

INSTRUCTIONS FOR INSTALLATION, OPERATION, AND MAINTENANCE

REFRIGERATION EQUIPMENT

DRINKING WATER COOLERS--ELECTRIC
AND SELF-CONTAINED

REFRIGERATORS--ELECTRIC AND SELF-CONTAINED

FROZEN FOOD CABINETS

REFRIGERATION HIGH SIDE ASSEMBLIES

(115 Volt Direct Current Power Supply)

Contract N5ss-1000

GENERAL  ELECTRIC

AIR CONDITIONING DEPARTMENT, 5 LAWRENCE STREET, BLOOMFIELD, NEW JERSEY

FOREWORD

The primary purpose of these instructions is to explain the operation, service, and maintenance of the equipment described herein.

Since effective service and proper maintenance go hand-in-hand with satisfactory operation, these instructions have been written with three thoughts in mind:

1. To describe the operation of the equipment.
2. To provide diagnosis and repair information.
3. To describe periodic maintenance procedures for reducing repairs to a minimum.

Years of experience and fine workmanship have gone into making the heavy duty equipment described in these instructions. With proper care, this equipment will render years of valuable and dependable service.

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INTRODUCTION

HOW A REFRIGERATING CYCLE COOLS

It will help you to understand the refrigeration equipment described herein if you keep in mind that anything which is cold attracts heat. Actually, refrigeration is accomplished, not by adding cold, but by removing heat from the atmosphere, or the object, which is to be cooled.

For example, if you dropped a red hot bolt into a bucket of cold water, the water would absorb heat units from the bolt until both the bolt and the water were the same temperature. The bolt would be cooler because it lost heat units. The water would be warmer than it was originally because it gained those same heat units. In this case, the water was the "refrigerant" which cooled the bolt.

This basic law of physics is utilized in a mechanical refrigerating machine. The trick is to use a refrigerant which will boil (absorbing heat units) at extremely low temperatures.

That is why "Freon-12" is used in the General Electric equipment described in this book. At normal atmospheric pressure "Freon-12" maintains a temperature of 21.6°F below zero.

FUNCTION OF THE COOLING UNIT: Look at the cooling unit shown in Figure 1. This unit is placed within the space to be refrigerated. It carries "Freon-12" at a low temperature. The liquid "Freon-12" absorbs heat from the surrounding atmosphere, causing the "Freon-12" to vaporize.

FUNCTION OF THE CONDENSER: Come back to the hot bolt and cold water. The water warmed up because it gained heat units which were transferred from the hot metal.

The same kind of heat transfer happens in a refrigerating machine. "Freon-12" absorbs heat units from the space to be cooled. But, unlike a bucket of water, "Freon-12" cannot be thrown away. It must be re-used, and for that reason there is the problem of getting rid of the heat gained.

That is why the refrigeration circuit, as shown in Figure 1, has a condenser. The hot

refrigerant vapor flows through the condenser coil where it releases its heat to cooling water or air and condenses to a liquid just as steam condenses to water. The cooled "Freon-12" is now ready to make another trip around the circuit.

FUNCTION OF THE COMPRESSOR: Remember that temperature and pressure go hand in hand. Water, for example, boils at a higher temperature at sea level (14.7 lb per sq in.) than it will at the top of a high mountain where the atmospheric pressure is lower. If you put more than sea-level pressure on a given amount of liquid, you need a higher temperature to make it boil.

At normal atmospheric pressure "Freon-12" boils at -21.6°F , but this is much too cold for practical purposes in certain refrigerating machines, such as water coolers. So, pressure is applied within the refrigerating circuit to maintain any desired temperature. With "Freon-12," for example

37.0 lb pressure corresponds to 40°F
30.1 lb pressure corresponds to 32°F
21.1 lb pressure corresponds to 20°F

The job of maintaining a desired pressure to obtain a desired temperature is accomplished by the compressor shown in Figure 1.

The compressor pumps "Freon-12" from the cooling coil to the condenser, and in so doing it produces the pressures needed to control refrigerating temperatures.

In actual operation there are two different pressures in a refrigerating circuit. A low pressure on the cooling coil side of the circuit causes evaporation of the refrigerant which absorbs heat. A high pressure on the condenser side liquifies the "Freon-12" vapor.

GLOSSARY OF TERMS USED IN REFRIGERATION

BRITISH THERMAL UNIT (Btu)-- the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit.

CONDENSING UNIT-- that portion of a refrigerating system consisting of a compressor, condenser, liquid receiver, and motor, mounted on a frame.

"FREON-12"-- the refrigerant used in the system described herein and chemically known as dichlorodifluoromethane (CCl_2F_2).

HEAT-- basic form of energy measured in Btu, calories, etc.

Latent Heat-- the heat which is required to change the state of a substance from solid to liquid, or from liquid to gas; likewise the heat given up by a change in state from a gas to a liquid or a liquid to a solid.

Sensible Heat-- heat which is associated with a change in temperature; specific heat multiplied by change of temperature.

HIGH SIDE-- parts of the refrigerant system under higher or condenser pressure.

LOW SIDE-- all parts of system under the lower or cooling unit pressure. Parts include cooling units and suction lines.

MACHINERY COMPARTMENT-- the base section of Reach-in Refrigerators which contains high side equipment and controls.

MECHANICAL REFRIGERATION-- process of lowering the temperature of a substance below that of its surrounding atmosphere by means of a refrigerating machine. The heat-absorbing body or refrigerant must be at a temperature lower than the substance to be cooled. Heat extracted from the space being cooled is carried away by the refrigerant. If the lower temperature of the cooled space is to be maintained, it must be surrounded by insulating material so that heat cannot readily return to it.

NON-CONDENSIBLE GAS-- foreign gas, such as air or nitrogen, which will not condense at the existing condenser temperature and pressure, thus causing high head pressure.

PRECOOLER (for water coolers)-- a double tube or other heat exchanger device for using cooled waste drinking water to help cool incoming drinking water.

PRESSURE-- the force exerted per unit area by a liquid or gas.

Absolute Pressure-- measured above zero (absolute vacuum). It is the sum of gage pressure and barometric pressure. Absolute pressure at sea level is 14.7 pounds per square inch (psi).

Gage Pressure-- pressure reading on gage. All pressures used in this instruction book are gage pressures unless otherwise noted.

Head Pressure-- discharge pressure from compressor, also called condenser pressure.

Suction Pressure-- pressure in suction line usually at end of cooling unit, also called "back" pressure and "low side" pressure.

PURGING-- ridding refrigerant system of non-condensable gas.

REFRIGERATION HIGH SIDE ASSEMBLY-- consists of a single or duplex condensing unit mounted in a frame with motor controller, pressure switch, dehydrator, sight flow indicator, and manually operated valves.

SATURATED VAPOR (also called saturated gas)-- when the temperature of a liquid is raised to the boiling point corresponding to its pressure, both liquid and gas can exist together and the condition is said to be saturated.

SUPERHEATED VAPOR (also called superheated gas)-- a vapor whose temperature is higher than the saturation temperature; i.e. higher than the boiling point.

REFRIGERANT-- a substance used to produce refrigeration by absorbing heat when it expands or vaporizes. "Freon-12," methyl chloride, and ammonia are common refrigerants.

TEMPERATURE-- relative hotness of a body measured in degrees Fahrenheit (F), Centigrade (C), etc.

Boiling Temperature-- a liquid has different boiling temperatures for different pressures under which it is confined; the boiling point is also the condensing point for that pressure. For example, water boils at $212^{\circ}F$ at atmospheric pressure (zero pounds gage pressure), but at 100 pounds gage pressure it boils at $338^{\circ}F$. "Freon-12" boils at minus $21.6^{\circ}F$ at atmospheric pressure.

FUNCTIONS OF EQUIPMENT

COMPRESSOR, refrigerant-- a machine for compressing the refrigerant vapor from the cooling unit and discharging it to the condenser.

CONDENSER, air-cooled-- a finned tube heat exchanger to condense refrigerant vapor by transmitting heat from the vapor to the air passing over the condenser.

DEHYDRATOR, refrigerant (also called drier)-- a device provided with a chemical such as silica gel or activated alumina, and connected in the refrigerant liquid line to remove or absorb moisture.

COMBINATION HIGH AND LOW PRESSURE CUT-OUT SWITCH-- combines high and low-pressure control. Its electrical contacts may be opened or closed by suction pressure and opened by head pressure.

High Pressure Switch (also called high pressure cut-out or high pressure control)-- high pressure control stops compressor automatically if there is excessive pressure on the high side of the system.

Low Pressure Switch (also called back pressure control or suction pressure control)-- low pressure switch stops and starts compressor automatically at predetermined suction temperature, thus controlling the amount of cooling. NOTE: Separate high and low pressure switches instead of the combination device are used on certain Refrigeration High Side Assemblies.

COOLING UNIT-- the cooling medium, usually in the form of coils, within space being cooled in which refrigerant is evaporated (or boiled) to produce refrigeration.

HEAT INTERCHANGER-- heat transfer surface between cold suction vapor and warm liquid refrigerant for precooling liquid refrigerant.

HOT GAS LINE-- pipe line which carries the hot refrigerant vapor from the compressor discharge to the condenser.

LIQUID RECEIVER-- a vessel permanently connected to high side of system which serves as a partial reservoir for liquid refrigerant from the condenser and provides storage space for refrigerant surges due to load changes. When a system is "pumped down" the refrigerant is pumped into the condenser and receiver.

LIQUID STRAINER-- a wire screen device located in liquid line ahead of the thermostatic expansion valve for the purpose of protecting this valve against clogging due to particles of grit, scale, etc., which the system may contain. A suction strainer is also located in the compressor suction manifold. NOTE: Liquid Strainer is furnished only on Size 30, Reach-in Refrigerator; Frozen Food Cabinets; and other remote systems.

SIGHT FLOW INDICATOR-- sight flow glass of the "bull's eye" type located in the liquid line. Presence of bubbles indicates low refrigerant charge.

STREAM REGULATOR (for water coolers)-- a pressure regulator in the drinking water line to maintain constant water pressure for uniform bubbler stream height.

TEMPERATURE CONTROL (thermostat)-- automatically controls the compressor operation to maintain desired temperature in space being cooled.

THERMOSTATIC EXPANSION VALVE-- automatically controls the quantity of liquid refrigerant entering the cooling unit. This valve keeps the cooling unit fully refrigerated and prevents liquid refrigerant from surging back to the compressor.

VALVES, MANUALLY CONTROLLED

Charging Valve-- located in liquid line at point where refrigerant drum is connected for charging the system.

Purging Valve-- connected to the top of liquid receiver for purging air and other noncondensable gases from refrigerant system.

Service Valve-- a shut-off valve in a refrigerant line either of the packed stem or the packless type. The latter type is illustrated elsewhere in this book. The packed stem type is used on the compressor suction and discharge connections, and contains a seal cap to prevent leakage around the stem when the valve is not being operated. Packless type valves are used for service requiring frequent manipulation and are of the diaphragm type.

"FREON-12" REFRIGERANT

PROPERTIES

Pure "Freon-12" (also known as "F-12", dichlorodifluoromethane or CCl_2F_2) is colorless and odorless in concentrations of less than 20 percent by volume in air; in higher concentrations its odor resembles that of carbon tetrachloride. It has a boiling point of -21.6 F at atmospheric pressure. At ordinary room temperatures it is a liquid when under a pressure of 70 to 75 psi gage and it is shipped liquified under pressure in steel cylinders. The refrigerant is non-poisonous, non-inflammable and non-explosive, however it may break down to form irritating and corrosive gases when subjected to high temperatures. In view of the low boiling point, liquid "Freon-12" should not come in contact with the skin or eyes.

PROPERTIES OF SATURATED VAPOR

Temp. F	Pressure		Volume		Enthalpy (from -40)		Temp. F	Pressure		Volume		Enthalpy (from -40)	
	Abs psi	Gage psi	Liquid cuft/lb	Vapor cuft/lb	Liquid Btu/lb	Vapor Btu/lb		Abs psi	Gage psi	Liquid cuft/lb	Vapor cuft/lb	Liquid Btu/lb	Vapor Btu/lb
-20	15.28	0.58	0.0108	2.474	4.07	75.87	60	72.41	57.71	0.0119	0.575	21.57	84.82
-18	16.01	1.31	0.0108	2.370	4.48	76.11	62	74.77	60.07	.0120	.557	22.03	85.02
-16	16.77	2.07	0.0108	2.271	4.89	76.34	64	77.20	62.50	.0120	.540	22.49	85.22
-14	17.55	2.85	0.0109	2.177	5.30	76.57	66	79.67	64.97	.0120	.524	22.95	85.42
-12	18.37	3.67	0.0109	2.088	5.72	76.81	68	82.24	67.54	.0121	.508	23.42	85.62
-10	19.20	4.50	0.0109	2.003	6.14	77.05	70	84.82	70.12	0.0121	0.493	23.90	85.82
-8	20.08	5.38	0.0109	1.922	6.57	77.29	72	87.50	72.80	.0121	.479	24.37	86.02
-6	20.98	6.28	0.0110	1.845	6.99	77.52	74	90.20	75.50	.0122	.464	24.84	86.22
-4	21.91	7.21	0.0110	1.772	7.41	77.75	76	93.00	78.30	.0122	.451	25.32	86.42
-2	22.87	8.17	0.0110	1.703	7.83	77.98	78	95.85	81.15	.0123	.438	25.80	86.61
0	23.87	9.17	0.0110	1.637	8.25	78.21	80	98.76	84.06	0.0123	0.425	26.28	86.80
2	24.89	10.19	0.0110	1.574	8.67	78.44	82	101.7	87.00	.0123	.413	26.76	86.99
4	25.96	11.26	0.0111	1.514	9.10	78.67	84	104.8	90.1	.0124	.401	27.24	87.18
5	26.51	11.81	0.0111	1.485	9.32	78.79	86	107.9	93.2	.0124	.389	27.72	87.37
6	27.05	12.35	0.0111	1.457	9.53	78.90	88	111.1	96.4	.0124	.378	28.21	87.56
8	28.18	13.48	0.0111	1.403	9.96	79.13	90	114.3	99.6	0.0125	0.368	28.70	87.74
10	29.35	14.65	0.0112	1.351	10.39	79.36	92	117.7	103.0	.0125	.357	29.19	87.92
12	30.56	15.86	0.0112	1.301	10.82	79.59	94	121.0	106.3	.0126	.347	29.68	88.10
14	31.80	17.10	0.0112	1.253	11.26	79.82	96	124.5	109.8	.0126	.338	30.18	88.28
16	33.08	18.38	0.0112	1.207	11.70	80.05	98	128.0	113.3	.0126	.328	30.67	88.45
18	34.40	19.70	0.0113	1.163	12.12	80.27	100	131.6	116.9	0.0127	0.319	31.16	88.62
20	35.75	21.05	0.0113	1.121	12.55	80.49	102	135.3	120.6	.0127	.310	31.65	88.79
22	37.15	22.45	0.0113	1.081	13.00	80.72	104	139.0	124.3	.0128	.302	32.15	88.95
24	38.58	23.88	0.0113	1.043	13.44	80.95	106	142.8	128.1	.0128	.293	32.65	89.11
26	40.07	25.37	0.0114	1.007	13.88	81.17	108	146.8	132.1	.0129	.285	33.15	89.27
28	41.59	26.89	0.0114	0.973	14.32	81.39	110	150.7	136.0	0.0129	0.277	33.65	89.43
30	43.16	28.46	0.0115	0.939	14.76	81.61	112	154.8	140.1	.0130	.269	34.15	89.58
32	44.77	30.07	0.0115	.908	15.21	81.83	114	158.9	144.2	.0130	.262	34.65	89.73
34	46.42	31.72	0.0115	.877	15.65	82.05	116	163.1	148.4	.0131	.254	35.15	89.87
36	48.13	33.43	0.0116	.848	16.10	82.27	118	167.4	152.7	.0131	.247	35.65	90.01
38	49.88	35.18	0.0116	.819	16.55	82.49	120	171.8	157.1	0.0132	0.240	36.16	90.15
40	51.68	36.98	0.0116	0.792	17.00	82.71	122	176.2	161.5	.0132	.233	36.66	90.28
42	53.51	38.81	0.0116	.767	17.46	82.93	124	180.8	166.1	.0133	.227	37.16	90.40
44	55.40	40.70	0.0117	.742	17.91	83.15	126	185.4	170.7	.0133	.220	37.67	90.52
46	57.35	42.65	0.0117	.718	18.36	83.36	128	190.1	175.4	.0134	.214	38.18	90.64
48	59.35	44.65	0.0117	.695	18.82	83.57	130	194.9	180.2	0.0134	0.208	38.69	90.76
50	61.39	46.69	0.0118	0.673	19.27	83.78	132	199.8	185.1	.0135	.202	39.19	90.86
52	63.49	48.79	0.0118	.652	19.72	83.99	134	204.8	190.1	.0135	.196	39.70	90.96
54	65.63	50.93	0.0118	.632	20.18	84.20	136	209.9	195.2	.0136	.191	40.21	91.06
56	67.84	53.14	0.0119	.612	20.64	84.41	138	215.0	200.3	.0137	.185	40.72	91.15
58	70.10	55.40	0.0119	.593	21.11	84.62	140	220.2	205.5	0.0138	0.180	41.24	91.24

Properties extracted from ASRE Circular No. 12. Printed by permission.

SECTION I - DESCRIPTION

The General Electric equipment described in this book has many parts which are common to all. For example, the compressor is exactly the same for Drinking Water Coolers, Reach-in Refrigerators, Frozen Food Cabinets and High Side Assemblies. Therefore, compressor descriptions apply to each piece of equipment.

The listing which follows includes all such common parts, with individual exceptions which you will find noted.

COMPRESSOR

No. of cylinders 2
 Bore and stroke (in.) 1 1/2 x 1 1/4
 Displacement (cu in. per min at 600 rpm) 2650
 Oil charge (oz) 18
 Oil, Navy symbol No. 2135

CAPACITY OF COMPRESSOR AT 600 RPM

Btu per hour, minimum 1400
 Capacity rating conditions:
 Compressor suction temp (deg F) 65
 Saturated refrig. evap. temp (deg F) -10
 Saturated discharge vapor temp (deg F) 100

COMPRESSOR MOTOR

Rating, horse power 1/2
 Speed (full load) rpm 1725
 Volts 115
 Frequency D-C
 Current, amperes (full load) 4.2
 Service Continuous

COMPRESSOR MOTOR CONTROLLER

Rating:
 Size 0, 0.75 hp maximum 115 volt D-C
 Operation Manual
 Type Across line
 Protection . . . Low voltage release effect and overload
 Service . . . Navy A, shock classification, HI

CONDENSER

Reach-in Refrigerators and all High Side Assemblies--copper tube, copper fin, 51 sq ft air side surface, with fan shroud. Condenser Fan--10-inch, 4-blade aphonnic type.

Drinking Water Cooler only--copper tube, copper fin, 63 sq ft air side surface. Condenser Fan--10-inch, 4-blade aphonnic type.

LIQUID RECEIVER

Vertical brass shell with dip tube liquid outlet at bottom and purge tube at top.

