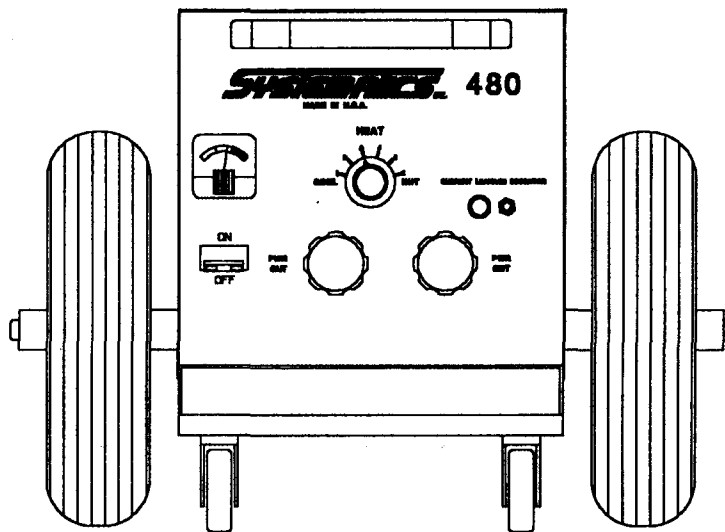


SYSTEMATICS inc.

OWNER'S MANUAL

MODEL IB480



**THE ICEBREAKER 480
HAS BEEN DESIGNED PRIMARILY FOR
MUNICIPALITIES AND UTILITY DEPART-
MENTS THAT REQUIRE THE USE OF PIPE
THAWING EQUIPMENT.**



FOR TECH. SERVICE, CALL 1-610-696-9040

INSTALLATION
OPERATION
TROUBLESHOOTING

MANUFACTURER'S LIMITED WARRANTY

This equipment is warranted against defects in materials and workmanship for a period of **2 YEARS** from the date of purchase.

Should it become defective for such reason, the Manufacturer will repair it without charge, if it is returned to the Manufacturer's factory, freight prepaid. This warranty does not cover: (1) failure due to normal wear and tear; (2) damage by accident, force majeure, improper use, neglect, unauthorized repair or alteration; (3) anyone other than the original purchaser.

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. THE MANUFACTURER SHALL NOT BE LIABLE FOR ANY INJURY TO PERSONS, INCLUDING DEATH; OR LOSS OR DAMAGE TO ANY PROPERTY, DIRECT OR CONSEQUENTIAL, INCLUDING, BUT NOT LIMITED TO, LOSS OF USE, ARISING OUT OF THE USE, OR THE INABILITY TO USE, THE PRODUCT. THE USER ASSUMES ALL RISK AND LIABILITY WHATSOEVER IN CONNECTION WITH THE USE OF THE PRODUCT, AND BEFORE DOING SO, SHALL DETERMINE ITS SUITABILITY FOR HIS INTENDED USE, AND SHALL ASCERTAIN THE PROPER METHOD OF USING IT.

SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, OR THE EXCLUSIONS OR LIMITATIONS OF INCIDENTAL OR CONSEQUENTIAL DAMAGES. SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE.

TABLE OF CONTENTS

INTRODUCTION	1
SPECIFICATIONS	2
INSTALLATION	3
OPERATION	4
TROUBLESHOOTING	11

INTRODUCTION

THAWING FROZEN PIPES ELECTRICALLY

A frozen water pipe can be thawed very quickly by passing low voltage, high current AC electricity through it. This method works on steel or copper pipes even when they are buried in the ground or concealed in the walls of buildings. This method **DOES NOT** work on plastic pipes because they will not conduct electricity. The method requires that there be unfrozen water, under standard pressure, on one side of the frozen section of pipe and an open faucet on the other side.

Thawing pipes electrically has been shown to be more convenient and safer than other methods of thawing pipes including the following:

<u>METHOD</u>	<u>REMARKS</u>
Open flame	Lack of control. Uses dangerous gas or other flammable liquids. Risk of fire.
Hot Water	Slow. Lack of control.
Arc Welder	Large power source is required to supply needed high voltage. Arc can melt pipes. Hazard of high voltage shock to operator. Damage to welder. Risk of fire.
Electric Pipe Thawer	Uses safe low voltage. Easy to use. No flame or arc when used properly.

