

MODEL F-777-3 FROSTO® ELECTRIC VAPORIZER

End of Season Maintenance

It is extremely important that all Frosto® Electric Vaporizers are properly checked and flushed at the END of each freezing season. This procedure will greatly enhance the life of the unit and also reduce the possibility of operating failures during the following freezing season. These instructions refer to parts **Form FV-PL**.

1. All electrical circuits should be turned OFF.
2. The N-17 Air Supply Valve and N-48 Gate Valve should be in OFF position.
3. We recommend all units be cleaned at the end of the freezing season by the following procedures:

TOP TANK

- a. Be sure the Frosto® Electric Vaporizer is turned OFF.
- b. Be sure there is no pressure in the Vaporizer by opening Valve N-02.
- c. Disconnect Vaporizer from the air supply.
- d. Drain any remaining Frosto® fluid from Tank.* Fill Tank with water.
- e. Remove the N-04 inspection Plug on lower side of the Tank and drain water.* There will be about 1 to 2 gallons of liquid below the level of the Plug. Insert a hose into Plug hole and work in to the bottom of the Tank. Siphon the fluid as completely as possible from this area in the Tank. Re-install the N-04 Plug.
- f. Reconnect Frosto® Electric Vaporizer to Air Supply.

VAPORIZING CHAMBER

- a. With Vaporizer turned OFF and Thermostat reading ambient temperature, remove N-44 Cap, N-22 Pipe Tee, N-21 Safety Relief Valve, N-23 Swing Check Valve and N-15 pump discharge Teflon Hose.
- b. Using water (warm water works best) flush lower chamber until water is clear.*
- c. Allow to drain, then re-assemble N-22, N-21 and N-23. Re-install N-15 Hose and N-44 Cap.

** Contain residue and process according to your company policy and local/state regulations.*

4. Fill upper reservoir with Frosto® fluid to maximum fill line. Turn N-02 Fill Valve to OFF position. Install dust cap which is part of N-01 Filling Funnel.
5. The upper and lower pressure vessels of the Vaporizer may require periodic testing. Check with your local/state regulations.
6. If your Frosto® Electric Vaporizer has a mechanical or electrical problem refer to the Service Manual **Form SM-777-3**; if not, the unit is ready for off-season storage.

TANNER SYSTEMS, INC.

The De-icer People since 1928

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<p style="text-align: center;">SERVICE MANUAL F-777-3 FROSTO® ELECTRIC VAPORIZER</p>

INSTALLATION and OPERATION:

Refer to the Instruction Sheet **Form FV-IN** and Parts Diagram **Form FV-PL** provided with the unit.

GENERAL SPECIFICATIONS:

Voltage	240
Cycles.....	60
Wattage	3500
Vessel Test Pressure	300 p.s.i.
Working Pressure	150 p.s.i.
Supply Tank	A.S.M.E. code welded to unfired pressure vessel standards.
Vaporizing Chamber	A.S.M.E. code welded to fired pressure vessel standards.
Heat Range During Operation	290° F. -- 380° F.
Maximum C.F.M. capacity	12,000 c.f.m.
Overall dimensions	31" X 62"

WIRING:

Refer to schematic **Form 777-WD** provided with the unit.

COMPONENTS:

Refer to drawing **Form FV-IN**, Fig. 2, with instructions.

Supply Tank: (Part N-16)

Capacity is 15 gallons. It is very important that the Supply Tank never be filled above the maximum fill line indicated on the Gauge Glass. Over filling can cause damage to the Pulsator Pump "D" (Part N-11). For consumption purposes, 1+1/8" on sight glass = 1 gallon of Frosto® anti-freeze fluid.

Air Supply Valve: (Part N-17)

Must be open when unit is in operation and closed for refilling. It is very important this valve be closed when the unit is not operating for long periods of time.

Safety Relief Valve: (Part N-21)

This valve should never be tampered with. DO NOT RESTRICT DISCHARGE from N-21 -- the discharge must be vented to a safe, unoccupied area.

Pulsator Pump: (Part N-11)

The Pump is designed to overcome line pressure and provide vaporization on a controlled basis. In the event of leakage or failure in the unit, first check to see that the Vertical Check Valve (Part N-14) at the discharge is in working order. Next, check the O'rings in the Pump itself for any damage. These O'rings are designed specifically for our units -- replacements should be ordered from a Tanner Systems distributor. O'ring kits (Part N-11KLRS) are available for this Pump.

Vaporizing Chamber: (Part N-28)

The Vaporizing Chamber is an ASME code welded pressure vessel designed for maximum working pressure of 150 p.s.i. and heat range of 320° -- 450° F. We recommend the chamber be drained and flushed at the end of each freezing season.

Refer to Maintenance Bulletin **Form M-5**.

Timer w/Base: (Part N-41/40)

The Timer actuates the Pulsator Pump (Part N-11) and controls the amount of Frosto® which enters the air system. This is a solid state timing device; replacement is simply a matter of pulling the Timer (Part N-41) from the Base (Part N-40) and inserting a new one. Refer to Parts Diagram **Form FV-PL**.

Relay Switch/Contactor: (Part N-45)

This is a solid state Relay which provides power to the control circuit.

Thermostat: (Part N-35)

The Thermostat on the Frosto® Electric Vaporizer has been preset at the factory and should not be tampered with at any time. It consists of three switches: Low Setting Switch (Part N-35C) which activates the Timer and Pump at approximately 290° F., High Setting Switch (Part N-35D) which shuts off the Heaters through the Relay at approximately 350° F. and High Limit Cut-Out Switch (Part N-35B) which shuts off the entire unit at 450° F. in case of overheating. (NOTE: *Red indicator should be set at 350° F. at all times.*) For other replacement parts refer to Parts Diagram Form FV-PL.

