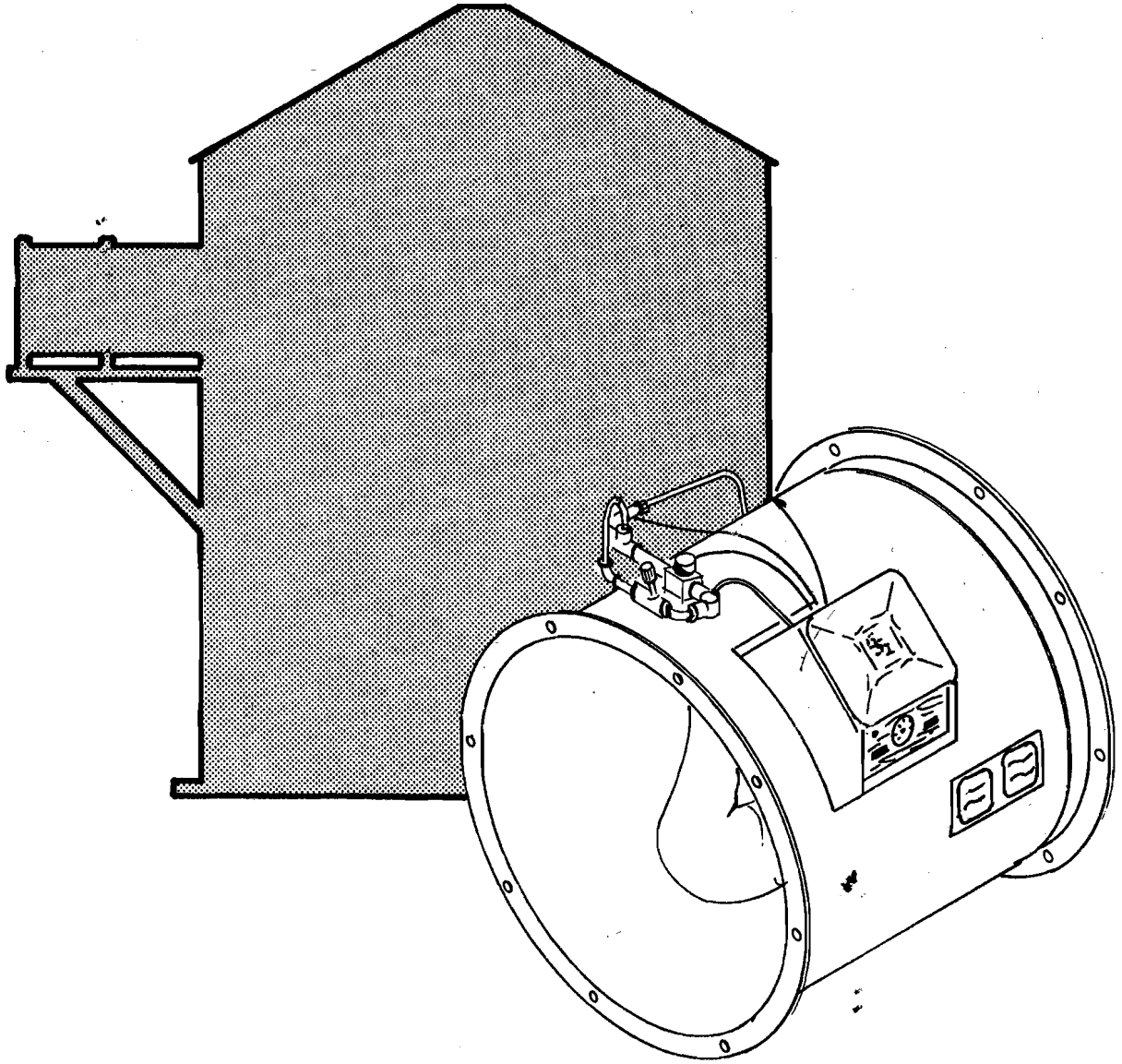


AIRSTREAM



TOP DRY SERIES HEATERS

MODEL NO.'S **THF-4024**
 THF-4028
 THF-4036
 THF-4042

OWNERS MANUAL

WARRANTY

GRAIN SYSTEMS, INC. warrants all products manufactured by GRAIN SYSTEMS, INC. to be free of defects in materials and workmanship under usual and customary service. GRAIN SYSTEMS, INC. only obligation is to repair or replace products returned on a prepaid basis within 12 months after retail sale, and, in our opinion, found to be defective due to material of workmanship. If defective, the product will be repaired or replaced without charge, F.O.B. factory, this constituting and fulfilling our warranty obligation. Expenses incurred without authorization of GRAIN SYSTEMS, INC. shall be the sole responsibility of the bearer. Under no circumstances will GRAIN SYSTEMS, INC. be liable for any kind of special or consequential damages, nor will the liability ever exceed the selling price of the product.

This warranty does not cover products or parts which have been damaged by negligent use, misuse, alteration or accident. All products supplied by outside manufacturers are warranted separately by the respective manufacturer. This warranty is exclusive and in lieu of all other warranties, expressed or implied. GRAIN SYSTEMS, INC. reserves the right to make design or specification changes at any time, without an contingent obligation to purchasers or products already sold.

All instructions shall be construed as recommendations only; because the actual installation may vary according to local conditions and GRAIN SYSTEMS, INC. assumes no liability for results arising from the use of such recommendations.

GRAIN SYSTEMS, INC. assumes no responsibility for field modifications or erection defects which create structural or storage quality problems. If any field modifications are necessary which are not specifically covered by the contents of this manual, contact GRAIN SYSTEMS, INC. for recommendations and approval. Any unauthorized modification or erection defect which effects the structural integrity of the G.S.I. bin will be cause for immediate nullification of the G.S.I. bin warranty.

