

ADVANCED SPAS

L.A. Spas

Owner's Manual/Portable Spa

FOR INDOOR AND OUTDOOR USE

USA AND CANADA

A. H. EQUIPMENT CORPORATION

Advanced Spa Designs, Inc.
L.A. Spas, Inc.

Model P2D

**TWENTY-NINE FUNCTION
240 VOLT AC ONLY**

This unit is not convertible to 120 volt power input.

WHEN CONTACTING THE FACTORY FOR SERVICE ON THIS UNIT,
REFER TO THE MODEL NUMBER LISTED ABOVE

THIS CONTROL UNIT IS CONVERTIBLE TO NATURAL OR
PROPANE GAS HEATED UNITS (FOR OUTDOOR USE ONLY)

December 1994

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ADVANCED SPA DESIGNS

IMPORTANT SAFETY INSTRUCTIONS

READ AND FOLLOW ALL INSTRUCTIONS

*

COVER MUST BE KEPT ON SPA AT ALL TIMES WHEN NOT IN USE. THIS APPLIES WHEN SPA IS DRAINED OR WINTERIZED. DIRECT EXPOSURE TO SUNLIGHT CAN DAMAGE PLASTIC PARTS AND INTERIOR SURFACE, JETS OR ANY INTERIOR COMPONENTS. DAMAGE AS SUCH WILL NOT BE COVERED UNDER WARRANTY.

*

READ ENTIRE OWNERS MANUAL AND SAFETY INSTRUCTIONS BEFORE OPERATING SPA.

*

KEEP ACCESS DOOR FASTENED CLOSED AT ALL TIMES.

*

DO NOT TOUCH ANY EQUIPMENT WITHOUT MAKING SURE CIRCUIT BREAKER AND/OR ALL POWER TO THE SPA IS OFF.

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INTRODUCTION

The spa that you have purchased is one of the very best available and incorporates features designed to assure long, enjoyable and healthful use if properly operated and maintained.

The following instructions are intended to acquaint you with important facts, measures and procedures which will guide you in the use and necessary care of your spa.

Your attention is particularly directed to the important safety instructions in this manual and we strongly urge you to become thoroughly familiar with prescribed safety practices and to carry them out as specified within this owner's manual.

Your A. H. Equipment Corp. spa and control equipment incorporates the finest components available, is designed in a manner to provide maximum enjoyment, ease of operation and years of trouble-free operation.

Model P2D features a 6.0 KW electric heater incorporated in the unit, or Model P2D-G incorporates a 53,000 natural or propane gas heater.

As an option to the standard electric heater, a natural gas or propane heater with electronic ignition may be used with this unit for efficient, economical spa water heating. The information contained within this manual describes optional wiring and switch settings concerning the use of a gas heater. If you are not sure of how to do this, call the factory for advice.

WARNING

IF YOU INTEND TO HAVE A NATURAL GAS OR PROPANE HEATER INSTALLED, BE SURE TO READ THE WARNINGS CONCERNING GAS HEAT IN THE "IMPORTANT SAFETY INSTRUCTIONS" SECTION OF THIS MANUAL. GAS HEATED SPAS MUST ONLY BE USED OUTDOORS.

NOTE

For model P2D-G, the maximum gas heater to be used is limited to 53,000 BTU.

IMPORTANT SAFETY INSTRUCTIONS

When installing and using this electrical equipment, basic safety precautions should always be followed, including the following:

READ AND FOLLOW ALL INSTRUCTIONS

1. **WARNING** -- To reduce the risk of injury, do not permit children to use this product unless they are closely supervised at all times.

2. **DANGER** -- **RISK OF CHILD DROWNING.** Extreme caution must be exercised to prevent unauthorized access by children. To avoid accidents, insure that children cannot use a spa or hot tub unless they are closely supervised at all times.

3. Connect only to a grounded grounding type receptacle.

4. A pressure wire connector is provided on the surface of the control box inside the spa to permit connection of a minimum No. 8 AWG solid copper bonding wire between this point and any metal equipment, metal enclosures of electrical equipment, metal water pipe or conduit within 5 feet (1.5M) of the unit.

5. **DANGER** -- **RISK OF ELECTRIC SHOCK.** Install at least 5 feet (1.5M) from all metal surfaces. A spa may be installed within 5 feet (1.5M) of metal surfaces if, in accordance with the National Electrical Code, each metal surface is permanently connected by a No. 8 AWG (8.4mm) solid copper conductor attached to the wire connector on the terminal box that is provided for this purpose.

6. **DANGER** -- **RISK OF INJURY.** 120 VAC power cords. To reduce the risk of injury, inspect the cord regularly and follow these simple safety rules.

- a. Replace a damaged cord immediately
- b. Do not bury cord
- c. Connect to a grounded, grounding type receptacle only.

8. **DANGER -- RISK OF INJURY.** The suction fittings in this spa are sized to match the specific water flow created by the pump. Should the need arise to replace the suction fittings or the pump, be sure that the flow rates are compatible.

Never operate the spa if the suction fittings are broken or missing. Never replace a suction fitting with one rated less than the flow rate marked on the original suction fitting.

9. **DANGER** -- To reduce the risk of injury to persons, do not remove suction grate. Suction through drains and skimmers is powerful when the jets in the spa are in use. Damaged covers can be hazardous to small children and adults with long hair. Should any part of the body be drawn into these fittings, turn off the spa immediately. As a precaution, long hair should not be allowed to float in the spa.

10. *Install to provide drainage of compartment for electrical components to keep water out of electrical equipment. Also install to permit access for servicing.*

11. **WARNING -- TO REDUCE THE RISK OF INJURY:**

a. Always enter and exit a spa slowly.

b. Do not use the spa alone.

c. Before entering the spa, always measure the water temperature with an accurate thermometer. Tolerance of water temperature regulating devices can vary as much as plus/minus 5 degrees F (3 degrees C).

d. Persons suffering from obesity or with a medical history of heart disease, diabetes, high or low blood pressure, or circulatory system problems should consult with their physician before using the spa.

e. Since excessive water temperature has a high potential for causing fetal damage during early months of pregnancy, pregnant or possibly pregnant women should limit spa water temperatures to 100 degrees F (38 degrees C).

f. Excessive water temperature can be dangerous. The water in the spa should never exceed 104 degrees F (40 degrees C). Water temperatures between 100 and 104 degrees F are considered safe for a healthy adult. Lower water temperatures are recommended for extended use (exceeding 10 minutes) and for young children. Long exposures at higher temperatures can result in hyperthermia.

HYPERTHERMIA

Hyperthermia occurs when the internal temperature of the body reaches a level several degrees above normal body temperature of 98.6 degrees F.

THE SYMPTOMS OF HYPERTHERMIA INCLUDE:

- * *DIZZINESS*
- * *FAINING*
- * *DROWSINESS*
- * *LETHARGY*
- * *INCREASE IN INTERNAL BODY TEMPERATURE*

THE EFFECTS OF HYPERTHERMIA INCLUDE:

- * *UNAWARENESS OF IMPENDING HAZARD*
- * *FAILURE TO PERCEIVE HEAT*
- * *FAILURE TO RECOGNIZE THE NEED TO EXIT SPA*
- * *PHYSICAL INABILITY TO EXIT SPA*
- * *FETAL DAMAGE IN PREGNANT WOMEN*
- * *UNCONSCIOUSNESS RESULTING IN A DANGER OF DROWNING*

g. Children's body temperature can increase more rapidly than adults in the same water with elevated temperatures (above 99 degrees F). Children should spend less time in water above body temperature than adults.

h. The use of a spa while under the influence of alcohol, drugs, and/or medication may lead to unconsciousness with the possibility of drowning.
* Persons on medication should consult with their physician before entering the spa since some medication may induce drowsiness while other medication may affect heart rate, blood pressure, and circulation.

