female Connector 3/8" MPT x 3/8" FL 45* (5)
7	17-612 - 209 P12-6 Bushing 3/4" MPT x 3/8" FPT (5)
8	17-613 - 2225 P-6 Street Tee 3/8" FPT x 3/8" MPT x 3/8" FPT (5)
9	17-614 - 209 P6-4 Bushing 3/8" MPT x 1/4" FPT (5)
10A	26-650 - 3/8" Hose Assembly 46 1/2" Long (1)
10B	26-651 - 3/8" Hose Assembly 57" Long (1)
10C	26-652 - 3/8" Hose Assembly 56 1/2" Long (1)
10D	26-653 - 3/8" Hose Assembly 27" Long (1)
10E	26-654 - 3/8" Hose Assembly 18 1/4" Long (1)
10F	26-655 - 3/8" Hose Assembly 28 1/2" Long (1)
10G	26-656 - 3/8" Hose Assembly 30" Long (1)
10H	26-657 - 3/8" Hose Assembly 54" Long (1)
10I	26-658 - 3/8" Hose Assembly 20" Long (1)
10J	26-659 - 3/8" Hose Assembly 23" Long (1)
11	21-007 - CF-1P-040A Gage 0-600 PSI-2 1/2" Face, 1/4" MPT
12	07-113 - AB-1001 Filler Breather
13	07-112 - 142771 Hyd Hand Pump w/ Check Valves 3/4" FPT Ports
14	D1018-2-14 Reservoir Body (3) x 18""
15	D1018-2-14 Reservoir End Cap (3) x 5 1/2"
16	D1018-16 MTG Ear (3) x 2" x 2"
17	D1018-2-17 (4) x 5 1/2" End Cap
18	D1018-2-18 Reservoir Assembly
19	28-129 Flow Divider FD2
20	07-051 LH 3 1/4 BO2 - 13 1/2-1-P2 Cyl. - 13 1/2 Stroke (9 STA)
21	07-052 RC1007 Rod Clevis w/c P0730 Pin
22	28-202 Relief Valve
23	19-278 Reducing Bushing 3/4" MPT x 1/2" FPT
24	28-205 Control Valve
25	20-105 3/8" MPT Close Nipple
26	03-003 3/4" O.D. Cushion Type Tube Clamp
27	01-015 1/4" - 20 x 1" Cap Screw S.S. (7)
28	02-207 5/16" Flat Washer S.S. (7)
29	01-109 3/8" - 16 x 1" LG. Hex HD. Screw S.S. (7)
30	02-233 3/8" Flat Washer S.S. (7)
31	02-213 - 5/16" - 18 Hex Nut S.S. (7)
32	02-238 - 5/16" Lockwasher S.S. (7)
33	02-218 - 1/2" - 13 Hex Nut S.S. (7)
34	02-239 - 1/2" Lockwasher S.S. (7)
35	D1018-2-35 Hydraulic Sys. Instl. (9 STA)
36	D1018-2-36 Hydraulic Sys. Instl. (7STA)
37	07-053 LH 3 1/4 B02-10 1/2-1-P2CYL-10 1/2 Stroke 7 STA
38	02-240 3/8" Lockwasher For Divider
39	02-230 1/4" Lockwasher
40	02-203 1/4" Flat Washer
41	19-214 Pipe Plug
42	Mounting Ear - (3) 2 x 2 1/4"

NOTES:

(1)	3/8" Hyd Hose w/ Female Nut Each End To Mate With 3/8" Male 45* Flare Fittings.
(2)	5" Schedule 40 Pipe
(3)	1/4" Steel Plate
(4)	1/2" Steel Plate
(5)	Brass
(6)	Steel, CAD-plated
(7)	Type 304 S.S.

these lifting bolts, which serve to lift and control the maximum spacing between plates. Two 7/16 inch diameter stainless steel rods pass through flanges on each plate, the pressure plate, and top and bottom frame members. These rods serve to guide and center the complete stack of plates.

A manual hand pump serves to provide the hydraulic pressure needed to raise and lower the plates. It is supplied with a reservoir, which has a breather/screen assembly and houses the hydraulic fluid, whose level rises and falls as the system is operated.

