



JOHNSON FURNACE INSTRUCTION MANUAL

#900 FURNACE - MANUAL TEMPERATURE CONTROL & THERMOCOUPLE SAFETY

FORMS - 819, 230, 800, 815-5, 816, 818-R, 315, 318, A-2076, A129R

INSTALLATION INSTRUCTIONS FOR F-900 FURNACE
WITH THERMOCOUPLE SAFETY AND SPARK IGNITION
(Consult Form No. 230 While Reading This)

POSITION FURNACE AND CONSOLE IN DESIRED LOCATION. THE BACK OF THE FURNACE (SIDE LID LIFT IS ON) SHOULD BE AT LEAST 20" AWAY FROM THE NEAREST WALL. ANY WALLS, CEILINGS OR FLOORS MADE FROM COMBUSTIBLE MATERIALS THAT ARE SUBJECTED TO RADIANT HEAT SHOULD BE PROTECTED WITH INSULATION BOARD OR SIMILAR MATERIAL. ON THE INITIAL HEATUP, NEARBY WALLS, ETC., CAN BE CHECKED TO SEE IF THEY NEED PROTECTION. THE FRONT OF THE FURNACE SHOULD BE LEFT CLEAR SO THAT THE OPERATOR HAS ENOUGH ROOM TO MOVE ABOUT.

FOR EXHAUSTING FUMES AND EXHAUST GASES, A METAL HOOD WITH AN EXHAUST FAN CAN BE USED. THE HOOD SHOULD BE HIGH ENOUGH TO ALLOW SUFFICIENT ROOM FOR THE OPERATOR TO MOVE ABOUT.

A METAL TRAY OR POT CAN BE PLACED BENEATH THE PLUGGED OPENING (IN THE SIDE OF THE FURNACE). IF THE CRUCIBLE BREAKS INSIDE THE FURNACE, THE PLUG CAN BE REMOVED WITH TONGS AND THE METAL CAUGHT IN A TRAY.

ASSEMBLE THE LID LIFT BY FOLLOWING INSTRUCTIONS ON FORM 800. CONNECT THE FLEXIBLE METAL HOSE BETWEEN THE FURNACE BURNER PORT CASTING AND THE OUTLET PIPE FROM THE CONSOLE BY USING THE UNION FITTING. DO NOT ADD ADDITIONAL PIPING OR FITTINGS BETWEEN THE CONSOLE AND THE FURNACE!

SCREW THE SPARK IGNITER INTO THE PORT CASTING. CONNECT THE CABLE FROM THE CONSOLE TO THE SPARK IGNITER. SLIP THE INSULATION CAP OVER THE END OF THE SPARK IGNITER.

FOR INSERTING THE THERMOCOUPLE, SEE SKETCH AT UPPER RIGHT CORNER OF FORM #230. REMOVE TAPE HOLDING SPACER SLEEVE IN PLACE. CAREFULLY, INSERT THERMOCOUPLE INTO BRASS BUSHING. MAKE SURE THE SPACER SLEEVE IS IN PLACE. TIGHTEN NUT INTO BRASS BUSHING (USE LIGHT FORCE WITH WRENCH).