LIQUID RECEIVER CAPACITIES

Drinking Water Coolers (cu ft)	0.035
Reach-In Refrigerators, and	
Frozen Food Cabinet High	
Side Assemblies (cu ft)	0.113
High Side Assemblies (cu ft)	0.21

THERMOSTATIC EXPANSION VALVE

Service	"Freon-12"
Maximum Operating Pressure	45 psi
Superheat	70° F
Adjustment	nonadjustable

DRINKING WATER COOLER SPECIFICATIONS

The following description applies only to Drinking Water Coolers, which are listed in two sizes, Size 10 and Size 20. Note that Size 20 consists of two Size 10 Water Coolers bolted together, provided with a single top which covers both coolers, and with the cooled drinking water lines interconnected.

For photo of Size 10, see Figure 2. For Size 20, see Figure 3. For outline drawing of Size 10, see Figure 39. For Size 20, see Figure 40.

Size 10, Overall Dimensions (in.)	
Width	20
Height	47 13/16
Depth (incl. bulkhead brackets)	25 7/8
Net Weight (lb)	445
Capacity (gal per hr at rating conditions)	10
Normal drinking water temp (deg F)	50
Refrigerant charge, "Freon-12" (lb)	2 3/4
Oil charge (oz)	18

Size 20, Overall Dimensions (in.)	
Width	39 5/8
Height	47 13/16
Depth (incl. bulkhead brackets)	25 7/8

Net Weight (lb)	860
Normal drinking water temp (deg F) . . .	50
Capacity (gal per hr at rating conditions) .	20
*Refrigerant charge, "Freon-12" (lb) . . .	2 3/4
*Oil charge, (oz)	18

*For each unit

REACH-IN REFRIGERATOR SPECIFICATIONS.

There are four different sizes of Reach-in Refrigerators. Not all sizes are alike, either in appearance or function.

Note that Sizes 8 and 16 are equipped with ice makers. Sizes 16a and 30 are for refrigeration only and are equipped with a motor and fan for the circulation of cooled air around the interior of the box. Size 8 has one door. Size 16 and 16a have a wide and a narrow door. Size 30 has two doors of same size.

For photo of Size 8, see Figure 4. For Size 16, see Figure 6. For Size 16a, see Figure 8. For Size 30, see Figure 10.

For outline drawing of Size 8, see Figure 41. For Sizes 16 and 16a, see Figure 42. For Size 30, see Figure 43.

Size 8, Overall Dimensions (in.)

Width	34
Height (excluding bulkhead bracket) . . .	63 1/2
Depth (excluding bulkhead bracket) . . .	27 1/8
Net weight (lb)	570
Volume, net (cu ft)	8.09
Normal operating temp (deg F)	40
Ice freezing capacity (lb)	8
Refrigerant charge, "Freon-12" (lb) . . .	4 1/2
Oil charge (oz)	18

Size 16, Overall Dimensions (in.)

Width	48 3/4
Height (excluding bulkhead brackets) . . .	70
Depth (excluding bulkhead brackets) . . .	28 7/8
Net weight (lb)	781
Volume, net (cu ft)	18.16
Normal operating temp (deg F)	40
Ice freezing capacity (lb)	16
Refrigerant charge, "Freon-12" (lb) . . .	5 1/2
Oil charge (oz)	18

Size 16a, Overall Dimensions (in.)

Width	48 3/4
Height (excluding bulkhead bracket) . . .	70

Depth (excluding bulkhead bracket) . . .	28 7/8
Net weight (lb)	794
Volume, net (cu ft)	15.67
Normal operating temp (deg F)	40
Refrigerant charge, "Freon-12", (lb) . . .	5
Oil charge (oz)	18

Size 30, Overall Dimensions (in.)

Width	68 3/4
Height (excluding bulkhead bracket) . . .	78
Depth (excluding bulkhead bracket) . . .	28 1/8
Net weight (lb)	1084
Volume, net (cu ft)	30.79
Normal operating temp (deg F)	40
Refrigerant charge, "Freon-12" (lb) . . .	6 1/2
Oil charge (oz)	18

FROZEN FOOD CABINET SPECIFICATIONS

Frozen Food Cabinet, Size 6 has a single low-temperature compartment. Size 10 has two compartments. Note that the condensing units are not in the cabinets. They are assembled in separate frames, and serve the cabinets from remote positions.

For photo of Size 6 Cabinet, see Figure 12. For Size 10 Cabinet, see Figure 14.

For outline drawing of Size 6 Cabinet, see Figure 44. For Size 10 Cabinet, see Figure 45.

Size 6 cabinet is served by a single condensing unit assembly (see Figure 13). Size 10 cabinet is served by a double condensing unit assembly (see Figures 15 and 16).

Size 6, Overall Dimensions (in.)

Width (cabinet only)	44
Height (cabinet only)	36
Depth	26 1/2
Net weight (lb)	555
Volume, net (cu ft)	5.6
Normal operating temp (deg F)	-5

Size 10, Overall Dimensions, (in.)

Width (cabinet only)	66
Height (cabinet only)	36
Depth	25 1/2
Net weight (lb)	790
Volume, net (cu ft) small compartment . .	3.7
Volume, net (cu ft) large compartment . .	5.6
Volume, net (cu ft) total	9.3
Normal operating temp (deg F)	-5

FROZEN FOOD CABINET HIGH SIDE ASSEMBLY SPECIFICATIONS

Size 6, Overall Dimensions (in.)	
Width	29
Height	36
Depth	24 1/8
Net weight (lb)	291
Refrigerant charge, "Freon-12" (lb)	7
Oil charge (oz)	18

Size 10, Overall Dimensions (in.)

Width	29
Height	60
Depth	24 1/8
Net weight (lb)	532
*Refrigerant charge, "Freon-12" (lb)	7
*Oil charge (oz)	18

*For each unit

HIGH SIDE ASSEMBLY SPECIFICATIONS

Each High Side Assembly includes a frame and valve and control panel exactly as furnished for the Frozen Food Cabinet, Size 6, except that the liquid receiver has a larger cubical capacity.

Specifications for the High Side Assembly will be found at the beginning of this Section which describes parts common to all equipment. For photo of High Side Assembly, see Figure 17.

Overall Dimensions (in.)

Width	29
Height	36
Depth	24 1/8
Net weight (lb)	307
Refrigerant charge, as shipped, "Freon-12" (lb)	1
Refrigerant charge, (max), "Freon-12" (lb)	15
Oil charge (oz)	18

SECTION 2 - INSTALLATION

LOCATING EQUIPMENT

The following points should be considered when locating the equipment:

1. Locate as far as possible from any source of artificial heat.
2. Location should be clean, dry, and well ventilated.
3. Remove bulkhead brackets, also doors of Reach-in Refrigerators if necessary to permit passage through bulkhead openings.
4. Install level both lengthwise and cross-wise. Use shims if necessary. Bolt securely through all mounting holes.
5. In all cases, the fronts of equipment should be easily accessible. In the Frozen Food Cabinets, controls are located in the left end, which should be accessible.
6. **DRINKING WATER COOLER:** If the unit will not pass through a bulkhead, the bulkhead mounting brackets, and the connecting piping and insulation of the Size 20, may be removed for free passage.
7. **HIGH SIDE ASSEMBLIES** are designed for either deck or bulkhead mounting through mounting holes which are provided on both the bottom and the back of the unit.
8. **REACH-IN REFRIGERATORS** are provided with bulkhead mounting brackets. When the installation is made, be sure to use the fibre spacer between the bracket and the cabinet.
- Door latches are shipped with wooden pegs in the holes provided for padlocks. Remove pegs to open doors. Condensing units are fastened to the frame with two shipping bolts that should be removed.
9. **SIZE 8, REACH-IN REFRIGERATOR** has a reversible door for either right or left hand swing. The door is assembled at the factory for right hand swing (latch on left side of front). Duplicate holes are provided for mounting the hardware on the opposite side. Check tightness of the door gasket,

and adjust the door latch keeper. Refer to page 4-7, Section 4 for proper adjustment if the door is changed.

10. **SIZE 30, REACH-IN REFRIGERATOR** may be disassembled between the cabinet and the machinery compartment to permit passage of the cabinet through bulkhead openings. Refer to drawing, Figure 43.

Disconnect the suction and liquid line flange unions below the cabinet and remove the cabinet wiring from the motor controller.

When the cabinet is reassembled at its final position, reconnect the flange unions leaving the bolts slightly loose until the lines have been purged, then tighten the bolts on the unions.

11. **WATER COOLERS AND REACH-IN REFRIGERATORS** should be spaced four inches away from a bulkhead, and bolted to the bulkhead with the mounting brackets provided.

REFRIGERANT PIPING--HIGH SIDE ASSEMBLY AND FROZEN FOOD CABINETS

After cabinets have been well secured to the deck, the refrigerant piping between the cabinet and the high side assembly should be run as shown in Figures 23 and 24 and may be run along the bulkhead. The following items should be noted when installing the piping:

1. To eliminate joints in tubing, it should be bent and a liberal radius allowed on all bends. Never use sand, resin, etc. to fill tubing for bending. A coil spring may be used.
2. Tubing should be securely anchored.
3. Do not run tubing parallel to hot pipes.
4. The suction line tubing should be insulated.
5. Mated surfaces to be soldered should be cleaned to a bright finish.
6. Use flux sparingly so that no residue will get inside of system.
7. When soldering hand valve connections observe the following:-

(a) Valve should be wide open then turned back $1/4$ turn, (b) clean and apply flux, (c) preheat tubing 2 inches beyond valve connection with sweeping motion, (d) gradually fan flame toward and around valve connection until desired temperature is reached, (e) after flux has melted, touch joint with brazing wire which should melt and seal joint, (f) quickly apply wet cloth over valve body and brazed joint.

8. Purge interconnecting tubing before making the last connection at the cabinet. Open the liquid line valve on the high side assembly and admit a small amount of refrigerant into the lines.

9. All soldered joints should be made with silver solder--Buships specification 47 S 13 (INT).

The importance of keeping the refrigerant system clean and dry cannot be over-emphasized. A great number of service troubles are caused by lack of precautions against the entrance of dirt, air, and moisture into any part of the system. Use extreme care to keep tubing dry and clean after uncrating.

WATER PIPING FOR WATER COOLERS

Connect water inlet to the fresh water supply. Connect waste connection to the drain. For locations and sizes of fresh water and waste connections, refer to Figures 39 and 40.

The waste pipe should not be smaller than $1-1/4$ " pipe size.

There is no internal trap in the cooler waste line. Installing activity to furnish and install suitable means such that 15° list or waste line stoppage external to the cooler will not cause drain back-up into the cooler.

NOTE: Drinking water cooler Size 20, is provided with two water inlets for connection to the fresh water supply line, and two waste connections to the drain. Refer to Figure 40 for locations.

WATER COOLER PITCHER FILLER

To install the pitcher filler, remove the

knurled cap in the water cooler cabinet top. Then remove the pipe plug by means of a socket wrench through the $1-1/4$ " cap opening. Assemble the rubber insulator, collar, pipe nipple and washers. Refer to detailed instructions packed with each pitcher filler.

WIRING

SCHEMATIC WIRING DIAGRAMS for all equipment are shown in Figs. 26 to 33 under List of Illustrations. See diagrams before making installations.

DRINKING WATER COOLERS AND REACH-IN REFRIGERATORS are completely wired at the factory and require only a line cable into the compressor or motor controller.

Size of cable DCOP-3

FROZEN FOOD CABINET ASSEMBLIES AND REFRIGERATOR HIGH SIDE ASSEMBLIES require a line cable into the compressor motor controller and an external cable from the controller to the temperature control on the Frozen Food Cabinet or other refrigerated fixture. Refer to Schematic Wiring Diagrams, Figures 31, 32 and 33.

Size of line cable DCOP-3

Size of temperature control cable . . . DCOP-3

Size of terminal tubes. Size B

After the wiring is completed do not throw on switches until equipment is ready to run as directed in Section 3--Operation.

MOTORS AND CONTROLLERS

Compressor motor outlines, specifications, and winding data are shown in Figure 34.

Motor controller outlines are shown in Figure 35.

Fan motor specifications and winding data for Reach-in Refrigerators, Sizes 16a and 30, are shown in Figure 50.

The controller wiring diagram and a description of controller operation is attached inside the enclosure door of each controller.

Motor greasing instructions are given on page 4-1, Section 4--Maintenance.

SECTION 3 - OPERATION

INITIAL STARTING

Check the following points before starting compressor:

1. Positions of hand valves should be adjusted so they are the same as given in the table below.

Make doubly sure that the compressor discharge valve is open. (Refer to valve Number 11 on Schematic Piping Diagrams, Figs. 18 to 25).

On drinking water coolers, open the fresh water supply line valve(s), and allow the cooler to fill with water. Open the bubbler valve(s) on cabinet top until all air is released and steady stream(s) is obtained.

2. Check for refrigerant leaks as directed on page 4-2, Section 4. Although the liquid receiver is shipped with a full refrigerant charge, leaks may occur when receiver valves are opened to admit refrigerant to other parts of system.
3. Check compressor oil level as directed on page 4-1, Section 4.
4. Start the compressor by closing line switch and turning motor controller switch to "on" position. Make sure that compressor fly-wheel rotates in a counter-clockwise direction when facing the end of the compressor containing the oil level sight glass.

POSITIONS OF REFRIGERANT VALVES FOR NORMAL OPERATION

Numbers indicate valve numbers shown in Figures 18 to 25.

All valves turn clockwise to close, counter-clockwise to open.

VALVES OPEN--SEE FIGURES 18 TO 25

Compressor Suction Valve	10
Compressor Discharge Valve	11
Liquid Line Valve on Condensing Unit	12
High Pressure Switch Valve	13
Low Pressure Switch Valve	14

ON REACH-IN REFRIGERATOR, SIZE 30, ONLY--SEE FIGURE 22

Liquid Line Shut Off Valve, Flange Union Inlet....15

Liquid Line Shut Off Valve, Flange Union Outlet...16

Suction Line Shut Off Valve, Flange Union Inlet...17

Suction Line Shut Off Valve, Flange Union Outlet..18

ON HIGH SIDE ASSEMBLY ONLY--SEE FIGURES 23 TO 25

Liquid Line Shut Off Valve(s) 19

Suction Line Shut Off Valve(s) 20

ON FROZEN FOOD CABINET ONLY--SEE FIGURES 23 AND 24

Liquid Line Shut Off Valve (s) 21

Liquid Line Shut Off Valve(s), Cooling Coil Inlet 22

Suction Line Shut Off Valve(s) 23

VALVES CLOSED--SEE FIGURES 18 TO 25

Charging Valve 24

Purge Valve 25

5. If the compressor pounds when first started, due to liquid or oil slugging, run for a few revolutions, then shut off. Repeat several times to give "Freon-12" a chance to boil out of the oil in order to minimize slugging.
6. Observe whether temperature of cooling unit, cabinet, or drinking water, is being lowered.
7. To stop compressor, push "STOP" button at compressor motor controller.

CHECKS AND ADJUSTMENTS DURING INITIAL OPERATION

1. Maintain a low head pressure during initial run-in period by throttling suction valve if necessary.

2. Feel all bearings frequently to make sure they are not running hot.
3. Watch belts to see that slippage or whip does not occur.
4. Watch motor pulley for excessive end bump.
5. Check oil level in compressor sight glass at frequent intervals. Normal level should be maintained 1/2 to 7/8 full on the glass.
6. Although unit is shipped with a full operating charge of "Freon-12," this charge should be checked during initial operation. Observe whether sight flow indicator is full of liquid refrigerant. The continued appearance of refrigerant vapor bubbles indicates a low refrigerant charge.

Note: The following control checks or adjustments should be made with equipment operating under normal load. Keep in mind that normal pressures and temperatures which determine whether controls are properly adjusted will not be reached immediately. Although controls are set properly at the factory for most applications, see Control Adjustments on page 4-5, Section 4, if adjustments are required. Install suction and discharge pressure gages on the compressor service valves before checking controls.

7. Check low pressure control setting.
8. Check high pressure control setting.
9. Check temperature control setting.

AUTOMATIC OPERATION

In normal operation, proper temperatures are maintained by the temperature control which starts and stops the compressor. The temperature control is adjustable by either an external knob or screw driver adjustment to meet a variety of operating conditions. For temperature control switch settings, see page 4-7, Section 4. Check temperatures carefully before and after making any control adjustment.

The pressure control switch normally remains closed, except to function as a protective device. The high pressure cut-out switch opens with excessive head pressure. To close,

it must be reset manually. For pressure control switch settings, see page 4-6, Section 4.

The low pressure cut-out switch is set below the minimum operating suction pressure, but may open under certain unusual conditions. Refer to Symptom Check Charts.

ICEMAKER TYPE, REACH-IN REFRIGERATORS

Sizes 8 and 16 are manually defrosted. It is best to defrost the unit frequently. The frost should not be more than 3/8 in. thick.

Before defrosting, empty the drip pan and remove the ice freezing trays.

To defrost, turn the temperature control clockwise to the defrost position until the ice melts away from the cooling unit.

The defrosting operation may be speeded up by filling the ice trays with hot water.

Clean the cooling unit with warm water and a mild soap powder before restoring to normal operation.

FORCED AIR TYPE, REACH-IN REFRIGERATORS

Sizes 16a and 30 operate by a combination of temperature and suction pressure control to automatically defrost the cooling coil. As soon as the frost blocks the coil, the compressor will cycle off on the suction pressure switch, and will defrost before restarting.

The drip pan should be emptied daily.

WATER COOLER STREAM REGULATOR

The stream regulator is located behind the front panel. (Refer to Fig. 2). Loosen the hex locknut before making adjustments. Turn the screw in (clockwise) to increase stream height and turn the screw out (counter clockwise) to reduce stream height. Fig. 52 illustrates the stream regulator.

TYPICAL PRESSURES AND TEMPERATURES

It is suggested that regular readings of pressures and temperatures be taken over a period of time when the system is operating

properly, so that any trouble can be quickly detected should the readings deviate considerably from an established average. For normal operating temperatures, see beginning page 1-1, Section 1.

EQUIPMENT AND SYSTEM CHECKS

POWER SUPPLY: Close temperature control and pressure switch by hand (use insulated screw driver or dry piece of wood) to find out whether compressor will run. If it does not run use a test lamp to make sure power is being supplied to the motor. Fuses may be blown, switches open, or starting contactors may not be closing properly. Check voltage not only with the motor running under load but also notice how much voltage drops when the motor is starting. When the voltage is too low the compressor will not start.

MOTOR: If the power supply is satisfactory and the motor compressor unit still does not start, look for a defective motor, or a stuck compressor, or a stuck motor, by attempting to turn the flywheel by hand with the power turned off.

MOTOR OVERLOAD DEVICE: Too much friction in the compressor caused by a seized bearing or excessive head pressure would cause the motor to be overloaded. But in any case the thermal overload device should operate to protect the motor. In case the overload device should cut out, it must be manually reset, after the difficulty has been remedied.

COMPRESSOR VALVES: Before opening compressor for valve inspection it should be determined whether faulty valves are responsible for improper operation. Indications of faulty compressor valves are as follows:

1. Gradual or sudden decrease in compressor capacity.
2. Long running periods and short shut-down periods.
3. Low head pressures and high suction pressures.
4. With good valves it should be possible to pump a vacuum of 20 inches or more. This can be done by closing the suction service

valve, blocking the low pressure control closed and observing the suction pressure gage. For replacing valves refer to page 6-2, Section 6.

