

HENRY VOGT MACHINE CO.

P. O. Box 1918

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FORGED STEEL VALVES, FITTINGS, FLANGES AND UNIONS
STEAM GENERATORS • HEAT EXCHANGERS • TUBE-ICE MACHINES
Main Office and Plant - 1000 W. Ormsby Ave. - Louisville, Kentucky 40210

Vogt®

SERVICE MANUAL

and parts catalogue

MODEL P418F

Tube-Ice® MACHINE

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F O R E W O R D

Vogt has been building quality refrigerating equipment since 1880 and all the skill in engineering and fabrication that over ninety years of experience have taught is reflected in this unit. Since its inception in 1939, the Tube-Ice process has been recognized as the only modern means for producing sized ice, which hundreds of installations have proven as well as the economy and reliability of operation.

This manual has been designed to assist you in the setting, starting and maintenance of the unit. Your Tube-Ice Machine will give a lifetime of service if reasonable inspection and attention is provided and the suggestions in this manual are carefully read and followed.

The Henry Vogt Machine Company will use first-class material and workmanship in the construction of the equipment furnished and agrees to repair at factory, or, furnish (at its option) F.O.B. factory, within one year from shipment, any part or parts which shall prove to have been defective at the time they were furnished. The defective parts as above specified, and the Company in any event shall not be held liable for any special, indirect or consequential damages whatever or for loss through defective material or workmanship. No allowance will be granted for repairs or alterations made by the Purchaser without the Company's written consent.

HENRY VOGT MACHINE CO.

SPECIAL PRECAUTIONS TO BE OBSERVED
WHEN CHARGING REFRIGERATION SYSTEMS

Only technically qualified persons, experienced and knowledgeable in the handling and operation of refrigeration systems, should perform the operations described in this manual.

Safety goggles should be worn during refrigerant handling, charging or transfer operations.

If a refrigeration system is being charged from refrigerant cylinders, disconnect each cylinder when empty or system is fully charged. A gauge should be installed in the charging line to indicate refrigerant cylinder pressure. The cylinder may be considered empty of liquid R-12 when the gauge pressure is 25 pounds or less and there is no frost on the cylinder. Close the refrigerant charging valve and cylinder valve before disconnecting cylinder. Loosen union in refrigerant charging line slowly to relieve refrigerant pressure between cylinder valve and charging valve.

CAUTION: IMMEDIATELY CLOSE SYSTEM CHARGING VALVE AT COMMENCEMENT OF DEFROST OR THAWING CYCLE IF REFRIGERANT CYLINDER IS CONNECTED. NEVER LEAVE A REFRIGERANT CYLINDER CONNECTED TO SYSTEM EXCEPT DURING CHARGING OPERATION. FAILURE TO OBSERVE EITHER OF THESE PRECAUTIONS CAN RESULT IN TRANSFERRING REFRIGERANT FROM THE SYSTEM TO THE REFRIGERANT CYLINDER, OVER-FILLING IT, AND POSSIBLY CAUSING THE CYLINDER TO RUPTURE BECAUSE OF PRESSURE FROM EXPANSION OF THE LIQUID REFRIGERANT.

Always store cylinders containing refrigerant-12 in a cool place. They should never be exposed to temperatures higher than 140°F and should be stored in a manner to prevent abnormal mechanical shocks.

It is not recommended that refrigerant be transferred from a refrigeration system into a cylinder. If such a transfer is made, the refrigerant cylinder must be weighed continuously to assure contents do not exceed net weight specified by cylinder manufacturer or any applicable code requirements.

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DESCRIPTION

The Vogt Model P418F Tube-Ice Machine, with four sequentially harvesting freezers, compressor, 50 HP motor and breaker type cutter is completely piped, wired and operational tested.

Standard unit is for operation on 460 volt, 3 phase, 60 hertz current for "across-the-line starting" resulting in maximum starting inrush current of 354 amperes. Machine full load current rating is 73 amperes.

(+) See Note "For 230 volt part-winding start"

Approximate shipping weight - 13,500#.

CAPACITY

The machine will produce approximately 16 tons of cylinder ice each 24 hours of operation when supplied with 45°F water and operated at a head pressure no more than 115 PSIG with maximum ambient of 90°F.

CAUTION

Only service personnel experienced in refrigeration and qualified to work with high amperage electrical equipment should be allowed to work on this Tube-Ice Machine.

INSPECTION

As soon as the machine is received, it should be inspected for any damage. If damage is suspected, it should be noted on the carrier's papers. A separate written request for inspection by the carrier's agent should be made immediately. Any repair work or alteration to the machine without the permission of the Henry Vogt Machine Co., will void the machine's warranty.

LEAK TESTING

The machine was shipped with a "Holding Charge" of R-12. If a positive pressure is shown on the gauges, it is evident that no leak has developed during shipment.

Should the gauges read "0" pounds pressure, the machine should be leak tested at approximately 100 PSIG* air pressure. Air pressure is to be supplied by an independent air compressor. Do not use the compressor on the ice machine for this purpose. During such a pressure test, all hand shop valves (except drains and purge) and solenoid valves in refrigerant system should be opened manually.

