Carrier
A United Technologies Company

REPLACEMENT COMPONENTS DIVISION

SERVICE BULLETIN

SUBJECT: Pumpout Units

NUMBER: CA-SB-19-C-68-41
DATE: 1-11-68
SUPERSEDES:
DATE:
PAGE: 1 of 20

MODELS AFFECTED: 17CA, 17DA, 17M,P,S & 19C Chillers

PURPOSE:

To transmit Installation, Operation, and Service Parts Instructions pertaining to the standard pumpout unit.

MACHINES AFFECTED:

17CA, 17DA, 17M, P, S, and 19C machines provided with pumpout units.

PROCEDURE:

The attached instructions are issued to cover procedures pertaining to the standard pumpout unit.

INSTALLATION, OPERATION AND SERVICE PARTS INSTRUCTIONS
PUMPOUT UNIT
17CA, 17DA, 17M, P, S, & 19C CENTRIFUGAL MACHINES

PUMPOUT UNIT

The standard pumpout unit consists of a reciprocating compressor, oil separator, water-cooled condenser, pressure reducing device (float valve), and storage tank.

This unit provides two important functions:

(a) Capability of transferring the refrigerant into a storage tank which enables the machine to be opened without losing any refrigerant.

(b) Capability of distilling the refrigerant charge, thereby removing all impurities from the refrigerant.

1. Transferring the Refrigerant

Figure 1 shows a typical pumpout system with the cooler and storage tank on the same level. To transfer liquid from the cooler to the storage tank, the hand valves are set to permit the pumpout compressor to discharge into the cooler while taking its suction from the storage tank. The pressure differential thus created forces the liquid from the cooler into the storage tank. This method of transfer also applies when the storage tank is located above the cooler.

It is desirable to locate the storage tank so that its top is below the bottom of the cooler. Then, by opening the proper valves, it is possible to vent the storage tank to the cooler, and the liquid will drain by gravity.

To transfer refrigerant from the machine to the storage tank, open valves 5, 7, 6, 2, and 12 (Fig. 1), close the remaining valves, and operate the pumpout compressor. This takes a suction on the storage tank and pressurizes the machine. When the pressure in the storage tank is reduced to less than that of the machine, open valve 11. This permits flow of the refrigerant from the machine to the storage tank.

After all the liquid is transferred, the remaining refrigerant vapor can be drawn off by taking a suction on the machine and discharging through the pumpout unit condenser into the storage tank. This is done by opening valves 12, 3, 7, 6, 8, and 9, while closing the remaining valves. During this operation, assure that there is water flow through the pumpout condenser. This will condense the refrigerant prior to its entering the storage tank.

The high pressure cut-out is set to prevent excessive pressure which could cause the rupture disc to blow and, consequently, lose the refrigerant charge. The normal pumpout condensing temperature is 100°F at maximum load.

During evacuation of the cooler, any liquid remaining in the cooler shell will flash off. This may lower the temperature in the cooler enough to freeze the "brine."* For this reason, it is essential that all liquid refrigerant be removed from the cooler before evacuation is started. When complete drainage is not assured, the brine pump must be operated during evacuation of the cooler.

To transfer the liquid from the storage tank to the cooler, operate the pumpout compressor with the appropriate valves set to pressurize the storage tank and take its suction from the cooler. The pressure in the cooler is lowered to a corresponding saturated refrigerant liquid temperature equal to 2° above the brine freezing temperature. The proper valves are then set so that the pressure difference between the two vessels forces the liquid from the storage tank to the cooler.

To charge the machine from the storage tank, take a suction on the cooler and discharge into the storage tank by opening valves 12, 3, 7, 6, and 4 (Fig. 1), and closing the remaining valves. When there is a pressure differential, open Valve 11 and refrigerant will flow into the cooler. Again, care must be taken to assure that cooler water is being circulated to prevent freeze-up.

*Brine is the fluid passing through the cooler tubes, and may be water or another chilled liquid.

2. Use of the Centrifugal Compressor

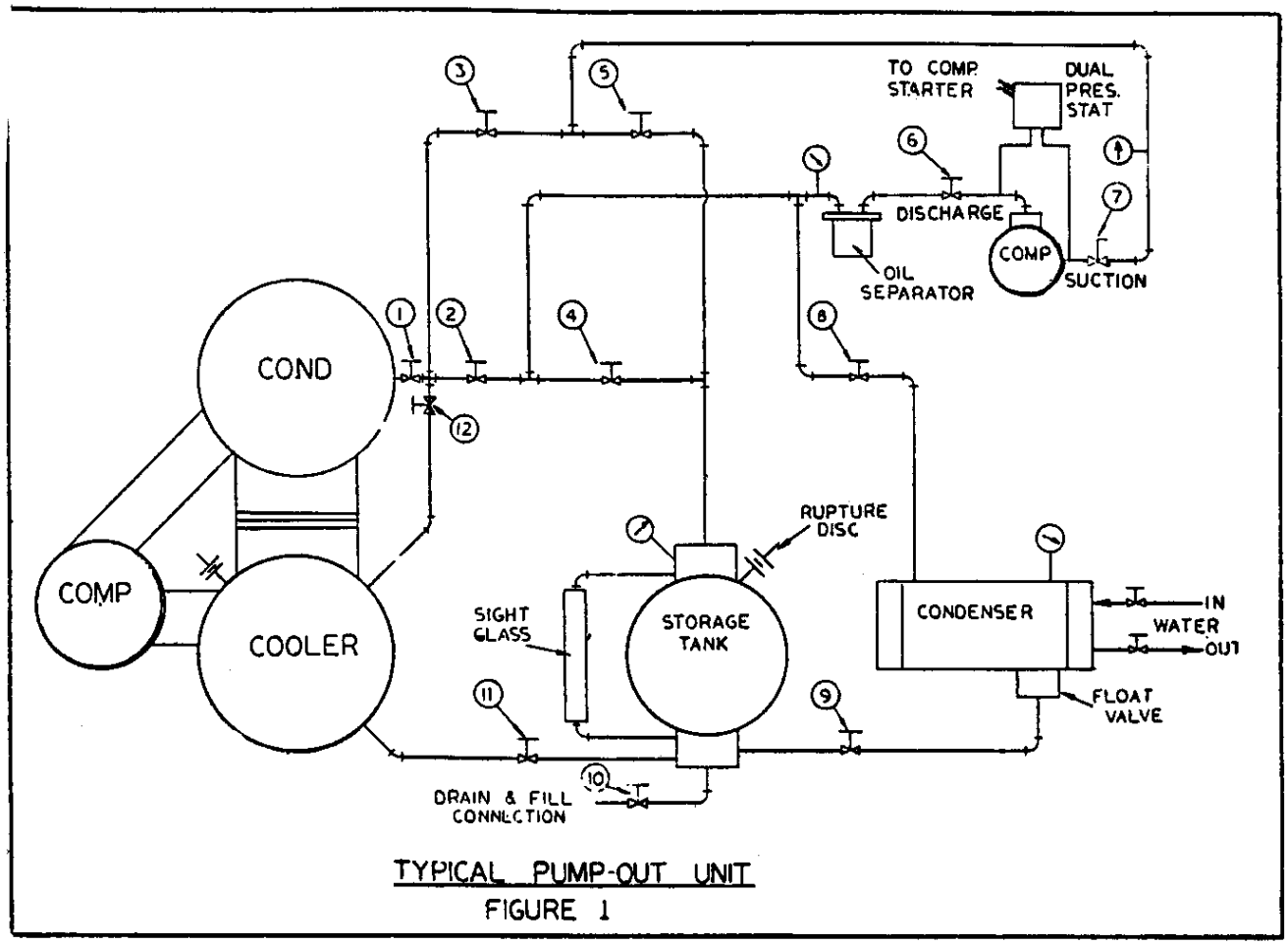
Under certain circumstances, it may be found that the 5F20 compressor must be operated for a very long time to build up enough pressure in the storage tank to return refrigerant to the cooler. This can occur, for example, when a large storage tank has a large charge of very cold refrigerant. In this case, the hot gas from the compressor will be condensed by the cold refrigerant with a very slow build-up in temperature and pressure.