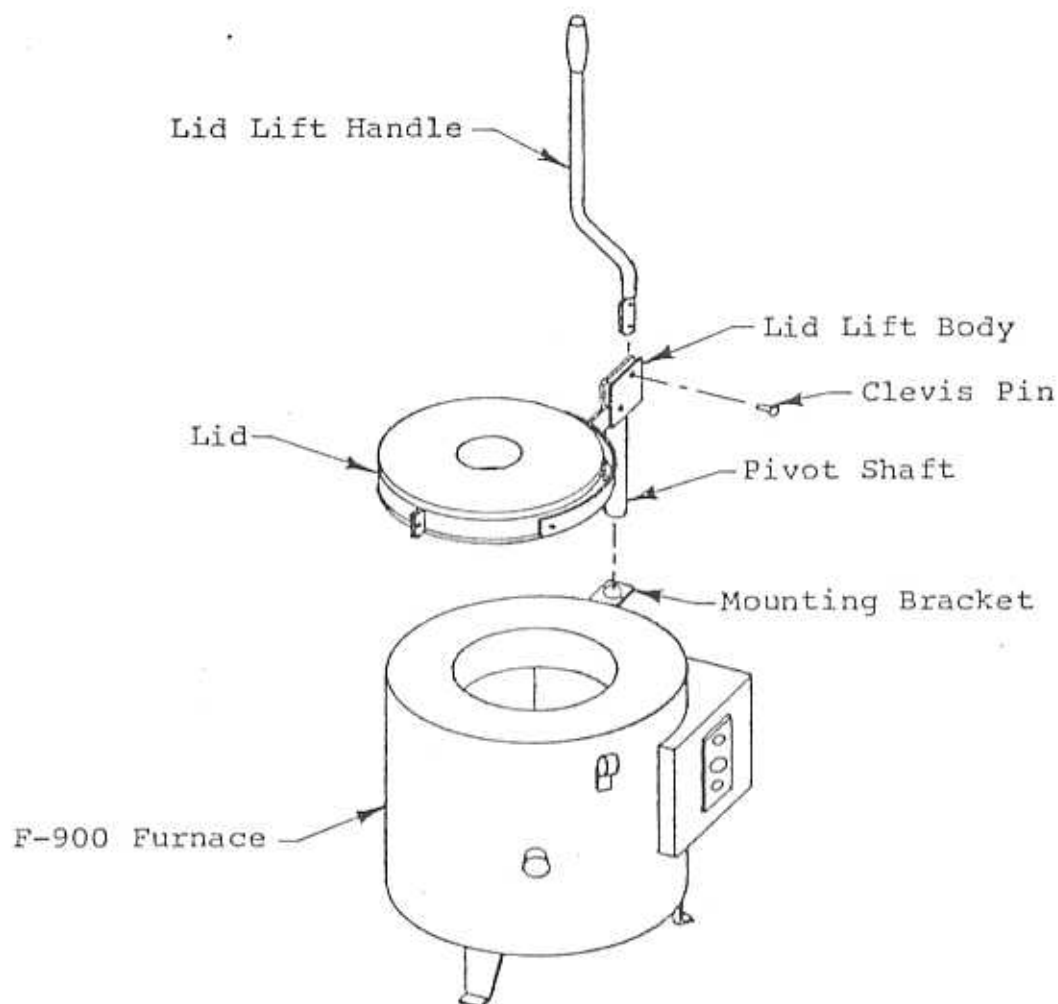
CONNECT THE GAS LINE TO THE CONSOLE GAS INLET. WHEN THE FURNACE IS IN OPERATION, THE PRESSURE SHOULD BE 4" TO 14" ON NATURAL GAS AND 11" ON LP GAS.

CONNECT 115 VOLT/60 CYCLE POWER SOURCE TO THE BLACK AND WHITE LEADS EXTENDING FROM THE CONSOLE. SET CRUCIBLE INSIDE FURNACE ON CRUCIBLE REST. LOWER LID ONTO FURNACE.

TURN "ON" MAIN GAS AND POWER SUPPLY. SEE FORM #818 FOR LIGHTING THE FURNACE.