COMPRESSOR OIL: If damaged bearings or stuck compressor is observed, the compressor oil level should be checked as directed on page 4-1, Section 4. After the compressor is first put in operation, the oil should be carefully examined at frequent intervals. Discoloration of oil, or presence of any sand or grit indicates impurities in the system which may score or lap the crankshaft, bearings, cylinders, and pistons. Crankcase should be emptied, cleaned carefully, and refilled with fresh oil as often as necessary until oil stays clear.

DIRTY CONDENSER: Aside from air in the system, excessively high head pressure frequently means the condenser air flow is restricted or the condenser air temperature is too high. Clean condenser fins periodically, as lint and dust may form on condenser fins causing high head pressures.

THERMOSTATIC EXPANSION VALVE: Expansion valve troubles are usually caused by one of the following:

1. Anything that makes the bulb warmer than it should be. This condition frequently results in liquid "flood back."
2. Anything that makes the bulb too cold. This condition will "starve" the coil of refrigerant during operation.
3. Moisture or dirt can freeze the valve open or closed to cause anything from "flood back" to no refrigeration.
4. The valve can be defective. This will usually be due to the loss of refrigerant charge from the bulb, in which case the valve will not open; or there is too much friction in the valve causing erratic operation. Defective valves should be replaced. For drawing of Thermostatic Expansion Valve, see Figure 47.

CONTROL ADJUSTMENTS: For adjustments on the temperature control, combination high and low pressure cut-out switch, see page 4-6, Section 4.

LOW "FREON-12" CHARGE: Insufficient "Freon-12" may be suspected if:

1. The liquid line temperature is too high.
2. The suction pressure is below normal.
3. The head pressure is below normal.
4. Cooling coils are warm.
5. Temperature too high in space being cooled.
6. The liquid line sight glass does not show a solid stream of liquid when unit is operating.

If the system has the above symptoms,

test for leaks as directed on page 4-2, Section 4.

MOISTURE IN SYSTEM: Moisture in system is evidenced by freezing of water in expansion valve, corrosion of parts, sludging of oil, copper plating, etc. The presence of air in a system is the most common source of moisture. Methods for removing air by purging and for the removal of moisture by means of the drier, are given in Section 4.

AIR IN SYSTEM: If air is in the system, it usually accumulates at the top of the liquid receiver, causing the head pressure to be abnormally high. For instructions on purging, see page 4-4, Section 4.

SYMPTOM CHECK CHART
(FOR REFRIGERATION SYSTEM)

Symptom	Possible Cause	Correction
High head pressure	Air or noncondensable gas in system.	Purge through discharge service valve gage connection. Also purge air from liquid receiver.
	Air entering condenser too warm or restricted.	Provide better ventilation or remove restrictions.
	Condenser fins clogged with lint and dust.	Clean condenser fins.
	Too much refrigerant in system (condenser filled with liquid refrigerant).	Draw off excess refrigerant into service drum.
Low head pressure	Air entering condenser too cool.	Regulate air temperature or reduce quantity.
	Liquid refrigerant flooding back from evaporators.	Check expansion valve adjustments, examine fastenings of thermal bulbs.
	Leaky discharge valve.	Examine. If leaking, replace.
High suction pressure	Overfeeding or stuck-open expansion valve.	Check expansion valve, check bulb attachment.
	Leaky suction valves.	Examine valve discs, o-rings; replace if defective.
	Low-pressure control switch set too high.	Readjust switch.
	Discharge valves leak slightly.	Examine valves. If leaking, replace if necessary.
Low suction pressure	Restricted liquid line, liquid strainer and expansion valve or suction strainer.	Pump down, remove, examine, and clean strainers.
	Insufficient refrigerant in system.	Check for refrigerant shortage.
	Too much oil circulating in system.	Check for too much oil in circulation. Remove oil.
	Improper adjustment or stuck-shut expansion valve.	Adjust or repair expansion valve.
	Partially closed hand valves.	Open valves.

SYMPTOM CHECK CHART - Continued
 (FOR REFRIGERATION SYSTEM)

Symptom	Possible Cause	Correction
Compressor locked out on high-pressure switch.	Too warm or insufficient condenser air.	Provide better ventilation. Check for clogged condenser.
	High-pressure cut-out incorrectly set.	Check setting of high-pressure cut-out; switch should cut-out at 200 pounds head pressure.
	System overcharged with refrigerant. (Also see "High head pressure").	High pressure cut-out may be tripping due to insufficient condenser capacity because of liquid refrigerant in condenser tubes. Remove excess refrigerant if necessary.
Compressor short cycles on low-pressure control switch.	Insufficient load on cooling units.	Check cooling unit loads.
	Liquid, suction, or expansion valve strainers plugged.	Pump down and clean strainers.
	Thermal bulb of expansion valve has lost charge.	Detach thermal bulb from suction line and hold in the palm of one hand, with the other hand gripping the suction line; if flooding through is observed, bulb has not lost its charge. If no flooding through is noticed, test and replace expansion valve if necessary.
	Hand valves partly closed. (See "Low suction pressure" above).	Open valves.
Compressor runs continuously.	Shortage of refrigerant.	Test for shortage of refrigerant; if insufficient, add proper amount. Test system for leaks.
	Discharge or suction valves leak badly.	Check for leaking valves; if leaking, repair or replace.
	Head gasket blown between cylinders.	Replace gasket.
	Improper functioning of low-pressure control switch.	Adjust or replace switch.

SYMPTOM CHECK CHART - Continued

(FOR REFRIGERATION SYSTEM)

Symptom	Possible Cause	Correction
Compressor will not start.	Overload tripped, fuses blown.	Reset overload on starter, replace fuses, and examine for cause of condition.
	(a) High-pressure switch open or (b) Low pressure switch open	(a) Check switch setting. Check head pressure. (b) Check switch setting. Check suction pressure.
	Broken or loose belts or pulleys.	Check belts and pulleys.
	No charge of Freon in system.	With no Freon in system there is insufficient pressure to throw in low-pressure control. Recharge system with refrigerant; stop leaks.
	No air flow through condenser.	Provide air flow.
	Motor burned out.	Replace motor.
	Compressor bearings frozen.	Replace or repair bearings.
	No power.	Obtain power.
Cylinders and crank-case sweating or frosting.	Too much oil in circulation. Too much refrigerant in circulation.	Check refrigerant and oil charges and correct.
	Liquid refrigerant returning to compressor.	Check expansion valve for proper adjustment.
Compressor noisy.	Vibration because of faulty mounting.	Bolt down rigidly.
	Too much oil in circulation causing hydraulic knock.	Check oil level.
	Slugging due to flooding back of refrigerant. (Throttle suction valve before checking for cause).	Expansion valve open too wide or stuck open; close. Thermal bulb incorrectly placed or loose; check.
	Wear of parts such as piston pins, bearings, etc.	Determine location of cause. Repair or replace compressor.

SYMPTOM CHECK CHART Continued
(FOR REFRIGERATION SYSTEM)

Symptom	Possible Cause	Correction
Oil leaves crankcase.	Refrigerant flooding back to compressor.	Check expansion valve.
	Worn cylinder or piston walls.	Repair or replace compressor.
Oil does not return to crankcase.	Expansion valve not supplying cooling coil with sufficient refrigerant.	Check expansion valve.
Condenser fan noisy.	Loose condenser fan or fan shroud.	Check condenser fan and shroud.
Compressor drive noisy.	Loose belts or pulley or poor drive alignment.	Check belts, pulley and drive alignment.
Expansion valve hissing.	Low refrigerant charge.	Find leak and recharge.

SECTION 4 - MAINTENANCE

GENERAL

Good installation, effective service, and proper maintenance go hand-in-hand in establishing long life and satisfactory operation of a refrigerating system.

The following items should be checked when making regular inspections. A schedule should be set up for performing the various lubricating and cleaning operations which, if carried out, will do more than anything else to avoid equipment breakdowns.

COMPRESSOR LUBRICATION

The oil level in the compressor crankcase should be checked regularly. The actual oil level is often difficult to determine because of the constantly changing amount of refrigerant which is mixed with the oil. Thus the best time for checking the oil level is after a period of operation when there will be the least refrigerant mixed with the oil.

To check oil level, observe the oil level in the bull's eye sight glass. Normal oil level is from 1/2 to 7/8 of the way up on the sight glass.

Compressor lubrication is supplied by a small rotary oil pump consisting of an eccentric in the crankshaft and a spring loaded vane to separate the discharge side from the suction side.

During operation, oil overflow from the spring relief in the rear end of the shaft is visible as a trickle flow downward across the oil sight glass. If no discharge is evident above the oil level, the compressor end flange should be removed for checking the vane clearance and oil filter, or for inspection of fitted parts. (See page 6-2, Section 6).

If excessive wear is indicated, replace defective part.

Vane should be smooth on contacting surface and have no burrs.

Put a few drops of oil on the vane before reassembling with spring to flange.

Oil should be added by pumping down the compressor and isolating it from the rest of the system. Front seat (close) the suction and discharge service valves.

Oil for the compressor should be dehydrated and supplied in sealed cans to prevent absorption of moisture from the atmosphere. If a can is only partially used when charging a compressor, the remainder should be used for another purpose not requiring dehydrated oil and should not be put into the compressor.

COMPRESSOR MOTOR LUBRICATION

The compressor motor should be checked regularly to see that grease cups are full of grease. At the same time give the cups a turn to maintain the bearings not more than one-third full.

An approved grade of medium ball bearing grease (Navy Grease Specification 14L3 Grade III) should be used.)

The ball bearing housings are packed with the proper amount of grease before leaving the factory. The length of time before adding grease is determined by the severity of operating conditions.

When care is exercised to exclude dirt from the bearing housing and from the grease, complete removal of old grease from the bearing and bearing housing should be required only at infrequent intervals such as when the motor is disassembled for general inspection and reconditioning.

COMPRESSOR V-BELT DRIVE

Inspect belt tension, alignment and wear. To replace belts proceed as follows:

1. When aligning the drive, find the magnetic center of the motor rotor. This is done by running the motor idle and measuring the distance from the inside face of the motor pulley to some fixed point on the motor frame. This distance must be maintained during alignment procedure.

2. The motor adjusting screws (including jack screw through compressor foot on water coolers) should be loosened and the motor moved toward the flywheel before the belt is replaced. Belts should not be forced over the pulley or flywheel as this will damage them.
3. The pulley and flywheel should be lined up with a straight edge. This may be done with a taut cord which should just touch the inside edges of these parts when the cord is held against the outside edges. Rotate first the pulley and then the flywheel to see if the alignment is still true.
4. Belts will be in proper tension if the belt can be depressed about 1/2 inch when approximately 10 lb pressure is applied midway between the pulley and the flywheel.
5. New belts should be adjusted for tension during the first week of operation and at regular intervals thereafter.

CONDENSER CLEANING

The finned surface of the condenser tubes should be inspected every month to determine whether cleaning is required. Indication of a dirty condenser is abnormally high head pressure, providing air is not present in the system. Another indication is when liquid temperature leaving condenser is extremely high.

To clean condenser, use a stiff brush or blow out in opposite direction to normal air flow with a compressed air line.

CLEANING STRAINERS

Liquid strainers and the suction line strainer in the compressor suction manifold should be cleaned if necessary.

To clean any strainer or to repair any expansion valve, first close the nearest service valve immediately ahead of the part to be worked on. Operate the compressor until a one pound positive suction pressure is reached.

In the case of the suction strainer, shut compressor off, and immediately close discharge service valve.

In the case of the expansion valve, shut off the nearest service valve beyond the expansion valve before stopping the compressor.

NOTE: The motor may cut out before the one pound positive pressure is reached because of the low pressure control. If this happens, hold the suction pressure switch contacts closed with a piece of insulating material until one pound positive pressure is reached.

After cleaning or repairing and before making up a tight joint, open the service valves slightly to permit the pressure in the system to blow out air that may have entered the blocked off section of the line. After purging, make up joint tightly and test for leakage before restoring the equipment to normal operation. See Schematic Piping Diagrams, Figs. 18 to 25 for location of valves.

Caution: To avoid injury from high pressure liquid, do not open strainer circuit suddenly without first relieving pressure.

REFRIGERANT DEHYDRATOR

The dehydrator in these systems is permanently installed in the liquid refrigerant circuit. If system is opened for repairs, care must be taken that the drier does not become wet from atmospheric moisture.

If the dehydrator cartridge becomes saturated with moisture, it should be replaced with the spare dehydrator cartridge.

To replace dehydrator cartridge, close the liquid valve near the dehydrator inlet and pump down system as described on page 4-5. Then close nearest valve to the dehydrator outlet.

Disassemble the flange of the dehydrator, taking care to allow liquid refrigerant to escape from the broken seal before the bolts are thoroughly loosened.

Remove dehydrator cartridge and reassemble by reversing above steps.

TESTING FOR LEAKS

USE OF THE HALIDE TORCH: Small "Freon-12" leaks are detected by a specially designed

torch known as the Halide Torch. Atmosphere suspected of containing "Freon" gas is drawn through an exploring hose into the burner by an injector action. The air sample passes over a copper reactor plate in the burner chamber which is heated to incandescence by the flame. If there is even a minute trace of "Freon" present, the torch flame will turn from its normal blue or neutral color to a green color as it comes in contact with the reactor plate. The shade of green will depend upon the amount of "Freon" present, being pale for small concentrations and darker for greater concentrations. Excessive quantities of "Freon" will color the flame a vivid purple and may even extinguish it by eliminating the supply of oxygen in the air.

When using the Halide Torch for detecting leaks, keep in mind that even the smallest leak cannot be neglected because it will cause loss of refrigerant and eventually insufficient cooling. The extra time spent testing all joints made in the field and at the factory is well justified.

USE OF SOAP SUDS: A Halide Torch will detect small "Freon-12" leaks. However, this torch

is so sensitive that it is impossible to locate the source of a bad leak as torch will indicate presence of "Freon-12" in air at considerable distance from leak.

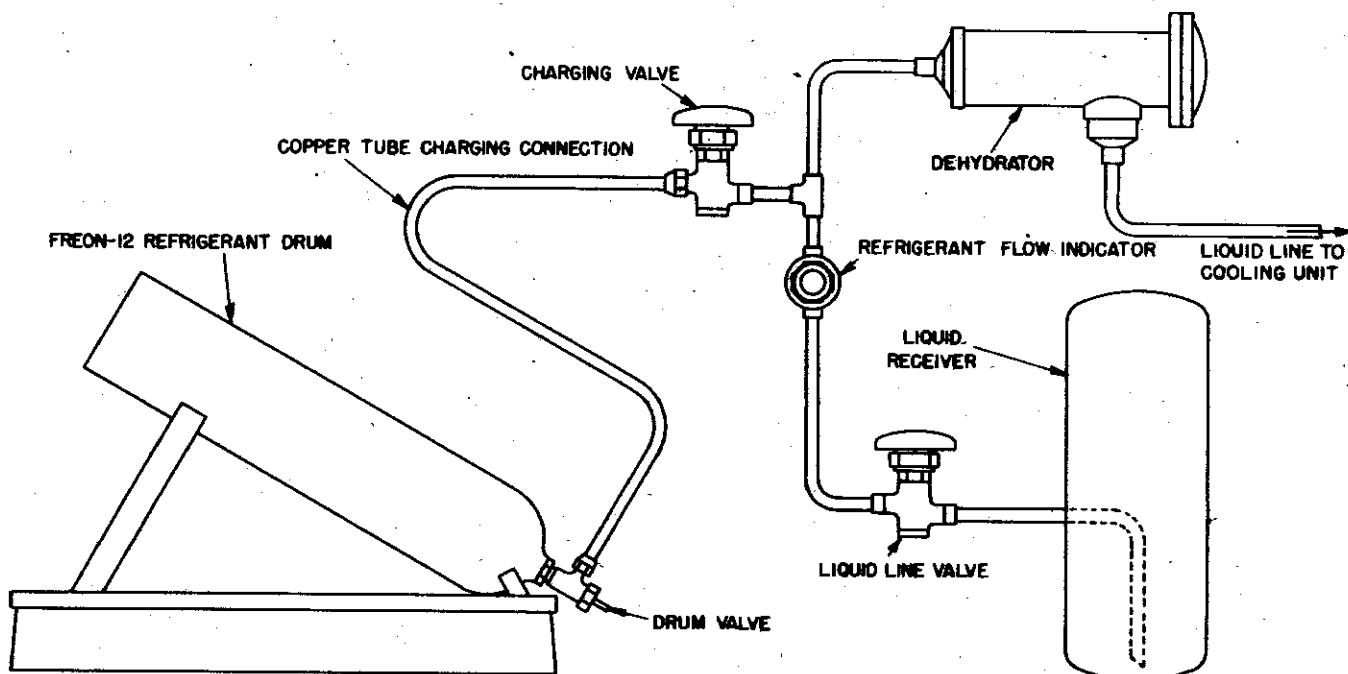
To prepare soap-suds for testing, work up a lather by rubbing a wetted brush on a cake of soap. A few drops of glycerine added to the solution will cause the lather to remain wet.

When applying the soap-suds, paint the soap lather on the joint all the way 'round and examine the joint thoroughly for bubbles. Use a pocket mirror if part of the joint is not visible. It may take a minute for bubbles to appear around a small leak. Questionable spots should be covered with lather and examined again.

CHARGING "FREON-12" INTO SYSTEM

If symptoms given on page 3-3, Section 3 indicate low charge, note Schematic Piping Diagrams under *List of Illustrations* and proceed as follows:

1. Locate leak and repair. Be sure part repaired has been purged and any trace of moisture has been removed from the system.



PIPING DIAGRAM FOR CHARGING "FREON-12"

(From 6-E Dwg. P-8154739)

2. Connect drum of "Freon-12" to charging valve in liquid line. Elevate rear end of drum to bring drum outlet below liquid level. Purge the charging line to remove air before opening the charging valve.
3. Close receiver outlet valve.
4. Start compressor allowing it to operate on suction pressure control. Regulate flow of "Freon" entering system through dehydrator by throttling charging valve.
5. Check every few minutes for sufficient charge by closing charging connection and opening liquid line valve to allow system to operate normally. Observe whether a solid stream of liquid is passing through the bull's eye sight glass. If bubbles appear in sight glass the refrigerant charge is usually insufficient. Other checks for refrigerant charge may be found in Section 3.

REMOVING "FREON-12"

It is necessary to drain the system of "Freon-12" when making repairs on the condenser, receiver, or hot gas line. Also some refrigerant should be removed if the system has been overcharged.

1. Connect empty "Freon-12" drum to charging valve and purge the charging line to remove air. The empty drum should be horizontal on the deck with the valve facing up. Make sure that a clean, dry, drum is used.
2. Open "Freon-12" charging valve and valve on drum.
3. Operate compressor making certain that expansion valve is open.
4. If the "Freon-12" stops flowing into the drum, the drum should be immersed in a bath of cold water. The cooler the drum the more "Freon-12" can be removed from the system.