ROOF DAMAGE WARNING

GRAIN SYSTEMS, INC. cannot warrant any roof damages due to excessive vacuum or internal pressure caused by fans or other air moving systems. Adequate ventilation and/or "make-up air" devices should be provided for all powered air handling systems. GRAIN SYSTEMS, INC. does not recommend the use of downward flow systems (suction). Severe roof structural damage can result from any blockage of air passages. Running of fans during certain high humidity/cold weather conditions can cause freezing over of air exhaust or intake ports.

OCTOBER 1986

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SPECIFICATIONS

DIAMETER	24"	28"	36"	42"	
BTU RATING	2000000	3000000	4000000	6000000	
WIEGHT	110	145	228	286	
LIQUID MODELS	MAX FUEL FLOW (GPH)	21	32	43	71
	ORIFICE SIZE	.177	.25	.25	.438
	MIN OPERATING PRESSURE	1	3	5	1
	MAX OPERATING PRESSURE	30	18	30	8
VAPOR MODELS	MIN LINE SIZE	3/8"	3/8"	1/2"	1/2"
	MAX FUEL FLOW (CU FT/HR)	800	1185	1590	-----
	ORIFICE SIZE	.177	.25	.25	-----
	MIN OPERATING PRESSURE	1	3	5	-----
NAT GAS MODELS	MAX OPERATING PRESSURE	30	18	30	-----
	MIN LINE SIZE	3/4"	1"	1"	-----
	MAX FUEL FLOW (CU FT/HR)	2100	3000	4200	6500
	ORIFICE SIZE	.25	.375	.375	.500
NAT GAS MODELS	MIN OPERATING PRESSURE	1	1	3	1
	MAX OPERATING PRESSURE	10	6	10	6.5
	MIN LINE SIZE	1"	1-1/4"	1-1/2"	2"

HEATER CONTROL SPECIFICATIONS

<u>SPARK PLUG</u>	Double electrode 1/8" gap
<u>FUSES</u>	5 amp 250 volt
<u>HI-LIMIT HOUSING</u>	Opens circuit at 200 degrees f
<u>HI-LIMIT VAPOR</u>	Opens circuit at 180 degrees f
<u>SOLID STATE IGNITION BOARD</u>	110 v works on flame rectification principle to prove flame. supplys 15000 v to spark plug for ignition.

FUNCTION OF HEATER PARTS

HEATER HIGH LIMIT - Shuts down heater in event housing temperature exceeds 200 degrees. (This might occur if fan motor were to fail.)