Heating Elements: (Part N-31)

There are ten 350 watt Heating Elements around the lower chamber of the F-777-3 Frosto® Vaporizer; these are very low watt intensity heaters (6 watts/sq.in).

Solenoid Valve: (Part N-13)

This Valve allows flow of Frosto® into the Vaporizing Chamber through the Pump and is cycled by the Timing device. The Coils (Part N-11/13C) for the Solenoid (Part N-13) and Pump (Part N-11) are interchangeable.

Heat Limiter: (Part N-47)

The Heat Limiter provides an extra safety measure to shut the unit off at 490° in the event of excessive heat buildup in the Vaporizing Chamber. To replace the Heat Limiter refer to **Form VN-47**.

PARTS ORDERING:

Refer to the Parts List **Form FV-PL** for ordering. All parts are normally in stock for immediate shipment.

PROBLEM CHECKLIST:

- It is very important that the installation and operating instructions have been followed to the letter. The Installation Diagram **Form FV-IN**, Fig. 1, provided in the instructions must be studied to determine proper installation for your air system. Note in particular the trap in the upper left hand corner – this will prevent contaminants from entering the Frosto® system and avoid possible damage.
 - The wiring Diagram **Form 777-WD** provided must be followed closely. Note in particular that two fused lines are required – one 120V and one 240V as follows:
 - a) The 120V Control Circuit has a combined amperage of 2.45 amps. Fuse this circuit with a 3.4 or 3.6 amp fuse.
 - b) The 240V Power Circuit has a combined amperage of 16 amps. Fuse this circuit with a 20 amp fuse.
- This procedure is required by code and must be followed to assure efficient and safe operation. If the Frosto® Electric Vaporizer is not properly fused, damage may result to the unit or to your other equipment.
- If assistance is required call Tanner Systems help line: 800-461-6454.

MAINTENANCE: Refer to End of Season Maintenance **Form M-5**.

- Use only **Frosto®** anti-freeze fluid in the F-777-3 Frosto® Electric Vaporizer which has been specifically formulated for this unit. *Do not use Tannergas® or other compounds in this vaporizer* -- the warranty is void if other than **Frosto®** fluid is used.
- At the end of the freezing season drain and flush the system to prevent trouble at the beginning of the next season. This is a very important factor as a majority of problems with the unit are caused by improper maintenance procedures.
- Both pressure vessels (Parts N-16 and N-28) may require periodic testing. Check your local/state regulations.
- When the unit is out of operation for prolonged periods of time it is important that the air supply Valve (Part N-17) is shut off. This will prevent contaminants from entering the Supply Tank (Part N-16).

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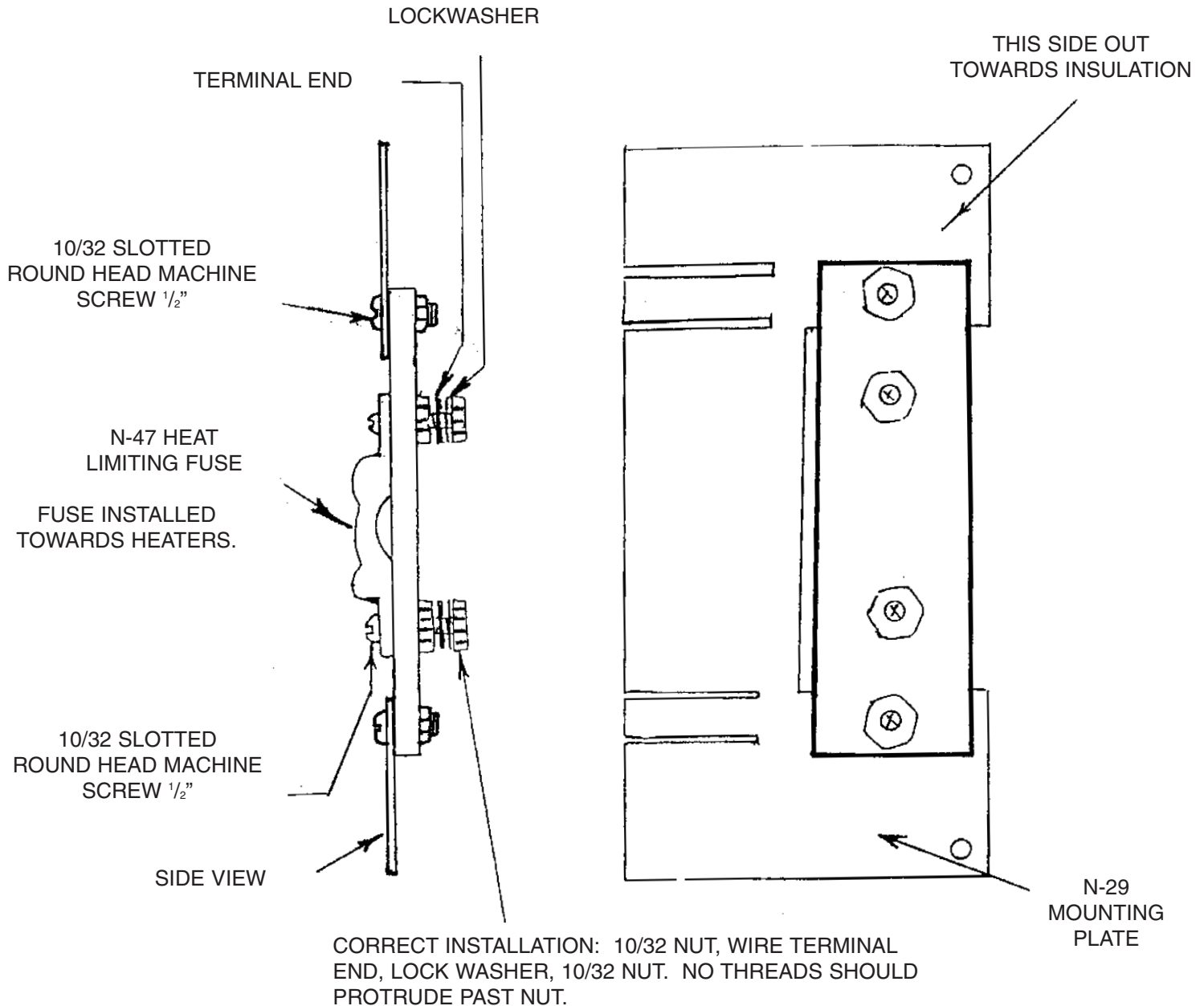
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HEAT LIMITER (N-47) INSTALLATION