NOTE: Never fill a service drum beyond its rated capacity; it may rupture from hydraulic pressure with rise in temperature. After disconnecting the drum from the system, weigh it

to be sure it is not overcharged. The net and gross weight is stamped on the drum and includes the cast iron protecting cap.

PURGING AIR FROM SYSTEM

A refrigerant system must be kept free from air or any other foreign gases. These gases collect in the condenser or liquid receiver and have a blanketing effect on the condenser so as to reduce the normal rate of heat transfer. This causes head pressure to increase and introduces other undesirable characteristics.

Systems should be checked for air in system before initial operation or after a system has been opened for repairs. To check for air in a system, proceed as follows:

1. Connect a pressure gage to the compressor discharge valve.
2. Make sure that the system contains the normal charge of "Freon-12." For a satisfactory check, the liquid line sight glass should show a solid column of liquid refrigerant during normal operation.
3. Close the liquid line service valve.
4. Stop the compressor and immediately close the suction service valve.
5. Suspend a thermometer in the air near the condensing unit.
6. Wait until the temperature of the condenser has cooled to the room temperature. This can be determined by waiting until you are certain there is no further decrease in the pressure indicated by the discharge pressure gage.
7. Read the temperature of the air near the condensing unit. This will be the actual condensing temperature of the liquid "Freon-12" in the condenser.
8. Read the pressure indicated by the discharge pressure gage. Then refer to the "Freon-12" tables on page 4 to determine the theoretical condensing temperature for this pressure.

9. Then subtract the actual condensing temperature (temperature of surrounding air) from the temperature of saturated "Freon-12" derived from the tables. If the difference between these temperatures is more than 5 degrees, it is necessary to purge.

To purge air from the system proceed as follows:

1. Stop the compressor and allow it to stand for about 15 minutes. The condenser should be as cool as practicable so that the purged gas will have the largest possible percentage of air.
2. Intermittently open and close purge valve for a few seconds. Also, purge condenser backwards by cracking seal cap on compressor discharge service valve gage connection. If a "Freon-12" odor (like carbon tetrachloride) is detected, stop purging. Eyes should be protected with goggles during this operation.
3. After purging again, check for the presence of air. Repeat purging operation if necessary.

PUMPING DOWN

Pumping down generally means the pumping out of refrigerant from part or all of the low side to the high side.

1. Connect a suction pressure gage to the compressor suction valve and a discharge pressure gage to the compressor discharge valve.
2. Close liquid line valve.
3. Start compressor and allow it to operate until the suction pressure switch stops the compressor.
4. Now hold the suction pressure switch contacts closed with a piece of insulating material and operate compressor intermittently with manual start and stop switch until a suction pressure of not less than one pound is reached.

During this time keep a close watch on the compressor discharge gage. Should it suddenly start to rise, immediately stop the com-

pressor to avoid damage as this is an indication that the "Freon"-holding capacity of the condenser and receiver has been reached.

Note: The safe "Freon" storage capacity of a receiver is considered to be 85% of its maximum capacity. See Section 1 for maximum volume of receiver as well as for approximate operating refrigerant charge of the system.

Front seat the suction service valve on the compressor. This isolates the low side of the system for servicing the expansion valve or cooling unit.

EXTENDED LAYUP

When preparing the system for long layup periods, proceed as follows:

1. Pump system down to 1 or 2 pounds pressure and close suction and discharge valve.
2. Tag all closed valves to be sure they will be opened when the system is again started. Lock the disconnect switch in open position with a warning tag stating that switch must not be closed until the discharge valve has been opened.

To resume service after a long shut-down proceed as instructed on page 3-1, Section 3, for initial operation of system. Be sure to observe the oil level in the crankcase.

PRESSURE CONTROL ADJUSTMENTS

Drawings of the following automatic controls should be used in conjunction with these instructions. See Figure 37.

Low Pressure Cut-out Switch Adjustment: The low pressure switch is designed to automatically close the compressor motor circuit on high suction pressure and open it on low suction pressure.

Setting: This switch is set at the factory to suit the application as nearly as possible (see page 4-6 for factory setting). Tightening the main spring 10 (Figure 37) by turning adjusting screw 11 clockwise raises the starting and stopping points a like amount. Loosening spring by turning screw counter-clockwise lowers both starting and stopping points.

TEMPERATURE CONTROL ADJUSTMENT

Should it be necessary to readjust the temperature control switch, turn the adjustment knob 5 (Figure 38) clockwise to raise the temperature setting and counterclockwise to lower temperature.

In the case of the Reach-in Refrigerators the adjustment knobs should not be given more than a partial turn at a time, and, after waiting a half-hour, the temperature should be checked.

In the case of the Drinking Water Coolers, the adjustment knobs should be turned to suit taste.

TEMPERATURE CONTROL SWITCH SETTINGS

To obtain the normal operating temperatures on the equipment, follow the settings of the control switches as listed below.

DRINKING WATER COOLERS

Open: 34.5° F Closed: 52.5° F
Adjustment knob set at mid position (No. 3)

REACH-IN REFRIGERATORS, SIZES 8 & 16

Open: 16° F Closed: 26° F
Adjustment knob set at mid position (No. 3)

REACH-IN REFRIGERATORS, SIZES 16a & 30

Open: 40° F Closed: 43° F
Adjustment knob set at mid position (No. 3)

FROZEN FOOD CABINETS

Open: -5° F Closed: 0° F
With factory setting of control adjustment

CABINET MAINTENANCE INSTRUCTIONS, REACH-IN REFRIGERATORS

DOOR GASKET ADJUSTMENT

The refrigerator door gasket should be checked periodically. A loose or broken gasket results in excessive air leakage, high cabinet temperatures, and rapid frost accumulation.

To test the gasket, use a thin sheet of paper under the gasket, trying it at various points around the doors. If the paper pulls out easily with the door closed, the door latch should be adjusted (see following instruction) or the gasket should be replaced (see second instruction following).

DOOR LATCH ADJUSTMENT

The latch is equipped with micrometer strike adjustment. First, loosen the hex head screw on the end. Then turn the knurled screw to adjust the strike. Check the door fit and gasket tightness after each adjustment.

GASKET REPLACEMENT

Replace the door gasket if it becomes deteriorated or broken. Remove and pull out the gasket from one side at a time. Leave some of the screws in place to hold the inner door panel.

Cut the new length of gasket, using the old gasket as a pattern. Replace the gasket screws, and check the gasket fit around the door.

DOOR HARDWARE

Oil the bearing surfaces of the hinge and latch occasionally, using light machine oil.

Hinges have a ball bearing ring for thrust above the lower support.

When replacing hinges, make certain that the ball bearing ring is at the bottom side of the hinge.

Hinges for the Size 8, Reach-in Refrigerator have a double ball bearing assembly since they are reversible.

FAN MOTOR (Forced Air Type Refrigerators)

The fan motor has permanently lubricated and sealed ball bearings. No lubrication or other maintenance is required.

Forced air refrigerators should be checked occasionally for proper air circulation. Air enters the grilles at the top of the cabinet and is discharged through the openings above the drip pan.

If circulation is reduced with the fan motor running, the coil may be blocked with frost. Set the temperature control to a higher position and allow the compressor to defrost automatically by the suction pressure control.

If the fan motor stops, check the wiring

or replace the motor, if necessary.

**MAINTENANCE INSTRUCTIONS,
FROZEN FOOD CABINETS**

Valves and controls are accessible from the end of the cabinet which has the thermometer dials. This end is removable.

The Size 10 cabinet has a small panel on the front for access to the capillary tube and bulb extensions of expansion valves, temperature controls, and thermometers. Bulbs of these parts are inserted in wells in contact with the cabinet liners.

The thermometer bulb is secured in its well by a set screw. Loosen the set screw before removing the bulb.

G. E. SERVICE REPRESENTATIVES

General Electric Company, 700 Commonwealth Avenue, Boston 15, Massachusetts

Bruce Electric Company, 198 West Houston St., New York 14, N. Y.

or

General Electric Company, 570 Lexington Ave., New York, N. Y.

Judson C. Burns, Inc., 31st and Oxford Streets, Philadelphia 21, Pennsylvania

or

General Electric Company, 1405 Locust Street, Philadelphia, Pennsylvania

R. S. Montgomery, Moore Street at Altamont, Richmond, Virginia (Branch at Norfolk)

or

General Electric Company, 267 Bank Street, Norfolk, Virginia

Perry-Mann Electric Company, Inc., 165 Meeting Street, Charleston, South Carolina

or

General Electric Company, 18 Broad Street, Charleston, South Carolina

Acme Refrigeration Company, 2214 Fourth Avenue, Seattle 1, Washington

or

General Electric Company, 710 Second Avenue, Seattle, Washington

General Air Conditioning and Heating Company, 1126 Howard Street, San Francisco 3, Calif.

or

General Electric Company, 235 Montgomery St., San Francisco, California

C. G. Hokanson Company, 8373 Melrose Avenue, Los Angeles, California (Branch at San Diego)

or

General Electric Company, 881 Sixth Avenue, San Diego, California

Magnus Summers, International General Electric Company, Apartado 1338, Panama, R. P.

Clima Ideal, 29 Avenue Central, Panama City, R. P.

W. A. Ramsay, Ltd., Fort and Queen Streets, Honolulu 6, T. H.

SECTION 5 - SAFETY

GENERAL SAFETY PRECAUTIONS

1. Always open the disconnect switch before doing service work on the condensing unit or electrical controls.
2. Be sure discharge service valve in compressor discharge line is open before starting compressor.
3. Always check oil in crankcase before starting compressor.
4. Never bridge an electric overload device--find the trouble.
5. Do not let a compressor pump oil or liquid refrigerant as this may break the compressor valves. Immediately stop a pounding compressor.

REFRIGERANT SAFETY PRECAUTIONS

1. Use goggles when handling refrigerant.
2. Do not heat refrigerant drums with a flame.
3. When repairing refrigerant pipe or tubing always blow out refrigerant gas before applying torch.
4. Never fill a refrigerant cylinder to more than 85 per cent of its capacity.

5. Never heat any part of refrigerating system if refrigerant is trapped within.
6. Never put liquid refrigerant into a compressor suction line.
7. Avoid breathing gases formed when "Freon-12" has been subjected to high temperatures -- they may be irritating.

If liquid "Freon-12" comes in contact with the skin a serious "burn" may result and should be treated as if the skin were frost-bitten or frozen.

Particular care must be taken that liquid "Freon-12" does not come in contact with the eyes by wearing goggles when working on parts from which refrigerant may be liberated. If liquid "Freon-12" should come in contact with eyes, get medical attention, and use the following first aid treatment:

1. Drop sterile mineral oil into the eye as an irrigant.
2. Wash the eyes with a boric acid solution if the irritation continues.
3. Do not rub or irritate the eye.

SECTION 6--PARTS REPLACEMENT

GENERAL ON CONDENSING UNITS

The replacement of parts on condensing units requires mechanical skill, and a complete knowledge of the equipment and its component parts. Special attention must be given to cleanliness. Dirt, metal chips, and moisture must be kept out of the compressor, condenser, and liquid receiver. A complete set of tools and all parts necessary to make the replacement should be on hand before the work is started.

The complete compressor, as well as many of the compressor parts, may be replaced by confining the refrigerant in another part of the system, and isolating the compressor from the rest of the system.

Compressor parts which require the measurement of fits or clearances when replacing are called "Fitted Parts." Such parts as pistons, connecting rods, etc., fall into this classification. Shaft seal assemblies, valves, valve plates, and similar parts do not require such operations and are called "Nonfitted Parts."

The following general rules must be observed when making replacements:

1. Pump down compressor. See page 4-5, Section 4.
2. Before removal of any part on a unit be sure that the disconnecting switch is open.
3. Use care in handling refrigerant. Refer to Section 5--Safety.
4. Use care in handling parts. Finished surfaces must not be scratched or marred and must be kept clean. Many parts are shipped from the factory in special protective containers and are protected from rust by a rustproofing solution. Other parts are dipped in oil and wrapped in paper before shipping. Such parts should not be unpacked or cleaned of the rustproofing solution until ready for use. To clean the parts, wash them with naphtha or carbon tetrachloride.
5. When it is necessary to remove or replace

parts such as the cylinder head, valve plate, etc., use new gaskets in order to assure tight joints. Check thickness of gaskets removed and replace with new gaskets of equal thickness.

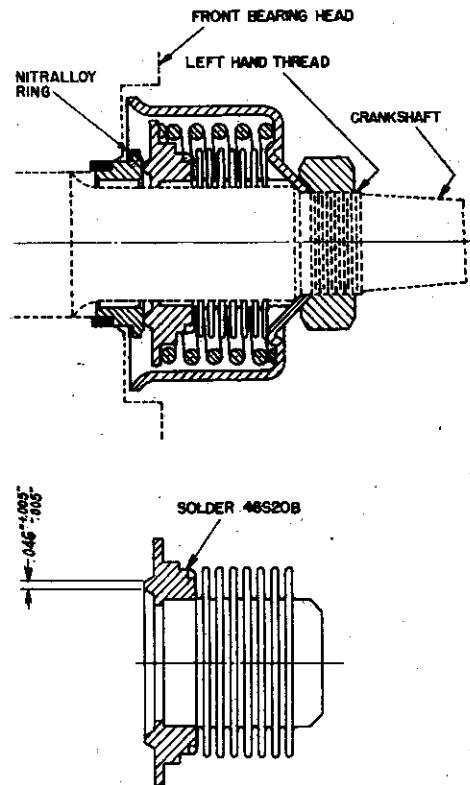
6. Use care when making any joints in refrigerant tubing or when replacing gaskets in the refrigerant system. Check carefully for refrigerant leaks at all such points. In testing for leaks in the low pressure side, permit the pressure to build up as high as possible before the test is made; otherwise, small leaks may not be detected. Shaft seals should not be subjected to pressure in excess of 150 pounds.
7. After changing or replacing parts of the refrigerant circuit, purge any air that may have been trapped. Check the operation of the unit to see that there is no air in the system.
8. Check the oil level in the crankcase, particularly if any major parts which may contain some oil have been replaced. Add, or remove, oil if necessary. For proper oil level, see page 4-1, Section 4.
9. When returning the unit to service, see that all service valves are open, particularly the compressor discharge service valve, before starting the equipment. The compressor service valves should be turned one-quarter turn away from the full open (back seat) position to assure that the stem will not stick in that position. Valve caps with copper gaskets should be used to prevent leakage at the valve stems and gage connections.
10. Test the operation of the entire system before leaving the job, making a special check of the part or parts replaced.
11. Refer to the Renewal Parts List in this section for catalog numbers of parts.

COMPRESSOR SHAFT SEAL REPLACEMENT

Pump the compressor down to one pound pressure as described on page 4-5, Section 4. Turn the motor controller switch off and close the compressor discharge valve. Bleed pres-

sure from the crankcase.

1. Remove the compressor from the base and remove flywheel, using wheel-puller if necessary. Note that the shaft has left hand thread.
2. Remove bellows seal assembly and seal cup by first removing shaft seal nut. Note that shaft seal nut has a left hand thread. Use flywheel and key to hold shaft. Then remove nitrallyoy ring with its Neoprene gasket from flange recess. Insert a screw driver behind the ring and pry it loose from the compressor at several places around the rim.



CROSS SECTION OF SHAFT SEAL ASSEMBLY
(From G-E Dwg. W-8119632)

3. Clean the shaft and seal cavity thoroughly, removing all rust and corrosion.
4. When a shaft seal is found to be defective, it is necessary to replace the entire assembly including nitrallyoy bearing ring and its Neoprene gasket.
5. To assemble shaft seal and parts, first inspect flange seal cavity to be sure that

all traces of dirt are removed. Dip Neoprene gasket in clean compressor oil and place it with beveled edge out, over the shoulder of the nitrallyoy ring. Push nitrallyoy ring with its Neoprene gasket firmly into place until gasket seats at bottom of recess. Use the installing tool for this purpose. NOTE: Neoprene gasket and ring assembly should fit snugly into flange recess. If fit is loose or excessively tight, replace Neoprene gasket until proper fit is obtained.

6. Dip the nose piece of the new bellows seal in clean compressor oil before assembly. NOTE: Do not touch sealing surface of seal with hands. The completed assembly should be left in place for at least fifteen minutes before the compressor is turned over to allow Neoprene gasket to swell. Purge air from compressor before starting as described on page 4-4, Section 4.

COMPRESSOR VALVE PLATE

The valve plate assembly can be removed after first removing the cylinder head.

1. Parts of the valve assembly can be replaced on the valve plate provided valve seats are not badly damaged. Minor nicks can be removed with a flat No. 145 fine carborundum oil stone. The valve plate assembly should be thoroughly cleaned of all foreign material prior to reassembly. Be sure the valve discs make good contact with the valve seat.
2. Use new valve plate gasket of the same thickness as that removed.

COMPRESSOR GASKETS

All gaskets assembled with the compressor at the factory have been selected to give proper clearances. When replacing gaskets, the same thickness of gaskets should be used. When installing any of these gaskets, see that all sealing surfaces, including the gaskets, are clean.

Use naptha or carbon tetrachloride to clean the surfaces. Allow the parts to dry before assembling.

REPLACEMENT OF COMPRESSOR FITTED PARTS

In replacing fitted parts, extreme care

must be exercised and all instructions must be followed closely. In replacing such parts, the compressor should be removed to a location where the proper precautions regarding workmanship and cleanliness may be observed. Compressors that have been open to the air a considerable length of time should be baked out to remove moisture.

The compressor should be put back in service immediately after reconditioning. After the reconditioned compressor has been connected, it should be tested for leaks, using dry air, nitrogen, or "Freon-12" refrigerant under pressure of at least 70 lb gage, but not over 150 lb gage. Evacuate the compressor by means of a separate vacuum pump before charging with refrigerant.

If a compressor that has been repaired in this manner is to stand for any length of time before being installed, cover plate and gaskets should be used to keep out air and moisture and a holding charge of refrigerant should be added.

PISTONS

PISTON REMOVAL: To remove the pistons from the compressor, the following procedure should be employed:

1. Remove flywheel, using wheel puller, if necessary. NOTE: Flywheel nut has left hand thread.
2. Remove bellows seal assembly and seal cup by first removing shaft seal nut. NOTE: Shaft seal nut has left hand thread.
3. When disassembling the compressor, make a note of the thickness of the gaskets removed. Replace with gaskets of equal thickness.
4. Unbolt and carefully remove flange, taking precautions that oil vane and spring do not fall out.
5. Remove the two assembly plugs in the bottom of the compressor. If plugs are stuck tight, tap the outer rim of the plug, taking care not to damage the socket.
6. Rotate shaft into position so that connecting rod screws may be removed through the assembly plug holes with an Allen wrench.

Remove screws and end caps, taking care that lock washers under screws are removed.

7. Remove head and valve plate.
8. Push connecting rods and pistons up into cylinders and carefully remove crankshaft.
9. Reach into case and remove piston and connecting rod assembly.
10. Remove piston pin by driving out in one direction only. Pin should be driven out that end which has the larger hole. Make sure that snap ring is still in the piston groove.

Pistons are assembled with clearance in cylinders of .0003 inches to .0006. If the clearance is less than .0003 inches, piston may be lapped in cylinder bore until proper clearance is obtained. NOTE: Top of pistons have a slight bevel.