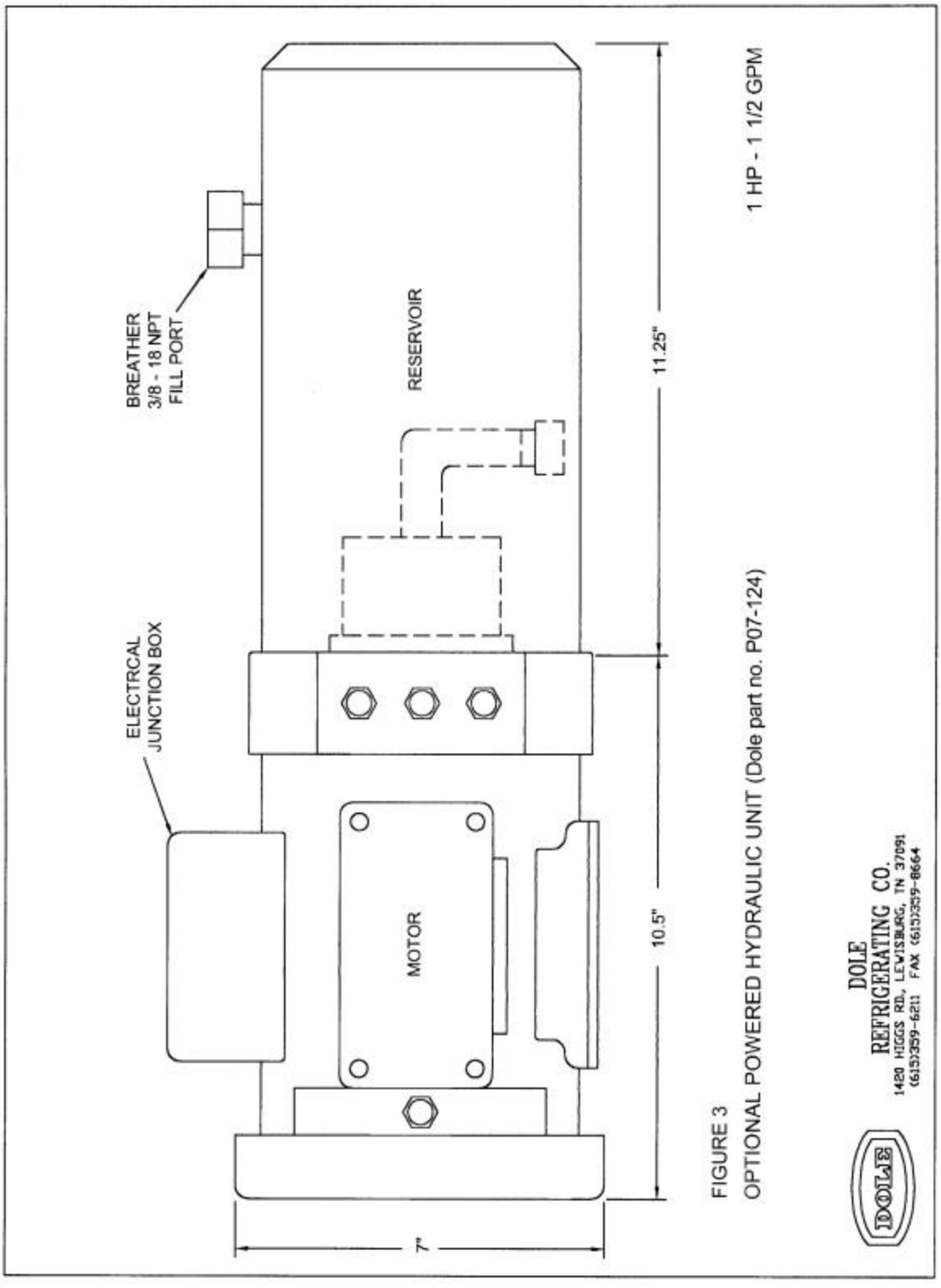
CAUTION: This system has been filled with a hydraulic fluid that is compatible with operating temperatures as low as –70 F. Only fluids meeting this requirement should be used in this system.

A check valve is located at the intake and outlet of the hand pump to assure one-way flow. A pressure gauge is installed immediately downstream to monitor system pressure. A pressure of less than 400 psig is required to operate this system.

A manual control valve is included which can be placed in an “UP”, “NEUTRAL” or “DOWN” position. When the plates are placed in the freezing (down) position, the control valve handle may be kept in the “DOWN” or in the “NEUTRAL” position. During the freezing cycle, all products will expand. As they attempt to expand, the actuators will resist this force and pressure in the system could rise to the point where a rupture might occur. To prevent such an occurrence, an internal relief is provided in the control valve to direct fluid through the valve to return, should the valve be left in “NEUTRAL” during the freezing cycle. If the valve is left in the “DOWN” position during freezing, a spring loaded relief valve in the return line to the reservoir will open. The control valve should <u>not</u> be placed in the “UP” position during freezing as this will prevent the system from developing pressure needed to maintain firm plate/product contact during freezing.