NOTE: #10 STOVE WIRE AT TERMINAL CONNECTION SHOULD NOT BE FRAYED AND CONNECTION MUST BE TIGHT.



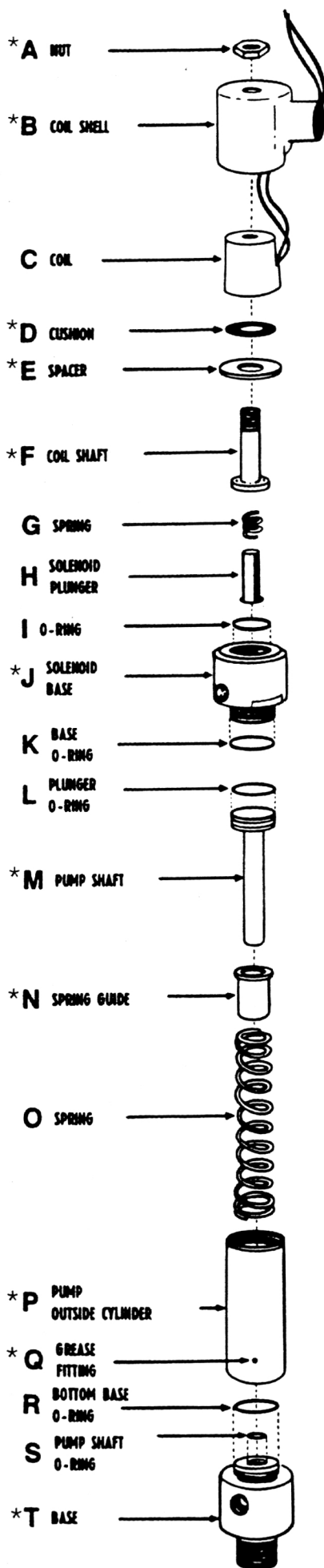
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MODEL F-777-3
FROSTO® ELECTRIC VAPORIZER
REPAIR INSTRUCTIONS FOR
N-11 PULSATOR PUMP

COIL REPLACEMENT

- Disconnect Coil wire.
- Remove Nut A and Coil Shell B.
- Replace with new Coil and reassemble.

O'RING REPLACEMENT

- Remove Nut A, and remove B,C,D,E, assembly in one unit. It is not necessary to disconnect Coil wires.
- Remove Pump from unit at union beside Pump.
- Place Base T in vise.
- Turn Pump Outside Cylinder P with a small pipe wrench, while aiding removal with a crescent wrench on Solenoid Base J. *DO NOT EXERT EXCESSIVE PRESSURE ON CYLINDER P.* It is not necessary to remove Solenoid Base J from Pump Cylinder P.
- Remove M,N and O.
- Replace plunger O'Ring L and Bottom Base O'Ring R.
- Remove Pump Shaft O'Ring S from groove in Base T. (A small pick or O'Ring remover is best for removal). Replace with new O'Ring.
- A small amount of grease should be applied to O'Rings to ease assembly of Pump.
- Reassemble Pump as diagrammed.

NOTE: C Coil, KLRS O'Rings, GHI Plunger Kit and O Spring are only replacements parts available.