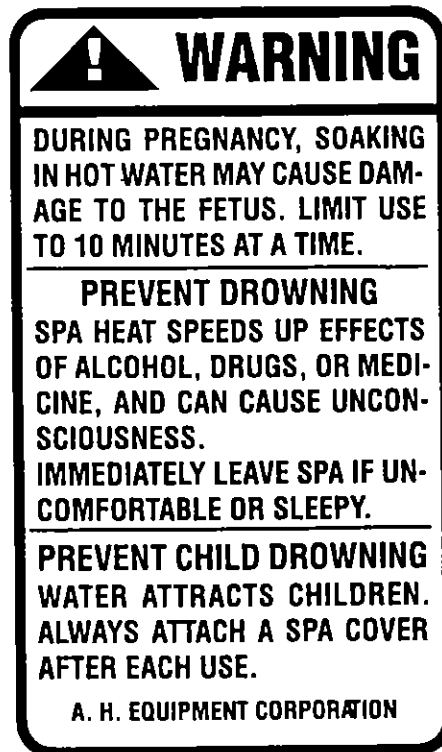
12. People with infections, sores, or the like should not use the spa. Warm and hot water temperatures may allow the growth of infectious bacteria if not properly disinfected.
13. **DANGER -- RISK OF ELECTRIC SHOCK.** Do not permit any electric appliance, such as a light, telephone, radio, or television, within 5 feet of the spa. Never operate any electrical appliances from inside the spa or while wet.

14. **WARNING -- RISK OF SUFFOCATION.** If this spa is equipped with a gas heater it is intended for outdoor use only, unless proper ventilation can be provided for an indoor installation.

SAVE THESE INSTRUCTIONS

SAFETY SIGN

Included with your new spa is a safety sign. The sign is for you and your guest protection and is suitable for outdoor use in wet locations. The sign should be placed in a location visible to all users of the spa.



Please take time to point out the physical location of the safety sign and the importance of the safety precautions displayed on the safety sign to all of your guests. Remember, your safety and the safety of anyone who enjoys the use of your spa is our utmost concern.

The sign should be mounted with screws or another type of permanent fastener.

Additional or replacement signs can be obtained from your dealer or direct from the factory.

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INSTALLATION CONSIDERATIONSGETTING READY FOR DELIVERY AND SET-UP OF YOUR NEW SPA

It is highly recommended that the owner/user of this spa carefully read all instructions in this manual prior to having your spa installed at your chosen location, whether indoors or outdoors. IMPROPER INSTALLATION MAY RESULT IN EQUIPMENT DAMAGE AND VOID THE WARRANTY.

SURFACE AND PAD REQUIREMENTS

1. Your new spa MUST BE PLACED ON A UNIFORMLY FIRM AND LEVEL SURFACE. The only pad foundation recommended is a concrete pad at least 4 inches thick. As an alternative, a pea-gravel foundation pad could be used, but it must be on a firm, level base and it must be contained with a secure wood or concrete restraining border so that the loose gravel cannot shift once the spa is in place. If a concrete pad is poured, this is the logical time to "plumb-in" your electrical conduit (for 240 volt, 3-wire power). Ensure the concrete has cured for at least one week before setting the spa in place. A typical spa, filled with water, could weigh as much as two and a half tons, and if the concrete is not fully cured, it could easily crack. AN UNEVEN OR CRACKED CONCRETE PAD OR THE USE OF SHIMS OF ANY KIND MAY CAUSE THE SPA TO BUCKLE, DISTORT AND/OR CRACK AND, IF THIS BEING THE CASE, THE WARRANTY ON YOUR SPA WILL BE VOIDED.

2. If your spa is located near water sprinklers, adjust or cap them so the water will not hit the siding of the spa.

3. Balconies and decks must be constructed to current state and local codes to safely support the maximum load of your water filled spa and the number of people using the spa. Check with your construction contractor for these specifications.

4. Gates must be self-closing and self-locking (California requirements). Check your local codes regarding fences and gates.

5. It is the responsibility of the owner to provide clear access on all sides of the spa once it is set in place for ease in repair otherwise additional costs to service and repair the spa will be incurred.

6. Install to provide drainage of compartment for electrical components to keep water out of electrical equipment. Also install to permit access for servicing.

ELECTRICAL INSTALLATION REQUIREMENTS

**HAVE YOUR ELECTRICIAN READ THE FOLLOWING PARAGRAPHS
BEFORE INSTALLATION BEGINS**

ELECTRICAL CONNECTIONS MADE IMPROPERLY, OR THE USE OF WIRE GAUGE SIZES FOR INCOMING POWER WHICH ARE TOO SMALL, MAY CONTINUALLY BLOW FUSES IN THE ELECTRICAL EQUIPMENT BOX, MAY DAMAGE THE INTERNAL ELECTRICAL CONTROLS AND COMPONENTS, MAY BE UNSAFE BUT, IN ANY CASE, WILL VOID YOUR WARRANTY.

It is the responsibility of the spa owner to ensure that electrical connections are made by a qualified electrician in accordance with the National Electric Code and any local and state electrical codes in force at the time of the installation. These connections must be made in accordance with the wiring diagrams found inside the control box and the wiring diagrams within this manual. This equipment has been designed to operate on 50 Hz alternating current only 240 volts as required. Make sure that power is not applied while performing any electrical installation. A copper bonding lug has been provided on the electrical equipment pack to allow connection to local grounded points. The ground wire must be at least 8 a.w.g. and must be connected securely to a grounded metal structure such as a cold water pipe.

IMPORTANT

The Model P2D one-pump system electrical equipment pack installed in your spa IS WIRED FOR 240 INPUT VOLTS AC ONLY. IT IS NOT CONVERTIBLE TO 120 VOLTS AC.

240 VAC APPLICATION

For 240 volt wired packs, all field electrical connections can be made by removing the front cover of the electrical equipment control box. CONNECTIONS SHOULD BE MADE USING COPPER CONDUCTORS ONLY.

This 240 volt model control box must be connected to a circuit that has two wires plus a ground.

Line 1	(Black)	120 VAC
Line 2	(Red)	120 VAC
Plus	(Green)	Ground

The model P2D, when supplied by 240 VAC the power source requirements are as follows:

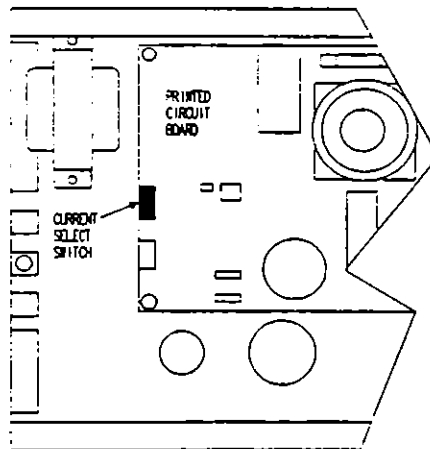
Voltage	HZ	Minimum Rated Circuit Breaker
240 VAC	60HZ	60

A dual 60 ampere circuit breaker must be used in the electrical power distribution box.

INPUT POWER WIRING & CIRCUIT BREAKER SIZING FOR EQUIPMENT OPTIONS

ELECTRIC HEATED UNITS (STANDARD)

This electrical equipment model allows a "current select" power option, that is, a switch within the electrical equipment control box on the printed circuit board can set to select either a "30 AMP" or "60 AMP" current operating configuration. Refer to the following diagram for the location of this switch.



LOCATION OF THE CURRENT SELECT POWER SWITCH

THE 60 AMP POSITION

When the current conversion switch is set the 60 AMP position, this allows spa water heating in all possible selected functions from the top panel control. For this configuration, a dual 60 ampere circuit breaker must be used in the electrical power distribution box and furthermore, power input wiring from the electrical distribution box must be at least #6 gauge copper wire for wire runs up to 200 feet to the spa. For runs over 200 feet, you must use #4 gauge copper wire.

THE 30 AMP POSITION

When the current conversion switch is set to the 30 AMP position, this prevents the spa water heater from turning on in all selected functions except the ECONOMY and filter functions. For this configuration, a dual 30 ampere circuit breaker must be used in the electrical power distribution box and furthermore, power input wiring from the electrical distribution box must be at least #8 gauge copper wire for runs up to 250 feet to the spa. For runs over 250 feet you must use #6 gauge copper wire.

DEDICATED CIRCUITS

Your spa, when connected to a 240 volt power source, requires a isolated, dedicated electrical supply circuit. A dedicated circuit is one where no other electrical appliances (such as a clothes dryer or air conditioner) are connected to the same circuit. If a dedicated circuit is not available, or there is a question if the circuit serves other electrical appliances, it is the responsibility and obligation of the owner/user to have one installed by a qualified electrician. IF THIS ELECTRICAL CONTROL UNIT IS NOT WIRED TO A DEDICATED CIRCUIT, YOU RUN THE RISK OF OPERATING THIS EQUIPMENT AT A REDUCED VOLTAGE WHICH CAN CAUSE PREMATURE FAILURE OF THE ELECTRICAL COMPONENTS IN THE UNIT HOWEVER, IN ANY CASE UNDER THIS CONDITION, YOUR WARRANTY WILL BE VOIDED.