The rate of transfer of refrigerant to the cooler may be increased by running the centrifugal compressor to lower the cooler pressure and, if necessary, the storage tank can be pressurized by bleeding pressure from the machine condenser to the storage tank. *Care must be taken, however, to prevent blowing the rupture disc of the storage tank.*

Other precautions that must be taken when using the centrifugal compressor in this manner are: Assure a flow of brine through the cooler to minimize the possibility of a freeze-up. The suction damper must be maintained in a minimum position, a careful watch of the suction pressure gage must be kept, and the cooler pressure must be maintained above the freezing point of the brine. Also, maintain a safe temperature on all the compressor bearings during this operation.

3. Distilling the Charge

To distill the charge, take a suction from the storage tank (which contains the refrigerant), and discharge into the machine condenser as follows: Open valves 5, 7, 6, 2, and 1 (Fig. 1), while closing the remaining valves. During this operation, circulate condensing water to condense the refrigerant as it enters the machine. The impurities in the refrigerant will be left in the storage tank and must be drained off through Valve 10.



TYPICAL PUMP-OUT UNIT
FIGURE 1

4. System Limitations

To transfer liquid from one vessel to another requires either a difference in elevation to permit gravity flow, or a difference in pressure between the two vessels to force the flow of liquid. The latter method requires lowering the pressure in one vessel which, if there is liquid in the vessel, means reducing its temperature and, simultaneously, increasing the pressure in the other vessel.

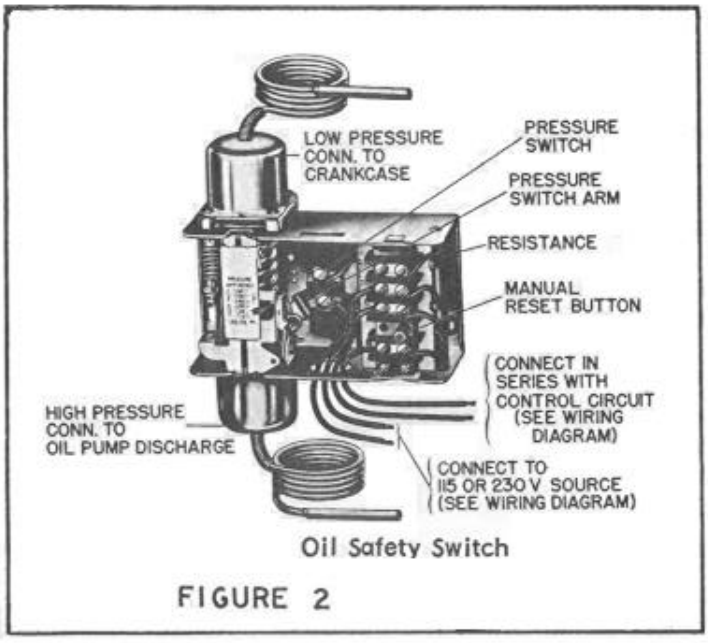
On most applications, this is not a problem. However, applications such as low temperature jobs, outdoor installations, or installations with high temperature differentials between the storage tank and the cooler require a careful study of the problems that can develop in transferring the refrigerant.

In some cases, it may be necessary to add auxiliary heat to one of the vessels or to insulate the storage tank where high ambient temperatures or sun load make it difficult to reduce the temperature and pressure in the vessel. All storage tanks located outdoors must have a cover or roof over the tank to be sure that the pressure in the tank does not exceed the relief pressure setting.

Sound engineering judgment must be used on all pumpout systems to determine their limitations on a particular application.

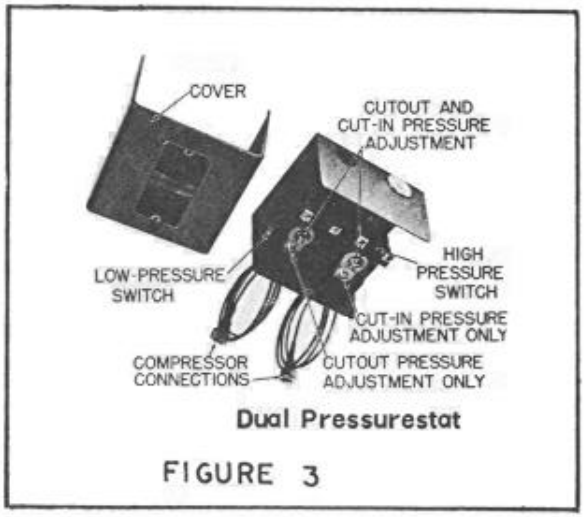
4.5 Pumpout System Adjustments

Each pumpout unit is supplied with an oil safety switch (Fig. 2), and a dual pressurestat (Fig. 3). A description of these switches follows.



Oil Safety Switch

FIGURE 2



Dual Pressurestat

FIGURE 3

5. Oil Safety Switch

The oil safety switch is provided to sense the oil pressure differential between the oil reservoir and pump discharge. The switch contains two switches and a heater element. If the oil temperature falls below the cut out pressure (see Table 1), the oil pressure differential switch closes, which energizes the heater element which, in turn, opens the oil pump failure switch (a thermostatic type switch) that shuts the compressor off. If the oil pressure increases to above the cut-in pressure, the oil pressure differential switch opens, de-energizes the heater element and, in turn, the oil pump failure switch closes. This operation is covered in more detail under 4.8, Controls.

6. Dual Pressurestat

The dual pressurestat consists of a high and low pressure safety switch.

(a) High Pressure Switch. This switch measures pumpout unit compressor discharge pressure and will open when the pressure corresponds to a temperature of approximately 125°, thus shutting the compressor off. These pressure settings vary, depending upon the type of refrigerant used (see Table 1). The switch will close again at a pressure corresponding to approximately 100°.

(b) Low Pressure Switch. This switch measures compressor suction pressure and will open when the pressure corresponds to a temperature of approximately 38°, thus shutting the compressor off. Again, these values vary, depending upon the type of refrigerant (Table 1). This switch will close again at a pressure corresponding to approximately 50°.

Table 1. Suggested Pressure Settings

	Dual Pressurestat (psig)*				Oil Safety Switch		Normal Oil
	High Pressure		Low Pressure		Cut-out	Cut-in	Pressure
Refrigerant	Cut-out	Cut-in	Cut-out	Cut-in	(psid)**	(psid)	(psid)
114	50	30	1	10	11-14	16-19	45-55
12	165	115	36	67	11-14	16-19	45-55
500	190	140	44	60	11-14	16-19	45-55

* Settings given are for water chilling application. For other applications, set the low pressure cut-out to atmospheric pressure or to a pressure corresponding to a temperature equal to 5° above the freezing temperature of the brine, whichever is highest. The high pressure switch and oil safety switch settings remain as shown.

** Differential pressure (between oil reservoir and pump discharge).

7. Storage Tank Safeties

Table 2 summarizes the rupture disc and/or safety relief valve settings on the pumpout storage tank. Field adjustment is not required on these devices. Check device nameplate against Table 2.

Table 2. Pumpout Storage Tank Safety Device

System Refrigerant	Rupture Disc/Relief Valve (psig)
114	60
12	185
500	225

8. Controls

The schematic wiring diagrams for a pumpout unit are shown in Figs. 4 and 5. They differ only in respect to the power source to the compressor motor. Figure 4 shows a high voltage motor.

The following is a step-by-step explanation of the operation of the control circuit, using Fig. 4 as a guide. The control circuit uses 110 volt power. A CR relay, located across one of the power legs from the starter to the compressor motor, is also part of this circuit. To simplify, the circuit will be divided into three sub-circuits; namely, the crankcase heater (Branch A), the safety (Branch B), and the oil pressure circuit (Branch C). Also, the various connections will be alpha-numerically numbered.

When the start switch is depressed, power is available to the compressor starter (c) relay, bypassing from B1 through the normally closed stop switch to B2, through the now closed start button to B3, through the normally closed oil pump failure safety switch to B4, through the normally closed low pressure switch to B5, through the normally closed high pressure switch and a set of overloads to the relay, and on to ground at B6.