After all joints have been proved leak tight, the system must be evacuated to at least 25 inches vacuum. Obtain vacuum by use of an independent vacuum pump. Do not use the compressor on the ice machine to create a vacuum. After evacuating system, return manual stem on solenoid valves to the automatic position.

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(+)Note-for 230 volt part winding start-
Maximum Inrush - 426 Amperes
Full Load Rating - 146 Amperes

*NOTE: Compressed air or dry nitrogen may be used to raise pressure for testing. Do not use CO₂ gases.

MACHINE ROOM

The machine must be located inside a suitable building and must not be subjected to ambient temperatures below 50°F. Heat radiation from other sources (sunlight, furnaces, condenser, etc) and unusual air currents may affect the operation of the machine and should be avoided.

ELECTRICAL

A wiring diagram has been affixed to the inside of the control panel door and is also furnished with the service information that accompanies each machine.

The terminal connections (L1, L2 and L3) for the power source are located in the compressor motor starter enclosure. This wiring must be done in accordance with existing National and Local Codes by qualified personnel only. Actual power source and the nameplate electrical characteristics must match.

SAFETY VALVES

Five safety pressure relief valve assemblies are an integral part of the packaged Tube-Ice Machine. Four are located in the low-side of the system (one of each freezer) and one is in the high side of the system (on the condenser/receiver). Each of the pressure relief valves must be vented to the atmosphere in such a manner to comply with Local and National Codes.

WATER DISTRIBUTORS

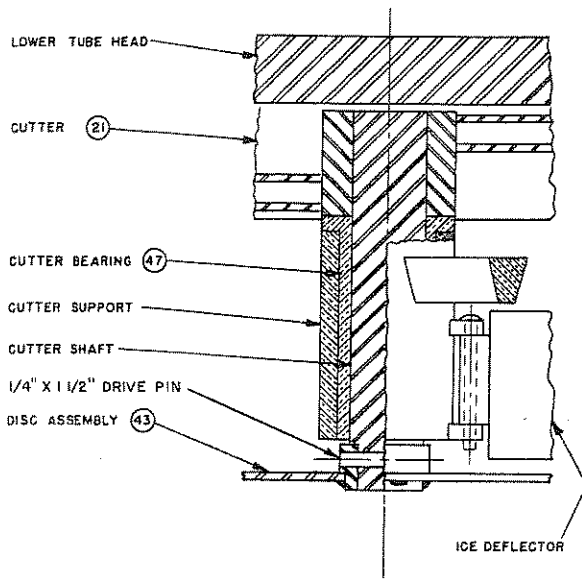
Remove freezer top cover plates and check the water distributors to see if any have worked loose during shipment. Each of the 624 distributors should remain firmly inserted in the freezer tubes. To replace any that have loosened, insert them into the tubes and tap until tight. Replace cover plate before starting machine.

COMPRESSOR COUPLING

The alignment of the compressor drive coupling must be checked before the compressor motor is started to assure that neither are damaged. Refer to coupling manufacturer's instructions that were shipped with the machine.

CUTTER

PARTIAL SECTION SHOWING PARTS AND THEIR ARRANGEMENT



CUTTERS

To remove the cutter (21), if necessary, proceed as follows-

Shut-down the appropriate freezer and shut the exterior valve in the water inlet line to its water pan and drain pan.

Disconnect the water inlet line, pump suction and the drain line at the water pan.

Separate motor from the cutter drive reducer by removing four (4) cap screws. Watch for shaft key when separating unit which must be installed in motor keyway when unit is reassembled. It is not necessary to remove the reducer from its mounting plate of the water pan.

Remove the water pan, which contains the cutter, by removing three (3) nuts from studs welded to the top edge of the pan. It may then be taken to a work bench for removal of cutter assembly. This is held in place by three 3/8" cap screws which fasten the cutter support to the side of the water pan. Before loosening these cap screws, remove the ice deflector and the cutter disc assembly.

If the cutter bearing (47) is badly worn, it should be replaced with a new one, which may be ordered from the factory. A 1/8" driv-pin locks the bearing to the hub. If a bearing replacement is necessary, this pin must be removed by pressing it thru the hub. It is suggested that a bearing be retained as a spare part to prevent a prolonged shutdown of the machine in the event of a bearing failure.

After pressing the new bearing in the cutter support, it may be necessary to ream the I.D. to obtain free running clearance between bearing and cutter shaft. Use a 1 1/4" straight reamer for this application. Drill a 1/8" hole thru the bearing and install the locking pin in the original hole in the hub.

The parts should be reassembled, reversing the procedure described for removal.

PUMPING TANK

The production of opaque (or cloudy) ice usually indicates that the water in the pumping tank has accumulated a concentrated amount of solids or salts. A daily flushing with fresh water, and an occasional brushing with a stiff brush will generally suffice for cleaning.

When re-starting the machine after filling the pumping tank with fresh water, be sure the pumps are circulating water. It is possible that air may have collected in the pump impeller housing and the pump may have to be stopped and started several times to expel the air. This process should be done by using the Pump Circuit Breaker (P1-OL, P2-OL, P3-OL, P4-OL).

COOLING TOWER

When selecting a cooling tower, careful attention must be given to operating wet bulb condition. It is advisable to check with your local cooling tower distributor for his recommendations based on actual operating conditions in your area.