PRESSURE GAUGE - Allows the manifold pressure to be monitored for regulator adjustment.

HI-FLAME SOLENOID VALVE - When closed forces gas to go to bypass and through adjustable flow control for low flame. When opened it allows gas to flow straight through to orifice.

LO-FLAME SOLENOID VALVE - Closes in event that the low flame would get to hot.

SPARK PLUG - Provides electric spark for ignition.

BURNER SWITCH - Switches on power to heater unit.

PURGE RELAY - Provides a ten second delay to allow all gas to be purged from heater and fan to come up speed before first igniting burner.

ELECTRONIC IGNITION BOARD - Provides high voltage to spark plug for ignition and also provides flame proving through flame rectification.

FLAME SENSOR - Senses flame and sends signal back to ignition board.

RESET - Locks out system after repeated trials for ignition.

RED LIGHT - Indicates that electronic ignition board is receiving power.

FUNCTION OF VAPORIZER PARTS

STRAINER - Filters out any foreign matter from gas line that could lodge in gas solenoid valve.

SHUT-OFF VALVE - Starts or Stops flow of liquid to vaporizer.

SAFETY RELIEF VALVE - Releases pressure should blockage or pressure build up occur.

SOLENOID VALVE - Shuts off flow of liquid should vapor get overheated in cooling coil.

VAPOR HIGH LIMIT - Senses overheating in cooling coil and sends signal to solenoid valve to close, shutting off flow of liquid to heater.

COOLING COIL - Allows hot vapor to cool slightly before combustion.

VAPORIZER SUPPORT WELDMENT - Provides lateral and vertical movement of vaporizer coil.

HEATER INSTALLATION

1. Top Dry series heaters are designed primarily for use with Top Dry systems, although they are suitable for many other crop drying applications. Instructions given in this manual will assume that heater is being installed on a Top Dry.
2. Bolt heater to downwind side of fan. (If required) Use 3/8" x 1-1/4" bolts, nuts and lockwashers. (not included)
3. Hoist fan and heater unit up onto fan and heater platform.
4. If fan and heater unit is 36" or 42" then the unit should bolt directly to transition sheet. For a 24" or 28" fan and heater, unit must be shimmed under the legs in order to gain height required to bolt to transition.
5. Wire fan as per fan manual.
6. Plug heater interlock plug into fan. This should be all that is required for wiring on heater. (See dual heater control instructions for wiring more than 1 fan and heater.)

FUEL CONNECTION

IMPORTANT - DO NOT USE PROPANE TANKS WHICH HAVE PREVIOUSLY BEEN USED FOR AMMONIA UNLESS THEY HAVE BEEN PURGED ACCORDING TO PROCEDURES OF THE NATIONAL L.P. ASSOCIATION.

INVESTIGATE TO BE SURE THAT FUEL SUPPLY SYSTEM COMPLYS WITH ALL LOCAL CODES FOR L.P. GAS INSTALLATIONS.

LIQUID PROPANE MODELS

1. LP models are designed to run on liquid propane, with liquid draw from the propane tank. Avoid using propane supply tanks that have been used for vapor draw for long periods of time. When using liquid draw systems any moisture that may be present in tank or lines may freeze when system used in cold weather. To avoid this the usual precaution is to purge the system with methanol.
2. Run proper size line (see specifications) to liquid pipe train on heater. Have qualified gas service man inspect installation to be sure that every thing is installed according to local codes and ordinances.
3. After installation is complete check all connections for leaks.

PROPANE VAPOR MODELS

1. Propane vapor models are designed to run either directly off of supply tank or from a separate external vaporizer.
2. A high pressure (0-30 lbs.) regulator should be installed in line to regulate gas flow to heater. 24" model heaters have regulator installed on heater at factory.
3. Run proper size line (see specifications) to pipe train on heater. Have a qualified gas service man inspect installation to be sure that everything is installed according to local codes and ordinances.
4. After installation is complete check all connections for leaks.

NATURAL GAS MODELS

1. Natural gas models are similar to vapor models, but have a larger orifice to accommodate lower pressures sometimes found with Natural gas.
2. Pressure regulator must be installed ahead of heater to adjust gas flow. This regulator must be capable of supplying the required pressure and maximum gas flow. (see specifications)
3. Run proper size lines (see specifications) to pipe train on heater. Have qualified gas service man inspect installation to be sure that everything is installed according to local codes and ordinances.
4. After installation is complete check all connections for leaks.