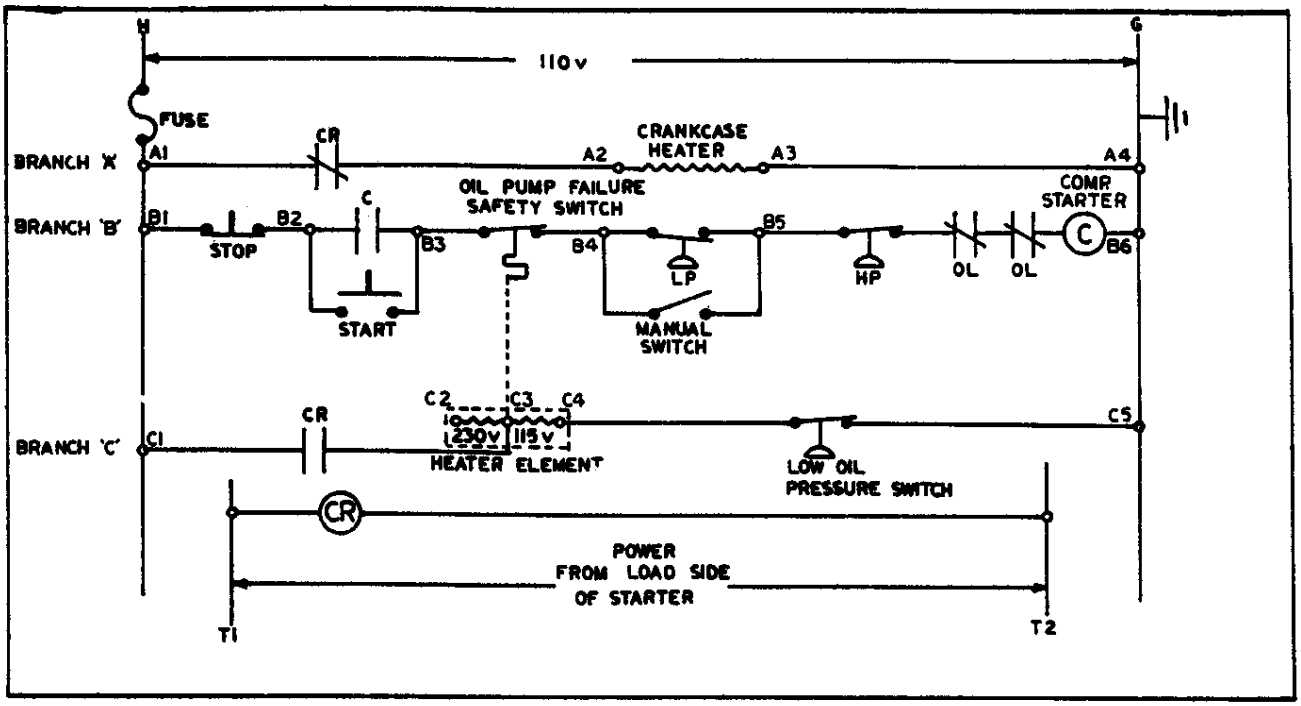


FIGURE 4

Pumpout System Schematic Wiring Diagram for Compressor Motor Voltage **other** than 230

When the relay (C) is energized, the starter contacts close and power is supplied to the compressor motor, the C contact in parallel with the start button closes, making the circuit from B2 to B3, which allows the start button to be released, and the safety circuit (Branch B) is energized and self-sustaining.

When power is applied to the compressor motor, the CR relay located across one of the legs of T1 and T2 is energized. As a result of CR relay being energized, the set of normally closed CR contacts in the crankcase heater circuit (Branch A) opens and the set of normally open CR contacts in the oil pressure circuit (Branch C) closes. With the CR contacts in Branch A open, the power is interrupted between A1 and A2 thus de-energizing the crankcase heater. With the CR contacts in Branch C closed, power is available from C1 to C3; thus the heater element would energize. However, the low oil pressure switch opened when the compressor started and oil pressure built up so power is interrupted from C4 to C5, thus de-energizing the heater elements. At this stage, the compressor is operating normally and all switches are in their operating position.

To stop the compressor, one of the safeties must be actuated, or the stop button must be pushed.

If the stop button is pushed, the opposite of the starting sequence occurs. The C relay is de-energized, the compressor starter contacts open, de-energizing the compressor motor, and the C contacts in Branch B open, interrupting power between B2 and B3, thus opening the safety subcircuit (Branch B) which requires depressing the start button to restart. With the compressor motor de-energized, the CR relay is de-energized. As a result, the CR contacts in Branch A close, allowing power to A2, energizing the crankcase heater to A3, and on to ground at A4. Also, the CR contacts in Branch C open, interrupting power between C1 and C3, thus preventing any power from passing through the heater element by opening Branch C.

If the high or low pressure switch should open (by the pressure settings as listed in Table 1 being exceeded), the sequence of events will be the same as just described. By manually closing the jumper switch from B4 to B5, the low pressure switch is bypassed. This enables the machine to pump down to any pressure, usually atmospheric, without the pumpout compressor cycling off due to low pressure.

If oil pressure should fail while the compressor is operating, the low oil pressure switch will close. In review, when the compressor is operating, the CR contacts in Branch C are closed. Thus, with the closing of the low oil pressure switch, power is available across the heater element to ground at C5, which results in the element heating up. This, in turn, causes the oil pump failure safety switch (a thermostatic switch) to open, interrupting power from B3 to B4, thus opening Branch B and, again, causing the same sequence of events as described in pushing the stop button. A momentary loss in oil pressure will not necessarily cause the compressor to shut off, since there is a time lag in the oil safety switch; namely, the time it takes for the element to heat up sufficiently to open the oil pump failure safety switch.

Figure 5 is similar to Fig. 4, except that a 230 V compressor is used. In this application, the low oil pressure switch and heater element of the oil safety switch can be wired across the 230 V source, eliminating one set of CR contacts. Both methods of wiring are equally acceptable.

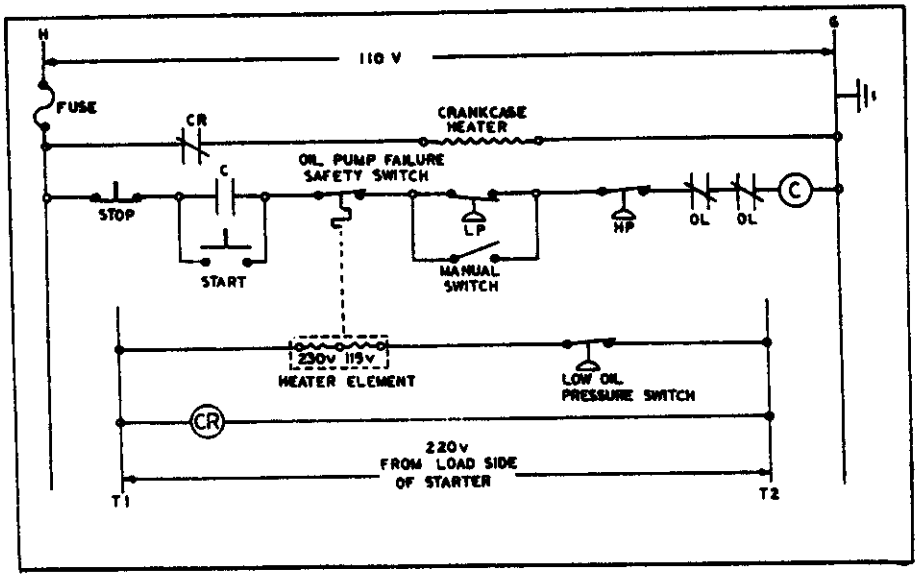


FIGURE 5

Pumpout System Schematic Wiring Diagram (Compressor Motor Voltage of 230/3/60)

NOTE: The oil pressure switch is shown schematically as three separate devices. Actually, they are all contained within one switch box as shown in Fig. 2. The control consists of a low oil pressure switch which opens with an increase in pressure and closes with a decrease in pressure. Next, a heater element which can be wired across 230 or 110 V, depending upon the availability of 230 V, which heats up whenever the low oil pressure switch is closed and power is available to it. Last, an oil pump failure safety switch (normally closed thermostatic switch) which will open whenever the heater element is energized long enough to raise its temperature above a predetermined setting.

9. Assembly and Parts

Figure 6 shows a direct drive pump-out unit with explosion proof controls, showing the compactness of the unit.

The standard storage tanks for R-114 and R-12 are shown in Figs. 7 and 7A, respectively. The two types of condensing units, direct drive and belt driven, are shown on Figs. 8 and 9, respectively, with the parts called out for each unit.

NOTE: On installations requiring explosion-proof controls, the direct drive unit is supplied.