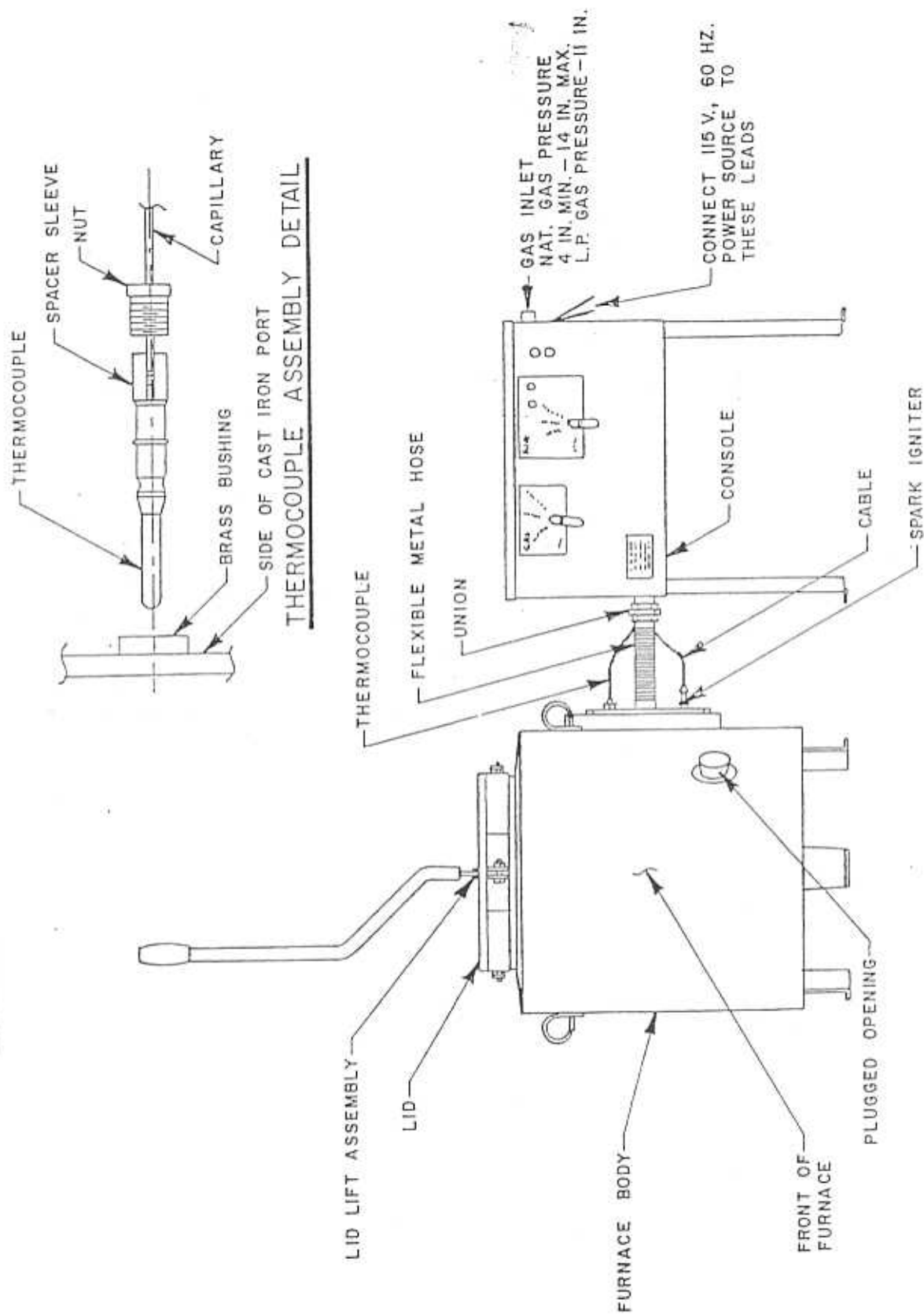
A LONG HANDLED TONG CAN BE USED TO PLACE THE METAL THRU THE OPENING IN THE LID. THE PIECES SHOULD BE SMALL ENOUGH TO PASS THRU THE HOLE WITHOUT BLOCKING TOO MUCH.

NOTE: AFTER FURNACE HAS BEEN HEATED UP AND COOLED, YOU WILL NOTICE CRACKS APPEAR IN THE LID REFRACTORY AND IN THE FURNACE LINING. THIS IS NORMAL, DUE TO EXPANSION AND CONTRACTION OF THE REFRACTORY AND WILL NOT AFFECT THE PERFORMANCE OF THE FURNACE.

LID LIFT ASSEMBLY INSTRUCTIONS FOR F-900

1. SET LID ON TOP OF FURNACE WITH PIVOT SHAFT OF LID LIFT BODY GOING THROUGH HOLE IN TOP OF MOUNTING BRACKET AND FITTING OVER PLUG ON BOTTOM BRACKET.
2. LID LIFT HANDLE SLIPS BETWEEN SIDES OF LID LIFT BODY AND IS SECURED WITH A $\frac{1}{2}$ " DIA. X 1" CLEVIS PIN AND COTTER PIN.

NOTE: HANDLE IS OFFSET AWAY FROM BURNER PORTION OF FURNACE BODY.



VENTING REQUIREMENTS FOR
JOHNSON FURNACES

1. POT FURNACES, FORGES, AND MELTING FURNACES.

SINGLE UNITS OR MULTIPLE INSTALLATIONS

FOR EXHAUST HOODS APPROXIMATELY 6' 6" TO 7' ABOVE FLOOR, THE EXHAUST FAN SHOULD BE SUFFICIENT TO PROVIDE A 200 FPM FACE VELOCITY AT THE HOOD.