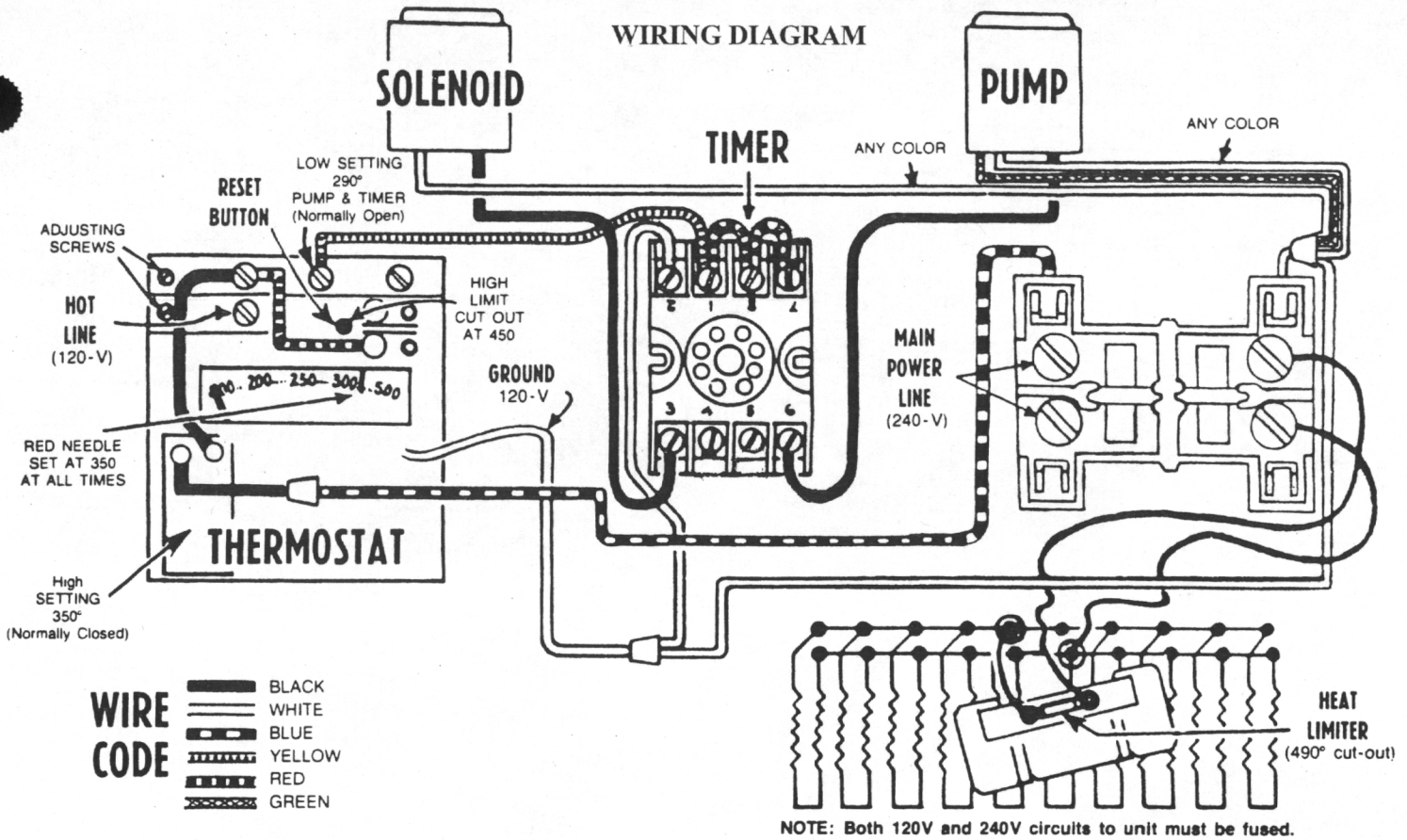
*NOT A REPLACEMENT PART

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**MODEL F-777-3
FROSTO® ELECTRIC VAPORIZER**

WIRING DIAGRAM



FUSE AS FOLLOWS:

- 1) The 120V Control Circuit has a combined amperage of 2.45 amps. We recommend fusing this circuit with either a **3.4 or 3.6 amp fuse**.
- 2) The 240V Power Circuit has a combined amperage of 16 amps. We recommend fusing this circuit with a **20 amp fuse**. If this unit is not properly fused, damage may result to the unit or to your other equipment.



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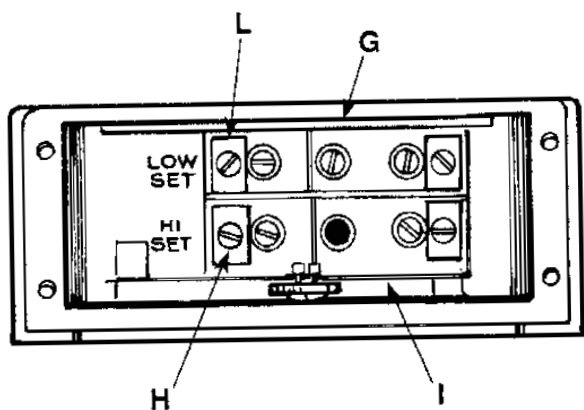
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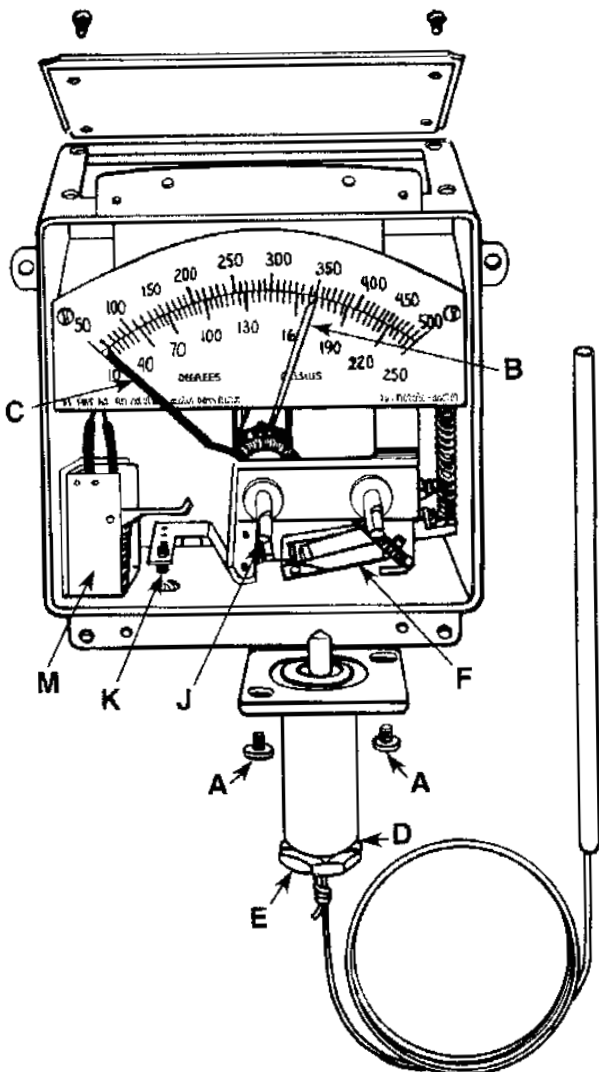
FROSTO VAPORIZER