PISTON ASSEMBLY: Reverse above procedure for reassembling, noting the following exceptions:

1. Inspect the bronze thrust washer to make sure that it has a smooth finish. Washer is assembled in factory with a thickness dimension of .0940 inches; plus or minus .0005 inches. Inside diameter is 1.2525 inches; plus .001 inches, minus .000 inches. Replace with new thrust washer if excess wear is noted, or finish is rough. NOTE: Thrust washer should be soaked five minutes in clean compressor oil before assembly.

2. When assembling the flange with its oil vane and spring, put a few drops of oil on the vane, turn the shaft until flywheel key-way is on top of shaft. Check the vane spring to see that the small end is tight in the vane and the large end fits properly in three machined segments in the flange.

Likewise, the flange should be turned to its indicated position ("Top" mark). Maintaining this relation between shaft and flange, carefully advance flange over shaft until firmly in position.

Be careful that vane does not bind on shaft threads.

Bolt firmly into place.

3. The bellows seal assembly, the nitralloy ring and Neoprene gasket should be replaced. See compressor shaft seal replacement, page 8-1.
4. Use new gaskets throughout when reassembling. When replacing gaskets between the cylinder block and valve plate, it is necessary to determine the thickness to be used in order to obtain proper end clearance as indicated on compressor drawing.

PISTON PINS: Dismantle in the manner outlined under PISTONS. NOTE: Piston pins can be removed in one direction only.

When replacing piston pins, pistons, or connecting rods, attention must be given to the clearances between fitted surfaces. If clearances are excessive, the compressor will be noisy and replacement of the other parts concerned should be made. Connecting rod and piston pin clearances are: minimum, .0003 inches; maximum, .0005 inches.

Piston and piston pin clearances are: minimum, minus .0001 inches; maximum, plus .0001 inches.

CONNECTING RODS: Dismantle in the manner outlined under PISTONS.

The connecting rods can be fitted to the crankshaft most conveniently with the shaft removed from the crankcase. Care must be taken to fit a connecting rod to the crankshaft bearing to which it is to be assembled in the compressor. Bearing caps should be kept with their mated rods as supplied. If two connecting rods are removed and fitted, replace them on the same journal with the rods turned in the same direction as they were originally. Note that connecting rod bolts are off center and cap can be assembled only one way. Clearances between the crankshaft and connecting rod bearing are: minimum, .0005 inches; maximum, .0009 inches. Side clearances between shaft and connecting rods are: minimum, .002 inches; maximum, .007 inches.

It is not always necessary to replace a connecting rod if the bearing becomes worn. Small clearances may be taken up by removing metal from the flats of the cap and rod. Place a piece of emery cloth on a flat surface and use this to remove a thin layer of metal. Move the cap or rod over the surface of the

emery cloth using a lapping motion. The bearing should be checked for fit to the crankshaft as metal is removed.

After all bearings have been fitted, wash all parts in carbon tetrachloride or naphtha. Assemble parts as outlined under PISTONS, leaving valve plate and head off. Charge the compressor with the proper amount of oil, and attach the flywheel and belt.

Run the compressor at no load for at least four hours. This constitutes a "running-in" operation on the connecting-rod bearings. It is essential that this be done before the compressor is put back into operation. After the bearing run-in, drain out all the oil.

Complete the assembly of the compressor, determining the proper gasket thickness to give the correct piston end clearance as described under PISTONS.

MAIN BEARINGS: Compressor is assembled in the factory with a clearance between the crankshaft and main bearings of .0014 inches, maximum; to .0007 inches, minimum. Defective parts should be replaced if excessive wear is indicated.

CRANKSHAFT: Dismantle in the manner outlined under PISTONS.

The crankshaft should not be replaced if the main bearings are worn since the replacement of the crankshaft alone will not remedy the trouble.

Replace the crankshaft only because of breakage or badly worn condition.

When replacing crankshaft, check the main bearing fit to see that the shaft is not loose in the bearings. Be sure to check oil relief spring in end of shaft. Spring should be tightly closed in normal position, threaded firmly in shaft, and have a plug in its extended end.

If spring needs replacing, assemble new spring, using a slotted rod inserted through the spring to engage the leading end. Snap plug in open end.

Shaft end clearance should be .010 inches minimum to .048 inches maximum.

Assemble parts as outlined under PISTONS.

OIL FILTER

Before replacing flange, check porous bronze oil filter located in crankcase near bottom of flange. If it appears partially clogged with dirt or lint, replace with a new one. In emergencies, it is possible to back wash the filter by forcing naptha or carbon tetrachloride from the inside through the filter. A filter spring is attached to a projection at the closed end. This spring should seat the flat surface of the filter against the flange after the bolts are tightened.

OIL SIGHT GLASS

Should glass become broken or gaskets defective, proceed as follows: (If the sight glass has broken so that pieces have dropped in crankcase, it will be necessary to remove compressor and clean crankcase thoroughly).

1. Pump down compressor, or if glass is leaking badly simply shut off compressor and close service valves.
2. Drain oil from compressor.
3. Remove nut holding glass, being careful not to destroy wrench slots. Insert knife blade under washer and gaskets to loosen.

To install sight glass:

1. Clean all parts with carbon tetrachloride.
2. Arrange parts in place and tighten nut.
3. Charge crankcase with clean oil.

DIAPHRAGM HAND VALVES

To dismantle a diaphragm valve, refer to Figure 49, and proceed as follows: First, open the valve to the full open position. Then apply a wrench to the flats on the valve cap below the handwheel and another wrench to the other two flats on the valve body. Turn the cap in a counter-clockwise direction. This will expose the complete valve cap assembly consisting of the cap, handwheel, stem, and diaphragms. The diaphragms should be assembled in the same order as when removed.

After removing the valve cap, the cage assembly will be exposed and this complete

assembly can then be removed by applying a bushing wrench in the slots of the valve stem guide, and turning in a counter-clockwise direction. Extra precautions should be taken not to scratch or mar the finely machined lip on the top of the valve body where the diaphragms are held in place. Any damage on this surface will produce a leakage condition, which can be remedied only with a special cutter.

To reassemble the valve, replace the cage assembly and tighten. Replace the diaphragm and valve cap assembly, and with the stem in full open position tighten with a wrench on the valve cap, to seat the joint between the diaphragms, body, and valve cap. Be careful not to exert too much force when tightening cap to avoid crushing finely machined lip for diaphragm seal.

A 1/4" diaphragm hand valve with flare seal cap and chain is furnished in the spare parts for a purge or charging valve. This valve also serves as a spare in the pressure control lines by removing the cap and chain.

DRINKING WATER COOLER CABINET TOP SIZES 10 and 20

REMOVAL: To remove cabinet top, proceed as follows:

1. First remove the stem assembly of the bubbler valve and the locknut which secures the valve to the top.
2. Unsolder the water tube (to the bubbler valve) where it is soldered into the fitting in the cooling unit housing; after first removing the sponge rubber insulator from the fitting and pushing the sponge rubber tube back on the water tube so that it will not be damaged by the heat.
3. Remove drain outlet fitting, using 5/16" Allen wrench.
4. Remove pitcher filler (if one is installed) by turning the body counter-clockwise.
5. Remove the six screws on sides of top, using #3 Phillips screw driver.
6. Top may now be lifted from cooler.

REPLACEMENT: Reverse above procedure for re-assembling cabinet top, noting the following procedures:

1. Tighten six side screws after all other parts are replaced and tightened.
2. Make sure that soft rubber washer on under-side of top makes a water tight seal when drain fitting is tightened.
3. When valve stem assembly of bubbler valve

is in place, make sure there is some play in four ball handle so that stem seat washer will not be lifted off seat. Stem adjusting nut and locking key are located beneath knurled cap.

4. Bubbler guard need not be removed. If desired, it may be removed by removing sponge rubber insulator from stream regulator, unscrewing nut that secures bubbler guard to stream regulator and unscrewing lock-nut that secures bubbler guard to cabinet top.

LIST OF MISCELLANEOUS SPARE PARTS AND TOOLS

Size 10, Drinking Water Cooler

ITEM NO.	NUMBER SUPPLIED	NAME OF SPARE PART	G.E. CAT. NO.	WEIGHT LBS. OZ.	CONTRACTOR	G.E. & BUREAU PC. NO.	BUREAU FILE NO. INDEX	GROUP	FILE NO. ALT.	
1	1	3/8"OD PACKLESS FREON-12 TWO WAY VLV. MUELLER # A-13818	A19A397	1 12	W-8119510	54400	S5900	1170	1	
2	1	1/4"OD SWEAT X 1/4"FLARE PACKLESS TYPE TWO WAY FREON 12 PURGE, DRAIN & CHARGING VLV. MUELLER CAT. NO. A-13859	A19A418	1 12	W-8119602	54400	S5900	1172	1	
3	1	3/8"OD DEHYDRATOR - METREX CAT. NO. 7461	A18A148	3 0	W-8119658	54400	S5900	1139	0	
4	2	GASKET - DEHYDRATOR	C11A354	0 4	W-8119658	10	54400	S5900	1139	0
5	1	3/8" SIGHT FLOW INDICATOR - MUELLER CAT. NO. A14028	A18A147	1 14	W-8119527	54400	S5900	1167	0	
6	4	GASKET - SIGHT FLOW INDICATOR	C11A355	0 4	W-8119367	4	54400	S5900	1166	0
7	4	PACKING - SIGHT FLOW INDICATOR	C11A356	0 4	W-8119367	5	54400	S5900	1166	0
8	4	PACKING WASHER - SIGHT FLOW INDICATOR	C20B49	0 4	W-8119367	6	54400	S5900	1166	0
9	4	GASKET - SIGHT FLOW INDICATOR	C11A357	0 4	W-8119367	8	54400	S5900	1166	0
10	1	TEE 3/8" X 1/4" X 1/2" OD TUBE SIZE		0 3	W-8119831	97	53310	S3603	847857	0
11	1 SET	PRESSURE GAGE ADAPTER SET EACH CONSISTING OF	A1A422	1 0	W-8119824	512	54177	S5900	1123	0
11-1	2	FLARE CONNECTOR			W-8119824	512-1	54177	S5900	1123	0
11-2	2	COPPER TUBE			W-8119824	512-2	54177	S5900	1123	0
11-3	4	FLARE NUT			W-8119824	512-3	54177	S5900	1123	0
12	1	HIGH PRESSURE AND LOW PRESSURE CUT-OUTS - PENN CAT. NO. 281AP08-2301	M4B385	3 10	W-8119861	54500	S5900	1221	0	
13	3	COMPRESSOR BELTS "A" SECTION - PITCH LENGTH-38.57"	C4A174	1 2	W-8119817	75	53310	S3603	847854	0
14	1	THERMO. EXPANSION VLV. -DETROIT LUB.CAT.NO. 894N-894173	M4B394	2 0	W-8119859	54500	S5900	1192	0	
15	1	TEMPERATURE CONTROL-PENN CAT.NO. 280AT02-1120	M4B388	3 8	W-8119803	54500	S5900	1220	0	
16	1	TEE 3/8" X 3/8" X 1/4" OD TUBE SIZE		0 3	W-8119831	91	53310	S3603	847857	0
17	1	TEE 5/8" X 1/2" X 1/4" OD TUBE SIZE		0 4	W-8119831	95	53310	S3603	847857	0
18	1	TEE 3/8" X 3/8" X 1/2" OD TUBE SIZE		0 3	W-8119809	34	53310	S3603	847849	0
19	1	TEE 1/2" OD TUBE X 1/2" ID FITTING X 1/2" OD TUBE SIZE		0 3	W-8119807	38	53310	S3603	847847	0
20	1	ELBOW 3/8" ID FITTING X 3/8" ID FITTING		0 3	W-8119831	90	53310	S3603	847857	0
21	1	COUPLING 1/2" X 1/2" OD TUBE SIZE		0 4	W-8119807	59	53310	S3603	847847	0
22	1	BUBBLER VALVE	B8A239	1 12	W-8119894		53310	S3603	847845	0
23	1	STREAM REGULATOR VALVE	B8A241	1 6	W-8119814		53310	S3603	847862	0
		MISCELLANEOUS TOOLS								
31	1	1/4" REFRIGERANT CHARGING TUBE	A1A423	1 0	W-8119823	54700	S5900	1257	0	
32	1	ALLEN SET SCREW WRENCH - 5/32" HEXAGON		0 2						
33	1	ALLEN SET SCREW WRENCH - 5/16" HEXAGON		0 2						
34	1	SCREW DRIVER FOR PHILLIPS HD.SCR.#2 POINT - APEX CAT. NO. 1252		0 8						
35	1	SCREW DRIVER FOR PHILLIPS HD.SCR.#3 POINT - APEX CAT. NO. 1253		0 12						
36	1	SCREW DRIVER FOR PHILLIPS HD.SCR.#4 POINT - APEX CAT. NO. 1254		1 0						

IDENTIFICATION FOR WHICH PARTS AND TOOLS ARE INTENDED: -
SIZE 10 WATER COOLER - 1/2 H.P. 2 CYLINDER 1 1/2" BORE
1 1/4" STROKE ACCORDING TO BUREAU OF SHIPS SPEC. 66R-2.

WHEN REORDERING ALWAYS REFER TO MANUFACTURER'S CATALOG OR SERIAL ORDERING DATA, PLAN NO., AND PIECE NO., SERIAL NO., OF COMPRESSOR SHOULD ALSO BE GIVEN.

LIST OF MISCELLANEOUS SPARE PARTS AND TOOLS

Size 20, Drinking Water Cooler

ITEM NO.	NUMBER SUPPLIED	NAME OF SPARE PART	G.E. CAT. NO.	WEIGHT LBS. OZ.	CONTRACTOR	G.E. & BUREAU PC. NO.		BUREAU FILE NO.		
						INDEX	GROUP	FILE NO.	ALT.	
1	1	3/8" OD PACKLESS FREON-12 TWO WAY VLV. MUELLER #A-13818	A19A397	1 12	W-8119510			54400	S5900	1170 1
2	1	1/4" OD SWEAT X 1/4" FLARE PACKLESS TYPE TWO WAY FREON-12 PURGE, DRAIN & CHARGING VLV. MUELLER CAT. NO. A-13869	A19A418	1 12	W-8119602			54400	S5900	1172 1
3	1	3/8" OD DEHYDRATOR - METREX CAT. NO. 7461	A18A148	3 0	W-8119658			54400	S5900	1139 0
4	4	GASKET - DEHYDRATOR	C11A354	0 8	W-8119658	10		54400	S5900	1139 0
5	1	3/8" SIGHT FLOW INDICATOR - MUELLER CAT. NO. A-14028	A18A147	1 14	W-8119527			54400	S5900	1167 0
6	8	GASKET - SIGHT FLOW INDICATOR	C11A355	0 8	W-8119367	4		54400	S5900	1166 0
7	8	PACKING - SIGHT FLOW INDICATOR	C11A356	0 8	W-8119367	5		54400	S5900	1166 0
8	8	PACKING WASHER - SIGHT FLOW INDICATOR	C20849	0 8	W-8119367	6		54400	S5900	1166 0
9	8	GASKET - SIGHT FLOW INDICATOR	C11A357	0 8	W-8119367	8		54400	S5900	1166 0
10	1	TEE 3/8" X 1/4" X 1/2" OD TUBE SIZE		0 3	W-8119831	97		53310	S3603	847857 0
11	1 SET	PRESSURE GAGE ADAPTER SET EACH CONSISTING OF	A1A422	1 0	W-8119824	512		54177	S5900	1123 0
11-1	2	FLARE CONNECTOR			W-8119824	512-1		54177	S5900	1123 0
11-2	2	COPPER TUBE			W-8119824	512-2		54177	S5900	1123 0
11-3	4	FLARE NUT			W-8119824	512-3		54177	S5900	1123 0
12	1	HIGH PRESSURE AND LOW PRESSURE CUT-OUTS - PENN CAT. NO. 261AP08-2301	M4B385	3 10	W-8119661			54500	S5900	1221 0
13	3	COMPRESSOR BELTS "A" SECTION - PITCH LENGTH-38.57"	C4A174	1 2	W-8119817	75		53310	S3603	847854 0
14	1	THERMO EXPANSION VLV. DETROIT LUB. CAT. NO. 894N-894173	M4B394	2 0	W-8119659			54500	S5900	1192 0
15	1	TEMPERATURE CONTROL - PENN CAT. NO. 260AT02-1120	M4B388	3 8	W-8119803			54500	S5900	1220 0
16	1	TEE 3/8" X 3/8" X 1/4" OD TUBE SIZE		0 3	W-8119831	91		53310	S3603	847857 0
17	1	TEE 5/8" X 1/2" X 1/4" OD TUBE SIZE		0 4	W-8119831	95		53310	S3603	847857 0
18	1	TEE 3/8" X 3/8" X 1/2" OD TUBE SIZE		0 3	W-8119809	34		53310	S3603	847849 0
19	1	TEE 1/2" OD TUBE X 1/2" ID FITTING X 1/2" OD TUBE SIZE		0 3	W-8119807	38		53310	S3603	847847 0
20	1	ELBOW 3/8" ID FITTING X 3/8" ID FITTING		0 3	W-8119831	90		53310	S3603	847857 0
21	1	COUPLING 1/2" X 1/2" OD TUBE SIZE		0 4	W-8119807	59		53310	S3603	847847 0
22	1	BUBBLER VALVE	88A239	1 12	W-8119894			53310	S3603	847845 0
23	1	STREAM REGULATOR VALVE	88A241	1 8	W-8119814			53310	S3603	847862 0
		MISCELLANEOUS TOOLS								
31	1	1/4" REFRIGERANT CHARGING TUBE	A1A423	1 0	W-8119823			54700	S5900	1257 0
32	1	ALLEN SET SCREW WRENCH - 5/32" HEXAGON		0 2						
33	1	ALLEN SET SCREW WRENCH - 5/16" HEXAGON		0 2						
34	1	SCREW DRIVER FOR PHILLIPS HD. SCR. #2 POINT - APEX CAT. NO. 1252		0 8						
35	1	SCREW DRIVER FOR PHILLIPS HD. SCR. #8 POINT - APEX CAT. NO. 1253		0 12						
36	1	SCREW DRIVER FOR PHILLIPS HD. SCR. #4 POINT - APEX CAT. NO. 1254		1 0						
IDENTIFICATION FOR WHICH PARTS AND TOOLS ARE INTENDED:- SIZE 20 WATER COOLER - 1/2 HP 2 CYLINDER 1 1/2" BORE 1 1/4" STROKE ACCORDING TO BUREAU OF SHIPS SPEC.65R-2.						WHEN REORDERING ALWAYS REFER TO MANUFACTURER'S CATALOG OR SERIAL ORDERING DATA, PLAN NO., AND PIECE NO., SERIAL NO., OF COMPRESSOR SHOULD ALSO BE GIVEN.				