HEATER OPERATION

All Top Dry heaters have standard a HI-LO type pipe train. This style of burner should burn constantly cycling in and out the high flame. Follow these instructions when first starting up your unit.

1. The thermostat plugs must be plugged into heater control box for heater to operate. (see thermostat instructions)
2. Open all manual shut-off valves to heater unit.
3. Start fan. This should supply power to heater on/off switch.
4. Depress heater on/off switch. Switch should stay in. To release push up on red tab below the button.
5. After 10 seconds red indicator light should light up, indicating that there is power to the ignition board.

6. Heater should now be lit. If not check to see that all gas is on and both thermostats are plugged in.
7. Turn thermostat dial to its highest setting so that heater should be on high flame.
8. Open adjustable flow control valve all the way. (On propane models this is the small red top adjustable valve, on natural gas models this is the ball valve with the lever handle.)
9. Turn thermostat dial to lowest setting so that heater should be on low flame.
10. Adjust flow control valve so that low flame pressure is at desired setting.
11. Turn thermostat dial back to a very high setting and wait for bin plenum to come up to temperature. Then turn thermostat back slowly until heater goes to low flame.
12. Low flame should be adjusted so that it drops slowly until burner goes back to high flame.
13. Watch plenum temperature as burner goes through a few cycles, to be sure that it is operating properly.
14. Refer to Top Dry Control Center manual for further instructions on drying with a Top Dry System.

HEATER SERVICE

All AIRSTREAM heaters are constructed of durable weather-resistant materials, so a minimum amount of service should be required; however before the unit is started for the first time each season there are a few items that need to be checked out. All damaged parts should be repaired or replaced.

1. Unplug heater power cord from fan. Open control box lid and inspect all components for moisture, vibration, or rodent damage. Inspect and tighten all loose terminal connections. Replace any damaged wiring.
2. Remove burner orifice tube and inspect for dirt or foreign material. Clean out if necessary.
3. Remove burner cup from burner venturi and inspect for foreign material in any of the ports. Clean these parts out if necessary. Any foreign material blocking burner cup ports may seriously impair the performance of the heater.
4. Inspect the spark plug and flame sensor for corrosion and damage. Clean or replace if necessary.

ADJUSTING PRIMARY AIR DAMPER PLATE

(42" HEATER ONLY)

The 42" heater is equipped with an air damper plate. It is located on top of the heater inside of the can. The brass orifice tube goes down through this plate. This plate is adjustable up and down to control the quality of the flame.

1. With heater on adjust gas pressure to desired setting. Observe flame through access door. If flame is a clear blue color air damper is adjusted correctly.
2. Stop fan and heater. Damper plate may be adjusted from heater outlet or from access cover.
3. Loosen wingnuts and readjust damper. Secure again with wingnuts.
4. Operate heater and recheck flame. Readjust plate if necessary.