MODEL F-777-3

ADJUSTMENT & REPLACEMENT PROCEDURES FOR N-35 THERMOSTAT



Top View



Front View

NOTE: Red needle "B" set at 350°. High limit switch "I" with reset button set at 450°. Switch "G" (next to limit switch "I"), set at 290°. Switch "M" (inside thermostat), operates relay for heaters. Set to shut off at 350°. Switches set at factory. **DO NOT** change unless replacing.

ADJUSTING & REPLACING SWITCHES & THERMOSTAT

IMPORTANT: Set red pointer "B" to 350°, when adjusting or replacing switches, by turning "J."

ADJUSTING CAPILLARY TUBING

Replace "A." Loosen "D" locknut. Turn "E" so that pointer "C" reaches room temperature on the face plate.

ADJUSTING LOW SETTING ON PUMP AND TIMER SWITCH "G"

1. Remove top cover and face.
2. Bring the setter point "C" towards 350° by raising "F". This will actuate switch "G" at 290°.
3. If indicator pointer kicks in, under or over 290°, adjust the switch bracket adjustment screw "L" until switch turns on timer and pump.

ADJUSTING SWITCH "M" TO CONTROL RELAY

Raise "F" until pointer "C" reads 350°. If over or above, adjust brass screw "K" on end of "F".

ADJUSTING HIGH LIMIT SWITCH "I"

1. Remove top cover and face.
2. Bring the setter point "C" to 350° by raising "F". Move indicator past 350° to 450°. This will actuate switch "I" causing reset button to release.
3. If indicator pointer goes under or beyond 450°, adjust switch bracket adjustment screw "H", on switch "I", to release reset button at 450°.



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FROSTO®
ELECTRIC VAPORIZER
 Assembly and Parts List

Model
F-777-3



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MINIMUM INVOICE \$10.00

DIMENSIONS
 and **SPECIFICATIONS**

Heater Voltage 240 AC – Watts 3500
Amps 14.5 – Cycles 60 – Single Phase
Control Voltage 120 AC – Watts 36

TOP TANK

Specifications: 16" X 18" (406 mm. X 457 mm.)
 All units designed for 150 psi (10.6 kg./cm.²)
 working pressure, hydrostatic test 300 psi
 (21.1 kg./cm.²).

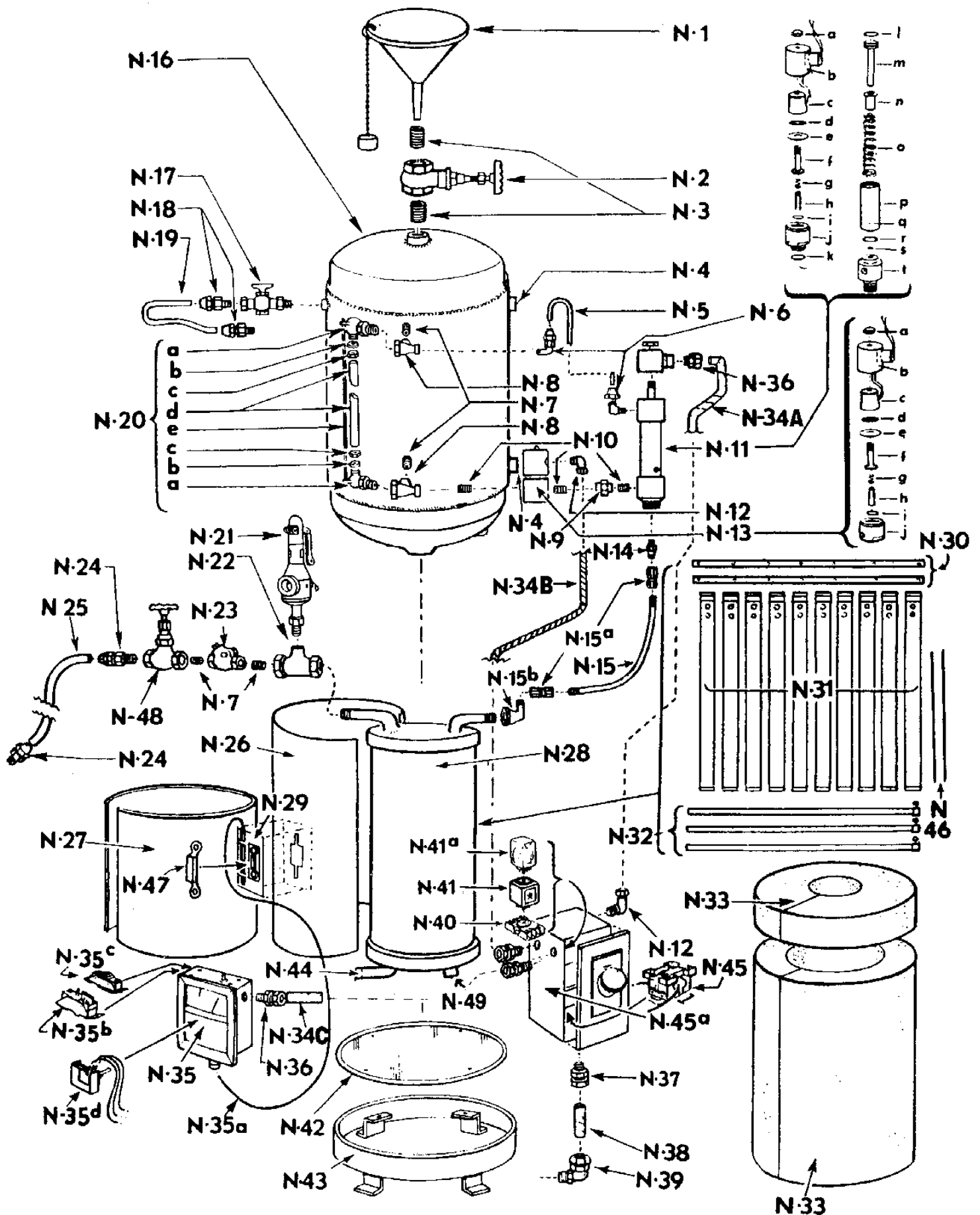
All seams double-butt welded. Tanks are
 A.S.M.E. welded and inspected. Inspection
 sheets for tank available on request.