THE PIPE THAWING PROCESS

When electrically thawing a section of water pipe, it is only necessary to heat the pipe enough to melt a thin film of ice on the inside of the pipe. The warmer water, under standard pressure, on the one side of the ice will seep through the melted film and very quickly melt the rest of the ice, causing a flow out of the open faucet on the downstream side. If operated properly, the pipe thawing machine will melt the ice and cause the water to start to flow in about 10 minutes (see "APPROXIMATE" thawing times on page 5).

NOTICE

Since copper pipe will not heat up as fast as iron pipe, allow about 30 percent longer thawing time.

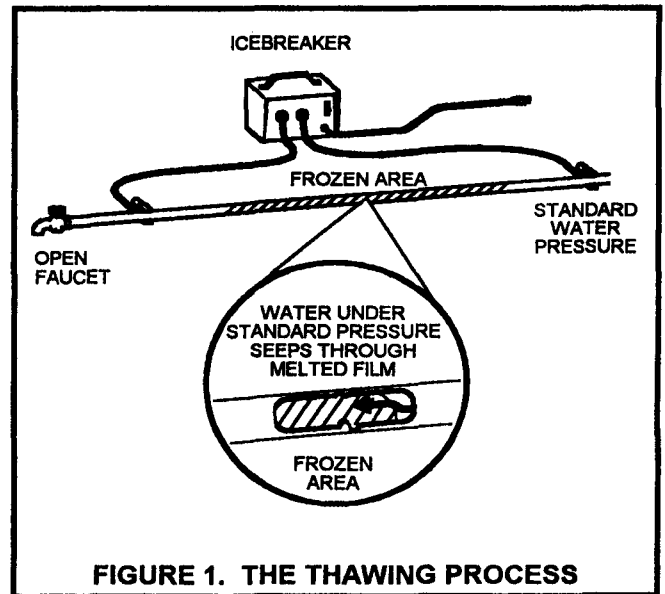


FIGURE 1. THE THAWING PROCESS

IMPORTANT

The Icebreaker 480 comes equipped with a built-in thermal protector. When the Icebreaker's internal temperature reaches a certain point, automatic shut down will occur.

DESCRIPTION

The Systematics **Icebreaker 480** is a electric pipe thawing machine intended for use by Municipalities and Water departments. It is designed for use with 1/2 inch to 1 1/4 inch copper or iron pipe up to 150 feet in length. The unit is protected by a internal thermal switch and a 25 amp circuit breaker. It features a six position switch to control heat output. The meter on the unit informs the operator that the selected heat output is; too low, safe, or too high for each pipe thawing operation. Two #2/0 AWG cables of 20, 50 or 100 feet, or two #4/0 AWG cables of 50 or 100 feet should be used for thawing.

NOTE

Longer cables must also be larger in AWG size. If smaller diameter cables are used, current (amperage) will be limited.

The **Icebreaker 480** comes equipped with our specially designed Current Leakage Indicator (CLI). The CLI is a safety circuit built into the **IB480** that helps eliminate the possibility of current leaking into the electrical grounding circuits.

WARNING

Current leaking into the electrical grounding wires can overheat nearby combustible materials and cause fires.

SPECIFICATIONS

PART NO. **IB480**

INPUT:

Voltage	115V AC
Phase	single
Frequency	50/60 Hz
Current	19 Amps
Input Cable	20 feet

OUTPUT:

Voltage	4.5 - 10V AC
Current-(Maximum)	480 Amps

SPECIAL SAFETY FEATURE:

CLI - Current Leakage Indicator (Special Built-in Safety Circuit)

PIPE THAWING CAPACITY:

Pipe Size	1 1/4 inch
Length	150 feet (max.)

DIMENSIONS:

Height	19 inches
Width	14 inches
Depth	27 3/4 inches
Weight	107 pounds

RECOMMENDED CABLES:

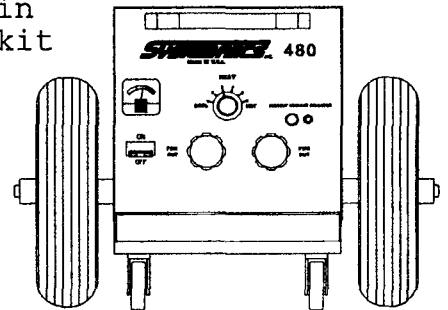
two 50 ft. #2/0 AWG*	(2) 50-2/0
two 100 ft. #4/0 AWG*	(2) 100-4/0

*Longer cables must also be larger in AWG size.