GAS HEATED UNITS (OPTIONAL)

For 240 field-wired units heated by a gas heater rather than the electric heater, the power input wiring size can be reduced to a minimum size of #8 gauge copper wire for runs up to 250 feet from the electrical distribution box to the spa. For runs over 250 feet, use #6 gauge copper wire. A dual, 30 ampere circuit breaker is required in the electrical distribution box feeding this gas heated unit.

(Please refer to the "Gas Heater Connections" diagram in the back of this manual for correct wiring connections)

GAS PIPING LINE REQUIREMENTS FOR GAS HEATERS

CAUTION

IT IS RECOMMENDED THAT YOU DO NOT USE A GAS HEATER RATED MORE THAN 50,000 BTU FOR YOUR SPA'S HEATING REQUIREMENTS.

1. Gas lines must be run to within 3 feet of the spa heater.
2. If the gas line run is under 50 feet from the gas meter, use 1/2 inch line.
3. If the gas line is over 50 feet from the gas meter, use 3/4 inch line.
4. It is the spa owner's responsibility for the gas line installation, hook up, and any permits that might be necessary.

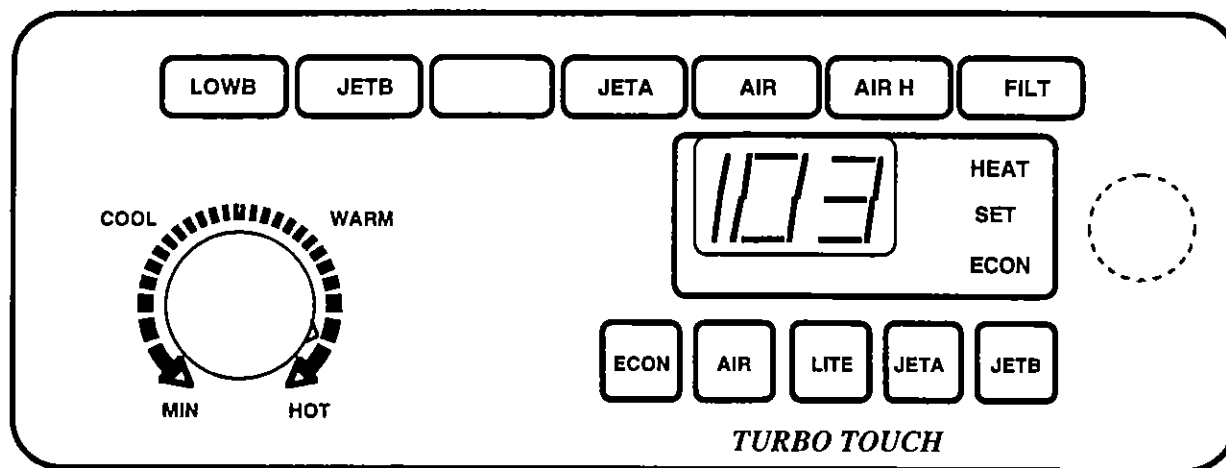
INITIAL START-UP PROCEDURES

After you have read and completed all installation instructions in accordance with the procedures set forth in this manual, spa start up procedures may begin.

CAUTION

DO NOT APPLY POWER TO OR OPERATE THE SPA WHEN THE SPA IS PARTIALLY FILLED OR THERE IS NO WATER IN THE TUB.

1. Turn off the main circuit breaker located at your house circuit breaker panel.
2. Open all jets in the spa to the fully open position.
3. Pull open the "T" handle valves located in the equipment area so that the metal rod on these valves is visible about 2 inches.
4. Close the hose spigot (used for draining the spa) located near the pump(s).
5. Fill spa with water to a level of approximately 3 inches above the bottom of the skimmer openings.
6. Bleed air from plumbing by opening the hose bib temporarily until all air escapes. Then close the hose bib again.
7. Turn down the temperature dial counterclockwise to minimum. ("This is important to prevent a dry fire condition").
8. Turn the main circuit breaker on at this point (*remember, the spa must be filled*).
9. Run all jets and verify correct water circulation - review equipment use below. (This is important to prevent damage from an airlock.)

DESCRIPTION AND USE OF OPERATING CONTROLSMODEL P2D TOP CONTROL PANEL

The top panel controls allow you to control the spa equipment modes safely from within the spa.

THE HEATER THERMOSTATAutomatic Temperature Control:

This equipment is equipped with an automatic water temperature monitoring system (ATMS). This unit will monitor and maintain a set temperature of your choice.

A. Display: The illuminated digital display shows the current water temperature.

Note: "00" temperature display; The display may show double zeros in place of the current water temperature intermittently for up to 2 hours after the spa has reheated to the set temperature. The ATMS is disabled during this period to prevent rapid heater cycling and prolong equipment life. (If the spa is turned on by someone, the spa will heat if heat is required.)

B. Setting the temperature control: To select a temperature setting of your choice simply move the temperature knob in any direction. The "set" lamp will illuminate and the display will show the temperature selected. Adjust the knob to the desired temperature. After a few seconds the "set" lamp will switch off and the display will revert to the current water temperature.

C. Automatic Filtering: This equipment is equipped with an automatic water filtering system (AFS). This unit will filter the spa for two hours twice in a 24 hour period. When the spa is powered up the internal clock is reset to hour 00:00 (12:00 midnight). With this in mind the scheduled filter cycles are as follows:

* 12:00 noon - 2:00 p.m.

* 10:00 p.m. - 12:00 midnight

D. 30 Second Blow Out: As part of the automatic water filtering system the "air" function is switched on for 30 seconds at the beginning of the 10:00 p.m. filter cycle to help clean the air channels.

THE SPA LIGHT PUSH BUTTON SWITCH The spa light is controlled by the switch labeled LITE. This light is used at night to allow safe entry and exit from the spa. Push again to turn light off.

THE AIR BLOWER PUSH BUTTON SWITCH This switch, on the top control panel labeled AIR, is used to turn on the air blower. Push once to set to it's maximum therapy agitation mode. Push again to set to the AIR HEAT position; the air blower reduces speed and heats the air slightly to give a gentle bubble action. Do not expect to feel HOT air emerging through the water however, in this mode, the slight air heat will tend to cool the spa water slower than when the blower is set to the full AIR position. When the AIR position is selected, the AIR light will be illuminated. When the AIR HEAT is selected, the AIR HEAT light will be illuminated. Push again to turn the air blower off.

THE PUMP SELECTOR These pushbuttons labeled JETS A and JETS B enable the selection of jet functions. This model unit contains two, 2-speed water pumps- Pump A is referred to as the circulating pump or JETS A and Pump B is referred to as the booster pump or JETS B. A description of each of these switches follows:

1. JETS A and JETS B pushbuttons are each three function switches. When pushed once, they will select high speed jets; pushed again will select low speed jets and pushed once again will select jets off. The JETS A and JETS B lights will light accordingly.
2. Press the JETS A pushbutton to select the FILTER mode. FILTER is used to force filter and does not revert to the ECONOMY mode IF THE BLOWER, LIGHT AND JETS B ARE OFF. The need for this function will be rare but may be needed from time to time. Normally, the time clock will automatically control the filtration. This function allows filtration without changing the time clock and allows the spa to heat (when required) while in this mode. The JETS A indicating light will light.

THE ECON (ECONOMY) MODE When a function is selected, it will only be active for 30 minutes (except FILTER). After 30 minutes, the function will revert back to the ECON (economy) mode for filtering and heating as necessary. The ECON light will light when the control is set to run on the time clock. Turning the light, air and pumps off will force the function into the economy mode.

OTHER CONTROLS AND SWITCHESTHE HEATER HIGH LIMIT SWITCH

The heater high limit switch is located on the lower right hand corner on the front panel of the electrical control box underneath the skirt of the spa. To gain access to this switch, you must open the equipment access door. This switch monitors the temperature of the heater contained in the stainless steel pipe mounted behind the control box. If the temperature within the heater assembly reaches a factory-set, non-adjustable limit (118 degrees F, 48 degrees C) this switch will automatically shut the heater off. Several conditions could cause this to happen: low water level in the spa, shut-off valves closed while the heater is on, clogged plumbing lines, dirty filter or thermostat malfunction. The high limit switch reset knob is round and red in color. It is reset by pushing the reset knob in after the heater has cooled off and the problem causing the switch to trip has been corrected.