VAPORIZING CHAMBER

Specifications: 8" X 23" (203 mm. X 584 mm.)
 Vaporizing chamber is built to A.S.M.E.
 specifications for fired pressure vessels.
 Chamber designed for 150 psi (10.6 kg./cm.²)
 maximum working pressure.

Hydrostatic test 300 psi (21.1 kg./cm.²).
 Inspection sheets for chamber available on
 request.

<u>PART</u>	<u>DESCRIPTION</u>	<u>PART</u>	<u>DESCRIPTION</u>
N-01	Filling Funnel & Chain	N-21	½" Safety Relief Valve
N-02	1" Fill Valve (same as R16/N02/W16)	N-22	½" XH Pipe Tee
N03/W05	1" x 2" Nipple (2) *	N-23	½" XH Swing Check Valve
N-04	1 ½" Plug (2) * (part of N-16)	N-24	½" x ½" Copper Tube Fittings (2) *
N-05	37" Copper Tubing, 1/4"	N-25	½" x 10" Copper Tubing
N-06	¼" x ¼" Angle Copper Tube Fitting (2) *	N-26	Inside Oven Shell
N-07	½" x 1 ½" XH Nipple (4) *	N-27	Outside Insulation Cover
N-08	½" x ¼" x ½" Tee (2) *	N-28	Vaporizing Chamber (includes N-44)... ..
N-09	¼" XH Union	N-29	Holder for Capillary Tubing & Heat Limiter....
N-10	¼" x 1 ½" XH Nipple (3) *	N-30	Bus Bar , 36" (2) *
N-11	Pulsator Pump 120V, complete	N-31	Heaters 240V, 350W, (10) *
	<u>Replacement Parts Available --</u>	N-32	Heater Clamps (3) *
	N-11/13C Coil for Pump & Solenoid	N-33	Insulation
	N-11GHI Plunger Kit for Pump.....	N-34A	3/8" Sealtite Cable to Pump
	N-11KLRS O'ring Kit for Pump.....	N-34B	3/8" Sealtite Cable to Solenoid
	N-11O Large Spring for Pump	N-34C	3/8" Sealtite Cable to Thermostat
N-12	3/8" Sealtite Angle Connector (2) *	N-35	Thermostat, complete
N-13	Solenoid Valve 120V, complete		<u>Replacement Parts Available --</u>
	<u>Replacement Parts Available --</u>	N-35A	Capillary & Bulb only
	N-11/13C Coil for Solenoid & Pump.....	N-35B	Hi-limit Cut-out Switch
	N-13GHI Plunger Kit for Solenoid Valve ...	N-35C	Lo-setting Switch
N-14	¼" Vertical Check Valve	N-35D	Hi-setting Switch
N-15	¼" x 16" Teflon Hose	N-36	3/8" Sealtite St. Box Connector (4) *
N-15A	¼" Swivel Adaptors (2) *	N-37	¾" Sealtite St. Box Connector
N-15B	¼" St.Ell, Brass 45°	N-38	¾" Sealtite Cable
N-16	16" x 18" Supply Tank (includes N-04)	N-39	¾" Sealtite Angle Connector
N-17	¼" Air Supply Valve	N-41/40	Timer (includes relay) with Base, complete
N-18	¼" x ¼" Copper Tube Fittings (2) *	N-42	Bottom Insulation Cover
N-19	20" x ¼" Copper Tubing	N-43	Vaporizer Stand
N-20	Gauge Glass Assembly, complete	N-44	½" Cap Thread Protector (part of N-28)
	<u>Replacement Parts Available --</u>	N-45	Contactor 120V
	N-20A Gauge Glass Valves w/ball check (2) * ..	N-45A	Enclosure for Contactor & Timer
	(includes part N-20B & N-20C)	N-46	4' Stove Wire with Terminal Ends, (2) *
	N-20B 5/8" Ga.Glass Rubber Washers (2) * ..	N-47	Heat Limiter
	N-20C Gauge Glass Packing Nuts (2) *	N-48	½" XH Gate Valve
	N-20D 5/8" x 15" Gauge Glass	N-49	Inspection Plug
	N-20E Gauge Glass Rods (2) *		* Denotes quantity required per unit.