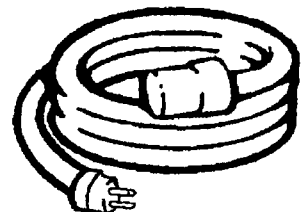
CHECK LIST

THE SYSTEMATICS ICEBREAKER 480 INCLUDES THE FOLLOWING:

- 1- **IB480**
Pipe Thawer
with
built-in
Wheel kit



- 1- **20CP-140**
20 foot
Power Input
Cable



IB480 FEATURES

The following features are located on the front of the IB480.

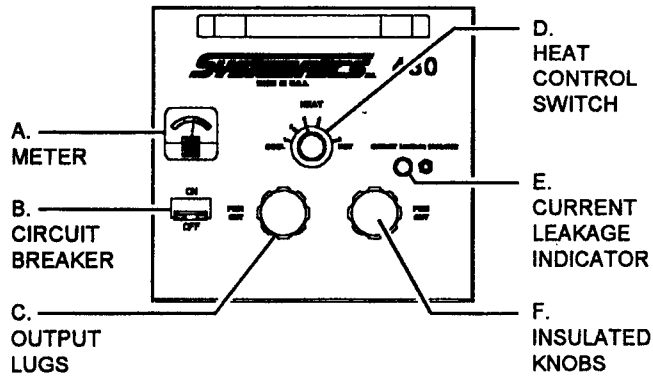


FIGURE 2. FRONT VIEW

A. METER

Color coded meter for quick selection of output current.
White - too low
Green - safe
Red - too high

B. CIRCUIT BREAKER

Primary power switch and overload protection device.

C. OUTPUT LUGS

Terminals allow quick installation and removal of pipe thawing cable assemblies.

D. HEAT CONTROL SWITCH

A six position switch for controlling heat output.

E. CURRENT LEAKAGE INDICATOR (CLI)

Safety circuit light that illuminates when a low current flows through an unsafe path. The push button switch allows easy testing of the CLI operation.

F. INSULATED KNOBS

No wrench required for easy cable removal.

INSTALLATION

The Icebreaker 480 is mobile and can be positioned in any location convenient to the frozen pipe and available input power. A 115 volt AC grounded 20 amp circuit is required or the IB480 can be used on a small portable generator (4000 watts or larger). If it is necessary to use an extension cord, it should be a heavy-duty 3 prong grounded conductor type.

WARNING

If the wiring is grounded in two places, such as, at a barn and a house, a parallel low voltage current may be established through the grounded neutral conductor. If so, the CLI should come on warning the operator of this possible situation. If left alone, the conductor could get hot and start a fire in either building. Disconnect all grounds at either end of the electrical wiring system.

Disconnect all appliances to prevent blowing house fuses or overheating the house wiring.

Do not connect the Icebreaker to the 115 volt power until all pipe connections have been made. See "Operation" section.

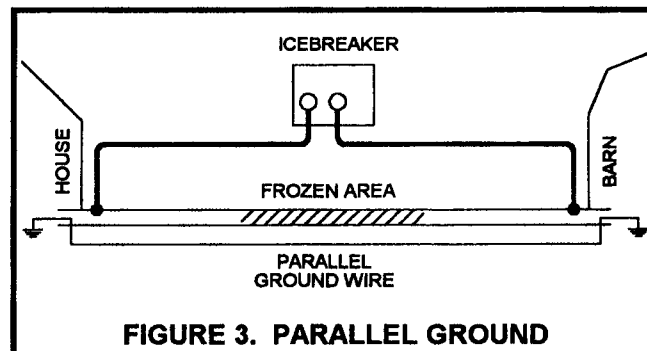


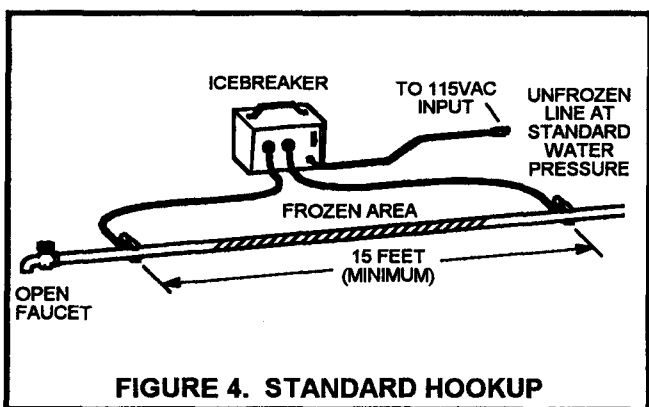
FIGURE 3. PARALLEL GROUND

OPERATION

First, isolate the frozen section of pipe. Inside a house, this is done by opening faucets and back tracing the pipes. The frozen section will usually be in the outside walls, near doors or windows, or in crawl spaces under floors. If all water outlets in the house fail to operate, the line from the curb valve to the house could be frozen (see "THAWING HOUSE SERVICE PIPES" on page 5).