FREEZE PROTECTION

This is an automatic function of the control system. When a freezing condition exists within the spa, the control system turns on the low speed pump(s) to keep the exposed pipes in the spa from freezing. Then when the temperature rises the pump is turned off again.

SPA NON-ELECTRICAL OPERATING CONTROLS

THE FOLLOWING PARAGRAPHS DESCRIBE THE PURPOSE AND OPERATION OF CONTROLS WHICH EFFECT THE OPERATION OF YOUR SPA.

NOTE

DEPENDING ON THE MODEL OF THE SPA YOU PURCHASED, YOU MAY OR MAY NOT HAVE THE CONTROLS LISTED BELOW AND FURTHERMORE, EACH CONTROL DESCRIBED MAY NOT FUNCTION EXACTLY AS DESCRIBED SINCE THE "PLUMBING" OF THE WATER AND AIR LINES WITHIN THE SPA MAY VARY DUE TO THE TYPE OR MODEL SPA YOU PURCHASED. THEREFORE THE FOLLOWING DESCRIPTIONS ARE WRITTEN IN A GENERAL WAY FOR EACH TYPE OF CONTROL.

THE DIVERTER VALVE

THIS CONTROL, A CONTINUOUSLY ADJUSTABLE KNOB-TYPE SWITCH LOCATED ON THE TOP OF THE SPA, CAN BE "PLUMBED" TO DIRECT EITHER WATER OR AIR TO DIFFERENT SETS OF JETS WITHIN YOUR SPA.

FOR EXAMPLE, IF THE DIVERTER VALVE IN YOUR SPA HAS BEEN PLUMBED AS AN AIR DIVERTER VALVE, TURNING THIS CONTROL ONE WAY OR THE OTHER WILL DIRECT FORCED AIR (BUBBLES) FROM THE BLOWER (WHEN ON) FROM THE SEAT OR OTHER AIR OUTLET AREAS TO A SET OF WATER JETS SO THAT THE AIR IS COMBINED WITH THE WATER COMING OUT OF THE JETS EFFECTING A GREATER THERAPEUTIC ACTION OF MIXED WATER AND AIR FROM A PARTICULAR SET OF WATER JETS.

IF, FOR EXAMPLE, THE DIVERTER VALVE HAS BEEN PLUMBED AS A WATER DIVERTER VALVE, TURNING THIS CONTROL WILL DIRECT ONLY WATER FROM ONE SET OF JETS, EITHER PARTIALLY OR TOTALLY, TO ANOTHER SET OF JETS WITHIN THE SPA.

SOME SPA MODELS MAY HAVE TWO WATER DIVERTER VALVES OR TWO AIR DIVERTER VALVES OR ONE OF EACH, HOWEVER THE OPERATION OF EACH IS AS DESCRIBED ABOVE.

OPERATING THESE CONTROLS AND OBSERVING THE RESULTS IN THE JET ACTION WILL TELL YOU HOW YOUR SPA HAS BEEN PLUMBED AND EXACTLY WHAT THESE CONTROLS WILL DO. THESE KNOB-TYPE CONTROLS ARE GENERALLY LOCATED TO THE LEFT OF THE TOP CONTROL (ELECTRICAL FUNCTION) PANEL ALTHOUGH, AGAIN, DEPENDING UPON YOUR MODEL, THESE LOCATIONS MAY VARY.

THE AIR VENTURI CONTROL

THE AIR VENTURI CONTROL IS A CONTINUOUSLY ADJUSTABLE (FROM FULL ON TO FULL OFF) KNOB-TYPE SWITCH WHICH WHEN TURNED ON, ALLOWS AIR TO BE INJECTED INTO A SET OF JETS FOR VIGOROUS JET ACTION. THE ACTION OF THIS CONTROL IS SIMILAR TO THE AIR DIVERTER VALVE CONTROL DESCRIBED ABOVE EXCEPT THAT THE AIR BLOWER (BUBBLES) DOES NOT HAVE TO BE TURNED ON TO ACHIEVE THIS AIR ACTION. OUTSIDE AIR IS SUCKED DIRECTLY INTO THE WATER JET ASSEMBLY AND COMBINED WITH THE WATER FLOWING OUT OF THE JET.

NOT UNLIKE THE AIR DIVERTER CONTROL, SPAS MAY HAVE ONE TWO OR EVEN THREE AIR VENTURI CONTROLS DEPENDING ON THE SPA MODEL. THESE CONTROLS ARE GENERALLY LOCATED ON EITHER SIDE OF THE TOP CONTROL PANEL.

GUIDELINES FOR SPA MAINTENANCE

THE MAINTENANCE AND CARE OF YOUR SPA IS SIMPLE AND EASY TO CARRY OUT. IF PERFORMED REGULARLY AS SCHEDULED, PROBLEMS WILL BE MINIMAL. THEREFORE IT IS IMPORTANT THAT THE FOLLOWING PROCEDURES BE READ THROUGH AND CARRIED OUT ON A REGULAR BASIS FOR BEST LONG-TERM OVER ALL PERFORMANCE OF YOUR SPA.

- FILTERS: *NEED TO BE REMOVED AND RINSED MINIMAL TWICE A MONTH.
(INCREASE FREQUENCY FOR HEAVY USE.)
*NEED TO BE DEGREASED WITH A FILTER CARTRIDGE CLEANER
MINIMAL TWICE A YEAR. (INCREASE FREQUENCY FOR HEAVY USE).
*REPLACE MINIMAL EVERY 3 YEARS OR SOONER AS WEAR DICTATES.
- PILLOWS: *NEED TO BE RINSED FREE OF CHEMICAL RESIDUE WITH FRESH
WATER MINIMAL ONCE A MONTH.
THIS WILL PREVENT CHEMICAL RESIDUE THAT IS ABSORBED FROM
CONCENTRATING AND CAUSE STIFFNESS AND/OR DISCOLORATION.
*NEED TO BE REMOVED WHEN SPA IS USED INFREQUENTLY.
*CARE NEEDS TO BE TAKEN WHEN REMOVING PILLOWS SO AS NOT TO
PULL BUT RATHER MANEUVER AT AN ANGLE.
- HOT LID (SPA COVER): *NEEDS TO BE PUT OFF TO THE SIDE AND ITS
UNDERSIDE HOSED OFF WITH FRESH WATER
- ACRYLIC SURFACES: *CARE MUST BE EXERCISED TO PREVENT THE ACRYLIC
FINISH FROM CRACKING OR BLISTERING DUE TO
CHEMICAL RESIDUE, CORROSIVE WATER CHEMISTRY OR
DIRECT SUNLIGHT.
*NEEDS TO BE WAXED QUARTERLY (WITH EVERY DRAINING
OF SPA) THIS ADDS A PROTECTIVE COATING ON THE
FINISH.
*USE SPA WAX ONLY

ACRYLIC SURFACES: (CONT)

- *DO NOT ALLOW AN EMPTY SPA TO SIT IN DIRECT SUNLIGHT.
- *DO NOT CLOSE A SPA COVER ON AN EMPTY SPA
- *(USE SPACERS TO ELEVATE SPA COVER TO ALLOW FOR SHADE AND FOR AIR VENTILATION.)

MAINTAINING THE SPA'S PROPER WATER CHEMICAL BALANCE IS ESSENTIAL TO THE COMFORT AND SAFETY OF THE USER. WATER MINERAL CONTENT VARIES CONSTANTLY AND IS DIRECTLY AFFECTED BY EVAPORATION AND THE USE OF CLEANSING AND MAINTENANCE CHEMICALS WHICH WILL INCREASE MINERAL CONTENT WHEN ADDED. IF THE MINERAL CONTENT DEVIATES FROM PRESCRIBED pH LEVEL (7.2 TO 7.8) AND TOTAL ALKALINITY LEVEL (100 TO 140 ppm), THE CONDITION AND OPERATION OF YOUR SPA AND EQUIPMENT MAY BE ADVERSELY AFFECTED BY DEPOSITS AND/OR CORROSION ON SPA WALLS, FILTER, ELECTRIC HEATING ELEMENT (OR GAS HEATING INTERNAL MANIFOLD) AND PIPING.