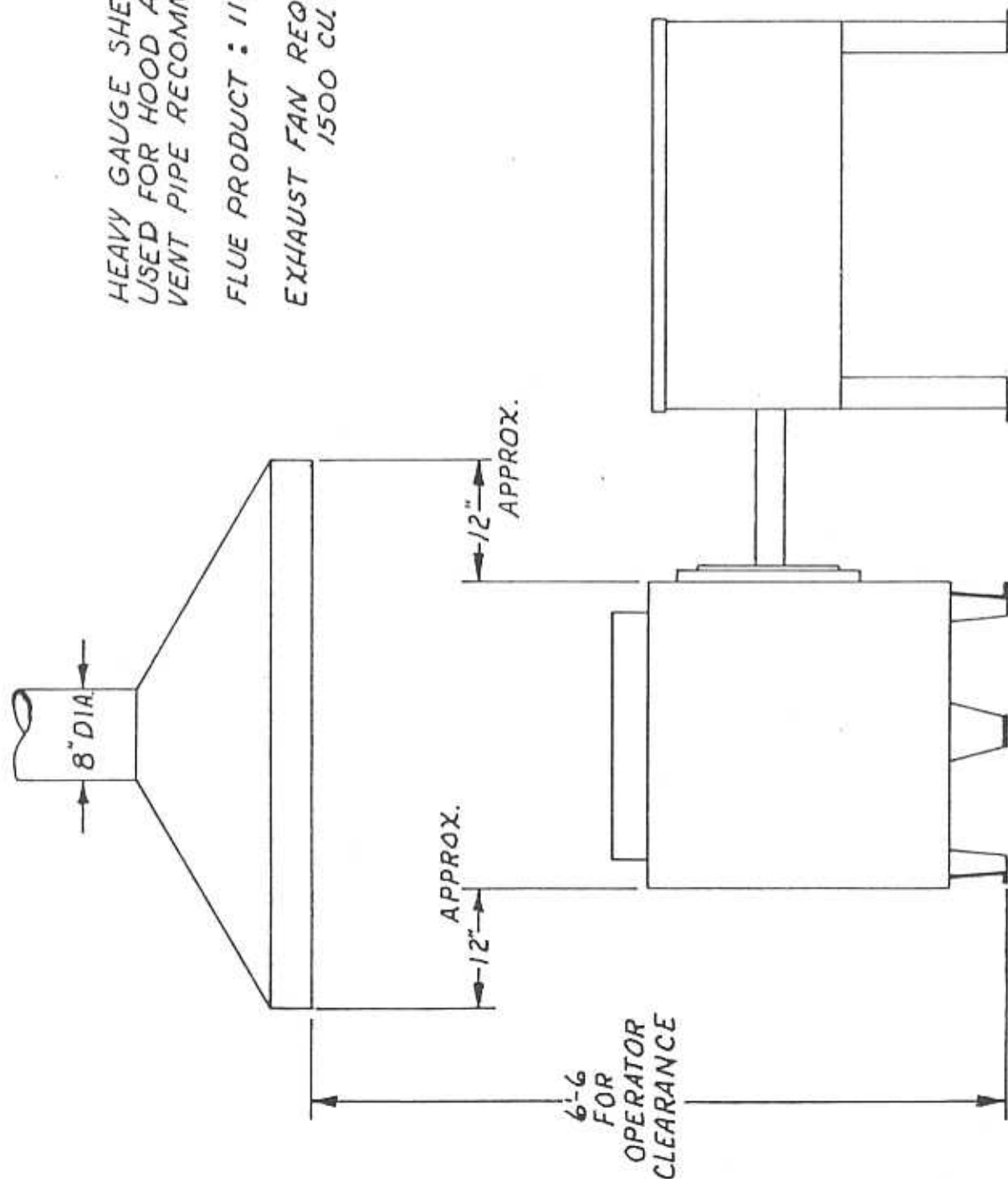
2. OVEN TYPE FURNACES [INCLUDES OVEN FORGES]

A. SINGLE INSTALLATIONS:

FOR SINGLE INSTALLATIONS THE VENT REQUIREMENTS SHOULD REDUCE FLUE GAS TEMPERATURE TO 500 OR BELOW. FOR CFM REQUIREMENTS, DIVIDE BTU INPUT OF THE FURNACE BY 225. [APPLICABLE WHERE THE VENT HOOD IS 6" TO 8" ABOVE EXHAUST OPENING].

B. FOR SINGLE OR MULTIPLE INSTALLATIONS WHEN SINGLE EXHAUST HOOD IS 6' 6" TO 7' ABOVE FLOOR, PROVIDE FOR A 200 FPM FACE VELOCITY.

SUGGESTED METHOD OF VENTING JOHNSON #900 FURNACE



HEAVY GAUGE SHEET METAL SHOULD BE USED FOR HOOD AND STACK. CLASS "A" VENT PIPE RECOMMENDED.

FLUE PRODUCT : 115 CU. FT./MIN. @ 2000°

EXHAUST FAN REQUIREMENT :
1500 CU. FT./MIN.