THAWING DIRECT LINES

1. Uncoil the pipe thawing cables.
2. Connect them to the Icebreaker and the pipe to be thawed, at the nearest convenient spots that will place the frozen section **BETWEEN** the clamps.



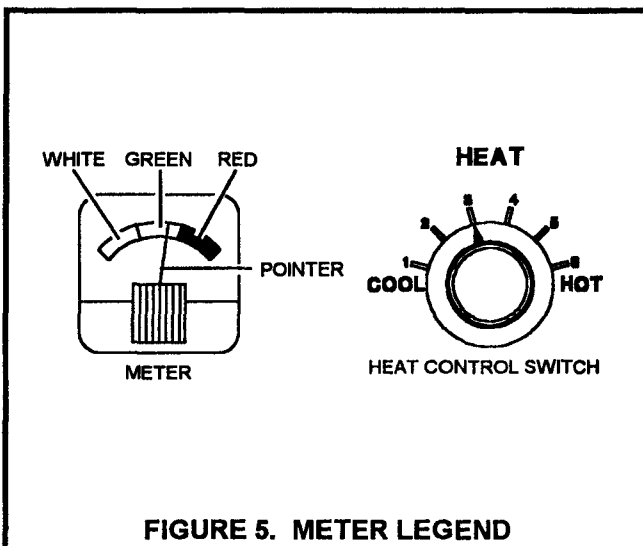
NOTE

Good connections are necessary. Before connecting the cables, clean all pipes by sanding with coarse emery cloth. Make sure all connections are tight to prevent overheating or arcing at the clamps. When the connections are good, the pipe and cables will vibrate to the touch. Do not use cables coiled up or placed on steel objects as heating in the pipe will be reduced.

WARNING

The cables get hot during operation so keep them off rugs and finished floors that may be damaged by the heat.

3. Place the clamps at least 15 feet apart to prevent overheating the machine and cables.
4. Set the Heat Control Switch on the **Icebreaker 480** to HEAT #1.
5. Plug the power input cord into a 115 volt AC receptacle.
6. Turn "ON" the circuit breaker and observe the meter.
7. If the pointer of the meter is in the white or lower green area, turn "OFF" the circuit breaker.
8. Reset the Icebreaker to heat #2.
9. Turn the circuit breaker "ON" and observe the meter.
10. If the pointer is still in the white or lower green area, try HEAT #3 setting and so on until the pointer is well into the green area but not in the red area.



NOTICE

After obtaining the correct meter reading the CLI red light should be "OFF". Test the circuit for operation by pressing the push button switch. If the red light comes on, operation is fine (for more information see "CURRENT LEAKAGE INDICATOR (CLI)" on page 6).

11. If the pointer is in the red area, turn the circuit breaker "OFF" and reset the Icebreaker to the next lower HEAT setting.
12. If the meter will not go into the green zone, larger diameter cables are required for maximum thawing results.

CAUTION

Always use the **Icebreaker 480** in the green area - never in the red area. Make sure the circuit breaker is turned "OFF" before changing the HEAT setting. Monitor the equipment during the pipe thawing operation.

13. Pipes may be thawed with the meter in the white zone, but thawing times will be longer.

WARNING

A small empty pipe in the circuit may get very hot before a larger pipe will thaw. This could melt the solder in a copper line or set fire to nearby combustible materials.

The following chart indicates the "APPROXIMATE" thawing times under "ideal" condition.

PIPE TO BE THAWED:

Size- 3/4 to 1 inch
Type- copper or steel

NOTICE

The Icebreaker relies upon a conductive material, (i.e. bronze, copper, iron), for operation. So plastic or PVC pipe can not be thawed using this type of equipment.

CABLES USED:

(2) 50-2/0
Size- #2/0 AWG
Length- 50 feet (each)

"APPROXIMATE"

PIPE LENGTH	CURRENT	THAWING TIME
20 feet	300 Amps	8 min.
40 feet	270 Amps	10 min.
50 feet	240 Amps	12 min.
60 feet	220 Amps	15 min.
80 feet	200 Amps	20 min.
100 feet	180 Amps	25 min.

(continued on following page)

CURRENT LEAKAGE INDICATOR (CLI)

1. Under proper thawing conditions the CLI red light will be off. The red light will come on only when a low current flows through an unsafe path such as electrical ground lines.