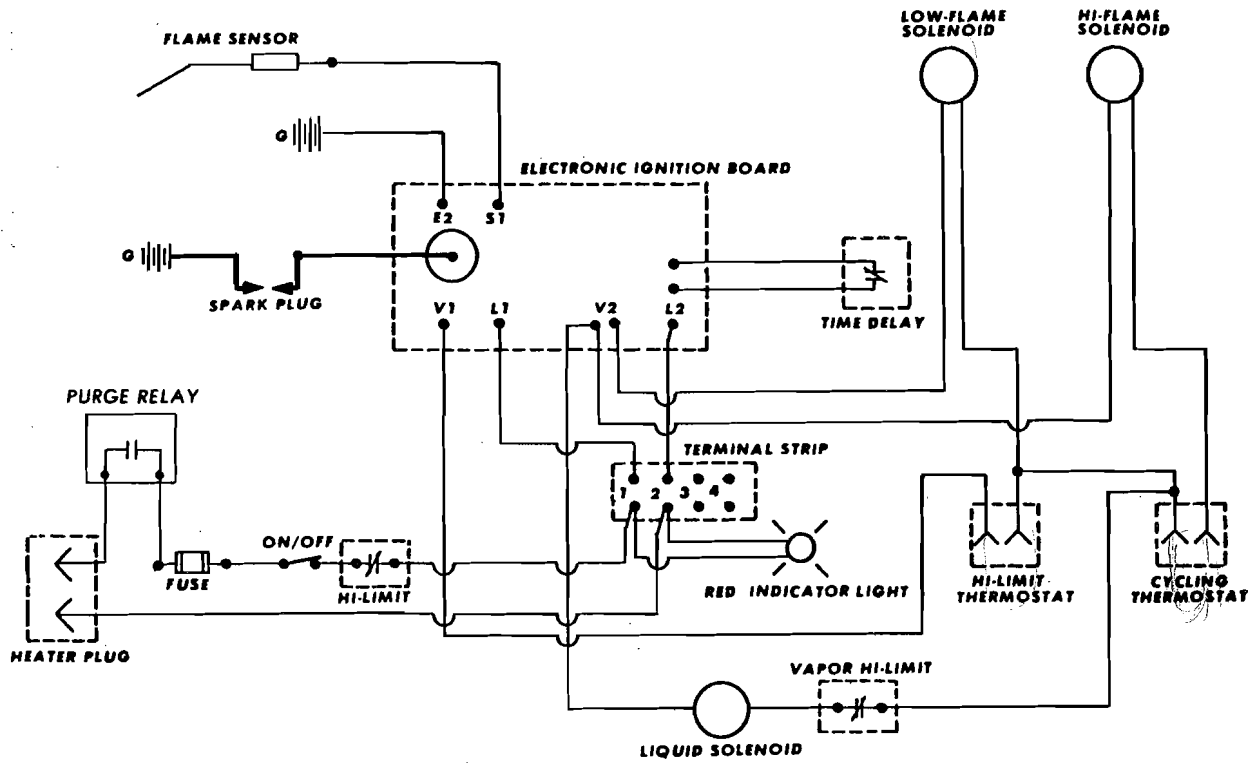
Flame should be checked periodically through-out drying season and adjusted if necessary.

TROUBLESHOOTING CHART

TROUBLE	PROBABLE CAUSE	CHECK-OUT PROCEDURE AND CORRECTION
Burner will not fire no gas pressure to orifice after 30 seconds of fan operation. (Red light does not come on at all.)	Heater not plugged in.	Plug heater cord into fan control box.
	Purge relay	Remove wires from purge relay and tie them together. If purge relay was bad red light should come on immediately after pressing on/off switch. If purge relay is bad replace
	Blown fuse	Check fuse visually or with ohm meter if bad replace.
	High limit (heater housing)	Press red reset button on hi-limit if this does not correct situation check hi-limit with ohm meter. If hi-limit shows open circuit then replace. (Remove wires before checking.)
	Fan and Heat unit not grounded properly.	Fan and Heat unit must be grounded for proper operation.
Burner will not fire, no gas pressure to orifice. (Red light comes on after 15 seconds of operation.)	Hi-limit reset on HI-LO thermostat	Depress red button on HI-LO thermostat. If this does not correct situation jump around thermostat to determine whether thermostat is bad.
	Vapor Hi-limit	Jump around the Hi-limit and if this corrects situation replace Hi-limit.
	Time Delay Reset (on control box)	Reset button
	Liquid solenoid valve	Feel top of valve to see if it clicks this would indicate that valve is working electrically. If valve does not click, connect 110 volts to valve if this causes valve to click open then valve should be okay. If not replace valve or valve coil.
	Lo-flame solenoid valve	Check out the same as liquid solenoid valve.
	Electronic ignition board	Remove wires from V1 and V2. Push start switch on heater after red light comes on there should be 110 volts between V1 and V2 for 4 seconds. If this is true then board should be okay. If not check power supply to board to make sure that is okay. If power supply checks out replace board.
	Obstruction in line	Remove obstruction.
Gauge shows gas pressure but unit will not fire.	Spark plug	Remove plug wire from spark plug. Carefully holding plug wire by insulation try to get an arc between end of wire and heater housing. HIGH VOLTAGE - STAY CLEAR OF END OF IGNITION WIRE. If spark is present replace or clean plug.
	Spark plug wire	If no spark was present after checking spark plug then problem may be faulty spark plug wire. Remove spark plug from ignition board Ground one end of a screwdriver to frame then bring the shaft of the screwdriver to within 1/8 inch of terminal on board. Turn power on to unit. If arc is established then replace spark plug wire. If arc is not established then replace board.
Heater starts properly but shuts after 10 seconds or solenoids cycle rapidly.	Flame sensor not in proper position.	Move flame probe into flame.
	Flame probe in bad condition.	Replace flame probe wire.
	Flame probe wire bad	Replace flame probe wire.
Lines freeze while starting.	Moisture in fuel	Call qualified gas serviceman to check tank
Cooling coil gets very hot and heater shuts off.	Vaporizer getting too hot.	Adjust vaporizer out of flame. Move small amount at a time and allow heater to run for a few minutes before checking cooling coil.