Ph LEVEL

Ph IS DERIVED FROM A 14 POINT SCALE WITH 7 BEING CONSIDERED NEUTRAL. A Ph READING BELOW 7 IS CONSIDERED ACIDIC WHILE A Ph READING ABOVE 7 IS CONSIDERED BASE (OR ALKALINE). A Ph READING OF YOUR SPA WATER LOWER THAN 7.2 COULD START TO DISSOLVE THE METAL IN YOUR SPA EQUIPMENT AND CHEMICALLY BURN THE SPA'S PVC PLUMBING AND ACRYLIC SURFACE AS WELL AS CAUSE IRRITATION TO YOUR EYES AND SKIN. THE LOWER THE READING THE MORE INTENSE THE REACTION. A Ph READING HIGHER THAN 7.8 COULD CAUSE DEPOSITS OF CALCIUM OR SCALE ON THE SPA'S EQUIPMENT, PLUMBING AND ACRYLIC SURFACE. THESE DEPOSITS COULD LEAD TO FUTURE CORROSION. THEREFORE, IT IS IMPORTANT TO MONITOR AND MAINTAIN A Ph LEVEL OF 7.2 TO 7.8 TO ENSURE CONSISTENT TROUBLE FREE OPERATION OF YOUR SPA.

TOTAL ALKALINITY LEVEL

TOTAL ALKALINITY IS A MEASUREMENT OF ALL BASE OR ALKALINE MATERIALS IN THE WATER. THESE BASE OR ALKALINE MATERIALS ACT AS BUFFERS TO HELP STABILIZE THE Ph LEVEL. AN IDEAL RANGE FOR TOTAL ALKALINITY IS BETWEEN 100 ppm AND 140 ppm. A LOW TOTAL ALKALINITY LEVEL WEAKENS THE BUFFERING CAPACITY OF THE SPA WATER AND ALLOWS THE Ph TO BECOME ERRATIC AND AT CERTAIN LEVELS CORROSIVE. A HIGH TOTAL ALKALINITY LEVEL COULD CREATE TOO MUCH OF A BUFFERING CAPACITY IN WHICH CASE THE Ph WILL BE VERY DIFFICULT TO CHANGE. ADDITIONALLY TOTAL ALKALINITY LEVELS OUT OF NORMAL RANGE COULD CAUSE THE SPA WATER TO APPEAR CLOUDY AND CAUSE EXCESSIVE FOAMING.

SINCE THE WATER CAPACITY OF YOUR SPA IS FAR LESS THAN THAT OF A SWIMMING POOL, THE CHEMICAL REACTION CAUSED BY THE PRESENCE OF ONE OR MORE PERSONS IN THE SPA IS MORE RAPID AND PRONOUNCED- IN OTHER WORDS, IT IS MUCH MORE DIFFICULT TO MAINTAIN THE PROPER pH BALANCE IN A SPA THAN A SWIMMING POOL. FOR THESE REASONS, IT IS IMPORTANT TO CHECK FREQUENTLY THE CHLORINE LEVEL, THE pH LEVEL AND TOTAL ALKALINITY OF THE WATER THEN ADD THE PRESCRIBED CHEMICALS AS NECESSARY TO MAINTAIN THE PROPER CHEMICAL BALANCES. FAILURE TO MAINTAIN A PROPER BALANCE OF CHEMICALS IN YOUR SPA WILL RESULT IN AN EARLY, PREMATURE FAILURE OF YOUR SPA PARTS INCLUDING, BUT NOT LIMITED TO, THE SPA COVER, PIPING AND CERTAIN ELECTRICAL COMPONENTS IN THE SPA ELECTRICAL CONTROL BOX AND TOP PANEL CONTROL, THUS VOIDING YOUR WARRANTY.

ESSENTIAL CHEMICALS AND THEIR USE

CAUTION

THE FOLLOWING INFORMATION ON CHEMICAL USE FOR SPA MAINTENANCE IS PROVIDED STRICTLY AS A GUIDE FOR THE SPA OWNER AND MAY OR MAY NOT BE APPROPRIATE TO MAINTAIN YOUR SPA CORRECTLY AND MAY, UNDER CERTAIN CONDITIONS, BE HARMFUL TO YOUR SPA AND/OR PERSONS USING THE SPA. ALWAYS CHECK WITH YOUR SPA DEALER TO DETERMINE WHICH CHEMICALS AND/OR PROCEDURES HE RECOMMENDS TO MAINTAIN YOUR SPA CORRECTLY. A. H. EQUIPMENT CORPORATION DOES HEREBY CLAIM NO RESPONSIBILITY OR LIABILITY FOR THE USE OF AND QUANTITIES OF THE CHEMICALS LISTED BELOW.

CONCENTRATED CHLORINATING GRANULES. THE MINIMUM CHLORINE LEVEL IN THE SPA SHOULD BE AT LEAST 2.0 PPM (PARTS PER MILLION). CHLORINE LEVEL SHOULD BE TESTED FREQUENTLY AND THE CHEMICAL ADDED TO MAINTAIN A SAFE LEVEL IN EXCESS OF 2.0 PPM. THIS TYPE OF CHEMICAL CAN BE ADDED IN QUANTITY OF 1/2 OUNCE PER 500 GALLONS OF SPA WATER. CHECK THE CHLORINE LEVEL AT LEAST SEVEN HOURS OR MORE AFTER ADDING TO DETERMINE THE FULL EFFECT OF THE ADDED CHEMICAL. **LIQUID CHLORINE IS NOT RECOMMENDED.**

ORGANIC POLYMERS ARE USED IN VARIOUS FORMS. THESE CHEMICALS CLEAR UP CLOUDY OR DIRTY WATER APPEARANCE AND PREVENT CALCIUM DEPOSITS ON THE INSIDE SPA FINISH, PLUMBING AND HEATING EQUIPMENT. USE AS RECOMMENDED BY THE MANUFACTURER.

"METAL GON" OR EQUIVALENT IS A CHEMICAL THAT WILL PREVENT IRON IN THE SPA WATER FROM STAINING THE SPA FINISH. THIS CHEMICAL IS ADDED TO THE SPA WATER WHEN THE SPA IS FILLED FOR THE FIRST TIME OR WHEN RE-FILLED. USE AS DIRECTED.

SILICONE EMULSION QUICKLY AND EFFECTIVELY DISPERSES FOAM AND IS COMPLETELY COMPATIBLE WITH THE OTHER CHEMICALS LISTED. USE AS REQUIRED.

SEALER AND OTHER POLISH ARE USUALLY SILICONE COMPOUNDS THAT PROVIDE EFFECTIVE PROTECTION AND A GLOSSY FINISH TO THE INSIDE SURFACES OF THE SPA. IT SHOULD BE APPLIED AFTER THE SURFACES HAVE BEEN CLEANED WITH A MILD, NON-ABRASIVE CLEANER SUCH AS "409", "FANTASTIC" OR EQUIVALENT. RINSE WELL WITH CLEAN WATER THEN APPLY POLISH USING A SOFT CLOTH FOLLOWING DIRECTIONS. THIS PROCEDURE SHOULD BE DONE EVERY TIME THE SPA WATER IS CHANGED.

SPA WATER SHOULD BE CHANGED PERIODICALLY DEPENDING UPON THE FREQUENCY OF USAGE AND OTHER CONDITIONS THAT MAY AFFECT WATER USABILITY. TYPICALLY 60 TO 90 DAYS IS A SATISFACTORY INTERVAL UNDER NORMAL SPA USAGE CONDITIONS. IF A SPA GETS HEAVY USE WITH A LARGE NUMBER OF PEOPLE, THIS INTERVAL BETWEEN WATER CHANGING TIMES SHOULD, OF COURSE, BE LESS. THIS IS THE LOGICAL TIME TO APPLY SEALER AND POLISH COMPOUND TO PROTECT AND BEAUTIFY THE SPA SURFACE. AT THIS TIME THE FILTER SHOULD BE SOAKED IN A MILD DETERGENT OR FILTER CLEANER SPECIALLY MADE FOR THIS PURPOSE TO REMOVE ACCUMULATION OF OILS AND OTHER CONTAMINANTS WHICH WILL ENSURE GOOD, SANITARY WATER AND EXTEND EQUIPMENT LIFE.

THE SPA FILTER SHOULD BE CLEANED EVERY 2 TO 4 WEEKS DEPENDING UPON FREQUENCY OF USE. RINSE THE FILTER WITH CLEAR WATER AND RE-INSTALL CARTRIDGE IN THE FILTER HOUSING.