The installation details for the standard pumpout unit used with R-114 machines are shown in Fig. 10. The details for units using R-12 are similar, and each job will be provided with a layout drawing.

Pumpout units for R-500, R-22, or other special applications, such as large volume requirements, are obtainable through special orders.

a. Items Supplied by Carrier, Syracuse, and Factory Assembled

- 5F20 (5F40, special order only) belt driven compressor. (Direct drive on explosion proof units.)
- 5F20 condenser (5F40, special order only).
- Oil separator.
- Dual high and low pressure cut-out switch, 110/220 volt.
- Oil safety switch, 110/220 volt.
- Crankcase oil heater, 100 watts, 110 volts.
- Float valve(s).
- Suction and discharge gages.
- Special control enclosure (weatherproof, explosion-proof, if required).

b. Items Not Furnished by Carrier, Syracuse

- Motor starter. Must be order for 110 volt holding coil.
- Special control relays required (see 4.8, Controls).
- Interconnecting refrigerant valves and piping.
- Control relays
- Momentary contact switch.

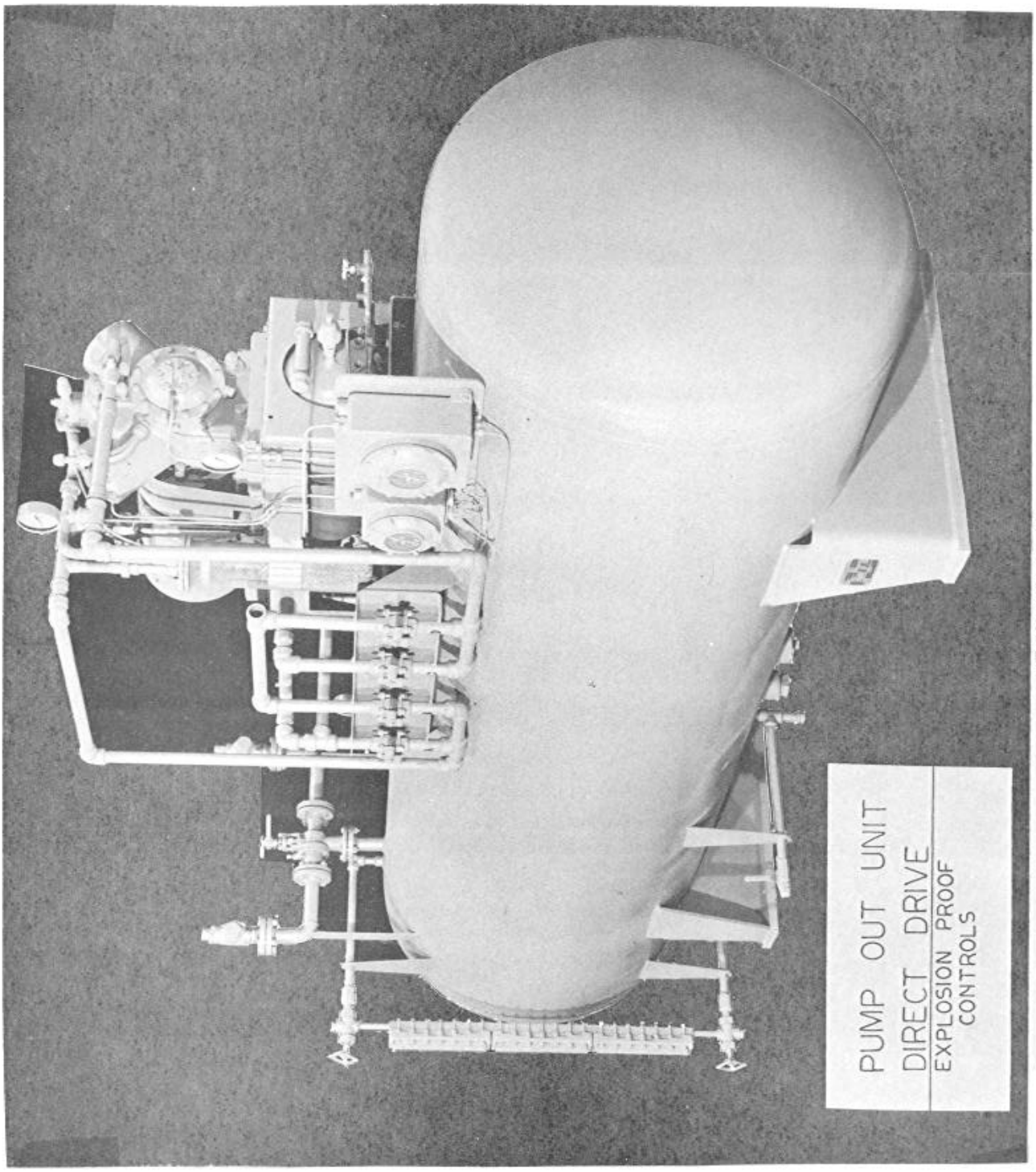
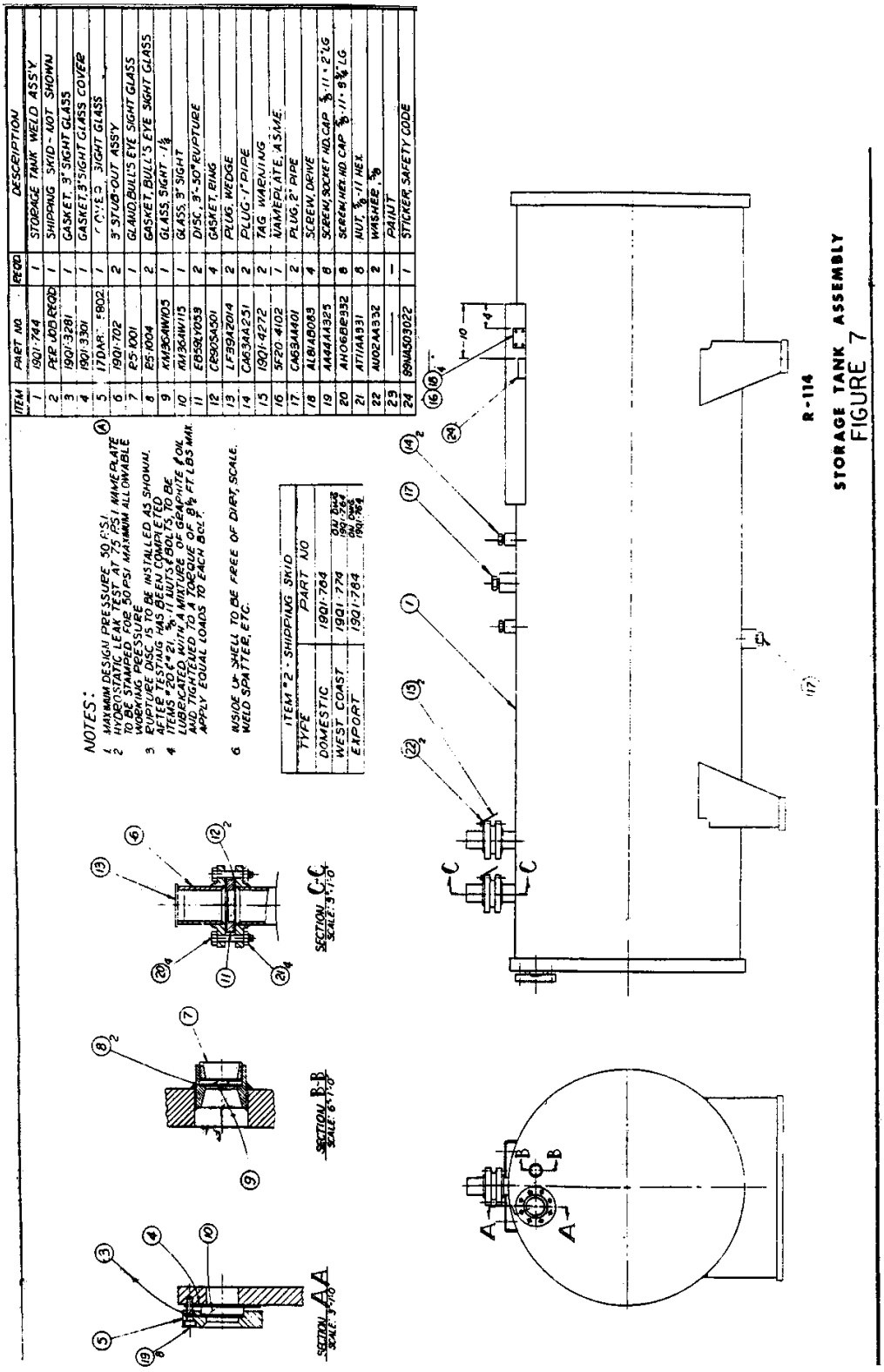