Tower water pump must be capable of delivering a minimum of 175 GPM through condenser. Due to cooling tower location and pressure drop through water lines, the water pump must be sized for each installation.

CONDENSER WATER

The condenser requires 175 GPM of water at 85°F to 91°F. Two (2) 3" F.I.P. connections are located in the condenser head - top one is the outlet-the lower one is the inlet.

The selection of a water recovery system must be done on an individual unit basis with particular emphasis on local wet bulb conditions. The size of the water pump will vary considerably with the location of the cooling tower, size of the tower and the location of the machine to the cooling tower; but it must be capable of delivering a minimum of 175 G.P.M. at the inlet to the condenser.

The water piping for the cooling tower and the installation of the pump must be in accordance with the manufacturer's instructions.

Water treatment for the prevention of scale, slime and algae build-up inside the condenser tubes is recommended. It is suggested that local chemical treatment supplier be contacted to arrange this form of preventative maintenance.

A 3" condenser water outlet may be piped to a recovery system or a drain as the case may be.

Local plumbing codes should be checked and complied with.

PRINCIPLE OF OPERATION

The Tube-Ice Machine operates in a cycle that consists of two periods, a "Freeze Period" and a "Harvest Period". The ice is made in total during the "Freeze Period", and is discharged in total during the "Harvest Period."

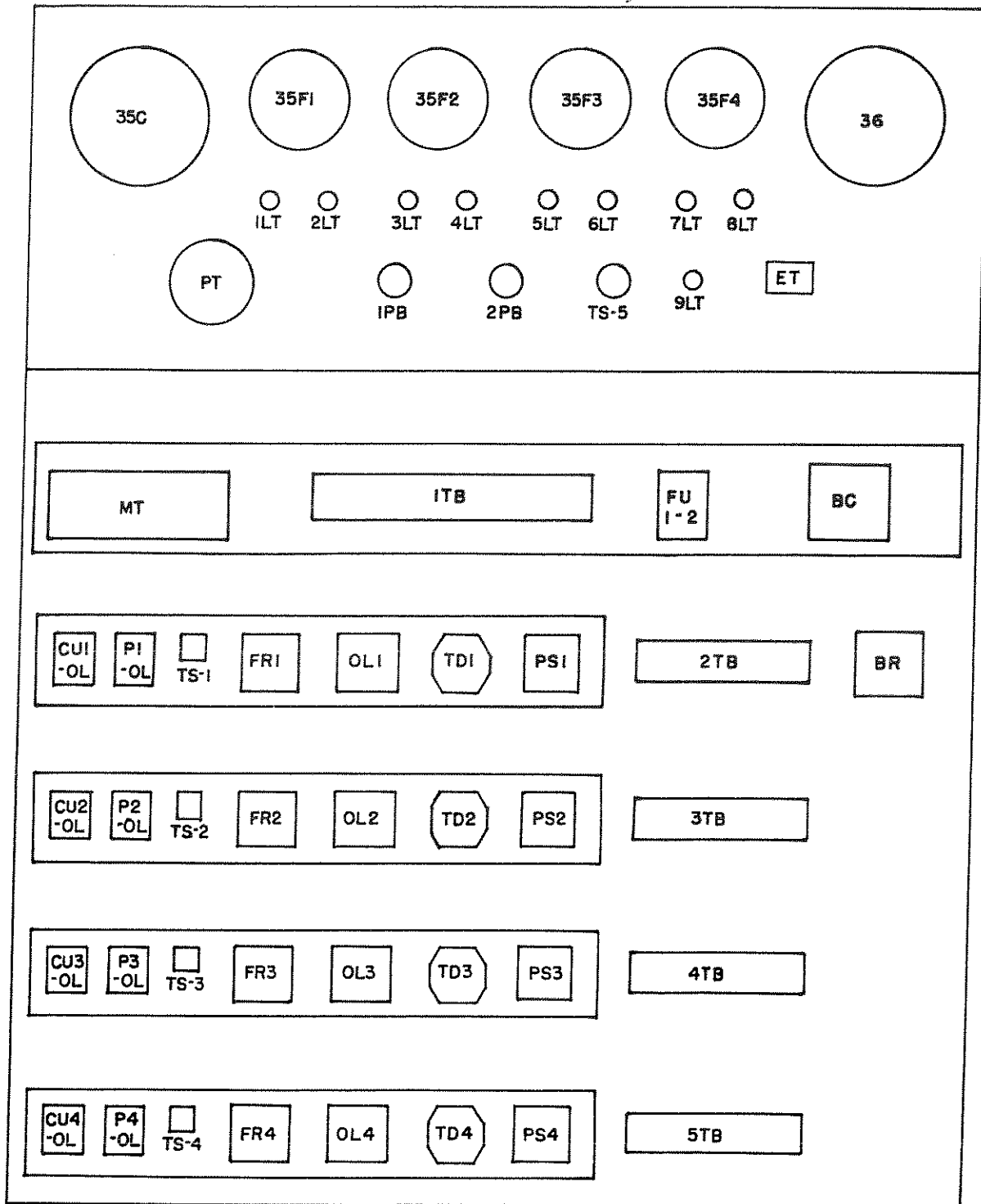
The Tube-Ice is frozen inside the stainless steel tubes in each freezer by the direct application of refrigerant to the shell side of the tubes. The ice is produced from constantly recirculating water during the "Freeze Period". Solids that may separate during the ice making period will accumulate in the pumping tanks. Automatic blowdown during each harvest period, plus an adjustable blowdown (pet cock on each water pump) during the ice making periods minimizes the accumulation of these solids.