WHEN ADDING CHEMICALS TO YOUR SPA WATER, ADD TO THE CENTER OF THE SPA WITH THE PUMP AND AIR BLOWER (BUBBLES) OPERATING SIMULTANEOUSLY. NEVER ADD CHEMICALS DIRECTLY INTO THE SKIMMER AND MAKE SURE THE WATER IS HEATED. NEVER ADD CHEMICALS TO COLD WATER AS THIS WILL AFFECT CHEMICAL ACTION.

STORE ALL CHEMICALS IN A COOL, DRY PLACE AND IN SUCH A MANNER TO PREVENT CONTACT BY CHILDREN AND PETS.

WOODSKIRTING - IT IS DESIRABLE TO PROTECT THE WOOD SKIRT AROUND YOUR SPA FROM WATER STAIN. THIS CAN BE DONE BY APPLYING A CLEAR WOOD FINISH TO FUNCTION AS A SEALANT. IF NECESSARY TO CLEAN AND PREPARE THE SURFACE BEFORE SEALING, USE A WIRE BRUSH AND WORK WITH THE GRAIN TO REMOVE AS MUCH STAINING AS POSSIBLE.

TRUBLE SHOOTING GUIDE

Your spa will normally function for long periods without interruption caused by malfunction. Occasionally, however, incidents occur which may cause stoppage of the system or certain functions. The following list is a guide for the spa owner. If the trouble cannot be corrected using the list below, then ask your spa dealer for service. Service on this unit, other than that listed below, by the spa owner or an unauthorized person could result in a potential electrical hazard and/or damage to the equipment that will not be covered under warranty.

REMEMBER THE IMPORTANT SAFETY INSTRUCTIONS AT ALL TIMES

<u>PROBLEM</u>	<u>ACTION</u>
----- EQUIPMENT DOES NOT OPERATE.	CHECK THE MAIN CIRCUIT BREAKER ON YOUR POWER DISTRIBUTION PANEL. CHECK THE GFCI TO SEE IF IT HAS TRIPPED. (IF THE GFCI TRIPS REPEATEDLY LOCATE THE SOURCE OF THE FAULT BEFORE USING SPA).
----- AIR BLOWER NOT WORKING.	SEE THAT THE AIR TUBE IS CONNECTED TO BOTH THE AIR BUTTON AND AIR SWITCH ON THE CONTROL BOX. SEE THAT THE BLOWER IS PLUGGED INTO THE CONTROL BOX.
----- SPA LIGHT NOT WORKING.	SEE THAT THE AIR TUBE IS CONNECTED TO BOTH THE AIR BUTTON AND AIR SWITCH ON THE CONTROL BOX. REPLACE THE LIGHT BULB. INSURE THAT THE LIGHT POWER CORD IS PLUGGED IN.
-----	-----

TROUBLESHOOTING (CONT)

<u>PROBLEM</u>	<u>ACTION</u>
----- LOW SPEED PUMP NOT WORKING.	SEE THAT THE AIR TUBE IS CONNECTED TO BOTH THE AIR BUTTON AND AIR SWITCH ON THE CONTROL BOX. ENSURE THAT THE PUMP IS PLUGGED INTO THE CONTROL BOX. OPEN ALL SPA JETS OPEN ALL SHUT-OFF VALVES LOCATED IN THE EQUIPMENT AREA. CLEAN OR REPLACE FILTER SEE "EQUIPMENT DOES NOT OPERATE".
----- HIGH SPEED PUMP NOT WORKING.	SEE THAT THE AIR TUBE IS CONNECTED TO BOTH THE AIR BUTTON AND AIR SWITCH ON THE CONTROL BOX. CHECK ALL OF THE ITEMS LISTED UNDER LOW SPEED PUMP.
----- WATER PRESSURE FROM JETS WEAK OR SURGING.	BE SURE THAT THE SHUT-OFF GATE VALVES IN THE EQUIPMENT COMPARTMENT ARE FULLY OPEN. OPEN THE AIR VENTURI VALVES. REMOVE THE FILTER CARTRIDGE THEN SEE IF THE WATER PRESSURE INCREASES, IF SO, CLEAN OR REPLACE FILTER CARTRIDGE.
-----	-----

TROUBLESHOOTING (CONT)

<u>PROBLEM</u>	<u>ACTION</u>
PUMP CAN BE HEARD RUNNING BUT WATER SURGING OR NO WATER COMING OUT OF JETS.	THERE MAY BE AN "AIR LOCK" IN THE WATER PLUMBING. MAKE SURE GATE VALVES ARE OPEN, IF SO, OPEN SLIGHTLY THE UNION ON THE PUMP SUCTION SIDE AND ALLOW AIR TO BLEED OUT OF THE PIPE WHILE THE PUMP IS RUNNING. RE-TIGHTEN THE PUMP UNION WHEN WATER BEGINS TO FLOW.
NO HEAT.	<p>ENSURE THAT THE TEMPERATURE DIAL IS SET TO THE DESIRED TEMPERATURE. THE HEATER HAS NOT HAD ENOUGH TIME TO HEAT THE SPA. IT TAKES SEVERAL HOURS TO HEAT A COLD SPA.</p> <p>ON 120 VOLT INSTALLATIONS, THE SPA ONLY HEATS ON LOW PUMP.</p> <p>THE AIR BLOWER AND JETS CAN COOL THE SPA WATER. TURN OFF THE BLOWER AND JETS TO ALLOW THE SPA TO HEAT.</p> <p>SEE "EQUIPMENT DOES NOT OPERATE".</p> <p>CHECK HIGH LIMIT SWITCH TO SEE IF IT HAS TRIPPED. IF SO, PUSH THE RESET BUTTON AND LOOK FOR THE CAUSE OF TRIPPING BELOW:</p> <ol style="list-style-type: none"> 1. THE WATER LEVEL IN THE SPA IS AT LEAST 1/2 THE DEPTH OF THE SKIMMER OPENING. 2. THE SHUTOFF GATE VALVES ARE NOT COMPLETELY OPEN. 3. THE FILTER CARTRIDGE IS DIRTY AND NEEDS REPLACING.

TROUBLESHOOTING (CONT)

<u>PROBLEM</u>	<u>ACTION</u>
NO HEAT (CONT).	4. THE SPA HAS BEEN DRAINED AND RE-FILLED WHILE THE POWER WAS ON.
WATER IS NOT CLEAR.	CHECK THE ph LEVEL AND CHLORINE IN SPA. CLEAN OR REPLACE FILTER CARTRIDGE.