FIGURE 6



ITEM NO.	PART NO.	REQD.	DESCRIPTION
1	1901-744	1	STORAGE TANK WELD ASS'Y
2	PER JOB REQD	1	SHIPPING SKID - NOT SHOWN
3	1901-3281	1	GASKET, 3" SIGHT GLASS
4	1901-3301	1	GASKET, 3" SIGHT GLASS COVER
5	17DAR-5802	1	CLEED SIGHT GLASS
6	1901-702	2	3" STUB-OUT ASS'Y
7	E5-1001	1	GLAND, BULL'S EYE SIGHT GLASS
8	E5-1004	2	GASKET, BULL'S EYE SIGHT GLASS
9	KM36AW105	1	GLASS, SIGHT - 1½
10	KM36AW115	1	GLASS, 3" SIGHT
11	E858LY059	2	DISC, 3"-50# RUPTURE
12	C8905A501	4	GASKET, RING
13	LF39A2014	2	PLUG, WEDGE
14	CA634A231	2	PLUG-1" PIPE
15	1901-4272	2	TAG WARNING
16	5F20-4102	1	NAMEPLATE, ASME
17	CA634A401	2	PLUG, 2" PIPE
18	AL81A5083	4	SCREW, DRIVE
19	A4444A1325	8	SCREW, SOCKET HD. CAP ⅜-11 x 2"LG
20	AH016B2352	8	SCREW, HEX HD. CAP ⅜-11 x 5½"LG
21	AT11AA931	8	NUT, ⅜-11 HEX
22	AU02AA332	2	WASHER, ⅜
23	———	—	PAINT
24	89NA503022	1	STICKER, SAFETY CODE

NOTES:

1. MAXIMUM DESIGN PRESSURE 50 PSI
2. HYDROSTATIC LEAK TEST AT 75 PSI MINIMUM ALLOWABLE TO BE STAMPED FOR 50 PSI MAXIMUM ALLOWABLE WORKING PRESSURE
3. PNEUMATIC TESTING HAS BEEN COMPLETED AFTER TESTING
4. ITEMS "20" & "21" TO BE INSTALLED AS SHOWN. ¾-11 NUTS & BOLTS TO BE LUBRICATED WITH A MIXTURE OF GRAPHITE & OIL AND TIGHTENED TO A TORQUE OF 8½ FT. LBS MAX. APPLY EQUAL LOADS TO EACH BOLT.
5. INSIDE OF SHELL TO BE FREE OF DIRT, SCALE, WELD SPATTER, ETC.

ITEM "2" - SHIPPING SKID	
TYPE	PART NO.
DOMESTIC	1901-784
WEST COAST	1901-774 (W/ TANK 1901-784)
EXPORT	1901-784

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

SECTION B-B SCALE: 6"=1'-0"

SECTION A-A SCALE: 3"=1'-0"

R-114

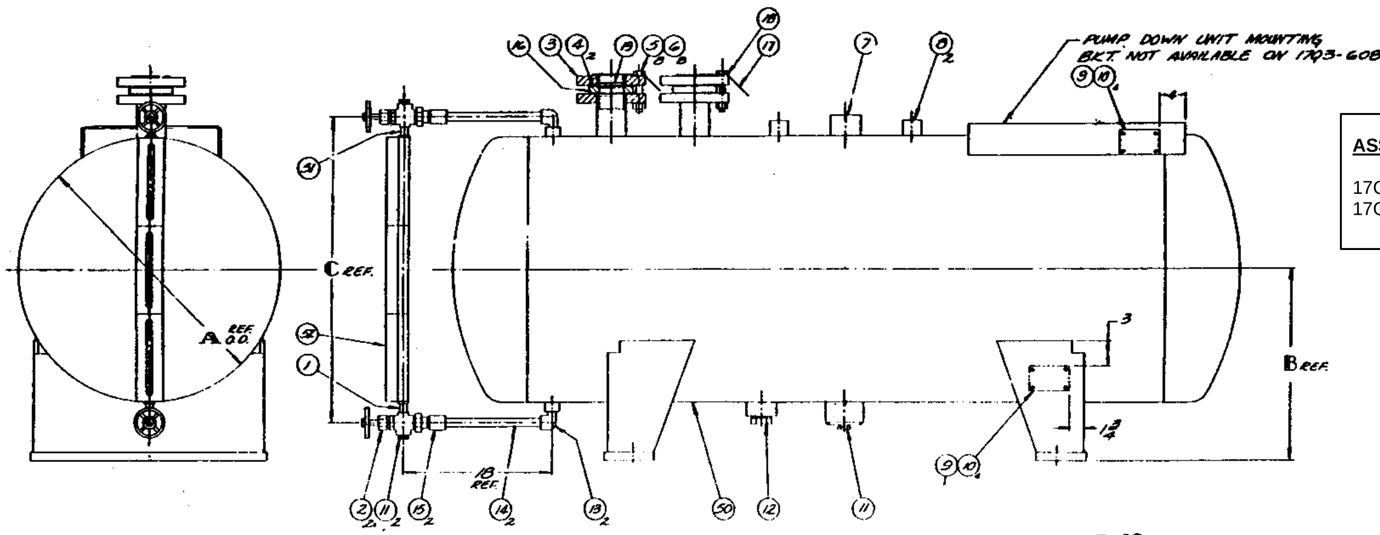
STORAGE TANK ASSEMBLY

FIGURE 7

NOTES:
1. DESIGN PRESSURE 185 P.S.I. MAX.
2. HYDROSTATIC LEAK TEST AT 278 P.S.I. NAMEPLATE TO BE STAMPED FOR 185 P.S.I. MAX. ALLOWABLE WORKING PRESSURE.
3. RUPTURE DISC IS TO BE INSTALLED AS SHOWN, AFTER TESTING HAS BEEN COMPLETED.
4. ITEMS #5 & #6, 3/4-10 NUTS & BOLTS, TO BE LUBRICATED WITH MIXTURE OF GRAPHITE AND OIL AND TIGHTENED TO A TORQUE 8 1/2 FT. LBS. MAX. APPLY EQUAL LOADS TO EACH BOLT
6. INSIDE OF SHELL TO BE CLEAN OF DIRT, SCALE, WELD SPATTER, ETC.
(G) 7. ALL PRE-ASSEMBLED PIPE THREADS TO BE SEALED WITH LOCTITE PIPE SEALANT (PF20-23), ITEM #20
8. HYDROSTATIC TEST TO BE MADE WITH SIGHT GLASS VALVES CLOSED SO THAT WATER DOES NOT ENTER GLASS ASSY.

ITEMS 1709-598-COMMON PARTS

ITEM	PART NO.	REQ	DESCRIPTION
1	JDB2DNOOIP	1	NIPPLE-[illegible]
2	EE59CX241	2	VALVE - SIGHT GLASS
3	CT33EA501	2	FLANGE - THREADED-[illegible]
4	CR905A501	4	GASKET
5	AH06BR365	16	HEX HD. CAP SCR.-3/4-10×[illegible]
6	AT11AA361	16	HEX. NUT - 3/4-10
7	LF39EZ062	1	CAPLUG - 2"
8	LF39EZ017	2	CAPLUG - 1"
9	SF20-4102	1	NAMEPLATE - ASME.
10	AL81AB083	4	DRIVE SCREW
11	CA63AA201	3	PIPE PLUG - 3/4
12	CA63AA401	1	PIPE PLUG - 2"
13	CP15EA201	2	STREET ELBOW - 3/4
14	JDB2EN012M	2	NIPPLE-3/4×[illegible]
15	CL34AA201	2	FULL COUPLING - 3/4
16	EB59LE88	2	RUPTURE DISC - 3"
17	1901-4272	2	MARKING TAG
18	AU02AA361	2	WASHER - 3/4
19	LF39RZ076	2	CAPLUG - 3"
20	PF20-23		LOCTITE, PIPE SEALANT