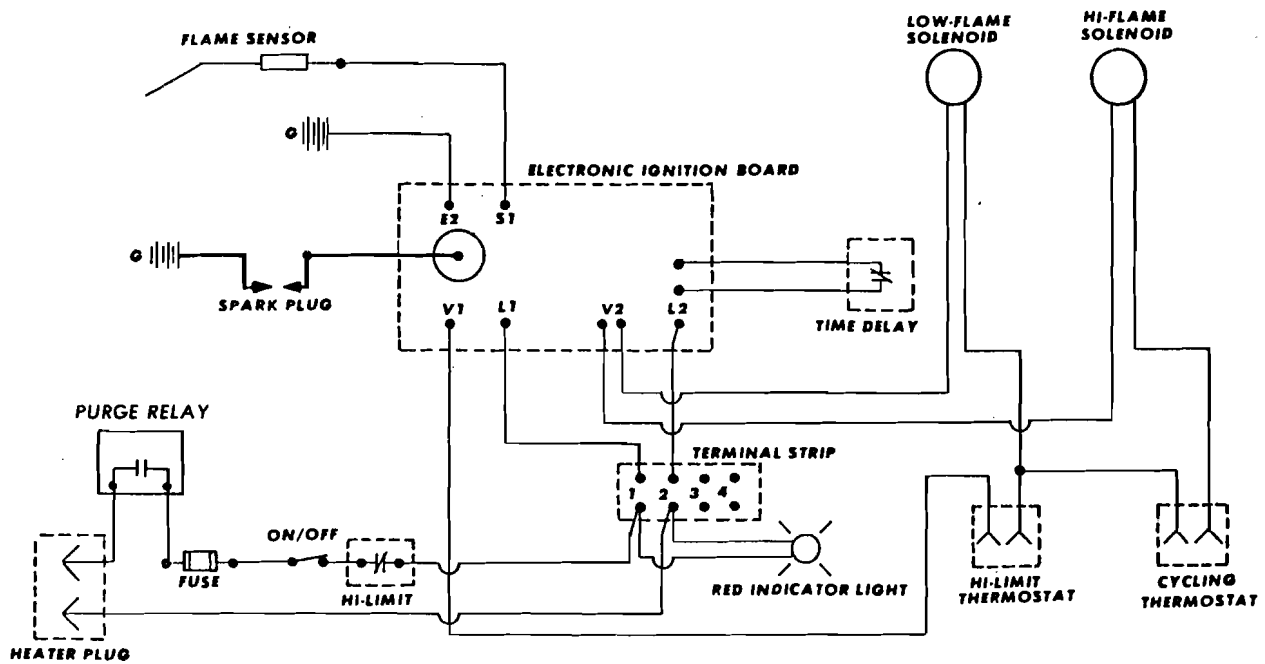
24", 28", 36" & 42" TOP DRY HEATER WIRING DIAGRAM