OVERALL DIMENSIONS: 62" x 31"
(1579 mm. x 787 mm.)

INSTRUCTIONS FOR INSTALLATION
AND OPERATION OF MODEL
F-777-3
FROSTO® ELECTRIC VAPORIZER

LOCATION:

Do not locate near fire, intense lamps or other excessive heat. The Frosto® Electric Vaporizer is equipped with 2 lines which must be connected to the air system (refer to fig.1, pg.2). Position the unit so that no more than 10 feet (3047 mm.) of the ½" discharge tubing is required to make the line connection as shown (10 feet of ½" tubing is supplied). Note in the drawing that the ½" line should be located **after** the compressor and the air receiver. The ¼" tap should be made **before** the receiver (20 feet, 6094 mm., of ¼" copper tubing is supplied).

If an air dryer has been installed in the line, the ½" Frosto® supply line should be installed *downstream* from the dryer.

INSTALLATION:

The ½" line from Gate Valve N-48 (refer to fig.2, pg.2) must be tapped in at the **top or side** of the air line at the position indicated on fig.1, pg.2. It is recommended that traps be installed at the main air supply lines for both the ¼" equalizer and ½" discharge lines to prevent contaminants from entering the Frosto® system. A detailed sketch of the trap is provided in fig.1. Check the wiring diagram, Form 777-WD, for proper electrical installation. A qualified person should make the proper connections and fuse installations.

IMPORTANT – PLEASE NOTE

This unit has two separate circuits; fuse these circuits **SEPARATELY** as follows:

- The 120V Control Circuit has a combined amperage of 2.45 amps. Fuse this circuit with either a 3.4 or 3.6 amp fuse.
 - The 240V Power Circuit has a combined amperage of 16 amps. Fuse this circuit with a 20 amp fuse.
- IMPORTANT:** if the Vaporizer is not properly fuse, damage may result to the unit and/or to other equipment in your air system.
- Maximum working pressure is 150 psi.

A ½" Gate Valve, N-48, is provided as a shut-off for the discharge line. Install this valve after the Swing Check Valve, N-23 (refer to fig.2, pg.2). The safety Relief Valve, N-21, must be vented to a safe, unoccupied area.

ORIGINAL FILLING: (refer to fig.2, pg.2)

1. **Do not smoke** while filling.
2. **Turn off** all **electric** service to Vaporizer prior to filling.
3. **Close Valve N-17**; this will cut off air supply to the unit.
4. Open Fill Valve N-02 – **Bleed air slowly**.
5. Fill Supply Tank with Frosto® fluid to desired level. The tank will hold approximately 15 U.S. gallons however **do not fill** above "Maximum Fill" line on Gauge Glass N-20. **Avoid spills – wipe excess**.
6. Close Fill Valve N-02, open Valve N-17.
7. Replace cap on Fill Valve to prevent contaminants from getting into Frosto® supply tank.
8. Turn electrical circuits **on**.
9. To refill, follow same procedures, begin with No. 1.

ORIGINAL STARTING: (refer to fig.2, pg.2)

1. Open Valve N-17 and allow air pressure to equalize in top tank; (this valve must be left open while unit is in operation).
2. Open ½" Gate Valve N-48 at discharge line.
3. Turn unit on. The Pulsator Pump N-11 will not stroke until vaporizing chamber reaches the proper temperature (290° F., 143° C.).
4. The Timer N-41/40 is preset at the factory for 13 strokes per minute. Once vaporization has begun, it may be necessary to adjust the timer setting to meet various weather conditions. **Note:** 1 1/8" (28.6 mm.) on sight gauge = 1 U.S. gallon (3.8 liters) of Frosto® consumed.
5. Thermostat N-35 is calibrated at the factory; should adjustment or switch replacement be required, refer to Form N-35 found in your instruction packet.

GENERAL INFORMATION:

Follow all instructions that come with unit. After first seasonal startup, leave unit at adjusted level required for your ambient conditions and air volume. Additional adjustments are not normally required unless ambient conditions change drastically.