ASSY NO.	A	B	C
17Q3-Q8-608	32	23	36 5/8
17Q3-Q9-618	42	29	46 5/8

R-12
STORAGE TANK ASSEMBLY
FIGURE 7A

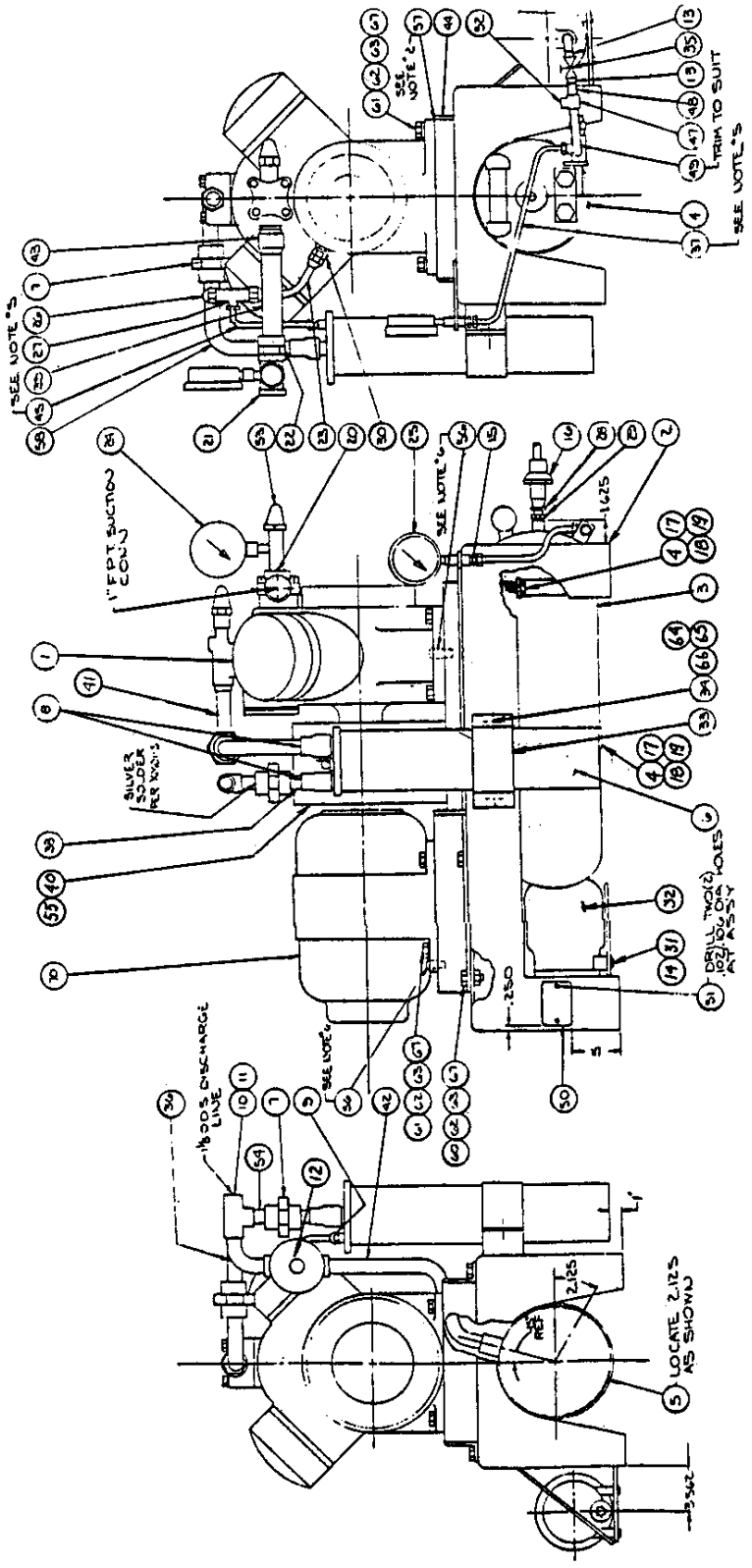
ITEM	PART NO.	REQ'D.	DESCRIPTION
1	5F20-C509	1	Compressor Assembly
2	17R3-817-7	1	Base Weld Assembly
3	5F20-344	1	Condenser Assembly
4	5F20-2042	2	Support Strap
5	5F20-1112	2	Strap Liner (On 5F20-1682)
6	KH31LZ011	1	Oil Separator
7	DE54CA701	2	1-1/8 Solder Ground Union
8	DE35BA903	2	1-3/8 X 1-1/8 Solder Red Bushing
9	DD12CA051	1	1/4 M. FL X 1/4 F. FL Elbow
10	DE53DA701	1	1-1/8 Streamline Plug
11	DE40BA701	1	1-1/8 O.D.S. Tee
12	EP44BC331	1	1-1/8 ODT Globe Valve
13	17Q5-4061-25	2	5/8 O.D.S. X 3/4 M.P.T. Coupling
14	AB06BR168	2	1/4 - 28 X 3/4 Lg Hex Hd. Capscrew
15	DD07DA051	1	1/4 MFL X 1/4 MPT Union Cplg
16	Per Job Req	1	Cond Relief Valve
17	AA06BR232	4	3/8 - 16 X 1-1/4 Lg Hex Hd Screw
18	AT44AH241	4	3/8 - 16 Square Nut
19	AU11AR241	4	3/8 Lockwasher
20	CA53AA255	1	1" MPT X 1/4 FPT Red Bushing
21	CA20JA251	1	1" X 1" X 1" FPT Tee
22	DE04DA904	1	1-3/8 OD X 1" MPT Coupling
23	17R3-556-3	1	Tube Assembly
24	17Q4-4071-85	1	30" - 0 - 200# Gage
25	17Q4-4071-86	1	0 - 250# Gage (dwg. 17Q4-4071-85)
26	DD19DA301	1	5/8 Flare Cap
27	DD14CA302	1	Flare Reducing Tee
28	CA29RA152	1	1/2 X 3/8 F.P.T. Reducer
29	CA52JA101	1	3/8 X 3/8 MPT Hex Nipple
30	DD07DA305	1	5/8 M. FL X 1/4 MPT Half Union Cplg
31	AU11AR171	2	1/4 Lockwasher
32	EC01BE017	1	Float Valve Assembly
33	17R3-3502-4	1	Oil Separator Strap
34	AA06BR229	2	3/8 - 16 X 7/8 Lg Hex Hd Screw
35	EP71CQ241	1	3/4 F.P.T. Ball Valve
36	17R3-3502-18	1	Valve to Tee Tube
37	17R3-556-5	1	Tube Assembly
38		1	1-1/8 O.D. X.065 W Cu. Tube (XA03-10) X 3" Lg
39		1	1-3/8 O.D. X.065 W Cu. Tube (XA03-10) X 8 Lg
40	17R3-1122-30	1	Coupling Guard
41	17R3-1122-19	1	Compressor to Union Tube
42	17R3-1122-29	1	Cond. to Tee Tube
43	DE20BA903	1	Adapter 1-3/8 O.D. X 1-1/8 O.D.
44	Per Job Req.	1	Base Direct Drive
45	17R3-556-8	1	Tube Assy (on 17R3-556-
*46	DE04DA302	1	1/2 MPT X 5/8 O.D.S. Cplg
47	DE40BA302	1	5/8 X 5/8 X 1/2 Tee
48		2	5/8 OD X.035 W. Cu Tube X 2 Lg
49		1	1/2 OD X.035 W. Cu Tube X 15 Lg
50	9G1-1052	1	Nameplate
51	AL81AF084	2	#4 X 5/16 Lg Drivescrew
52	DE53DA301	1	5/8 Streamline Plug
53	EP23NC090	1	Packed Angle Valve
54		1	1-1/8 O.D. X .065 W. Cu. Tube X 3-5/8 Lg
55	5F20-263-1	1	Flexible Coupling
56	AX15AA205	4	#5 X 2" Lg Taper Dowel Pin
57		2 each	1/32 - 1/64 Shim
58	17R3-123-20		Union to Separator Line
59			
60	AA06BR292	8	1/2 - 13 X 1/4 Lg Hex Hd Capscrew
61	AA06BR295	8	1/2 - 13 X 2 Lg Hex Hd Capscrew
62	AT11AA301	16	1/2 - 13 Hex Nut
63	AU11UA301	16	1/2 Lockwasher
64	AB06BR129	4	#10 - 32 X 3/4 Lg Hex Hd Screw
65	AT39AA132	4	#10 - 32 Hex Nut
66	AU27AS131	4	#10 Lockwasher
67	AU02AA301	16	1/2 Platewasher
68			
*69	5F20-381	1	Crankcase Htr. Pkg.
70	See B/M	1	Motor
71	Per Job Req.	1	Dual Pressurestat