WARNING

A unsafe condition is a possibility when one of the thawing leads is connected to a fire plug instead of the curb service valve when thawing the street to house service pipe. This condition only develops if the pipe line sections in the street have not been properly bonded electrically together. When the bonds have been accidentally broken or missed, thawing current can not go through the street pipe directly to the house. Instead it goes to some other nearby house, through the ground wire, up the electrical power lines, (from pole to pole), down the power lines through the ground wire to the pipe in the desired house and other houses. This condition can cause fires.

2. If an unsafe condition should occur, the CLI light will come on immediately. The machine then should be turned "OFF". Under this condition the thawing current would be too low to thaw the pipe but may be high enough to overheat the ground wires.
3. During every thawing operation, the CLI should be tested for proper operation.
 - a. Following the directions outline under "THAWING DIRECT LINES" on page 4.

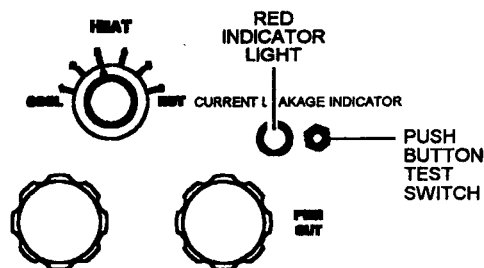


FIGURE 6. CURRENT LEAKAGE INDICATOR

- b. With the pointer of the meter located well into the green area. The red indicator light of the CLI circuit will be "OFF".
- c. Activate the push button test switch. The red light should illuminate (see Figure 6).
- d. If the test results are positive, continue with the thawing process.

THAWING HOUSE SERVICE PIPES

House service pipes usually can be thawed by connecting one cable to the exposed pipe in the kitchen or basement and the other cable to the curb service. At the curb, make the connection to the valve at the bottom of the service riser using a curb key. The adjustable ground level cover probably does not make a good connection to the valve.