FROM G.E.OWG. W-8119870. AND W-8119871 (New)

ITEM NO.	NUMBER SUPPLIED	NAME OF SPARE PART	G.E. CAT. NO.	WEIGHT LBS. OZ.	CONTRACTOR	BUREAU PC. NO.	BUREAU FILE NO.		
							INDEX	GROUP	FILE NO. ALT.
1	1	3/8"OD PACKLESS FREON 12 TWO WAY VLV. MUELLER #A-13818	A19A397	1 12	W-8119610		54400	S5900	1170 1
2	1	1/4"OD SWEAT X 1/4" FLARE PACKLESS TYPE-TWO WAY FREON 12 PURGE, DRAIN & CHARGING VLV. - MUELLER #A-13859	A19A418	1 12	W-8119602		54400	S5900	1172 1
3	1	3/8" O.D. DEHYDRATOR - METREX CAT. NO.7461	A18A148	3 0	W-8119658		54400	S5900	1139 0
4	2	GASKET - DEHYDRATOR	C11A354	0 4	W-8119658	10	54400	S5900	1139 0
5	1	3/8" SIGHT FLOW INDICATOR-MUELLER CAT.NO.A14028	A18A147	1 14	W-8119527		54400	S5900	1167 0
6	4	GASKET - SIGHT FLOW INDICATOR	C11A355	0 4	W-8119367	4	54400	S5900	1166 0
7	4	PACKING- SIGHT FLOW INDICATOR	C11A356	0 4	W-8119367	5	54400	S5900	1166 0
8	4	PACKING WASHER - SIGHT FLOW INDICATOR	C20B49	0 4	W-8119367	6	54400	S5900	1166 0
9	4	GASKET - SIGHT FLOW INDICATOR	C11A357	0 4	W-8119367	8	54400	S5900	1166 0
10	1	TEE 3/8"X 1/4" X 1/2" O.D. TUBE SIZE		0 3	W-8119650	148	54177	S5900	1101 0
11	1 SET	PRESSURE GAGE ADAPTER SET EACH CONSISTING OF	A1A422	1 0	W-8119824	512	54177	S5900	1123 0
11-1	2	FLARE CONNECTOR			W-8119824	512-1	54177	S5900	1123 0
11-2	2	COPPER TUBE			W-8119824	512-2	54177	S5900	1123 0
11-3	4	FLARE NUT			W-8119824	512-3	54177	S5900	1123 0
12	1	HIGH PRESSURE AND LOW PRESSURE CUT-OUTS-PENN CAT.NO. 261APOB-2301	M48385	3 10	W-8119661		54500	S5900	1221 0
13	3	COMPRESSOR BELTS "A" SECTION - PITCH LENGTH-38.57"	C4A174	1 2	W-8119650	111	54177	S5900	1101 0
14	1	THERMO. EXPANSION VALVE-DETROIT LUB. CAT.#894N-894173	M48394	2 0	W-8119659		54500	S5900	1192 0
15	1	TEMPERATURE CONTROL PENN CAT.NO.260AT02-1121	M48389	3 8	W-8119803		54500	S5900	1220 0
16	1	TEE 3/8" X 1/4" X 3/8" O.D. TUBE SIZE		0 3	W-8119802	9	53508	S3402	847906 0
17	1	TEE 5/8" X 1/2" X 1/4" O.D. TUBE SIZE		0 3	W-8119802	11	53508	S3402	847906 0
18	1	REDUCING ELBOW 3/8" O.D. X 1/4" I.D. SWEAT		0 3	W-8119802	19	53508	S3402	847906 0
19	1	REDUCING COUPLING 3/16" I.D. X 1/4" O.D. SWEAT		0 3	W-8119680	13	53508	S3402	847903 0
		MISCELLANEOUS TOOLS							
31	1	1/4" REFRIGERANT CHARGING TUBE	A1A423	1 0	W-8119823		54700	S5900	1257 0
32	1	ALLEN SET SCREW WRENCH - 5/32" HEXAGON		0 2					
33	1	SCREW DRIVER FOR PHILLIPS HEAD SCREW NO.2 POINT - APEX CAT. NO.1252		0 8					
		CABINET SPARES							
41	2	DOOR HINGE	H16B7	2 12	80-55-02	3	54508	S3402	847896 0
42	1	DOOR LATCH AND STRIKE	H15B13	2 12	80-55-02	1	54508	S3402	847896 0
43	1	DOOR GASKET	H13B43	1 4	80-55-02	9	54508	S3402	847896 0
44	24	HARDWARE SCREWS	H20B154	0 8	BB-50-01	14	54508	S3402	847891 0
45	22	GASKET SCREWS	H20B155	0 12	BB-50-01	20	54508	S3402	847891 0
46	1	REDUCING COUPLING 1/2" X 3/8" O.D. TUBE SIZE		0 4	BB-50-01	59	54508	S3402	847891 0
47	1	COUPLING 1/4" X 1/4" O.D. TUBE SIZE		0 3	BB-50-01		54508	S3402	847891 0
IDENTIFICATION FOR WHICH PARTS AND TOOLS ARE INTENDED:- SIZE 8 REFRIGERATOR - 1/2 HP - 2 CYLINDER - 1 1/2" BORE 1 1/4" STROKE ACCORDING TO BUREAU OF SHIPS SPEC.66R-2.				WHEN REORDERING ALWAYS REFER TO MANUFACTURER'S CATALOG OR SERIAL ORDERING DATA, PLAN NO. AND PIECE NO. SERIAL NUMBER OF COMPRESSOR SHOULD ALSO BE GIVEN.					

FROM G.E. DWGS. W-8119860 AND W-8119861 (Rev.)

LIST OF MISCELLANEOUS SPARE PARTS AND TOOLS

Size 8, Reach-in Refrigerator

LIST OF MISCELLANEOUS SPARE PARTS AND TOOLS

Size 16, Reach-in Refrigerator

ITEM NO.	NUMBER SUPPLIED	NAME OF SPARE PART	G.E. CAT. NO.	WEIGHT		CONTRACTOR	G.E. & BUREAU PC. NO.	BUREAU FILE NO.			
				LBS	OZ.			INDEX	GROUP	FILE NO.	ALT.
1	1	3/8" OD PACKLESS FREON-12 TWO WAY VALVE-MUELLER #A13818	A19A397	1	12	W-8119510		54400	S5900	1170	1
2	1	1/4"OD SWEAT X 1/4" FLARE PACKLESS TYPE TWO WAY FREON-12 PURGE, DRAIN & CHARGING VALVE-MUELLER #A-13859	A19A418	1	12	W-8119602		54400	S5900	1172	1
3	1	3/8" OD DEHYDRATOR - METREX CAT. NO.7461	A18A148	3	0	W-8119658		54400	S5900	1139	0
4	2	GASKET - DEHYDRATOR	C11A354	0	4	W-8119658	10	54400	S5900	1139	0
5	1	3/8" SIGHT FLOW INDICATOR-MUELLER CAT.NO. A14028	A18A147	1	14	W-8119527		54400	S5900	1167	0
6	4	GASKET - SIGHT FLOW INDICATOR	C11A355	0	4	W-8119367	4	54400	S5900	1166	0
7	4	PACKING - SIGHT FLOW INDICATOR	C11A356	0	4	W-8119367	5	54400	S5900	1166	0
8	4	PACKING WASHER - SIGHT FLOW INDICATOR	C20B49	0	4	W-8119367	6	54400	S5900	1166	0
9	4	GASKET - SIGHT FLOW INDICATOR	C11A367	0	4	W-8119367	8	54400	S5900	1166	0
10	1	TEE 3/8" X 1/4" X 1/2" O.D. TUBE SIZE		0	3	W-8119650	148	54177	S5900	1101	0
11	1 SET	PRESSURE GAGE ADAPTER SET EACH CONSISTING OF	A1A422	1	0	W-8119824	512	54177	S5900	1123	0
11-1	2	FLARE CONNECTOR				W-8119824	512-1	54177	S5900	1123	0
11-2	2	COPPER TUBE				W-8119824	512-2	54177	S5900	1123	0
11-3	4	FLARE NUT				W-8119824	512-3	54177	S5900	1123	0
12	1	HIGH & LOW PRESSURE CUT-OUTS-PENN CAT.NO.261AP08-2301	M4B385	3	10	W-8119651		54500	S5900	1221	0
13	3	COMPRESSOR BELTS "A" SECTION-PITCH LENGTH-39.82"	C4A152	1	2	W-8119650	111	54177	S5900	1101	0
14	1	THERMOSTATIC EXPANSION VLV.DETROIT LUB.CAT.NO. 894N-894173	M4B394	2	0	W-8119659		54600	S5900	1192	0
15	1	TEMPERATURE CONTROL - PENN CAT.NO.260AT02-1121	M4B389	3	8	W-8119803		54500	S5900	1220	0
16	1	TEE 3/8" X 1/4" X 3/8" O.D.TUBE SIZE		0	3	W-8119802	9	53508	S3402	847906	0
17	1	TEE 5/8" X 1/2" X 1/4" O.D.TUBE SIZE		0	3	W-8119802	11	53508	S3402	847906	0
18	1	REDUCING ELBOW 3/8" O.D. X 1/4" I.D.SWEAT		0	3	W-8119802	19	53508	S3402	847906	0
19	1	REDUCING COUPLING 3/16" I.D. X 1/4" O.D.SWEAT		0	3	W-8119680	13	53508	S3402	847903	0
		MISCELLANEOUS TOOLS									
31	1	1/4" REFRIGERANT CHARGING TUBE	A1A423	1	0	W-8119823		54700	S5900	1257	0
32	1	ALLEN SET SCREW WRENCH 5/32" HEXAGON									
33	1	SCREW DRIVER FOR PHILLIPS HEAD SCREW - NO.2 POINT - APEX CAT.NO.1252		0	8						
		CABINET SPARES									
41	2	DOOR HINGE - RIGHT HAND	H16B8	2	12	B0-55-02	2A	54508	S3402	847896	0
42	1	DOOR LATCH AND STRIKE	H16B13	2	12	B0-55-02	1	54508	S3402	847896	0
43	1	DOOR GASKET - WIDE DOOR	H13B44	1	4	B16-75-03					
44	24	HARDWARE SCREWS	H20B154	0	8	B16-75-03					
45	44	GASKET SCREWS	H20B155	0	12	B16-75-03					
46	1	REDUCING COUPLING 1/2"X 3/8" O.D.TUBE SIZE		0	3	B16-75-03					
47	2	DOOR HINGE - LEFT HAND	H16B9	1	6	B0-55-02	2B	54508	S3402	847896	0
48	1	DOOR GASKET - NARROW DOOR	H13B45	1	0	B16-75-03					
49	1	TEE 1/4" X 1/4" X 1/4" O.D.TUBE SIZE		0	3	B16-75-03					
50	1	TEE 1/2" X 1/2" X 1/2" O.D.TUBE SIZE		0	3	B16-75-03					
51	1	COUPLING 1/4" X 1/4" O.D.TUBE SIZE		0	3	B16-75-03					
IDENTIFICATION FOR WHICH PARTS AND TOOLS ARE INTENDED:- SIZE 16 REFRIGERATOR 1/2 HP - 2 CYLINDER 1 1/2" BORE 1 1/4" STROKE ACCORDING TO BUREAU OF SHIPS SPEC.66R-2.				WHEN REORDERING ALWAYS REFER TO MANUFACTURER'S CATALOG OR SERIAL ORDERING DATA, PLAN NO., AND PIECE NO. SERIAL NUMBER OF COMPRESSOR SHOULD ALSO BE GIVEN.							

FROM G.E. DWGS. W-8119862 AND W-8119863 (Rev.)

LIST OF MISCELLANEOUS SPARE PARTS AND TOOLS

Size 16a, Reach-in Refrigerator

ITEM NO.	NUMBER SUPPLIED	NAME OF SPARE PART	G.E.CAT.NO.	WEIGHT LBS OZ.	CONTRACTOR	G.E. & BUREAU PC.NO.	BUREAU FILE NO.		
							INDEX	GROUP	FILE NO.
1	1	3/8"OD PACKLESS FREON-12 TWO WAY VLV. MUELLER #A13818.	A19A397	1 12	W-8119610		54400	S5900	1170
2	1	1/4"OD SWEAT X 1/4" FLARE PACKLESS TYPE TWO WAY FREON-12 PURGE, DRAIN & CHARGING VALVE-MUELLER #A13859	A19A418	1 12	W-8119602		54400	S5900	1172
3	1	3/8" OD DEHYDRATOR - METREX CAT.NO.7461	A18A148	3 0	W-8119658		54400	S5900	1139
4	2	GASKET - DEHYDRATOR	C11A354	0 4	W-8119658	10	54400	S5900	1139
5	1	3/8" SIGHT FLOW INDICATOR - MUELLER CAT.NO A14028	A18A147	1 14	W-8119627		54400	S5900	1167
6	4	GASKET - SIGHT FLOW INDICATOR	C11A355	0 4	W-8119367	4	54400	S5900	1166
7	4	PACKING - SIGHT FLOW INDICATOR	C11A358	0 4	W-8119367	5	54400	S5900	1166
8	4	PACKING WASHER - SIGHT FLOW INDICATOR	C20849	0 4	W-8119367	6	54400	S5900	1166
9	4	GASKET - SIGHT FLOW INDICATOR	C11A357	0 4	W-8119367	8	54400	S5900	1166
10	1	TEE 3/8" X 1/4" X 1/2" O.D. TUBE SIZE		0 3	W-8119860	148	54177	S5900	1101
11	1 SET	PRESSURE GAGE ADAPTER SET EACH CONSISTING OF	A1A422	1 0	W-8119824	512	54177	S5900	1123
11-1	2	FLARE CONNECTOR			W-8119824	512-1	54177	S5900	1123
11-2	2	COPPER TUBE			W-8119824	512-2	54177	S5900	1123
11-3	4	FLARE NUT			W-8119824	512-3	54177	S5900	1123
12	1	HIGH & LOW PRESSURE CUT-OUTS PENN CAT.#261AP08-2301	M48385	3 10	W-8119661		54500	S5900	1221
13	3	COMPRESSOR BELTS "A" SECTION - PITCH LENGTH-38.57"	C4A174	1 2	W-8119650	111	54177	S5900	1101
14	1	THERMO. EXPANSION VALVE-DETROIT LUB.CAT. #894N-894173	M48394	2 0	W-8119659		54500	S5900	1192
15	1	TEMPERATURE CONTROL-PENN CAT.NO.260AT02-2802	M48390	3 8	W-8119803		54500	S5900	1220
16	1	TEE 3/8" X 1/4" X 3/8" O.D. TUBE SIZE		0 3	W-8119805	9	53516	S3402	847941
17	1	TEE 5/8" X 1/2" X 1/4" O.D. TUBE SIZE		0 3	W-8119805	11	53516	S3402	847941
18	1	REDUCING ELBOW 3/8" O.D. X 1/4" I.D. SWEAT		0 3	W-8119805	19	53516	S3402	847941
		MISCELLANEOUS TOOLS							
31	1	1/4" REFRIGERANT CHARGING TUBE	A1A423	1 0	W-8119823		54700	S5900	1257
32	1	ALLEN SET SCREW WRENCH 5/32" HEXAGON		0 2					
33	1	SCREW DRIVER FOR PHILLIP'S HEAD SCREW NO.2 POINT - APEX CAT.NO.1252		0 8					
34	1	ALLEN SET SCREW WRENCH 3/32" HEXAGON		0 2					
		CABINET SPARES							
41	2	DOOR HINGE - RIGHT HAND	H1688	2 12	80-55-02	2A	54508	S3402	847891
42	1	DOOR LATCH AND STRIKE	H15813	2 12	80-55-02	1	54508	S3402	847891
43	1	DOOR GASKET - WIDE DOOR	H13844	1 4	B16-75-04				
44	24	HARDWARE SCREWS	H208154	0 8	B16-75-04				
45	14	GASKET SCREWS	H208155	0 12	B16-75-04				
46	1	REDUCING COUPLING 3/4" X 1/2" O.D. TUBE SIZE		0 4	B16-75-04				
47	2	DOOR HINGE - LEFT HAND	H1689	2 12	80-55-02	2B	54508	S3402	847891
48	1	DOOR GASKET - NARROW DOOR	H13845	1 0	B16-75-04				
49	1	FAN	C7A71	0 8	W-8119821		53516	S3402	847943
IDENTIFICATION FOR WHICH PARTS AND TOOLS ARE INTENDED:-					WHEN RE-ORDERING ALWAYS REFER TO MANUFACTURER'S CATALOG OR SERIAL ORDERING DATA, PLAN NO., AND PIECE NO. SERIAL NUMBER OF COMPRESSOR SHOULD ALSO BE GIVEN.				

FROM G.E. DWGS. W-8119864 AND W-8119865 (Rev.)