LIQUID PROPANE



24", 28", 36" & 42" TOP DRY HEATER WIRING DIAGRAM

NATURAL GAS & VAPOR



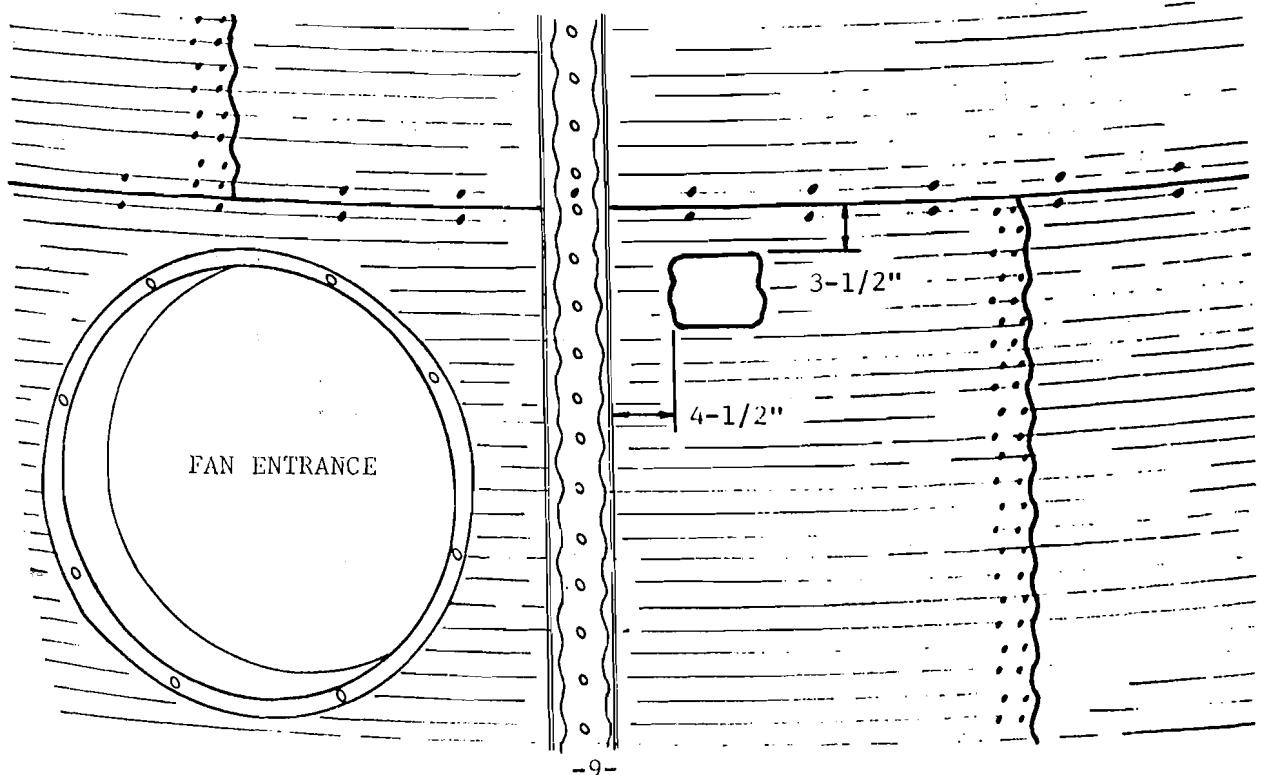
HI-LO THERMOSTAT

The HI-LO Thermostat is designed for use with GSI HI-LO fire heaters. It comes with 2 thermostats one is adjustable and cycles the HI-flame in and out. The other is a manually resetting HI-limit. It is not adjustable and is set to shut down heater should plenum exceed temperature of 200 degrees. The HI-LO thermostat also comes with a thermometer for monitoring the plenum temperature.