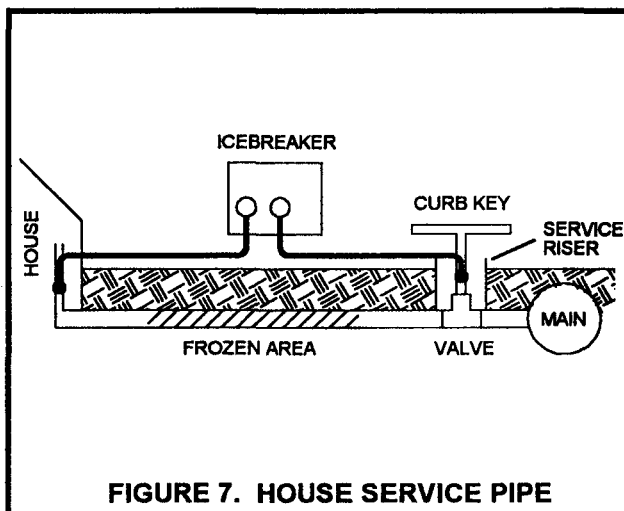


FIGURE 7. HOUSE SERVICE PIPE

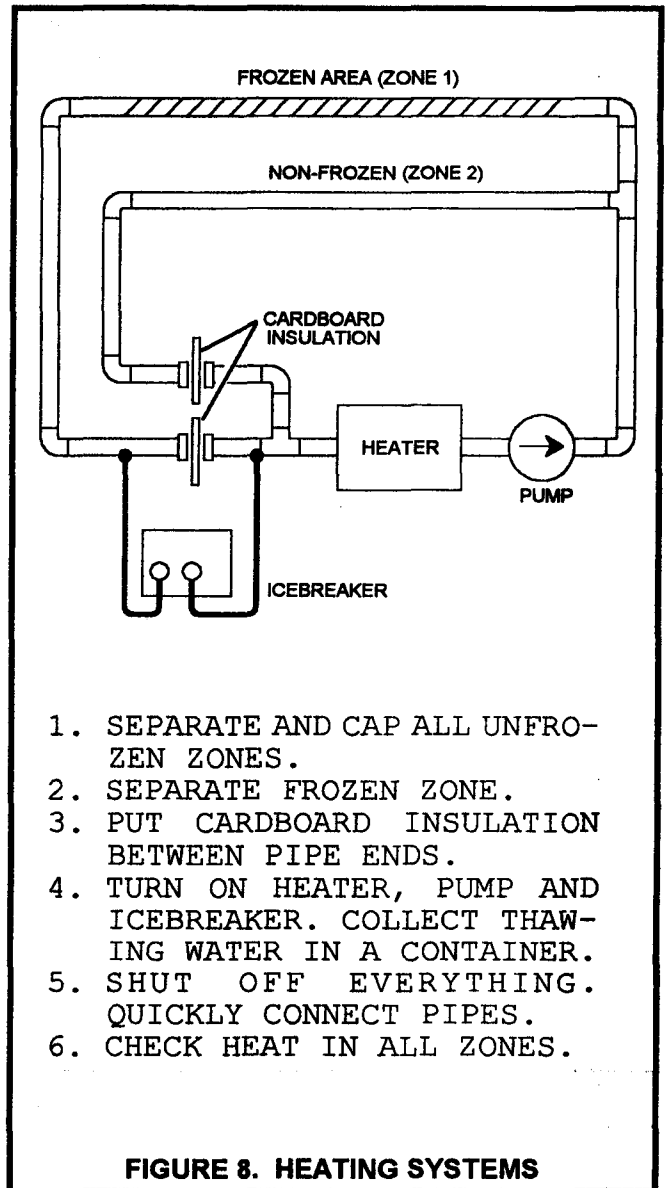
NOTICE

The curb key must make an excellent connection or heating of the key will be the only result.

THAWING HOT WATER HEATING SYSTEMS (WINTER/SUMMER HOOKUP)

This unit is intended for use in situations where there is a direct pipeline from an unfrozen, high pressure pipeline to an open faucet. It may be used on hot water heating systems. However, the design of these systems presents problems which may make the Icebreaker's use ineffective.

1. Because these systems use low pressure pumps, more heating is required before the warmer water can seep past the ice and continue the thawing process.
2. Because the pipes in the system are interconnected electrically, the resistance heating from the Icebreaker current can take several paths through the pipes and will not be concentrated in the frozen section. The heat developed in the frozen section will be only 1/2 to 1/3 of the heat developed by the Icebreaker. There may or may not be enough heat to thaw the pipe.
3. There is little hope of thawing pipes in systems using cast iron radiators, large iron pipes or gravity circulation.



1. SEPARATE AND CAP ALL UNFROZEN ZONES.
2. SEPARATE FROZEN ZONE.
3. PUT CARDBOARD INSULATION BETWEEN PIPE ENDS.
4. TURN ON HEATER, PUMP AND ICEBREAKER. COLLECT THAWING WATER IN A CONTAINER.
5. SHUT OFF EVERYTHING. QUICKLY CONNECT PIPES.
6. CHECK HEAT IN ALL ZONES.

FIGURE 8. HEATING SYSTEMS

If the setup is correct and there is no thaw, the final solution is to open the pipes so all the heat and pressure is concentrated in one frozen zone at a time, as shown in Figure 8.

THAWING COPPER BASEBOARD SYSTEMS

To thaw copper pipe baseboard systems, attach the clamps directly to the pipe and not to the sheet metal pipe covers. Covers should be removed or lifted up so they will not touch the heating pipe. The copper pipe should be insulated from any metal hangers or supports.

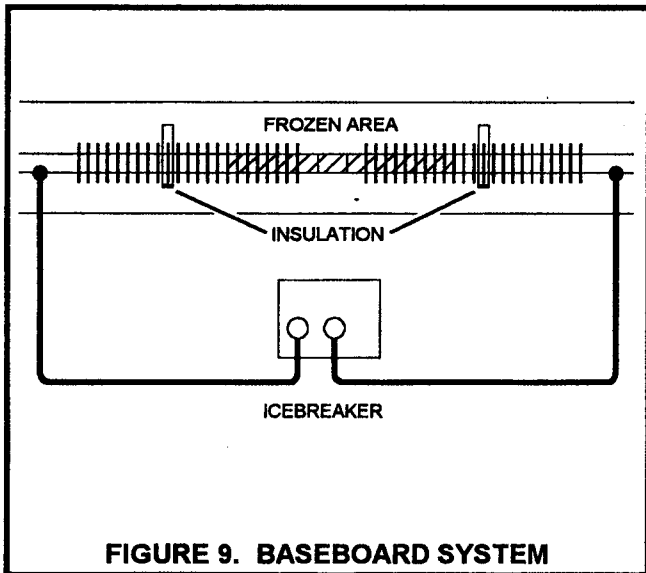


FIGURE 9. BASEBOARD SYSTEM

PREVENT REFREEZING OF PIPES

Prevent refreezing by taking steps to prevent the pipe from cooling below 32 degrees F. Insulate all cracks and openings, wrap pipes with thermostatically controlled heating tape and let water trickle on cold nights (usually a flow of one gallon per hour is enough to prevent freezing).