The introduction of warm refrigerant gas into the freezer releases the ice formed in the tubes which then drop to the rotating cutter for sizing and discharges from the machine. After all ice has been discharged by this process, that freezer advances to the next "Freeze Period" completing its cycle.

CONTROL PANEL NOMENCLATURE

CU1-OL, CU2-OL, CU3-OL, CU4-OL. Circuit breaker-for cutter motor.
P1-OL, P2-OL, P3-OL, P4-OL. Circuit breaker-for water pump.
TS1, TS2, TS3, TS4. "Freeze-Thaw" Toggle Switches.
FR1, FR2, FR3, FR4. Freezing Relays
OL1, OL2, OL3, OL4. Overload Relays.
TD1, TD2, TD3, TD4. Time Delay Relays.
PS1, PS2, PS3, PS4. Thawing Pressure Limiting Switches.

BC. Bin Control Relay
BR. Suction By-Pass Relay
MT. Master Timer
PT. Primary Timer
ET. Elapsed Time Indicator.
1LT, 3LT, 5LT, 7LT. Freeze Period Pilot Lights (Amber)
2LT, 4LT, 6LT, 8LT. Thaw Period Pilot Lights (Red)
35F1, 35F2, 35F3, 35F4. Freezer Pressure Gages
35C. Suction Pressure Gage
36. Discharge Pressure Gage
1PB. "Stop" Push Button (Red)
2PB. "Start" Push Button (Green)
TS-5. "Clean-on-Shutdown" (Off) Selector Switch
9LT. "Shutdown" Pilot Light (White)
FU1, FU2. 30 amp. fuses



CONTROL PANEL

CONTROL PANEL

(PT) Primary Timer

Controls the length of the freeze cycles. Timer is set for approximately one-fourth (1/4) of the required freeze time for each freezer. At the completion of this time setting, the Master Timer is activated to start the harvest cycle. (Vogt #12--746010M000)

(MT) Master Timer

Starts the harvest cycle for each freezer in sequence. The thawing time is controlled strictly by the Master Timer, which also resets the primary timer for operation of the next freezer. (Vogt #12--7488P4-000)

(ET) Elapsed Time Indicator

Registers total operating hours on the compressor for reference and maintenance upkeep. (Vogt #12--6514---000)

(OL1, OL2, OL3, OL4) Overload Relays

Isolates the freezer in a shutdown or overload situation (one for each freezer). (Vogt #12--7135---000)

(FR1, FR2, FR3, FR4) Freezing Relay

Controls the freezing and thawing. When energized-freezing, when de-energized thawing (one for each freezer). (Vogt #12--7135---000)

(TD1, TD2, TD3, TD4) Time Delay Relay

Controls the extended thawing time on the freezer during a shutdown cycle (one for each freezer). (Vogt #12--7483---000)

PS1, PS2, PS3, PS4) Thawing Pressure Limiting Switch

Pressure operated switch used in controlling the freezer pressure during a harvest cycle by regulating the opening and closing of the thawing gas solenoid valve (D). Switch is pre-set to close thawing gas valve when freezer pressure reaches approximately 45 PSIG and re-open when pressure drops to around 40 PSIG (one for each freezer) (Vogt #12--6324---000)

(P1-OL, P2-OL, P3-OL, P4-OL) Water Pump Overload

Stops operation of the water pump motor in the event of a mechanical or electrical malfunction resulting in excessive motor amperes-see note following cutter motor overload. Pump circuit breaker rating-must hold 4.2 amps., must trip 5.25 amps. (one for each water pump) (Vogt #12--7419-42000)

CU1-OL, CU2-OL, CU3-OL, CU4-OL) Cutter Motor Overload

Stops operation of the cutter motor in the event of a mechanical or electrical malfunction resulting in excessive motor amperes. Cutter Circuit breaker rating-must hold 4.2 amps., must trip 5.25 amps. (One for each cutter motor.) (Vogt #12--7419-42000).

Note-tripping of any pump or cutter motor circuit breaker immediately shuts down the operation of that particular freezer and reduces compressor capacity proportionally.

(4PS) High Pressure Safety Switch (Located at Compressor)

Protects machine from damage in event some malfunction creates an undue high pressure. This is an automatic reset type control.

(1PS) Low Pressure Safety Switch (Located at Compressor)

Protects machine in event an extreme low pressure condition occurs. This is an automatic reset type control.