LIGHTING AND OPERATING INSTRUCTIONS FOR #F-900 FURNACE WITH THERMOCOUPLE SAFETY AND SPARK IGNITION.

CONSULT FORM NO. 816 WHILE FOLLOWING LIGHTING PROCEDURE.

1. SET THE "GAS CONTROL HANDLE" TO THE "START" POSITION ON THE DIAL. SET THE "AIR CONTROL KNOB" TO NO. 3 ON THE DIAL.
2. DEPRESS THE "START" BUTTON ON THE FRONT PANEL OF THE CONSOLE. THE BLOWER MOTOR SHOULD BE RUNNING AND THE RED LIGHT SHOULD BE "ON".
3. DEPRESS AND HOLD IN THE IGNITION BUTTON. THE SOLENOID VALVE IN THE GAS LINE SHOULD OPEN, THE SPARK IGNITER SHOULD BE BUZZING AND THE BURNER SHOULD IGNITE. AFTER APPROXIMATELY 15 SECONDS THE RED LIGHT WILL GO OUT AND YOU CAN RELEASE THE IGNITION BUTTON. IF THE BURNER DOES NOT COME ON, MAKE SURE YOU PUSH THE IGNITION BUTTON ALL THE WAY IN. IF THE BURNER DOES NOT COME ON WITHIN 2 OR 3 SECONDS RELEASE THE IGNITION BUTTON AND CONSULT THE SHEET ON TROUBLE SHOOTING.
4. THE FIRST TIME THE FURNACE IS RUN, LET IT OPERATE AT THIS GAS INPUT FOR ABOUT 2 HOURS IN ORDER TO DRY OUT THE LINING. AFTER THE FURNACE IS WARMED UP, WATER WILL RUN FROM THE FURNACE.
5. AFTER THE DRYING OF THE FURNACE IS COMPLETED, USE THE FOLLOWING PROCEDURE FOR NORMAL OPERATION;

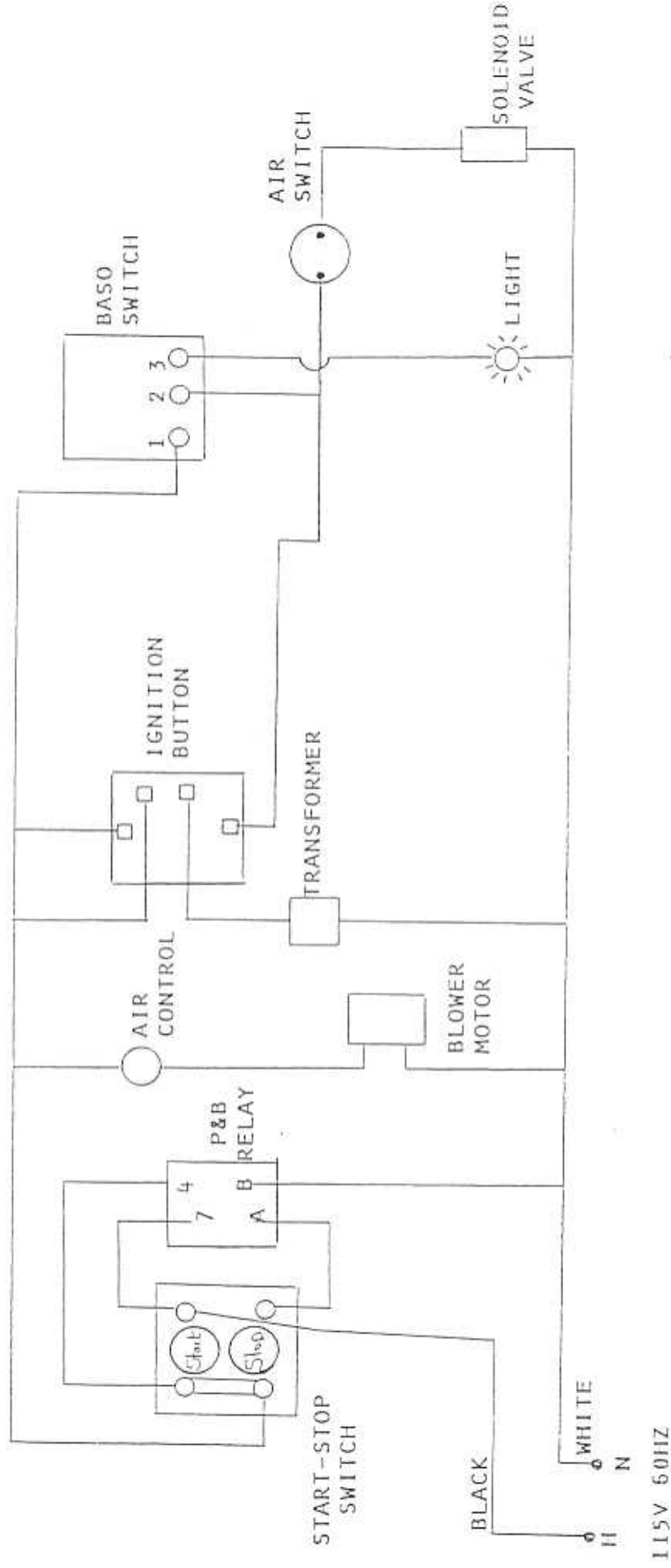
ALLOW THE FURNACE TO WARM UP FOR ABOUT 10 MINUTES. THEN, SLOWLY TURN THE "GAS CONTROL HANDLE" TOWARD THE "OPEN" POSITION UNTIL YOU CAN SEE A TAIL OF FLAME EXTENDING OUT THE HOLE IN THE LID. THEN, TURN THE "AIR CONTROL KNOB" TO INCREASE THE AMOUNT OF AIR UNTIL THE TAIL OF FLAME IS BARELY VISIBLE. THIS IS THE CORRECT AIR-GAS RATIO FOR PROPER OPERATION. A HIGH TAIL OF FLAME MEANS TOO MUCH GAS; NO FLAME MEANS NOT ENOUGH GAS.