To assure that both sides of the plate will open and close at the same rate and avoid binding, a flow divider has been included. This device will assure that the flow entering it is split, or “divided” and that an equal amount of fluid is sent to each cylinder.

Figure 3 (For Hydraulic Powered Unit)



Remote Parts List

28-129----------Flow Divider
28-202----------Relief Valve
28-205----------Gresen Valve
28-405----------TX Valve for R-404
28-431----------TX Valve for R22(old), with 3/8 inch distributor tubes
28-451----------TX Valve for R22(new), with 3/8 inch distributor tubes
28-954----------7/8 Ball Valve
28-955----------3/8 Ball Valve
28-956----------2 1/8 Ball Valve
28-957----------1 1/8 Ball Valve
31-612----------Distributor
28-102----------240 v Liquid Solenoid Valve
01-980----------Lifting Bolt 7 & 9 Station
01-981----------Lifting Bolt 7 & 9 Station
01-993----------Lifting Bolt 7 & 9 Station
01-998----------Lifting Bolt 7 & 9 Station
02-108----------Jam Nut (for above)
07-052----------Rod Clevis
07-082----------13 1/2 Cylinder 9 station
07-083----------10 1/2 Cylinder 7 station
07-112----------Hand Pump
07-113----------Filler Breather
08-215----------Top Panel
07-124----------Auto Pump (optional)
08-216----------Base Panel
08-217----------Side Panel
08-218----------R.H. Door
08-219----------L.H. Door
08-246----------Alum Trim Strip
21-007----------Hydraulic Gauge
22-103----------Gasket for Side Panels
22-107----------Door Seal Gasket
25-088----------S.S. Door Hardware (set)
25-087----------Aluminum Hinge
26-355----------3/8 JIC Flare Nut W/Ferrule
26-357----------3/4 JIC Flare Nut W/Ferrule
26-650----------Hydraulic Hose – 46 1/2"

26-651----------Hydraulic Hose – 57”
26-652----------Hydraulic Hose – 56 1/2"
26-653----------Hydraulic Hose – 27”
26-654----------Hydraulic Hose – 18 1/4"
26-655----------Hydraulic Hose – 28 1/2"
26-656----------Hydraulic Hose – 30”
26-657----------Hydraulic Hose – 54”
26-658----------Hydraulic Hose – 20”
26-659----------Hydraulic Hose – 29 1/2"
26-660-42.5----------Suction Hose 7 required
26-660-42.875----------Suction Hose 1 required
26-661-42.240----------Liquid Hose 7 required
26-661-42.625----------Liquid Hose 1 required
86-007----------5/8 S.S. Square Rod Door
01-354----------U Bolt
01-355----------U Bolt
01-356----------U Bolt

Limited Warranty

Dole Refrigerating Company
1420 Higgs Road
Lewisburg, TN 37091

Terms of Limited Warranty- Dole Plate Freezers

Limited Warranty

Dole warrants to the original purchaser-user that the new product is free from defects of manufacture, material and/or workmanship at the time of shipment from **Dole**. This warranty does not extend to future performance. Any claims against **Dole** must be initiated within the time periods stipulated in paragraphs following, and not later.

Doles obligation, and purchaser-user's exclusive remedy, under this warranty is limited to furnishing a new or rebuilt part in exchange for a part which, is both defective and in-warranty, within 12 months from the date of startup, or 14 months from date of shipment from **Dole**, whichever is earlier.

This warranty is given to the original purchaser-user in lieu of all other warranties and shall not be assignable.

Limitations And Exclusions

This warranty shall not apply to:

a. Spoilage or loss of perishables for any reason
b. Refrigerant
c. Charges for installation of any part or parts furnished under this warranty
d. Transportation costs of the new or rebuilt part to the installation site, or of the defective part from the installation site to **Dole**.
e. Normal service and maintenance costs.

Dole shall not be liable for defects or damage, which result from or are caused by:

a. Improper installation, wiring, electrical current characteristics, or maintenance.
b. Accident, misuse or abuse, fire, flood, alteration and/or misapplication of the product.
c. Default or delay in performance caused by war, government restrictions, strikes, material shortages and contingencies beyond the control of **Dole**, or acts of God.

Anyt hing in the warranty notwithstanding. **ALL IMPLIED WARRANTIES OF FITNESS FOR PARTICULAR PURPOSE AND MERCHANTABILITY ARE EXCLUDED.**

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