MODEL P2D
240 VOLT ONLY, 2-PUMP-ELECTRICAL EQUIPMENT PACK
BILL OF MATERIALS

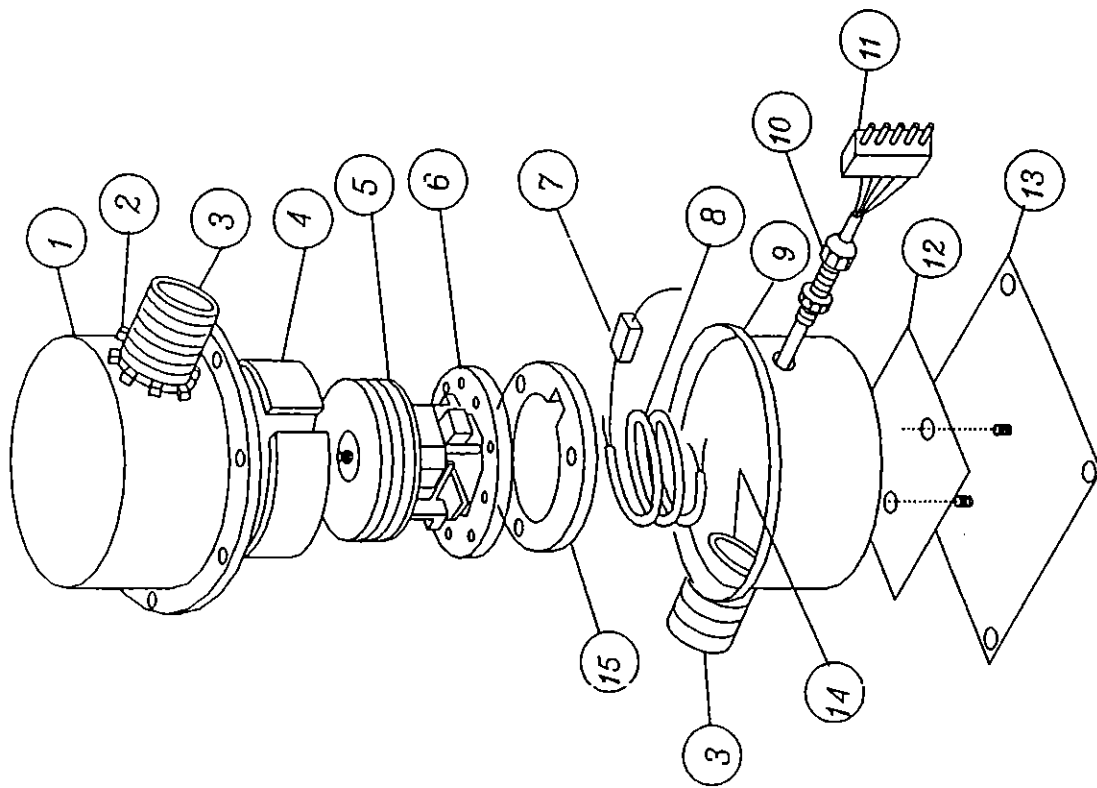
DRAWING A

<u>DRAWING ITEM No.</u>	<u>DESCRIPTION</u>	<u>QTY</u>	<u>ASD P/N</u>
<u>HEATED AIR BLOWER ASSEMBLY</u>			
1	HOUSING, BLOWER, TOP	1	EL-61505
2	NUT, LOCK, 2"	2	MS-90502
3	FITTING, AIR CHANNEL	2	FG-20000
4	FOAM STRIP, BLOWER	1	EL-61545
5	MOTOR, BLOWER, 1HP	1	EL-61530
6	GASKET, BLOWER, RUBBER	1	EL-61540
7	SWITCH, THERMAL CUT- OUT, HIGH LIMIT	1	EL-61045
8	ELEMENT, HEATER, SPIRAL	1	EL-61036
9	HOUSING, BLOWER, BOTTOM	1	EL-61505
10	STRAIN RELIEF, 3231	1	EL-62090
11	PLUG/CORD, 3 COND., RUB- BER COVERED	1	EL-61516
12	FOAM, INSULATION, BASE	1	DE-50000
13	BASE, SHT. MTL., BLOWER MOUNT	1	EL-61520
14	SILICONE, DAL, 700, WHT	A/R	DE-59000
15	RING, COMPRESSION	1	EL-61535
16	MANIFOLD, WATER HEATER FLOW-THRU TYPE	1	SR-11085

MODEL P2D BILLS OF MATERIALS (CONT)

DRAWING B

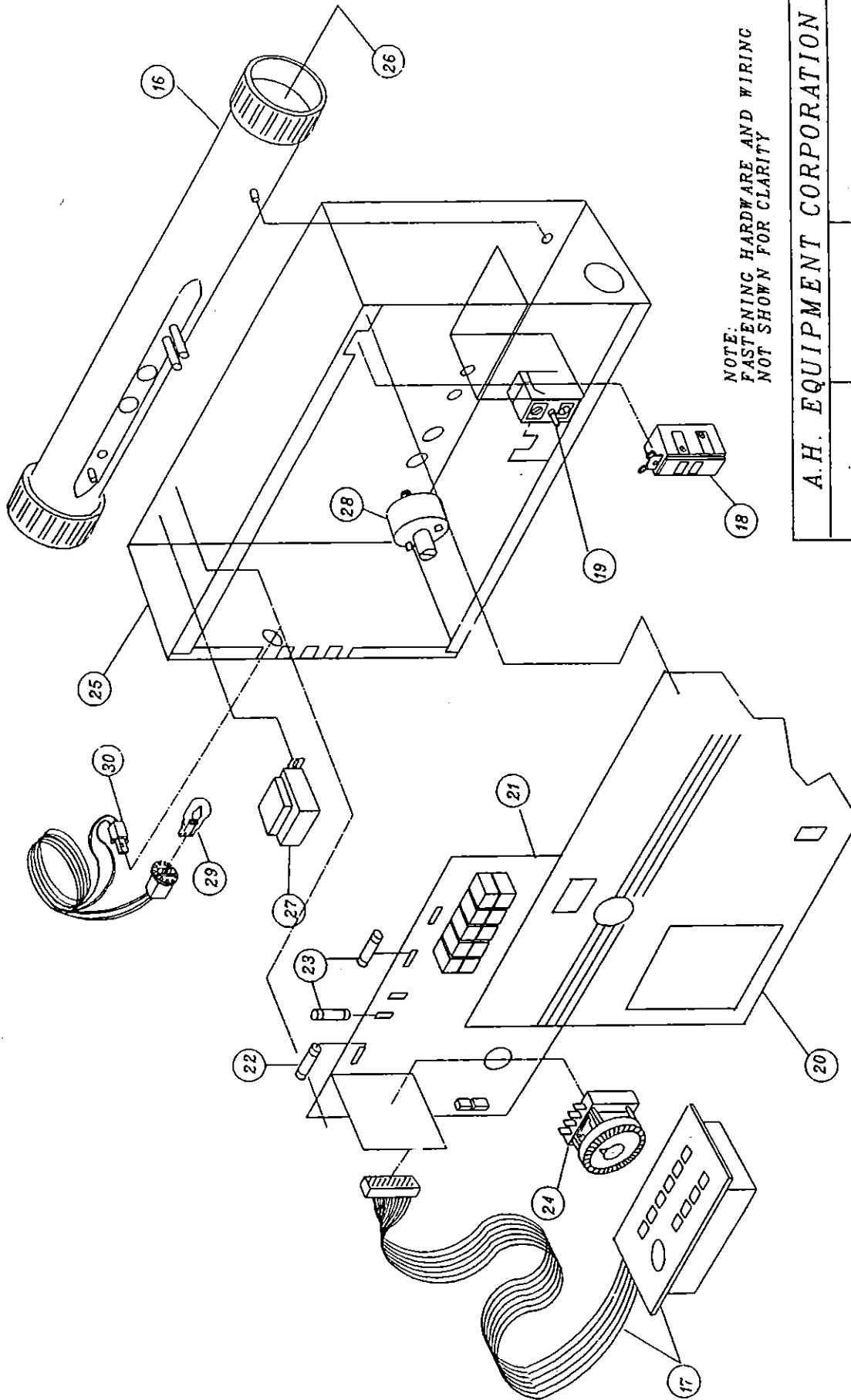
<u>DRAWING ITEM No.</u>	<u>DESCRIPTION</u>	<u>QTY</u>	<u>ASD P/N</u>
<u>CONTROL BOX AND HEATER ASSEMBLY</u>			
17	TOP PANEL CONTROL, P2D	1	SR-10034
18	GROUND FAULT CIRCUIT INTERRUPTER, 6590	1	EL-62005
19	HIGH LIMIT SWITCH	1	EL-62025
20	COVER, ELECTRICAL CONTROL SHEET METAL, PAINTED AND SILKSCREENED	1	SR-11105
21	PRINTED CIRCUIT BOARD, 14 RELAY, P1/P2	1	SR-11030
22	FUSE, 1 AMP, SPA LIGHT	1	SR-10055
23	FUSE, 20 AMP, BUSSMAN SC-20	2	EL-69120
24	TIME CLOCK, 24 HOUR	1	EL-62030
25	BOX, ELECTRICAL CONTROL, SHEET METAL, PAINTED	1	SR-11110
26	ELEMENT, WATER HEATER	1	SR-11090
27	TRANSFORMER, SPA LIGHT STEP-DOWN	1	SR-11035
28	PRESSURE SWITCH, 3703-AH	1	SR-11115
29	BULB, SPA LIGHT, 12 VOLT	1	SR-11050
30	HARNESS, SPA LIGHT/SOCKET	1	SR-11045
31	PUMP/MOTOR, 1.5 HP WATERWAY, COMPLETE W/UNIONS	2	EL-64021
OR	PUMP/MOTOR, 2.6 HP WATERWAY, COMPLETE W/UNIONS	2	EL-64028
OR	PUMP/MOTOR, 3 HP WATERWAY, COMPLETE W/UNIONS (NOT SHOWN)	2	EL-64029