THAWING PIPES WITH TWO ICEBREAKERS

The heating current in the pipe may be checked with a standard AC clamp-on "Amprobe" meter, this test instrument is highly recommended for best results. Current should be between 200 and 400 amps. If the current is less than 200 amps, a second **Icebreaker 480** can be used to increase the current.

The second **Icebreaker 480** will require a second 20 amp 115 volt AC circuit. The proper methods of connection are shown below. In set up #1, both units **MUST** be set on the same heat setting. In set up #2, the units are not required to be set on the same heat setting. Just as with jumping auto batteries, the polarity must be correct for the second unit to operate properly.

WARNING

Operation of a second unit with the polarity incorrect will burn up the machines and will not heat the pipe.

DETERMINING THE POLARITY

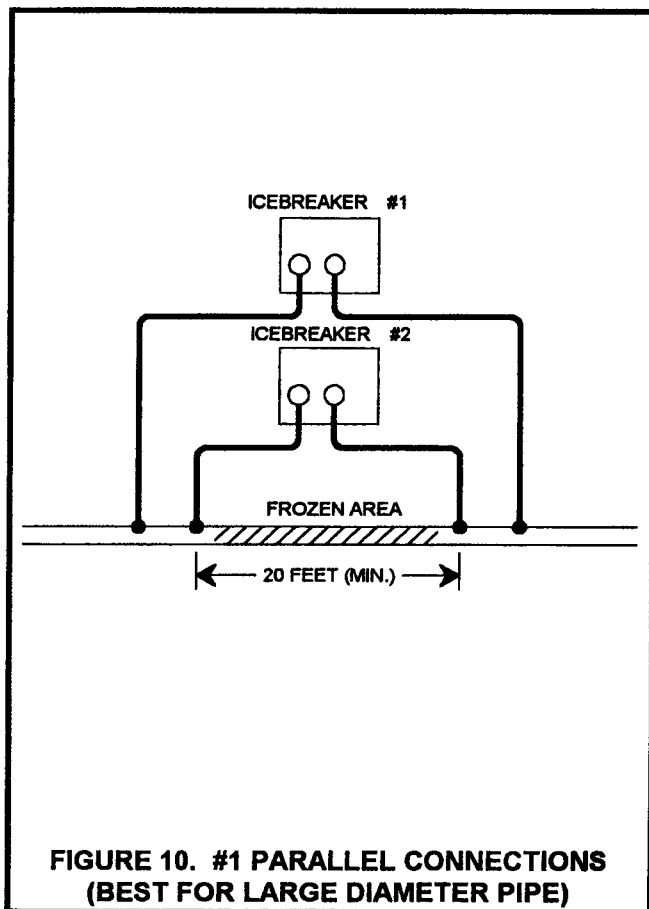
Since these units have an alternating current output, the instantaneous polarity can not be observed. A test procedure must be followed to determine if the polarity is correct.

TEST FOR POLARITY - SET UP #1 (Parallel)

Make the two pipe connections on one side of the pipe and plug in both units. Momentarily touch the other two clamps together and notice the amount of spark. If there is little or no spark, the polarity is correct and the clamps may be attached to the pipe. If there is a strong spark, the polarity is wrong. Correct the polarity by (A) turning over one of the 115V plugs OR (B) interchanging the cable leads on one of the Icebreaker units. Test again for the amount of spark.

WARNING

Due to the chance of a discharge of an electrical spark during the polarity test. Extreme caution should be exercised. Please remove all flammable materials, gases, etc., from the immediate area. Wear heavy gloves and eye protection.