(TS1, TS2, TS3, TS4) "Freeze-Thaw" Toggle Switches

Two Position switch used for manually harvesting a freezer. Freezer will stay in a harvest period until time delay timer times out and shuts off that freezer or until switch is reset to freeze position. Switch must be placed manually in the "FREEZE" position in order for that freezer to produce any ice. (One for each freezer) (Vogt #12--7422---000)

(TS-5) "Clean-On-Shutdown" (Off) Selector Switch

3-position switch used for manually placing machine into a sequential "shutdown" cycle or to clean. Switch must be in the "On" position for ice making. (Vogt #12--7429---000)

(1LT, 3LT, 5LT, 7LT) Freeze Pilot Lights (Amber)

Indicates when freezer is in a "freeze period". (One for each freezer) (Vogt #12--7165B--000)

(2LT, 4LT, 6LT, 8LT) Thaw Pilot Light (Red)

Indicates when freezer is in a "harvest period". (One for each freezer) (Vogt #12--7165A--000)

(9LT) Shutdown Pilot Light (White)

Indicates when machine is in a "shut down" cycle. (One per machine) (Vogt #12--7165C--000)

(BC) Bin Control Relay

Starts machine on "shut down" operation when de-energized by either the "On-Off" toggle switch (TS-5) or "Bin Control" (if used). (One per machine) (Vogt #12--7135---000)

(1PB) "Stop" Push-Button (Red)

May be used to stop machine as required. (Vogt #12--7423R--000)

(2PB) "Start" Push-Button (Green)

For starting machine. (Vogt #12--7423G--000)

CHARGING MACHINE

The P418F Tube-Ice Machine will require approximately 1000 lbs. of refrigerant
12. When charging machine, the following procedure should be followed:

1. Make connection between charging valve (28) and refrigerant cylinder using hose or pipe suitable for R-12 service. A gauge should be installed in this line to indicate cylinder pressure. See instruction card attached to cylinder for proper position of cylinder so machine can be charged with liquid.
2. Open valve on R-12 cylinder and purge air out of charging line at the charging valve (28) connection.
3. Close liquid line valve (58).
4. Open stop valves in make-up water supply line to fill pumping tanks with water.
5. Manually open all four suction solenoid valves (C).
6. Manually open all four liquid line solenoid valves (A).
7. Open electrical disconnect switch.
8. Carefully insert a piece of heavy paper between the contacts of each of the four thawing pressure limiting switches (PS1, PS2, PS3, PS4) which will then keep the thawing gas solenoid valve (D) de-energized should a freezer transfer to a harvest period during the charging process.
9. "Water Pump Overloads" (P1-OL, P2-OL, P3-OL, P4-OL) must be in the "On" position.
10. "Cutter Motor Overloads" (CU1-OL, CU2-OL, CU3-OL, CU4-OL) must be in the "On" position.
11. "Freeze-Thaw" toggle switches (TS1, TS2, TS3, TS4) must be in the "Freeze" position.
12. "On-Off" (shutdown) toggle switch (TS-5) must be in the "On" position.
13. Open charging valve (28) and close electrical disconnect switch.
14. The compressor may now be started by pushing the "START" button (2PB) located on the control panel. Compressor rotation must be counter-clockwise when viewing pump end cover (see direction arrow on side of compressor oil pump cover). See that cooling water is flowing thru the condenser and the oil level in the compressor is proper.

The compressor will stop during the charging operation due to action of the low pressure switch (1PS). When the compressor stops, make certain that the low pressure switch is the control that actually stopped the compressor. When pressure builds

- up to reset the low pressure switch, restart the compressor.
15. It will be necessary to change refrigerant cylinders as they are emptied. A cylinder may be considered empty when the gauge pressure is 25 PSIG or less, and no frost is present on the cylinder. Replace empty cylinder with full cylinder by closing both the charging valve and the cylinder valve and slowly relieving gas pressure in the line between the two. Purge the charging line after attaching each full cylinder as outlined in step 2.
 16. After three or four cylinders have been emptied into the system, the machine should be put into a harvest cycle. The following steps are required:
 - a. Stop machine by pushing (RED) "Stop" button (2PB) on front of control panel.
 - b. Close charging valve (28).
 - c. Place all four "suction solenoid valves" (C) in automatic position. (Stem screwed in)
 - d. Place all four "liquid solenoid valves" (A) in automatic position. (Stem screwed in)
 - e. Carefully remove pieces of paper between contacts on all four "thawing pressure limiting switches" (PS1, PS2, PS3, PS4).
 - f. Start machine by pushing (GREEN) start button (1PB) on front of control panel.
 - g. Manually put all four freezers in a harvest by switching the "Freeze-Thaw" toggle switches (TS1, TS2, TS3, TS4) into the "Thaw" position. The machine should be kept in a harvest period until all the ice is out of the freezers. The ice harvested during this period may be of poor quality and you may wish to divert it from the normal storage.
 17. The charging may be continued at the completion of this harvest period until the proper charge is attained, but first, steps 5, 6, 7 and 8 must be repeated.
 18. The correct charge has been attained when the liquid level in the condenser is near the upper black mark on the gage guard. (Approx. 17" above center of bottom cock).
 19. When the correct charge has been attained, stop machine and close charging valve (28) and R-12 cylinder valve. Slowly bleed pressure from the connecting line and remove the refrigerant cylinder.
 20. Check all valves to be certain they are in the normal operating positions. All solenoid valves are to be in automatic position and all stop valves are to be open with the exception of the drain valves for the water tanks (39), condenser drain valve (44)

charging valve (28) and purge valves on the compressor.