HEATED AIR BLOWER ASSEMBLY

A

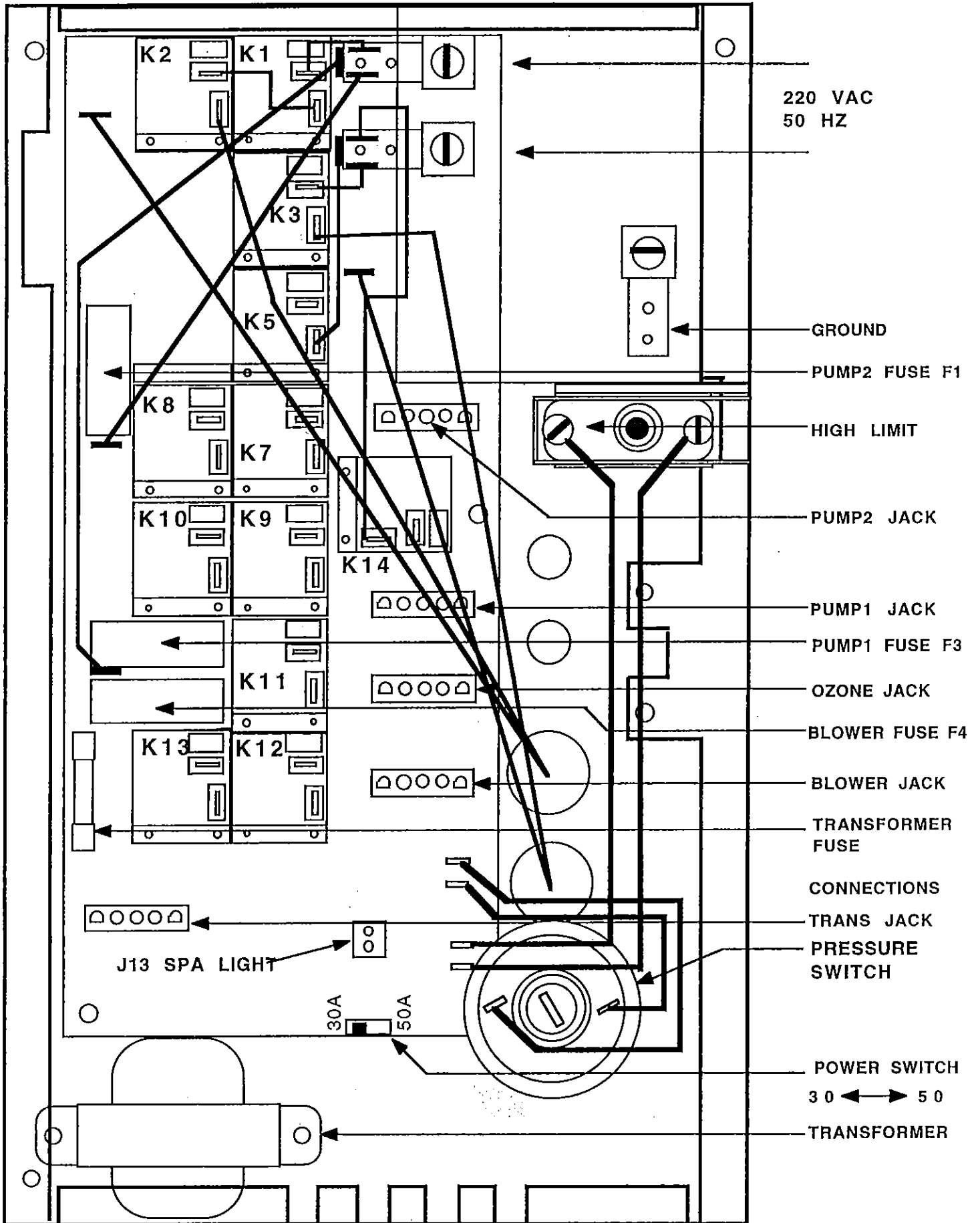
A.H. EQUIPMENT CORPORATION	
HEATED AIR BLOWER ASSEMBLY	
EXPLODED VIEW	



NOTE:
FASTENING HARDWARE AND WIRING
NOT SHOWN FOR CLARITY

A.H. EQUIPMENT CORPORATION	
MODEL P1/P2	
EXPLODED VIEW	

B



220 VAC
50 HZ

GROUND

PUMP2 FUSE F1

HIGH LIMIT

PUMP2 JACK

PUMP1 JACK

PUMP1 FUSE F3

OZONE JACK

BLOWER FUSE F4

BLOWER JACK

TRANSFORMER FUSE

CONNECTIONS

TRANS JACK

PRESSURE SWITCH

POWER SWITCH

30 ↔ 50

TRANSFORMER

K2

K1

K3

K5

K8

K7

K10

K9

K14

K11

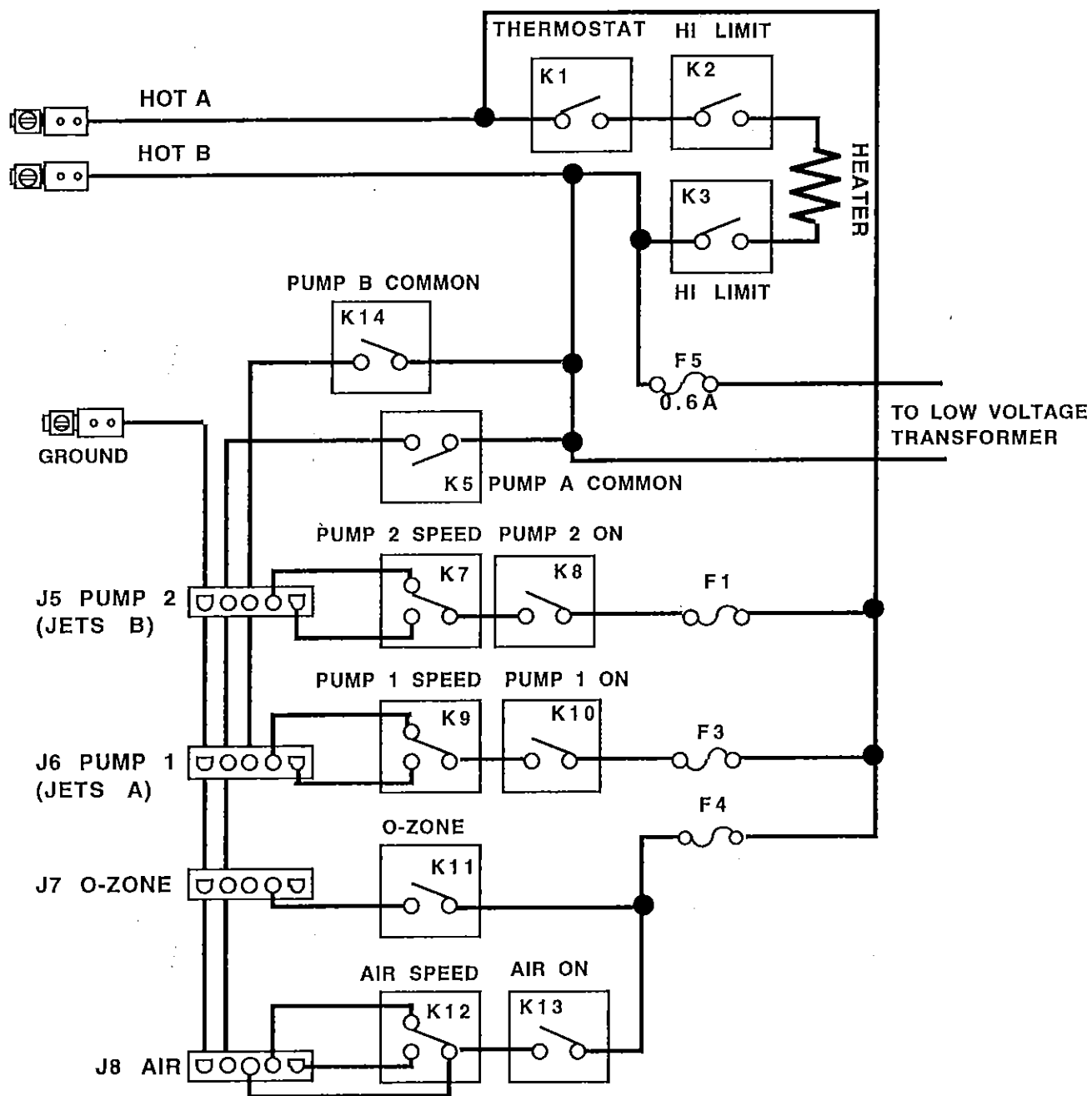
K13

K12

J13 SPA LIGHT

30A

50A



P1/P2 220 50HZ