Refrig.	Item # 16	Item # 71 (Explosionproof)
114	17D5-1101-13	17Q6-4072-5
12	17D5-1101-14	17Q6-4072-6
500	17D5-1101-15	17Q6-4072-8

5F-20 PUMP OUT UNIT

DIRECT DRIVE

SPECIFIED PARTS



SF-20 PUMP OUT UNIT
DIRECT DRIVE
ASSEMBLY

FIGURE 8

NOTES:

1. ALIGN COMPRESSOR AND MOTOR IN ACCORDANCE WITH STANDARD PRACTICE.
2. SHIM AS REQUIRED (ITEM #57) TO OBTAIN PROPER ALIGNMENT.
3. ALL SOLDER JOINTS TO BE SILVER SOLDERED.
4. SOLDER SPEC APPLIES TO ALL SIMILAR JOINTS.
5. ITEMS #37 AND 45 TO BE FORMED AS REQUIRED AT ASSEMBLY.
6. LOCATE DRILL AND REAM FOR #5 TAPER PIN AS REQUIRED.
7. * INDICATES ITEMS NOT SHOWN ON THIS DWG.

ITEM	PART NO.	REQ'D	DESCRIPTION	ITEM	PART NO.	REQ'D	DESCRIPTION
1	1TR3-214	1	5F-20 Pump Down Weld Assembly	31	CA53AA255	1	1 M.P.T. X ¼FPT Reducing Bushing
2	5F20-344	1	Condenser Assembly	32	CA29RA152	1	½ X 3/8F.P.T. Reducer
3	5F20-2042	2	Condenser Support Strap	33	DE35BA903	2	1 3/8 X 1 1/8 Bushing
4	5F20-1112	2	Condenser Strap Liner (on dwg. 5F-20	34	DE54EA701	1	1 1/8 Solder Ground Joint Union
5	5F20-1053	1	Compressor Flywheel	35	DE04DA201	1	½O.D.T. X ½M.P.T. Coupling
6	17R3-122	1	Tube Assembly	36	DE12BA701	1	1 1/8 X 1 1/8 X 90° Elbow
7	17R3-132	2	Tube Assembly	37	DD12CA051	1	¼M.F. X ¼F.F. Elbow
8	17R3-6055	1	Tube (Oil Separator to Tee)	38	DE53DA701	1	1 1/8 Plug
9	17R3-2776	1	Oil Separator Support Strap	39	DE40BA701	1	1 1/8 X 1 1/8 X 1 1/8 O.D.S. Tee
10	17R3-2067	1	Tube (Valve to Condenser Line)	40	CA20JA251	1	1" X 1" X 1" F.P.T. Tee
11	17R3-2786	1	Tube (Condenser to Float Valve)	41	DD14CA302	1	5/8 X 5/8 X ¼ M. Flare Tee
12	17R3-6005	1	1 1/8 O.D. X .065 W. X 4 ¾ Lg. Cu. Tube (XA03-2)	42	DD19DA301	1	5/8 Flare Cap
13	17R3-6015	1	1 1/8 O.D. X .065 W. X 2 ½ Lg. Cu. Tube (XA03-2)	43	AA06BR234	4	3/8 – 16 Hex HD. Cap Screw X 1 3/4 Lg.
14	17R3-6025	1	1 1/8 O.D. X .065 W. X 3 ½ Lg. Cu. Tube (XA03-2)	44	AA06BR232	4	3/8 – 16 Hex HD. Cap Screw X 1 1/4 Lg.
15	17R3-6035	1	1 1/8 O.D. X .065 W. X 9 ¾ Lg. Cu. Tube (XA03-2)	45	AB06BR168	2	1/4 – 28 Hex HD. Cap Screw 3/4 Lg.
16	17R3-6045	1	1 3/8 O.D. X .065 W. X 8 Lg. Cu. Tube (XA03-2)	46	AA06BR229	2	3/8 – 16 Hex HD. Cap Screw X 7/8 Lg.
17	*5F20-212	1	Oil Safety Switch Package	47	AU11AR241	8	3/8 Lock Washer
18	EC01BE017	1	Float Valve Assembly	48	AU11AR171	2	¼ Lock Washer
19	(See Chart)	1	Condenser Relief Valve	49	AT44AH241	8	3/8 – 16 Square Nut
20	EP44BC331	1	1 1/8 O.D.T. Globe Valve	50	#5F20-381	1	Crankcase Heater Package
21	KH31LZ011	1	Oil Separator	51	#17R3-224	1	Crate
22	KR12BG414	1	Pulley	52	LF39RZ017	1	CA-Plug- 1"
23	KM03AQ368	1	30# - 0 – 150# Gage, 3 ½dia., ¼M.P.T.	53	(See Chart)	1	Dual Pressurestat
24	KM01AF370	1	0 – 200# Gage, 3 ½ D., ¼M.P.T.				
25	HD59AZ051	1	Motor (5HP-AC-220/440V-3PH-60CY, 1750 RPM, Frame 215)				
26	KR20BA063	2	"V" Belt				
27	CA52JA101	1	3/8 M.P.T. Hex Nipple				
28	DD07DA305	1	5/8 MF X ¼M.P.T. Half Union Cplg.				
29	DD07DA051	1	¼M.F. X ¼M.P.T. Half Union Cplg.				
30	DE04DA904	1	1 3/8 ODT X 1" MPT Coupling				

*Denotes not shown on drawing.

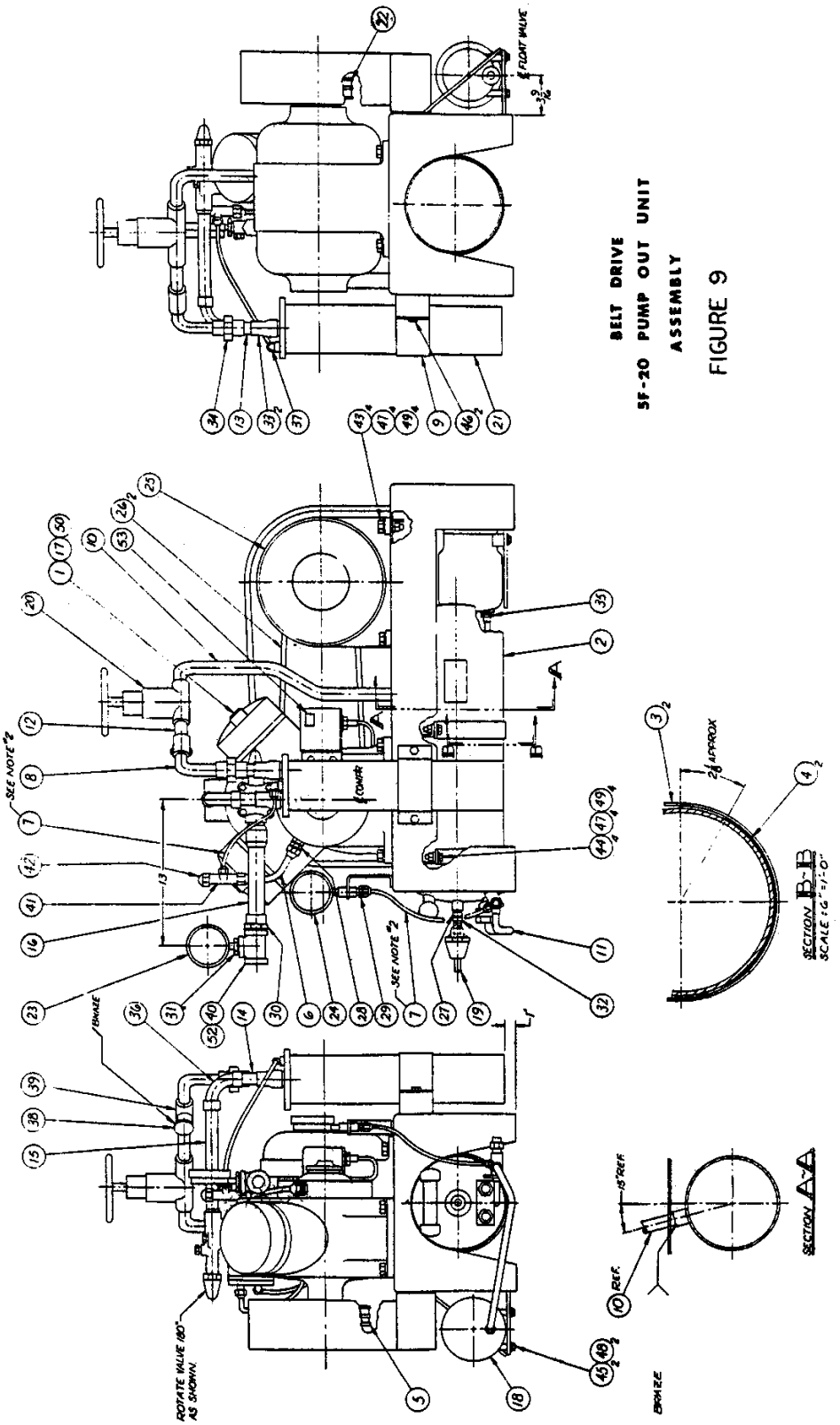
NOTES:
1. ALL SOLDER TYPE TUBE CONN'S. TO BE BRAZED
2. ITEM No. 7 IS TO BE BENT TO SHAPE AT ASSEMBLY.
3. OUTSIDE SURFACES OF ASSY. TO BE PAINTED IN ACCORDANCE WITH ENG. REQ.
4. ALL PIPE THREADS TO BE WRAPPED WITH TEFLON TAPE PF20-6.