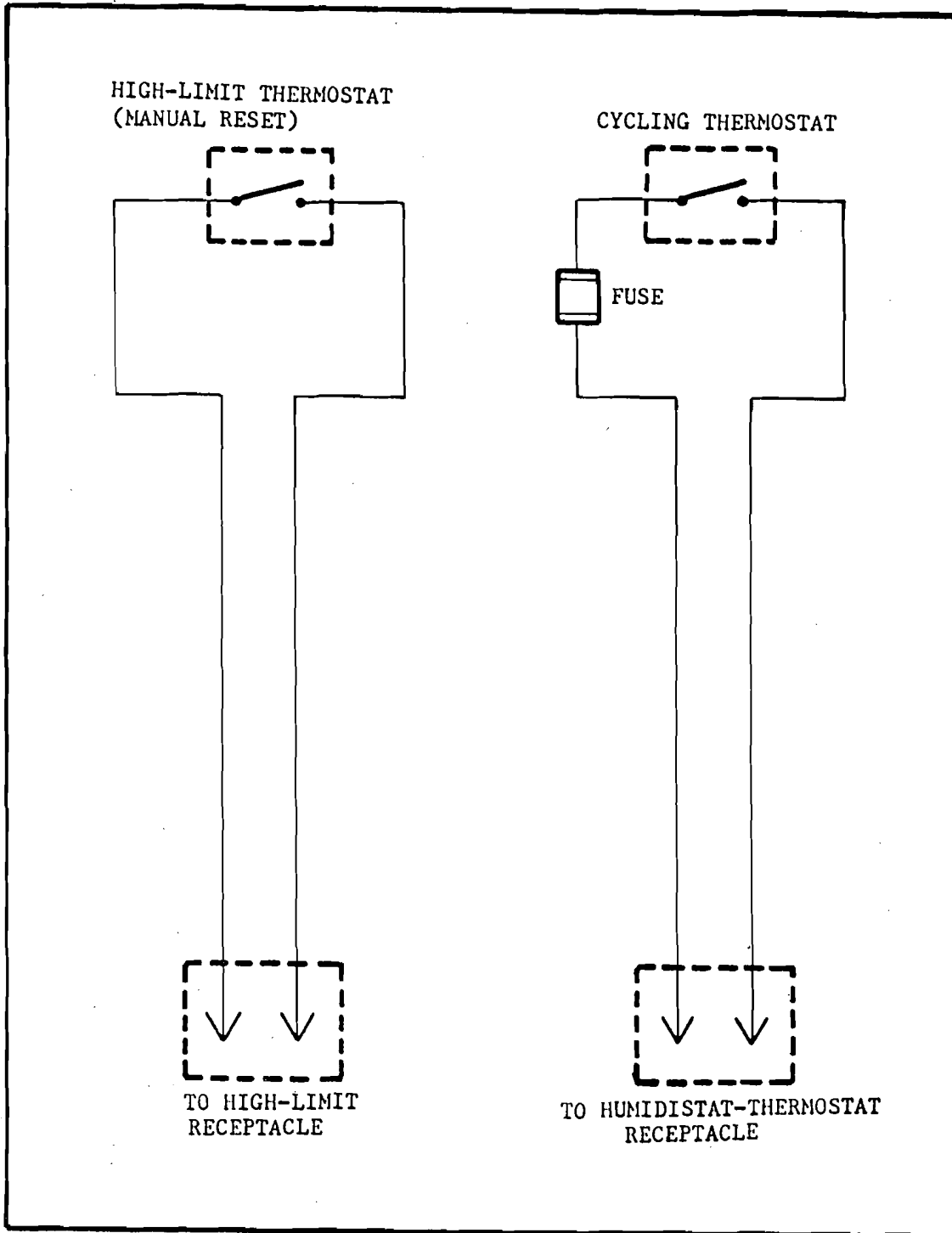
INSTALLATION

1. Locate mounting position of thermostat as shown in diagram.
2. Use template supplied to cut hole in sidewall.
3. Cut a piece of screen proper size to fit over opening cut in sidewall. (Screen door wire (aluminum) 12" x 12" will work) Cut holes for probes and thermostat in screen wire.
4. Apply rope caulk to sides and top of plastic housing. Leave bottom open to let moisture escape.
5. Secure housing to sidewall using self drilling screws supplied. Be careful not to overtighten this may crack housing.
6. Plugs coming out of housing should be labeled HI-LIMIT and HUMIDISTAT-THERMOSTAT. Plug these into the proper receptacle on heater control box.

This completes installation instructions for the HI-LO thermostat. For operating instructions see heater operating instructions.



HI-LO THERMOSTAT WIRING DIAGRAM





RECOMMENDED CUT-OUT FOR HI-LO THERMOSTAT

MOUNTING TEMPLATE HI-LO THERMOSTAT