21. Carefully remove paper from between contacts on all four of the "Thawing Pressure Limited Switches" (PS1, PS2, PS3, PS4).
22. Press "Start" button and allow machine to run in a freeze cycle for a couple of minutes, then manually harvest all four freezers by switching the "FREEZE-THAW" toggle switches to the "Thaw" position. When all the ice is out of the freezers, return switches to the "FREEZE" position. The machine should now be ready for normal operation.

FREEZE PERIOD

The freezers are shell and tube type vessels. During the freeze period, water is constantly recirculated through the vertical tubes of the freezer by a centrifugal pump (6). Makeup water is maintained by a float valve (12) in the water pan (7). Solenoid valves (A) and (C) in the liquid and suction lines, respectively, are open.

Refrigerant gas from the top of the freezer passed through the heat exchanger-suction accumulator (13/88), the "C" solenoid valve (54), heat exchanger (13), then to the compressor (3) which discharges it through the oil separator (14), a heating coil in the condenser-receiver (15) and then into the condenser. Liquid refrigerant from the receiver, flows through a filter drier (46), the heat exchanger, the heat exchanger-suction accumulator, the thawing chamber (16), the "A" solenoid valve (20) the expansion valve (17) and into the freezer, thereby completing the freezing circuit.

Each of the four freezers operates on its own "Freeze and Harvest" cycle which is maintained in uniform operating sequence with the other three freezers by the master timer type control panel. The Primary Timer (PT) governs the length of the freezing period and its time setting is approximately one-fourth (1/4) of the freeze period of each freezer. A total cycle of the four freezers will be approximately four times the primary timer setting plus the time of one harvest period. A change of the Primary Timer "Time Indicating Pointer" increases or decreases the cycle of each freezer four (4) times the actual time change. Thus, make only a minor change (15 seconds or less) at a time and allow the unit to operate a complete cycle (4 freezers harvest) before making any additional adjustment to the time setting. A counterclockwise adjustment increases the freezing cycle to produce a smaller hole (thicker ice) or clockwise to decrease the time cycle for a larger hole (thinner ice). The proper time setting for maximum capacity produces cylinder ice with a 1/16" minimum hole.

HARVEST PERIOD

When the Primary Timer "Progress Indicator" reaches the "zero" position a "starting contact" in the timer closes to start the "Master Timer Motor" of the cam timer (MT).

The first cam and switch (MT-1) assembly, adjacent to the timer motor, maintains the Master Timer Motor (and cam shaft) in rotation after it has been initially started by the Primary Timer, and subsequently

stops it after the necessary period of operation (1/4) rotation).

The second cam and switch (MT-2) assembly energizes the clutch coil of the Primary Timer, thereby releasing the clutch, allowing the "Process Pointer" to reset for the subsequent freezing period.

The third cam and switch (MT-3) assembly is required only during shut-down operation to maintain unit operation to complete ice harvest from each freezer-when the four (4) "FR" relays are eventually de-energized.

Cam and switch (MT-4, MT-5, MT-6, MT-7) assemblies starts and controls the length of the harvest period for each freezer by de-energizing Freezing Relays (FR-1, FR-2, FR-3, FR-4) respectively. Compressor capacity is also reduced proportional by de-energizing of Compressor Unloading Solenoids (U1-SOL, U2-SOL, U3-SOL) or de-energizing the Suction Bypass Relay (BR) which energizes the Suction Bypass Solenoid Valve (Y).

Cam and Switch (MT-8, MT-9) assemblies are extras for possible future usages.

When a Freezing Relay is de-energized to start a harvest period of a freezer, its Water Pump (6), Suction Valve (C), Liquid Valve (A) and Freeze Pilot Light (LT-amber) are de-energized and its Cutter Motor (CU), Thawing Valve (D) and Thaw Pilot (LT-Red) are energized.

The ice should release in approximately 15 seconds to drop onto the rotating cutter for sizing and discharge thru the opening in the water pan. The length of the harvest period (usually three (3) minutes) should be set for at least 30 seconds longer than the time required to harvest the entire discharge of ice. If it should become necessary to change the length of the harvest period of a particular freezer, adjust the right-hand lobe of its cam assembly (MT-4, MT-5, MT-6 or MT-7) to increase or decrease the valley which increases or decreases the length of the harvest period respectively. Change only the ride up point (right lobe) of the cam assembly.

A Thawing Pressure Limiting Switch (PS1, PS2, PS3, PS4), actuated by the pressure in the freezer, is wired in series with the Thawing Valve (D) to limit the freezer pressure during the harvest period by de-energizing the solenoid of the valve when the pressure reaches approximately 45 PSIG. The switch was factory set to maintain the thawing pressure between 40 to 45 PSIG.

SHUT DOWN CYCLE

"Shut Down" can either be started automatically by use of a bin control (opens) or manually by means of the "On-Off" selector switch (TS-5).

During each freezer harvest period, a Time Delay Relay (TD1, TD2, TD3, TD4) is energized. The relay is de-energized (and resets) when the freezer starts its next freeze period. The relay should be set for approximately 3 1/2 minutes.