	Item #		
Refrig.	19	53 (Standard)	53 (Explosionproof)
114	17D5-1101-13	17Q6-4072-3	17Q6-4072-5
12	17D5-1101-14	17Q6-4072-4	17Q6-4072-6
500	17D5-1101-15	17Q6-4072-7	17Q6-4072-8

5F20 PUMP OUT UNIT

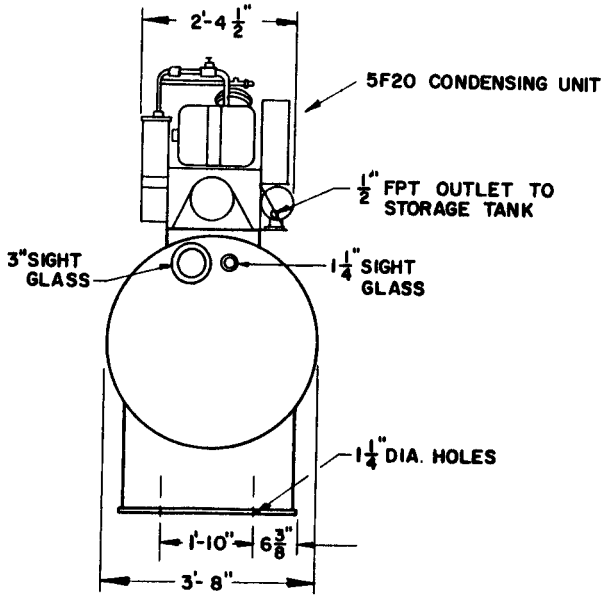
BELT DRIVE

SPECIFIED PARTS



BELT DRIVE
SF-20 PUMP OUT UNIT
ASSEMBLY

FIGURE 9



END VIEW

NOTES:

1. 5F20 CONDENSING UNIT MAY BE FLOOR MOUNTED IF CONDITIONS DICTATE.
2. STORAGE TANK SHOULD BE LOCATED BELOW COOLER LEVEL IF POSSIBLE. THIS WILL ALLOW LIQUID TO DRAIN FROM THE COOLER TO THE STORAGE TANK.
3. RUPTURE DISCS CANNOT TAKE ANY PIPING STRAIN. USE FLEXIBLE CONNECTIONS AT OUTLET OF DISC.
4. STORAGE TANK DESIGN PRESSURE 50 PSIG. RUPTURE DISC BURSTING PRESSURE IS SHOWN IN TABLE 2.

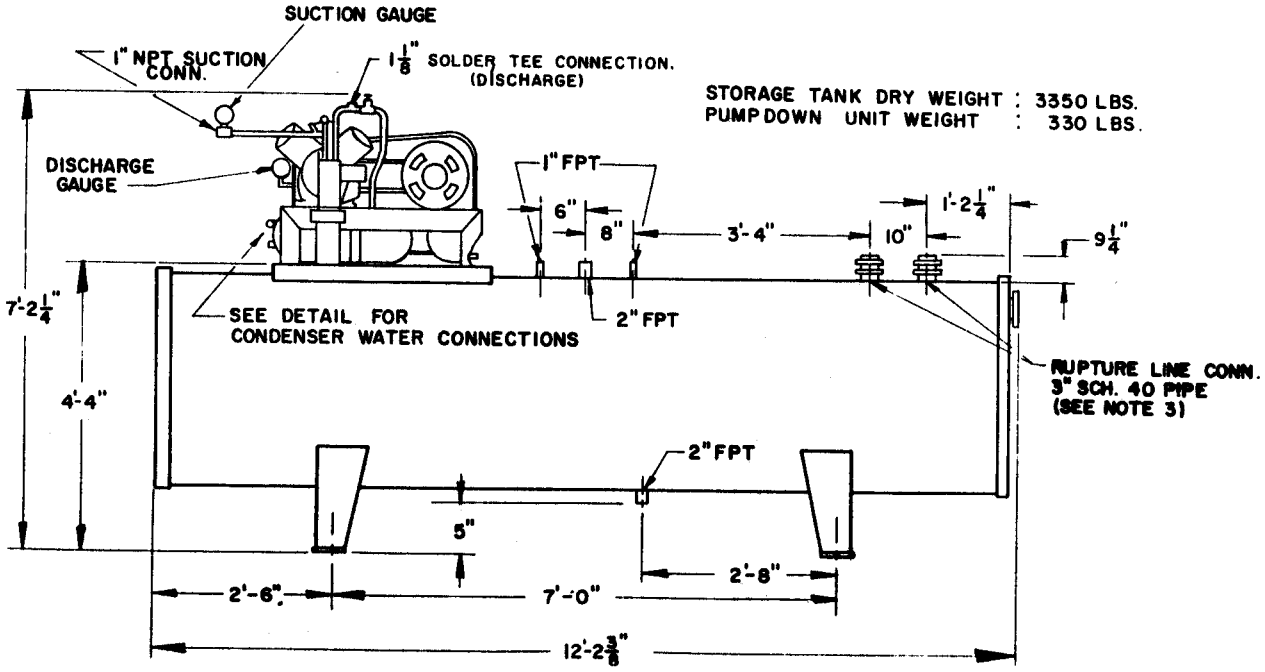
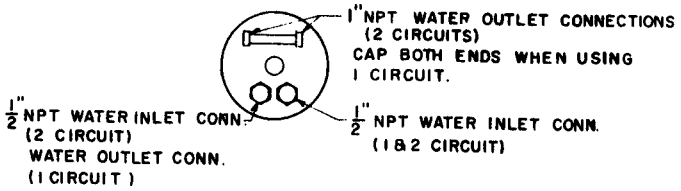


FIGURE 10

WATER CONNECTION TO 5F20 PUMPDOWN UNIT CONDENSER

NOTE: Approximate condenser water quantity = 15 GPM single circuit connections recommended for piping simplicity.



COMPRESSOR – CONDENSER FLOOR MOUNTING DIMENSIONS
(SEE NOTE 1)

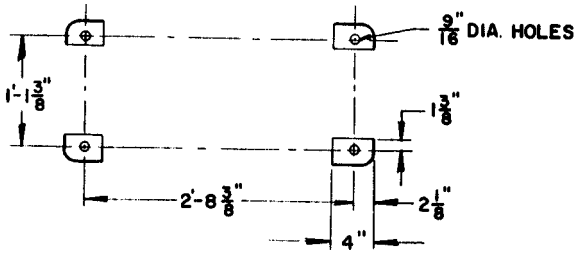


FIGURE 10
INSTALLATION DETAILS