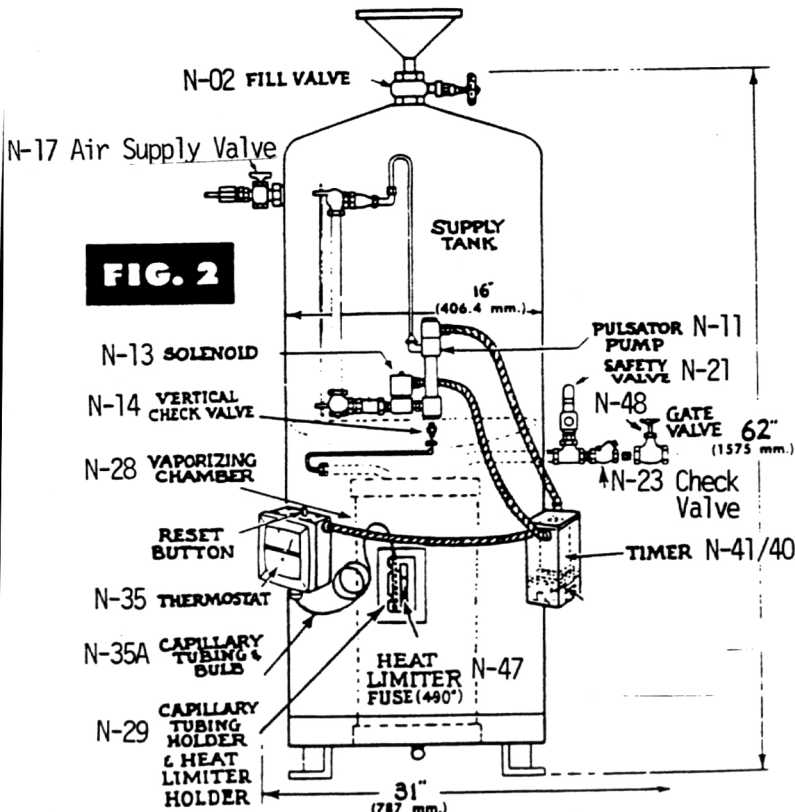
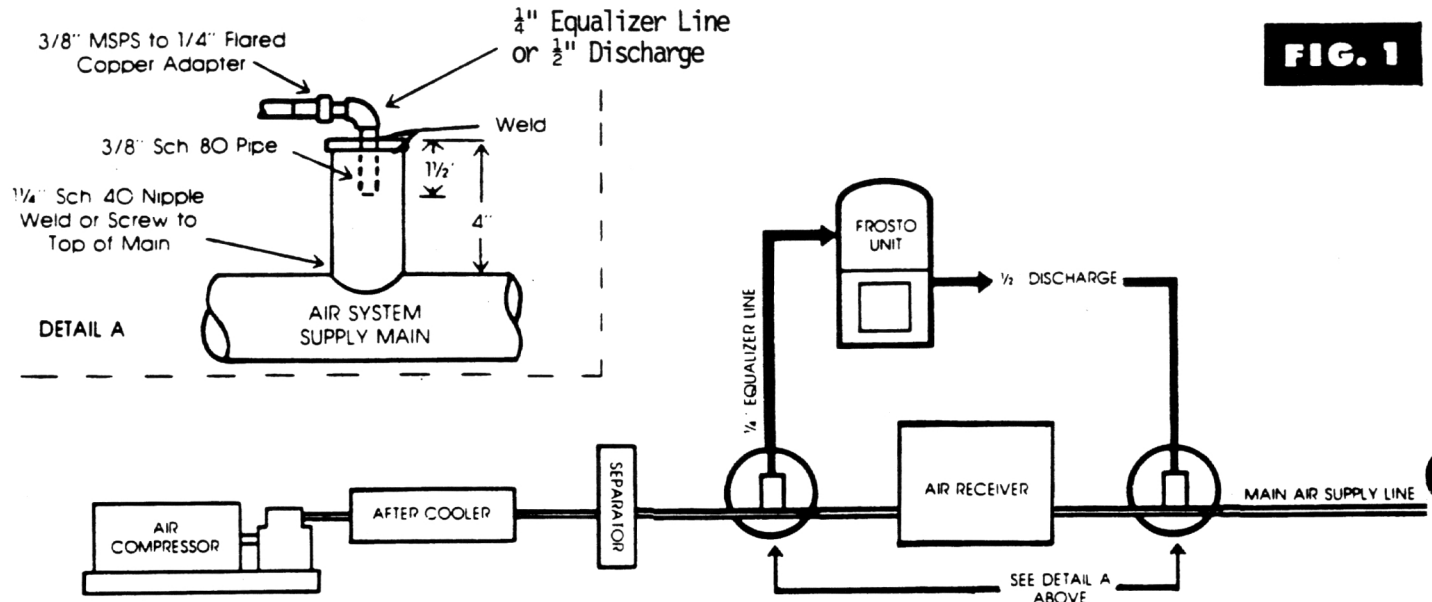
This unit is equipped with a Hi-Limit Cut-out Switch N-35B, located in the Thermostat to guard against excessive heat buildup in the vaporizing chamber.

DO'S

1. **Do** follow provided instructions and diagrams when installing the Frosto® Electric Vaporizer.
2. **Do** fuse the 120V control circuit and 240V heater circuit independently.
3. **Do** shut off both control circuit and heater circuit prior to filling.
4. **Do** shut off 1/4" Air Supply Valve N-17 and bleed air slowly from reservoir prior to filling.
5. **Do** use a clean container to transfer fluid when filling.
6. **Do** install the dust cover on Fill Valve N-02 once filling is complete.
7. **Do** follow Maintenance and End of Season instructions – refer to Form M-5.
8. **Do** call Tanner Systems customer service department (800-461-6454) with questions.

DON'TS

1. **Don't** use other than Frosto® fluid in this unit; other fluids may cause damage to the Vaporizer as well as other equipment on your line.
2. **Don't** attempt to use the unit or fluid without first reading operating instructions and the **Material Safety Data Sheet (MSDS)** on Frosto® fluid.
3. **Don't** store Frosto® fluid around or near the Vaporizer. Store in approved area.
4. **Don't** tamper with the Safety Relief Valve N-21 or restrict discharge from Safety Relief Valve.
5. **Don't** install elbow fittings on 1/2" discharge; use the provided 1/2" copper tubing and fittings to make a smooth gradual connection to main air line.
6. **Don't** attempt to alter vessels – they are A.S.M.E. code welded. Alterations or repairs must be made and inspected by an approved facility.



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