LIST OF MISCELLANEOUS SPARE PARTS AND TOOLS

Size 30, Reach-in Refrigerator

ITEM NO.	NUMBER SUPPLIED	NAME OF SPARE PART	G.E.CAT.NO.	WEIGHT LBS. OZ.	G.E. & CONTRACTOR PC.NO.	BUREAU FILE NO.		
						INDEX	GROUP	FILE NO.
1	1	3/8" OD PACKLESS FREON-12 TWO WAY VLV. MUELLER #A13818	A19A397	1 12	W-8119810	54400	S6900	1170 1
2	1	1/4" OD SWEAT X 1/4" FLARE PACKLESS TYPE TWO WAY FREON-12 PURGE, DRAIN & CHARGING VALVE-MUELLER #A13859	A18A418	1 12	W-8119602	54400	S6900	1172 1
3	1	3/8" OD DEHYDRATOR-METREX CAT.NO.7461	A18A148	3 0	W-8119658	54400	S6900	1139 0
4	2	GASKET-DEHYDRATOR	C11A354	0 4	W-8119658	10	54400	S6900 1139 0
5	1	3/8" SIGHT FLOW INDICATOR-MUELLER CAT.NO.A-14028	A18A147	1 14	W-8119527	54400	S6900	1167 0
6	4	GASKET-SIGHT FLOW INDICATOR	C11A355	0 4	W-8119367	4	54400	S6900 1166 0
7	4	PACKING - SIGHT FLOW INDICATOR	C11A356	0 4	W-8119367	5	54400	S6900 1166 0
8	4	PACKING WASHER - SIGHT FLOW INDICATOR	C20B49	0 4	W-8119367	6	54400	S6900 1166 0
9	4	GASKET - SIGHT FLOW INDICATOR	C11A357	0 4	W-8119367	8	54400	S6900 1166 0
10	1	TEE 3/8" X 1/4" X 1/2" O.D. TUBE SIZE		0 3	W-8119650	148	54177	S6900 1101 0
11	1 SET	PRESSURE GAGE ADAPTER SET EACH CONSISTING OF	A1A422	1 0	W-8119824	512	54177	S6900 1123 0
11-1	2	FLARE CONNECTOR			W-8119824	512-1	54177	S6900 1123 0
11-2	2	COPPER TUBE			W-8119824	512-2	54177	S6900 1123 0
11-3	4	FLARE NUT			W-8119824	512-3	54177	S6900 1123 0
12	1	HIGH & LOW PRESSURE CUT-OUTS - PENN #261AP08-2301	M4B385	3 10	W-8119661	54500	S6900	1221 0
13	3	COMPRESSOR BELTS "A" SECTION - PITCH LENGTH-39.07"	C4A169	1 2	W-8119650	111	54177	S6900 1101 0
14	1	THERMO. EXPANSION VLV.-DETROIT LUB. #B94N-894173	M4B394	2 0	W-8119659	54500	S6900	1192 0
15	1	TEMPERATURE CONTROL-PENN CAT.#260AT02-2802	M4B390	3 8	W-8119803	54500	S6900	1220 0
16	1	5/8" OD PACKLESS FREON-12 TWO WAY VLV. MUELLER #A13820	A19A398	2 0	W-8119510	54400	S6900	1170 1
17	1	3/8" OD STRAINER - METREX CAT.NO.8760	A18A149	2 8	W-8119842	54400	S6900	1138 0
18	2	GASKET - STRAINER	C11A363	0 4	W-8119842	10	54400	S6900 1138 0
19	1	3/8" FLANGED UNION - HENRY CAT.NO.1591	A19A422	2 4	W-8119086	54400	S6900	1165 0
20	1	5/8" FLANGED UNION - HENRY CAT.NO.1594	A19A336	2 4	W-8119086	54400	S6900	1165 0
21	4	GASKET-(FOR 3/8" & 5/8" UNIONS)	C11A319	0 4	W-8119086	4	54400	S6900 1165 0
22	1	TEE 5/8" X 5/8" X 1/4" O.D. TUBE SIZE		0 3	W-8119806	11	53530	S3402 847965 0
23	1	TEE 3/8" X 3/8" X 1/4" O.D. TUBE SIZE		0 3	W-8119806	9	53530	S3402 847965 0
		MISCELLANEOUS TOOLS						
31	1	1/4" REFRIGERANT CHARGING TUBE	A1A423	1 0	W-8119823	54700	S6900	1257 0
32	1	ALLEN SET SCREW WRENCH 5/32" HEXAGON		0 2				
33	1	SCREW DRIVER FOR PHILLIPS HEAD SCREW NO.2 POINT - APEX CAT.NO.1252		0 8				
34	1	ALLEN SET SCREW WRENCH 3/32" HEXAGON		0 2				
		CABINET SPARES						
41	3	DOOR HINGE - RIGHT HAND	H1688	4 2	B0-55-02	2A	54508	S3402 847891 0
42	1	DOOR LATCH & STRIKE	H16813	2 12	B0-55-02	1	54508	S3402 847891 0
43	2	DOOR GASKET	H13B46	3 0	B30-75-05			
44	32	HARDWARE SCREWS	H20B154	0 10	B30-75-05			
45	56	GASKET SCREWS	H20B155	1 0	B30-75-05			
46	1	REDUCING ELBOW 3/4" X 1/2" O.D. TUBE SIZE		0 4	B30-75-05			
47	3	DOOR HINGE - LEFT HAND	H1689	4 2	B0-55-02	2B	54508	S3402 847891 0
48	1	REDUCING FITTING 3/8" X 1/4" O.D. TUBE SIZE		0 3	B30-75-05			
49	1	FAN ASSEMBLY	19C7A72	0 12	W-8119822	53530	S3402	847967 0
50	1	REDUCING FITTING 5/8" X 1/2" O.D. TUBE SIZE		0 4	B30-75-05			
IDENTIFICATION FOR WHICH PARTS AND TOOLS ARE INTENDED:- SIZE 30 REFRIGERATOR 1/2 HP - 2 CYLINDER - 1 1/2" BORE 1 1/4" STROKE ACCORDING TO BUREAU OF SHIPS SPEC.66R2.				WHEN RE-ORDERING ALWAYS REFER TO MANUFACTURER'S CATALOG OR SERIAL ORDERING DATA, PLAN NO., AND PIECE NO. SERIAL NUMBER OF COMPRESSOR SHOULD ALSO BE GIVEN.				

FROM G.E. DWGS. W-8119866 AND W-8119867 (Rev.)

LIST OF MISCELLANEOUS SPARE PARTS AND TOOLS

Size 6, Frozen Food Cabinet

ITEM NO.	NUMBER SUPPLIED	NAME OF SPARE PART	G.E.CAT.NO.	WEIGHT LBS. OZ.	CONTRACTOR	G.E. & BUREAU PC.NO.	BUREAU FILE NO.			
							INDEX	GROUP	FILE NO.	ALT.
1	1	3/8" OD PACKLESS FREON-12 TWO WAY VLV. MUELLER #A13818	A19A397	1 12	W-8119510	54400	S5900	1170	1	
2	1	1/4" OD SWEAT X 1/4" FLARE PACKLESS TYPE TWO WAY FREON-12 PURGE, DRAIN & CHARGING VLV. - MUELLER #A-13859	A19A418	1 12	W-8119602	54400	S5900	1172	1	
3	1	3/8" OD DEHYDRATOR - METREX CAT. 7461	A18A148	3 0	W-8119658	54400	S5900	1139	0	
4	2	GASKET-DEHYDRATOR	C11A354	0 4	W-8119658	10	54400	S5900	1139	0
5	1	3/8" SIGHT FLOW INDICATOR MUELLER CAT.NO. A-14028	A18A147	1 14	W-8119527	54400	S5900	1167	0	
6	4	GASKET-SIGHT FLOW INDICATOR	C11A355	0 4	W-8119367	4	54400	S5900	1166	0
7	4	PACKING-SIGHT FLOW INDICATOR	C11A356	0 4	W-8119367	5	54400	S5900	1166	0
8	4	PACKING WASHER-SIGHT FLOW INDICATOR	C20B49	0 4	W-8119367	6	54400	S5900	1166	0
9	4	GASKET-SIGHT FLOW INDICATOR	C11A357	0 4	W-8119367	8	54400	S5900	1166	0
10	1	TEE 3/8" X 1/4" X 1/2" O.D. TUBE SIZE		0 3	W-8119650	148	54177	S5900	1101	0
11	1 SET	PRESSURE GAGE ADAPTER SET EACH CONSISTING OF	A1A422	1 0	W-8119824	512	54177	S5900	1123	0
11-1	2	FLARE CONNECTOR			W-8119824	512-1	54177	S5900	1123	0
11-2	2	COPPER TUBE			W-8119824	512-2	54177	S5900	1123	0
11-3	4	FLARE NUT			W-8119824	512-3	54177	S5900	1123	0
12	1	HIGH PRESSURE & LOW PRESSURE CUT-OUTS PENN CAT. NO. 261AP08-2301	M4B385	3 10	W-8119661	54500	S5900	1221	0	
13	3	COMPRESSOR BELTS "A" SECTION-PITCH LENGTH-39.82"	C4A152	1 2	W-8119650	111	54177	S5900	1101	0
14	1	THERMO. EXPANSION VLV. - DETROIT LUB. CAT. #894N-894173	M4B394	2 0	W-8119659	54500	S5900	1192	0	
15	1	TEMPERATURE CONTROL - PENN CAT. NO. 260ATO1-1142	M4B392	3 8	W-8119803	54500	S5900	1220	0	
16	1	5/8" O.D. PACKLESS FREON-12 TWO WAY VALVE - MUELLER CAT. NO. A-13820	A19A398	2 0	W-8119510	54400	S5900	1170	1	
17	1	3/8" O.D. STRAINER - METREX CAT. NO. 8760	A18A149	2 8	W-8119842	54400	S5900	1138	0	
18	2	GASKET - STRAINER	C11A353	0 4	W-8119842	10	54400	S5900	1138	0
19	1	TEE 5/8" X 5/8" X 1/4" O.D. TUBE SIZE		0 3	W-8119656	9	54600	S5900	1241	0
20	1	TEE 3/8" X 3/8" X 1/4" O.D. TUBE SIZE		0 3	W-8119656	5	54600	S5900	1241	0
21	1	DIAL TYPE THERMOMETER	A19A423	5 8	W-8119828	54600	S5900	1239	0	
22	1	REDUCING FITTING 3/8" X 1/4" O.D. TUBE SIZE		0 3	74SFG	61	51206	S3402	847802	0
23	1	REDUCING FITTING 5/8" X 1/4" O.D. TUBE SIZE		0 3	74SFG	60	51206	S3402	847802	0
		MISCELLANEOUS TOOLS								
31	1	1/4" REFRIGERANT CHARGING TUBE	A1A423	1 0	W-8119823	54700	S5900	1257	0	
32	1	ALLEN SET SCREW WRENCH 5/32" HEXAGON		0 2						
IDENTIFICATION FOR WHICH PARTS AND TOOLS ARE INTENDED: - SIZE 6 FROZEN FOOD CABINET 1/2 HP 2 CYLINDER - 1 1/2" BORE - 1 1/4" STROKE ACCORDING TO BUREAU OF SHIPS SPEC. 66R2.						WHEN REORDERING ALWAYS REFER TO MANUFACTURER'S CATALOG OR SERIAL ORDERING DATA, PLAN NO., AND PIECE NO. SERIAL NUMBER OF COMPRESSOR SHOULD ALSO BE GIVEN.				

LIST OF MISCELLANEOUS SPARE PARTS AND TOOLS

Size 10, Frozen Food Cabinet

ITEM NO.	NUMBER SUPPLIED	NAME OF SPARE PART	G.E.CAT.NO.	WEIGHT LBS. OZ.	CONTRACTOR	G.E. & BUREAU PC.NO.	BUREAU FILE NO.			
							INDEX	GROUP	FILE NO.	ALT.
1	1	3/8" OD PACKLESS FREON-12 TWO WAY VLV. MUELLER #A13818	A19A397	1 12	W-8119610		54400	S5900	1170	1
2	1	1/4" OD SWEAT X 1/4" FLARE PACKLESS TYPE TWO WAY FREON-12 PURGE, DRAIN & CHARGING VLV. - MUELLER #A13859	A19A418	1 12	W-8119602		54400	S5900	1172	1
3	1	3/8" OD DEHYDRATOR - METREX CAT. NO. 7461	A18A148	3 0	W-8119658		54400	S5900	1139	0
4	4	GASKET - DEHYDRATOR	C11A354	0 8	W-8119658	10	54400	S5900	1139	0
5	1	3/8" SIGHT FLOW INDICATOR MUELLER CAT. NO. A-14028	A18A147	1 14	W-8119527		54400	S5900	1167	0
6	8	GASKET - SIGHT FLOW INDICATOR	C11A355	0 8	W-8119367	4	54400	S5900	1166	0
7	8	PACKING - SIGHT FLOW INDICATOR	C11A356	0 8	W-8119367	5	54400	S5900	1166	0
8	8	PACKING WASHER - SIGHT FLOW INDICATOR	C20B49	0 8	W-8119367	6	54400	S5900	1166	0
9	8	GASKET - SIGHT FLOW INDICATOR	C11A357	0 8	W-8119367	8	54400	S5900	1166	0
10	1	TEE 3/8" X 1/4" X 1/2" O.D. TUBE SIZE		0 3	W-8119650	148	54177	S5900	1101	0
11	1 SET	PRESSURE GAGE ADAPTER SET EACH CONSISTING OF	A1A422	1 0	W-8119824	512	54177	S5900	1123	0
11-1	2	FLARE CONNECTOR			W-8119824	512-1	54177	S5900	1123	0
11-2	2	COPPER TUBE			W-8119824	512-2	54177	S5900	1123	0
11-3	4	FLARE NUT			W-8119824	512-3	54177	S5900	1123	0
12	1	HIGH & LOW PRESSURE CUT-OUTS PENN CAT. #261AP08-2301	M4B385	3 10	W-8119661		54600	S5900	1221	0
13	3	COMPRESSOR BELTS "A" SECTION - PITCH LENGTH-39.82"	C4A152	1 2	W-8119650	111	54177	S5900	1101	0
14	1	THERMO. EXPANSION VLV. DETROIT LUB. CAT. #894N-894173	M4B394	2 0	W-8119659		54600	S5900	1192	0
15	1	TEMPERATURE CONTROL - PENN CAT. NO. 260ATO1-1142	M4B392	3 8	W-8119803		54600	S5900	1220	0
16	1	5/8" O.D. PACKLESS FREON-12 TWO WAY VALVE - MUELLER CAT. NO. A-13820	A19A398	2 0	W-8119610		54400	S5900	1170	1
17	1	3/8" O.D. STRAINER - METREX CAT. NO. 8760	A18A149	2 8	W-8119842		54400	S5900	1138	0
18	4	GASKET - STRAINER	C11A353	0 8	W-8119842	10	54400	S5900	1138	0
19	1	TEE 5/8" X 5/8" X 1/4" O.D. TUBE SIZE		0 3	W-8119669	9	54600	S5900	1243	0
20	1	TEE 3/8" X 3/8" X 1/4" O.D. TUBE SIZE		0 3	W-8119669	5	54600	S5900	1243	0
21	1	DIAL TYPE THERMOMETER	A19A423	5 8	W-8119828		54600	S5900	1239	0
22	1	REDUCING FITTING 3/8" X 1/4" O.D. TUBE SIZE		0 3	73SFG	71	51210	S3402	847822	0
23	1	REDUCING FITTING 5/8" X 1/4" O.D. TUBE SIZE		0 3	73SFG	70	51210	S3402	847822	0
		MISCELLANEOUS TOOLS								
31	1	1/4" REFRIGERANT CHARGING TUBE	A1A423	1 0	W-8119823		54700	S5900	1267	0
32	1	ALLEN SET SCREW WRENCH 5/32" HEXAGON		0 2						

IDENTIFICATION FOR WHICH PARTS AND TOOLS ARE INTENDED:-
SIZE 10 FROZEN FOOD CABINET 1/2HP 2 CYLINDER -
1 1/2" BORE - 1 1/4" STROKE ACCORDING TO BUREAU OF
SHIPS SPEC. 66R2.

WHEN REORDERING ALWAYS REFER TO MANUFACTURER'S CATALOG
OR SERIAL ORDERING DATA, PLAN NO., AND PIECE NO.
SERIAL NUMBER OF COMPRESSOR SHOULD ALSO BE GIVEN.

IDENTIFICATION FOR WHICH PARTS AND TOOLS ARE INTENDED:-
 REFRIGERATION HIGH SIDE ASSEMBLY 1/2 HP - 2 CYLINDERS
 1 1/2" BORE - 1 1/4" STROKE ACCORDING TO BUREAU OF
 SHIPS SPEC. 66R2.

WHEN REORDERING ALWAYS REFER TO MANUFACTURER'S CATALOG OR
 SERIAL ORDERING DATA, PLAN NUMBER AND PIECE NUMBER.
 SERIAL NUMBER OF COMPRESSOR SHOULD ALSO BE GIVEN.

ITEM NO.	NUMBER SUPPLIED	NAME OF SPARE PART	G.E. CAT. NO.	WEIGHT LBS. OZ.	G.E. & BUREAU PC.NO.	BUREAU FILE NO.		
						INDEX	GROUP	FILE NO. ALT.
1	1	3/8" OD PACKLESS FREON-12 TWO WAY VLV. - MUELLER #A13818	A19A397	1 12	W-8119610	54400	S5900	1170 1
2	1	1/4" OD SWEAT X 1/4" FLARE PACKLESS TYPE TWO WAY FREON-12 PURGE, DRAIN & CHARGING VALVE - MUELLER #A13859	A19A418	1 12	W-8119602	54400	S5900	1172 1
3	1	3/8" OD DEHYDRATOR - METREX CAT. #7461	A18A148	3 0	W-8119658	54400	S5900	1139 0
4	2	GASKET - DEHYDRATOR	C11A354	0 4	W-8119658	10	54400	S5900 1139 0
5	1	3/8" SIGHT FLOW INDICATOR - MUELLER CAT. NO. A-14028	A18A147	1 14	W-8119527	54400	S5900	1167 0
6	4	GASKET - SIGHT FLOW INDICATOR	C11A355	0 4	W-8119367	4	54400	S5900 1166 0
7	4	PACKING - SIGHT FLOW INDICATOR	C11A356	0 4	W-8119367	5	54400	S5900 1166 0
8	4	PACKING WASHER - SIGHT FLOW INDICATOR	C20B49	0 4	W-8119367	6	54400	S5900 1166 0
9	4	GASKET - SIGHT FLOW INDICATOR	C11A357	0 4	W-8119367	8	54400	S5900 1166 0
10	1	TEE 3/8" X 1/4" X 1/2" O.D. TUBE SIZE		0 3	W-8119698	148	54177	S5900 1102 0
11	1 SET	PRESSURE GAGE ADAPTER SET EACH CONSISTING OF	A1A422	1 0	W-8119824	512	54177	S5900 1123 0
11-1	2	FLARE CONNECTOR			W-8119824	512-1	54177	S5900 1123 0
11-2	2	COPPER TUBE			W-8119824	512-2	54177	S5900 1123 0
11-3	4	FLARE NUT			W-8119824	512-3	54177	S5900 1123 0
12	1	HIGH PRESSURE CUT-OUT - PENN CAT. NO. 262HAP08-2302	M4B387	3 8	W-8119661	54500	S5900	1221 0
13	3	COMPRESSOR BELTS "A" SECTION - PITCH LENGTH-39.82"	C4A152	1 2	W-8119698	111	54177	S5900 1102 0
14	1	LOW PRESSURE CUT-OUT - PENN CAT. NO. 260AP01-2306	M4B386	3 8	W-8119661	54500	S5900	1221 0
16	1	5/8" O.D. PACKLESS FREON-12 TWO WAY VLV. MUELLER #A13820	A19A398	2 0	W-8119610	54400	S5900	1170 1
18	1	TEE 5/8" X 5/8" X 1/4" O.D. TUBE SIZE		0 3	W-8119656	9	54500	S5900 1241 0
19	1	TEE 3/8" X 3/8" X 1/4" O.D. TUBE SIZE		0 3	W-8119656	5	54500	S5900 1241 0
		MISCELLANEOUS TOOLS						
31	1	1/4" REFRIGERANT CHARGING TUBE	A1A423	1 0	W-8119823	54700	S5900	1287 0
32	1	ALLEN SET SCREW WRENCH 5/32" HEXAGON		0 2				