When the "Shut-Down" operation is initiated, the next freezer to go into a harvest period will be the first one to shut down. The length of this harvest period is now controlled by the setting of the Time Delay Relay instead of by the freezer control cam assembly (MT-4, MT-5, MT-6, MT-7).

When the last freezer to shut down completes its extended harvest period, operation will cease.

PUMP DOWN

Should it become necessary to pump the refrigerant out of the freezers and into the condenser, the following procedures should be followed:

1. Open electrical disconnect switch.
2. Carefully insert piece of heavy paper between the contacts on each of the four "thawing pressure limiting switches" (PS1, PS2, PS3, PS4).
3. Close liquid line valve (58).
4. Manually open all four "suction solenoid valves" (C).
5. Manually open all four "liquid line solenoid valves" (A).
6. Turn electrical power back on, start machine and allow it to operate until "low pressure switch" (1PS) stops the machine. (Adding warm water to the pumping tanks will aid in a more complete removal of the refrigerant from the freezers).
7. Close gas inlet stop valve (60), suction by-pass stop valve (90Y), thawing gas line stop valve (90) and the compressor suction and discharge stop valves.
8. Open electrical disconnect switch.
9. Remove paper from "thawing pressure limiting switches".
10. Drain all water from condenser and pumping tank if unit will be down for an extended period.

REFRIGERANT REMOVAL

To transfer the refrigerant charge from the machine into a separate container, proceed as instructed above under "Pump Down". This will isolate the refrigerant in the Condenser-Receiver.

Then connect a length of copper tubing or a charging hose to Condenser-Receiver Drain Valve #44 and to an approved refrigerant 12 storage container. Purge tubing or hose of air by allowing a small amount of refrigerant to escape.

Pack the storage container in ice and be sure that the container has a storage capacity in excess of the amount (weight) of refrigerant in the system. Open the Condenser-Receiver Drain Valve and the Storage

Container Valve. When the pressure in the Condenser-Receiver is reduced to approximately 30 PSI, close the drain valve (44). Close storage container valve.

COMPRESSOR OIL

Do not attempt to operate compressor unless an oil level is indicated in the sightglass on the handhole cover plate. With the compressor idle, the oil level should be at a height of 1/3 to 2/3 of the sightglass, but not out of sight above it. Use only 150 SSU viscosity oil such as Sunisco 3GS as manufactured by Sun Oil Company or Texaco Capella BI as manufactured by Texaco, or equal.

If it is necessary to add oil, connect a hand oil pump to the compressor oil charging valve (37) located on top of the compressor suction valve, but do not tighten the flare nut on the delivery tubing. With the bottom or suction end of the pump submerged in oil, operate the pump until oil drips from the flare nut joint, purging air from charging hose, then tighten the flare nut. Close compressor suction valve (34) one turn clockwise from backseated position and open oil charging valve (37). Pump oil in until the proper level is reached. Close the oil charging valve and backseat stem of compressor suction valve.

It is important that the compressor oil be changed in accordance with the compressor manufacturers requirements as described in the compressor manual supplied with the Tube-Ice Machine.

When no other service is anticipated other than changing oil, use the following procedure:

1. Manually put machine in a "Shutdown" cycle by use of the "On-Off" (shutdown) toggle switch (TS-5).
2. At the completion of the "Shutdown" cycle, close compressor suction valve (34).
3. Switch "On-Off" (Shutdown) toggle switch (TS-5) back to the "On" position and start machine by pushing the "Start" button.
4. When the "low pressure safety switch" (LPS) stops the machine, close the compressor discharge valve (45).
5. Close "oil return valve" (70) on bottom of oil separator (14).
6. Turn off electrical power source to machine.
7. Connect a hose to the oil drain valve in the compressor crankcase (lower front of compressor).
8. Allow oil to be pushed from compressor thru this hose to a waste container by slowly opening the oil drain valve.
9. When all the oil is drained from the compressor release any remaining refrigerant gas thru valve (37). Remove side access plate and wipe interior of compressor with a clean, lint free rag. After cleaning, it is recommended that the access plate

gasket be replaced prior to bolting plate back onto compressor.

10. Replace bleed-type, high pressure, throwaway oil filter.
(Vogt #12--6532C--000)
11. Use a vacuum pump and evacuate compressor and attached piping to at least 25 inches of vacuum through the compressor purge valve on top of the suction valve.
12. Connect one end of oil charging hose to drain valve on compressor and insert the other end down into the container of new oil. With vacuum pump still operating, open compressor drain valve and let the vacuum draw the oil into the compressor until the level reaches the center of the glass.
13. When proper oil level is attained, close compressor drain valve.
14. While the vacuum is still at least 25", close purge valve and disconnect the vacuum pump.
15. Open compressor suction and discharge valves and oil return line valve.
16. Turn on power source, press start button, and observe the operation to determine if oil condition and operating level remains proper.

When other service is anticipated, the mechanic may choose to (and probably should) follow the "pump down" procedure (Page 13) before using the above and thereby insure safety and accessibility to the rest of the low-side of the system. CAUTION: USE ONLY RECOMMENDED OIL (SEE COMPRESSOR MANUAL) NEVER MIX BRANDS AND NEVER RE-USE OIL.