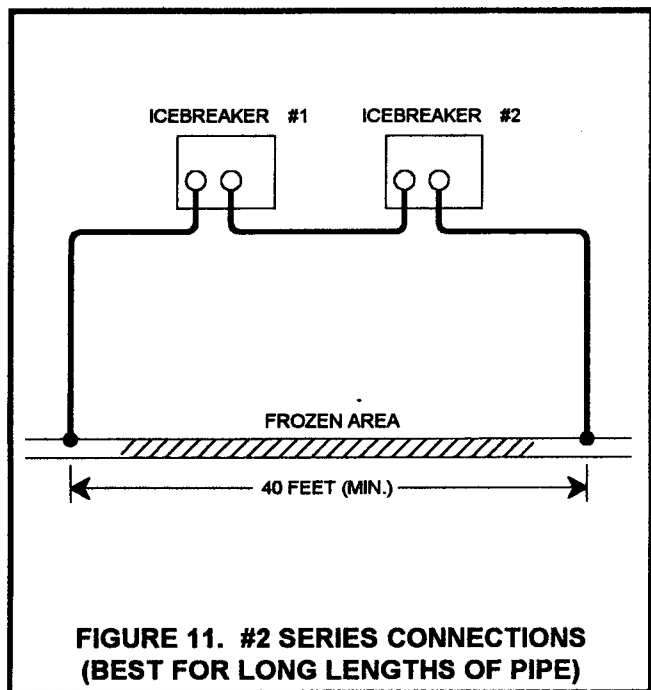


**FIGURE 10. #1 PARALLEL CONNECTIONS
(BEST FOR LARGE DIAMETER PIPE)**

(continued on following page)

TEST FOR POLARITY - SET UP #2 (Series)

Make all connections except the clamp on one end of the pipe. Momentarily touch the clamp to the pipe and observe the spark. If there is a strong spark, the polarity is correct and the clamp can be connected to the pipe. If there is little or no spark, the polarity is wrong. Correct the polarity by (A) turning over one of the 115V plugs OR (B) interchanging the cable leads on one of the Icebreaker units. Retest the spark strength.



Two Icebreakers, properly connected, will double the thawing action.

IMPORTANT REVIEW

- DO- use short cables.
- DO- unwind the cables.
- DO- connect clamps to unfrozen pipe on either side of frozen section.
- DO- clean pipe and make good connections.
- DO- make connections to pipe before plugging in the Icebreaker.
- DO- open faucets so moving water can help thaw pipe.
- DO- use only heavy duty extension cords.
- DO- disconnect other appliances while using the Icebreaker.
- DO- disconnect all electrical grounds attached to thawing area (i.e. telephone, cable TV, etc.).
- DO- make sure there is water pressure at one side of frozen section.
- DO- attach clamps to pipe correctly.
- DO- watch for overheating and fires.
- DO- prevent refreezing.
- DO NOT- lay cables across floors or carpeting.
- DO NOT- leave cables wound up.
- DO NOT- make quick connections to dirty pipe.
- DO NOT- move clamps while current is flowing.
- DO NOT- leave machine unattended.
- DO NOT- leave machine "ON" over night.

TROUBLE SHOOTING

FOR TECH. SERVICE, CALL 1-610-696-9040

The Trouble Shooting Chart is a guide in identifying and correcting possible troubles which may occur when operating this equipment.

FAULT	POSSIBLE CAUSE	REMEDY
Cables stay cold -pipe does not thaw (no current flow).	Line fuse is blown. Machine circuit breaker is "OFF". Poor connection by cable clamps. Both clamps are not on same pipe. Thermal protector is tripped. Some pipe in line is connected with rubber insulated couplings. (not a complete circuit) There is some plastic pipe in the line (not a complete circuit) Solder joint has been pushed apart by ice. (not a complete circuit)	Replace fuse. Turn on circuit breaker. Clean pipe where clamp are attached. Put clamps on same pipe. Allow unit to cool and retry. Need a complete circuit for electric current. Need a complete circuit for electric current. Need a complete circuit for electric current.
Cables get warm but not hot -pipe does not thaw.	Clamps attached to metal cover and not directly to pipe. Poor connection by cable clamp. Use of longer than standard cables which are not larger in AWG size.	Attach clamps directly to pipe. Clean pipe where clamps are attached. Use larger AWG cables -longer cables must also be larger.
Cables get hot -pipe does not thaw.	No water pressure -source is frozen. No water pressure -pump is not operating. Clamps do not cover all of frozen area. Pipes interconnected electrically-not enough heat is concentrated in the frozen section. Thawing hot water systems with several zones -not enough heat is concentrated in frozen section.	Thaw water pressure source. Turn on pump-water pressure is required. Reposition clamps so all of frozen area is between them. Separate frozen pipe from non-frozen pipe. Separate frozen zone from non-frozen zone.

THE ICEBREAKER 480 RELIES ON CURRENT FLOW FOR PROPER OPERATION. PLEASE EQUIP YOURSELF WITH AN AC CLAMP-ON "AMPROBE®" METER FOR CURRENT MONITORING PURPOSES.

NOTES:

...SOLVASE ...

...al ...

...no ...

... ...

... of ...

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..

... ..