LIST OF MISCELLANEOUS SPARE PARTS AND TOOLS
 Refrigeration High Side Assembly

LIST OF COMPRESSOR SPARE PARTS AND TOOLS

ITEM NO.	NUMBER SUPPLIED	NAME OF PART	G.E. CO. CAT. NO.	WEIGHT LBS. OZS.	DRAWING NUMBER			
					PIECE NO.	CONTRACTOR	BUREAU INDEX	PLAN GROUP
SHIPBOARD SPARES								
1	1	SUCTION & DISCHARGE VALVE PLATE ASSEMBLY CONSISTING OF	C10A334	1 4	44	W-8119635	54177	S5900 1109 0
	1	VALVE PLATE			45	W-8119635	54177	S5900 1109 0
	2	VALVE PLATE INSERT			502	W-8119635	54177	S5900 1109 0
	2	DISCHARGE VALVE DISC			46	W-8119635	54177	S5900 1109 0
	2	DISCHARGE VALVE RETAINER			47	W-8119635	54177	S5900 1109 0
	2	DISCHARGE VALVE BOLT			48	W-8119635	54177	S5900 1109 0
	2	VALVE BOLT SPACER			503	W-8119635	54177	S5900 1109 0
	2	SUCTION VALVE DISC			33	W-8119635	54177	S5900 1109 0
	2	DISCHARGE VALVE NUT			382	W-8119089	54172	S5900 1022 2
2	1	SUCTION VALVE DISC	C10A338	0 1	33	W-8119635	54177	S5900 1109 0
3	1	DISCHARGE VALVE DISC	C10A335	0 1	46	W-8119635	54177	S5900 1109 0
4	1	GASKET-VALVE PLATE TO CYLINDER HEAD	C11A348	0 3	51-1	W-8119640	54177	S5900 1110 0
5	1	GASKET-CRANKCASE TO VALVE PLATE	C11A349	0 3	36-1A	W-8119640	54177	S5900 1110 0
6	1	GASKET-CRANKCASE TO VALVE PLATE	C11A350	0 3	36-1B	W-8119640	54177	S5900 1110 0
7	1	GASKET-FRONT BEARING HEAD	C11A351	0 3	10	W-8119640	54177	S5900 1110 0
8	2	GASKET-SUCTION & DISCHARGE VALVE	C11A116	0 4	506	W-8119087	54172	S5900 1023 2
9	2	GASKET-SUCTION & DISCHARGE VALVE CAP	C11A347	0 2	8	W-8119644	54177	S5900 1112 0
10	8	GASKET-CYLINDER HEAD SCREW	C11A264	0 2	53	W-8119087	54172	S5900 1023 2
11	2	GASKET-ASSEMBLY PLUG	C11A352	0 2	508	W-8119087	54172	S5900 1023 2
12	1	GASKET-OIL SIGHT GLASS	C11A254	0 1	55	W-8119039	54172	S5900 1019 0
13	2	GASKET-SERVICE VALVE GAGE PORT CAP	A19X273	0 2	11	W-8119644	54177	S5900 1112 0
14	1	SHAFT SEAL ASSEMBLY CONSISTING OF	C16A204	0 12	15	W-8119632	54177	S5900 1106 0
	1	BELLOWS ASSEMBLY			16815C	W-8119632	54177	S5900 1106 0
	1	SPRING			17	W-8119632	54177	S5900 1106 0
	1	REMOVABLE SHAFT SEAL SHOULDER			18	W-8119632	54177	S5900 1106 0
	1	SEAL WASHER FOR SHOULDER			19	W-8119632	54177	S5900 1106 0
	1	SHAFT SEAL PROTECTOR			99	W-8119632	54177	S5900 1106 0
15	1	PISTON ASSEMBLY CONSISTING OF	C9A245	0 8	29	W-8119633	54177	S5900 1107 0
	1	PISTON			30	W-8119633	54177	S5900 1107 0
	1	PISTON PIN			31	W-8119633	54177	S5900 1107 0
	1	PISTON PIN SNAP RING			86	W-8119633	54177	S5900 1107 0
16	1	CONNECTING ROD ASSEMBLY CONSISTING OF	C9A241	0 7	24	W-8119633	54177	S5900 1107 0
	1	CONNECTING ROD			25	W-8119633	54177	S5900 1107 0
	1	CONNECTING ROD CAP			25A	W-8119633	54177	S5900 1107 0
	2	CONNECTING ROD CAP BOLT			26	W-8119633	54177	S5900 1107 0
	2	CAP BOLT LOCKWASHER			368	W-8119089	54172	S5900 1022 2
17	1	5/8" O.D. TUBE SIZE COMPRESSOR SUCTION STOP VALVE MUELLER CAT. B-31380	C1A121	1 4		W-8119644	54177	S5900 1112 0
18	1	1/2" O.D. TUBE SIZE COMPRESSOR DISCHARGE STOP VALVE MUELLER CAT. B-31379	C1A120	1 4		W-8119644	54177	S5900 1112 0
19	1	RETAINING WASHER GASKET	C20A867	0 2	57	W-8119039	54172	S5900 1019 0
20	1	OIL FILL PLUG GASKET	C11A141	0 2	65	W-8119087	54172	S5900 1023 2
SHIPBOARD TOOLS								
31	1	SHAFT SEAL INSTALLING TOOL	A18A163	0 11	91	W-8119824	54177	S5900 1123 0
32	1	1/4" RATCHET WRENCH	A18A144	0 4				
33	1	3/16" ALLEN SET SCREW WRENCH			0 2			
34	1	1/4" ALLEN SET SCREW WRENCH			0 2			
IDENTIFICATION FOR WHICH SPARE PARTS INTENDED: 1 1/2" BORE-1 1/4" STROKE-2 CYLINDER COMPRESSORS.					WHEN RE-ORDERING ALWAYS REFER TO MANUFACTURER'S CATALOG OR SERIAL ORDERING DATA PLAN NO. AND PIECE NO. SERIAL NUMBER OF COMPRESSOR SHOULD ALSO BE GIVEN.			

FROM G. E. DWG. W-8119651 (Rev.)

LIST OF SPARE PARTS - MOTOR CONTROLLER, COMPRESSOR MOTOR

COMPRESSOR MOTOR

MODEL 5BC66AB1750-FROM BU.SHIPS PLAN NO. S5901-837939

ITEM NO.	NO. PER SET	NAME OF SPARE PART	MANUFACTURER'S CATALOG OR SERIAL ORDER-ING DATA
1	2	BALL BEARING	5855279A02
2	2	BRUSH, SPRING, P.T. & TERM.	8100097AA2
3	3	FIELD COILS COMPLETE	8705648AB1
4	1	ARMATURE COMPLETE	8707677AA1
	2	BRUSH HOLDER & INSUL.	8100089AA2
5	2	INSULATED SCREW CAP	8125252AA2
	2	PREMITE WASHER	5895849AA1

MOTOR CONTROLLER

TYPE CR5894-B14H-FROM BU.SHIPS PLAN NO. S5901-837674

ITEM NO.	NO. PER SET	NAME OF SPARE PART	MANUFACTURER'S CATALOG OR SERIAL ORDER-ING DATA
1A	1	STAT. CONT. ASSEM.	*U-1117G16
1B	3	MOVABLE CONTACT	*U-1116G3
1C	1	SPRING (TOGGLE)	2417187
1D	1	SPRING (LIFT)	2417188
1E	1	SPRING (RELEASE)	2417189
1F	3	SPRING (CONTACT)	*U-1116G5
2	1	HEATER	810330

* INDICATES TRUMBULL ELECTRIC MFG. CO. DRG.

REFERENCE PLAN LIST

Sizes 10 and 20, Drinking Water Coolers

BUREAU FILE NO.			TITLE OF PLAN	G.E. PLAN NO.	USED ON		
INDEX	GROUP	FILE NO.	ALT.		SIZE 10	SIZE 20	
53310	S3603	847859	0	WATER COOLER ASSEMBLY	W-8119840	X	
53320	S3603	847883	0	WATER COOLER ASSEMBLY	W-8119841		X
53310	S3603	847857	0	UNIT REFRIGERATING SYSTEM	W-8119831	X	X
54177	S5900	1103	0	SECTIONAL ASSEMBLY 1 1/2" X 1 1/4" 2 CYLINDER COMP.	W-8119829	X	X
54177	S5900	1104	0	LIST OF MATERIAL, COMPRESSOR SPARES & SPECIAL TOOLS	W-8119851	X	X
54177	S5900	1105	0	CRANKCASE, CRANKSHAFT, ETC.	W-8119830	X	X
54177	S5900	1108	0	CYLINDER HEAD, FRONT BEARING HEAD & SUCTION STRAINER	W-8119834	X	X
54177	S5900	1107	0	CONNECTING ROD & PISTON ASSEMBLY & DETAILS	W-8119833	X	X
54177	S5900	1106	0	SHAFT SEAL ASSEMBLY	W-8119832	X	X
54177	S5900	1109	0	SUCTION & DISCHARGE VALVE PLATE ASSEM. & DETAILS	W-8119835	X	X
54177	S5900	1113	0	MISCELLANEOUS COMPRESSOR DETAILS	W-8119831	X	X
54177	S5900	1111	0	FLYWHEEL & PULLEY	W-8119842	X	X
54177	S5900	1112	0	COMPRESSOR SUCTION & DISCHARGE STOP VALVE	W-8119844	X	X
54177	S5900	1110	0	COMPRESSOR BODY GASKETS	W-8119840	X	X
54177	S5900	1123	0	SHAFT SEAL INSTALLING TOOL & GAUGE ADAPTERS	W-8119824	X	X
54700	S5900	1257	0	1/4" REFRIGERANT CHARGING TUBE	W-8119823	X	X
54172	S5900	1019	0	OIL SIGHT GLASS ASSEMBLY & DETAILS	W-8119039	X	X
54172	S5900	1022	2	UNIVERSAL DETAILS	W-8119089	X	X
54172	S5900	1023	2	MISCELLANEOUS SMALL GASKETS	W-8119087	X	X
53310	S3603	847854	0	MOTOR COMPRESSOR ASSEMBLY	W-8119817	X	X
53310	S3603	847853	0	MOTOR COMPRESSOR BASE ASSEMBLY & DETAILS	W-8119816	X	X
54293	S5900	1061	0	VERTICAL LIQUID RECEIVER	W-8119815	X	X
54200	S5900	1060	0	68 SQ. FT. AIR COOLED CONDENSER ASSEMBLY	W-8119818	X	X
54177	S5900	1116	0	FAN	W-8119648	X	X
53310	S3603	847847	0	COOLING UNIT ASSEMBLY	W-8119807	X	X
53310	S3603	847848	0	TANK & COIL ASSEMBLY	W-8119808	X	X
53310	S3603	847849	0	MISCELLANEOUS FITTINGS	W-8119809	X	X
53310	S3603	847850	0	MISCELLANEOUS COOLING UNIT DETAILS	W-8119810	X	X
53310	S3603	847851	0	COOLING UNIT CASE ASSEMBLY & DETAILS	W-8119811	X	X
53310	S3603	847852	0	CABINET TOP ASSEMBLY	W-8119812	X	
53320	S3603	847882	0	CABINET TOP ASSEMBLY	W-8119813		X
53310	S3603	847862	0	3/8" STREAM REGULATOR VALVE	W-8119814	X	X
53310	S3603	847842	0	CABINET TOP	W-8119683	X	
53320	S3603	847881	0	CABINET TOP	W-8119684		X
53310	S3603	847841	0	FRAME ASSEMBLY & DETAILS	W-8119668	X	X
53310	S3603	847844	0	FRONT & SIDE PANELS & MISCELLANEOUS DETAILS	W-8119690	X	X
54177	S5900	1117	0	MISCELLANEOUS UNIT DETAILS	W-8119801	X	X
54400	S5900	1170	1	PACKLESS TWO WAY VALVES	W-8119510	X	X
54400	S5900	1172	1	PACKLESS TYPE TWO PURGE, DRAIN & CHARGING VALVE	W-8119602	X	X
54400	S5900	1166	0	SIGHT FLOW INDICATOR DETAILS	W-8119367	X	X
54400	S5900	1187	0	3/8" SIGHT FLOW INDICATOR	W-8119527	X	X
54400	S5900	1173	0	PACKLESS TYPE TWO WAY GAUGE & CONTROL LINE VALVES	W-8119657	X	X
54400	S5900	1139	0	DEHYDRATOR-3/8" O.D. TUBE SIZE	W-8119658	X	X
54500	S5900	1192	0	THERMOSTATIC EXPANSION VALVE & BULB CLAMP	W-8119659	X	X
54500	S5900	1221	0	HIGH PRESSURE & LOW PRESSURE CUT-OUTS	W-8119661	X	X
54500	S5900	1220	0	TEMPERATURE CONTROLS WITH EXTERNAL ADJUSTMENT	W-8119803	X	X
53310	S3603	847843	0	BUBBLER GUARD ASSEMBLY & DETAILS	W-8119685	X	X
53310	S3603	847846	0	COOLING UNIT OUTLET VALVE	W-8119689	X	X
53310	S3603	847845	0	BUBBLER VALVE	W-8119694	X	X
53310	S3603	847855	0	PITCHER FILLER	W-8119829	X	X
53310	S3603	847856	0	BUBBLER VALVE & PITCHER FILLER DETAILS	W-8119830	X	X
54700	S5900	1251	1	NAMEPLATES	W-8119090	X	X
53310	S3603	847861	0	EXTERNAL WIRING DIAGRAM & DETAILS	W-8119845	X	X
53310	S3603	847840	0	INSTALLATION PLAN	W-8119870	X	
53320	S3603	847880	0	INSTALLATION PLAN	W-8119871		X
53310	S3603	847858	0	SCHEMATIC DIAGRAM OF REFRIGERANT & WATER PIPING	W-8119832	X	X
53310	S3603	847858	0	MOTOR	W-8119840	X	X
96013	S6303	756165	0	MAGNETIC CONTROLLER	11K2713-2	X	X
96013	S6307	789128	0	CERTIFICATION DATA SHEETS - 2 SHEETS	K-8705618AA	X	X
55901	S842466		0	CERTIFICATION DATA SHEETS - 3 SHEETS	K-8632493AA	X	X
55901	S837674		0				

REFERENCE PLAN LIST
Sizes 8 and 16, Reach-in Refrigerators

BUREAU FILE NO.				TITLE OF PLAN	G.E. PLAN NO.	USED ON	
INDEX	GROUP	FILE NO.	ALT.			SIZE 8	SIZE 16
53508	S3402	847906	0	MACHINERY COMPARTMENT	W-8119802	X	
53516	S3402	847933	0	MACHINERY COMPARTMENT	W-8119804		X
54177	S5900	1103	0	SECTIONAL ASSEMBLY 1 1/2" X 1 1/4"-2 CYL.COMPRESSOR	W-8119629	X	X
54177	S5900	1104	0	LIST OF MATERIAL, COMPRESSOR SPARES & SPECIAL TOOLS	W-8119651	X	X
54177	S5900	1105	0	CRANKCASE, CRANKSHAFT, ETC.	W-8119630	X	X
54177	S5900	1106	0	CYLINDER HEAD, FRONT BEARING HEAD & SUCTION STRAINER	W-8119634	X	X
54177	S5900	1107	0	CONNECTING ROD & PISTON ASSEMBLY & DETAILS	W-8119633	X	X
54177	S5900	1108	0	SHAFT SEAL ASSEMBLY	W-8119632	X	X
54177	S5900	1109	0	SUCTION & DISCHARGE VALVE PLATE ASSEM. & DETAILS	W-8119635	X	X
54177	S5900	1113	0	MISCELLANEOUS COMPRESSOR DETAILS	W-8119631	X	X
54177	S5900	1111	0	FLYWHEEL & PULLEY	W-8119642	X	X
54177	S5900	1112	0	COMPRESSOR SUCTION & DISCHARGE STOP VALVE	W-8119644	X	X
54177	S5900	1110	0	COMPRESSOR BODY GASKETS	W-8119640	X	X
54177	S5900	1123	0	SHAFT SEAL INSTALLING TOOL & GAUGE ADAPTERS	W-8119824	X	X
54700	S5900	1257	0	1/4" REFRIGERANT CHARGING TUBE	W-8119823	X	X
54172	S5900	1019	0	OIL SIGHT GLASS ASSEMBLY & DETAILS	W-8119039	X	X
54172	S5900	1022	2	UNIVERSAL DETAILS	W-8119089	X	X
54172	S5900	1023	2	MISCELLANEOUS SMALL GASKETS	W-8119087	X	X
54177	S5900	1101	0	CONDENSING UNIT ASSEMBLY	W-8119650	X	X
54177	S5900	1114	0	BASE AND DETAILS	W-8119645	X	X
54177	S5900	1115	0	BELT GUARD ASSEMBLY & DETAILS	W-8119646	X	X
54200	S5900	1059	0	51 SQ.FT. AIR COOLED CONDENSER ASSEMBLY	W-8119647	X	X
54177	S5900	1116	0	FAN	W-8119648	X	X
54205	S5900	1063	0	VERTICAL LIQUID RECEIVER	W-8119649	X	X
53508	S3402	847901	0	FRAME ASSEMBLY & DETAILS	W-8119665	X	
53516	S3402	847937	0	FRAME ASSEMBLY & DETAILS	W-8119663		X
53508	S3402	847902	0	BACK PANEL ASSEMBLY	W-8119666	X	
53516	S3402	847938	0	BACK PANEL ASSEMBLY	W-8119664		X
54177	S5900	1117	0	MISCELLANEOUS UNIT DETAILS	W-8119801	X	X
53508	S3402	847903	0	ICE MAKER COOLING UNIT ASSEMBLY	W-8119680	X	X
53508	S3402	847905	0	ICE TRAY,SEPARATOR ASSEMBLY & DETAILS	W-8119682	X	X
53508	S3402	847904	0	MISCELLANEOUS ICE MAKER DETAILS	W-8119681	X	X
54400	S5900	1167	0	3/8" SIGHT FLOW INDICATOR	W-8119627	X	X
54400	S5900	1166	0	SIGHT FLOW INDICATOR DETAILS	W-8119367	X	X
54400	S5900	1172	1	PACKLESS TYPE TWO WAY PURGE, DRAIN & CHARGING VALVES	W-8119602	X	X
54400	S5900	1170	1	PACKLESS TWO WAY VALVES	W-8119510	X	X
54400	S5900	1173	0	PACKLESS TYPE TWO WAY GAUGE & CONTROL LINE VALVES	W-8119657	X	X
54400	S5900	1139	0	DEHYDRATOR - 3/8" O.D. TUBE SIZE	W-8119688	X	X
54500	S5900	1221	0	HIGH PRESSURE & LOW PRESSURE CUT-OUTS	W-8119661	X	X
54500	S5900	1192	0	THERMOSTATIC EXPANSION VALVE & BULB CLAMP	W-8119659	X	X
54500	S5900	1220	0	TEMPERATURE CONTROLS WITH EXTERNAL ADJUSTMENT	W-8119803	X	X
54700	S5900	1251	1	NAMEPLATES	W-8119090	X	X
53508	S3402	847900	0	EXTERNAL WIRING DIAGRAM & DETAILS	W-8119847	X	
53516	S3402	847936	0	EXTERNAL WIRING DIAGRAM & DETAILS	W-8119849		X
53508	S3402	847890	0	INSTALLATION PLAN	W-8119672	X	
53516	S3402	847930	0	INSTALLATION PLAN	W-8119673		X
53508	S3402	847897	0	SCHEMATIC DIAGRAM OF REFRIGERANT PIPING	W-8119836	X	
53516	S3402	847934	0	SCHEMATIC DIAGRAM OF REFRIGERANT PIPING	W-8119837		X
96013	S6301	756165	0	MOTOR(D.C.)	W-8118640	X	X
96013	S6307	769128	0	MAGNETIC CONTROLLER (D.C.MOTOR)	I1K2713-2	X	X
	S5901	842466	0	CERTIFICATION DATA SHEETS (D.C.MOTOR)-2 SHEETS	K-8705618AA	X	X
	S5901	837674	0	CERTIFICATION DATA SHEETS (D.C.CONTROLLER)-3 SHEETS	K-8632493AA	X	X
54508	S3402	847891	0	SIZE 8 REFRIGERATOR ASSEM. & DETAILS	BB-50-01	X	
				SIZE 16 REFRIGERATOR ASSEM. & DETAILS	B16-75-03		X
54508	S3402	847896	0	REACH-IN REFRIGERATORS-MISC.PARTS & DETAILS	BB-55-02	X	X

G-E DWGS., W-8119861 & W-8119863 (8 & 16 R.I., DC)