COMPRESSOR UNLOADERS

The compressor operates at a reduced capacity (approx. 25%) each time a freezer starts a harvest period or "shut down" cycle. This reduction in capacity is obtained by the use of solenoid unloader valves on the compressor and a suction by-pass solenoid valve (Y) connected between the receiver and compressor suction.

The unloader valves are used for freezers number two, three, and four, and the suction by-pass valve is used for freezer number one.

MAINTENANCE

A careful inspection of the Tube-Ice Machine's refrigerant system for leaks and correct operational functions at time of installation will start its long satisfactory life of service. In order to insure this degree of dependability, a systematic maintenance program is recommended. Therefore, the following schedule is suggested as a minimum.

(A) Daily

1. Check "ice-out" time (maintain 30 second free run).
2. Check clarity of ice produced and hole size.
3. Check compressor oil level.

4. Check compressor oil pressure.
5. Check refrigerant charge by observing operating level in receiver gage glass (30).

(B) Weekly

1. Check system for leaks with suitable leak detector for the first four weeks of operation.
2. Change compressor oil after first 50 hours of operation and then every 700 hours thereafter. (Use "Elapsed Time Indicator" (ET) located on the front of control panel for operating time reference.)
3. Check oil level and condition.
4. Check refrigerant level in condenser-receiver.

(C) Monthly (In addition to weekly checks)

1. Check calibration and operation of all controls (high and low pressure switches, thawing pressure limiting switches, etc.)
2. Check cooling tower for scaling and algae (consult water treatment suppliers for corrective measures).
3. Check water distributors in freezer for scaling accumulating.
4. Check water tanks for solids to be removed.
5. Check all motor drive units (compressor, cutter and pump motors, cooling tower fan and pump, etc.) for abnormal noise and/or vibrations.

(D) Yearly (In addition to weekly and monthly)

1. Check entire system for leaks (See "E")
2. Drain water from condenser and cooling tower and check condenser tubes. Check closely for damage by corrosion or scale.
3. Remove all rust from all equipment, clean and paint.
4. Check all motors for shaft wear and end play.
5. Check operation and general condition of all electrical controls, relays, motor starters and solenoid valves.
6. Check freezing time, ice release time and ice out time.
7. Inspect compressor (See "F")

(E) Leaks

There are a number of reasons why leaks may develop in any refrigeration system; such as drying out of valve packings, yielding of gaskets, improper replacement of valve caps, and loosening of joints from vibrations.

For these reasons, the need for periodic leak testing can not be over-emphasized. By the same token, when any service operations are performed on the system, care should be exercised to insure that all open flanges are tightened, all plugs are replaced with sealant tape, all packing glands on valve stems are tightened, and all valve caps are replaced. When operation is restored, a complete leak check should be made.

(F) Compressor

It is highly recommended that yearly check of all internal compressor parts be made. The compressor should be opened yearly, and the condition of the valves, piston rings, and bearings checked. In this way, a small amount of time spent checking compressor condition once a year may prevent extensive shutdown later with subsequent product loss and expensive repairs.

CONDENSER CLEANING

The water side (inside) of the condenser tubes will require cleaning after some period of operation. The need for cleaning will become evident during the preventative maintenance checks described in this manual.

During such cleaning, both cast iron heads must be removed and each tube should be cleaned by rodding them with pipe conduit or rod, and flushing with clear water until deposits are removed. Any conventional method of tube cleaning will suffice.

CLEANING PROCEDURE
VOGT MODEL P418F TUBE-ICE MACHINE

1. Set selector switch (TS-5) to "Shutdown" position. (If the machine is running, it will shut down on completion of the 4th ice harvest period).
2. Remove ice from storage area or cover opening into it.
3. Shut off water supply and drain each tank (7). Remove any loose sediment from each tank.
4. Close drain valves and fill each tank with 9 gallons hot water. On units equipped with petcocks on the water pumps, close the petcocks during the cleaning period.
5. Add 3 bottles (approximately 36 oz.) of Calgon Ice Machine Cleaner (a food grade liquid phosphoric acid) to each water tank during the refill period.
6. Remove grid in ice discharge of water tanks and place inside tank during the cleaning operation.
7. To run pump only, set the selector switch to the "CLEAN" position. The pump is then started and stopped by the selector switch (TS-5). If necessary to purge air from pump return switch (TS-5) to "ON" position for a few seconds, then back to "CLEAN" position.
8. Circulate cleaning solution for 30 minutes or until deposits are dissolved.
9. Set switch (TS-5) to "ON" position to stop pump, then drain and flush water tank with fresh water. Open water supply to machine.
10. Replace grid in ice discharge chute and start pump again by setting switch (TS-5) to "CLEAN". Operate for 15 minutes, then stop pump by returning switch (TS-5) to "ON".

Drain and flush tank and then refill with fresh water. With the selector switch in the "ON" position, normal ice making operation can be resumed.
11. Clean inside of ice storage area and remove any solution that entered during the cleaning process. Remove cover if one was installed over opening into storage area.
12. Start ice-making cycle by depressing "START" Push Button.
13. Adjust setting of pump petcock per instructions in the Service Manual.

HENRY VOGT MACHINE CO.
LOUISVILLE, KENTUCKY
NOVEMBER 10, 1980
CP-418