IF YOU DESIRE TO INCREASE THE AMOUNT OF GAS INPUT TO THE FURNACE, INCREASE THE GAS SETTING TO OBTAIN A HIGHER TAIL OF FLAME. THEN INCREASE THE AMOUNT OF AIR WITH THE CONTROL KNOB TO BRING BACK THE SHARP TAIL OF FLAME. REPEAT THIS PROCEDURE UNTIL THE DESIRED OR MAXIMUM GAS INPUT IS REACHED.

IF YOU DESIRE TO DECREASE THE AMOUNT OF GAS INPUT TO THE FURNACE, DECREASE THE GAS INPUT WITH THE "GAS CONTROL HANDLE" UNTIL THE TAIL OF FLAME DISAPPEARS. THEN DECREASE THE AMOUNT OF AIR WITH THE CONTROL KNOB UNTIL THE SHARP TAIL OF FLAME RE-APPEARS. REPEAT THIS PROCEDURE UNTIL THE DESIRED GAS INPUT IS REACHED.

TO SHUT DOWN THE FURNACE, TURN THE "GAS CONTROL HANDLE" TO THE "CLOSED" POSITION AND PUSH THE "STOP" BUTTON ON THE FRONT PANEL OF THE CONSOLE.

WIRING DIAGRAM
F900 AND 122 FURNACES WITH SAFETY



CUSTOMER CONNECT 115V POWER SOURCE TO BLACK AND WHITE LEADS EXTENDING FROM CONSOLE. ALL OTHER WIRING IS DONE AT THE FACTORY.

TROUBLE SHOOTING F-900 FURNACE
WITH THERMOCOUPLE SAFETY

NOTE: IF YOU HAVE TROUBLE WITH A BRAND NEW FURNACE: MAKE SURE YOU READ THE INSTRUCTIONS PROPERLY. MAKE SURE THE GAS ON THE NAME PLATE IS THE SAME AS YOU ARE USING. MAKE SURE THE GAS PRESSURE AND VOLTAGE ARE THE SAME AS SPECIFIED ON THE INSTRUCTIONS.

PROBLEM: YOU DEPRESS AND RELEASE THE "START" BUTTON AND THE BLOWER MOTOR DOESN'T RUN.

SOLUTION: DEPRESS AND HOLD IN THE "START" BUTTON. IF THE MOTOR RUNS WHILE YOU HAVE THE "START" BUTTON "IN" AND STOPS WHEN YOU RELEASE IT, REPLACE THE RELAY.

IF THE BLOWER MOTOR DOESN'T RUN: AND YOU HAVE A SPEED CONTROL, REPLACE THE SPEED CONTROL.

PROBLEM: YOU DEPRESS AND HOLD IN THE "IGNITION" BUTTON, THE BURNER IGNITES, THE RED LIGHT STAYS ON AND THE BURNER GOES OUT WHEN YOU RELEASE THE IGNITION BUTTON.

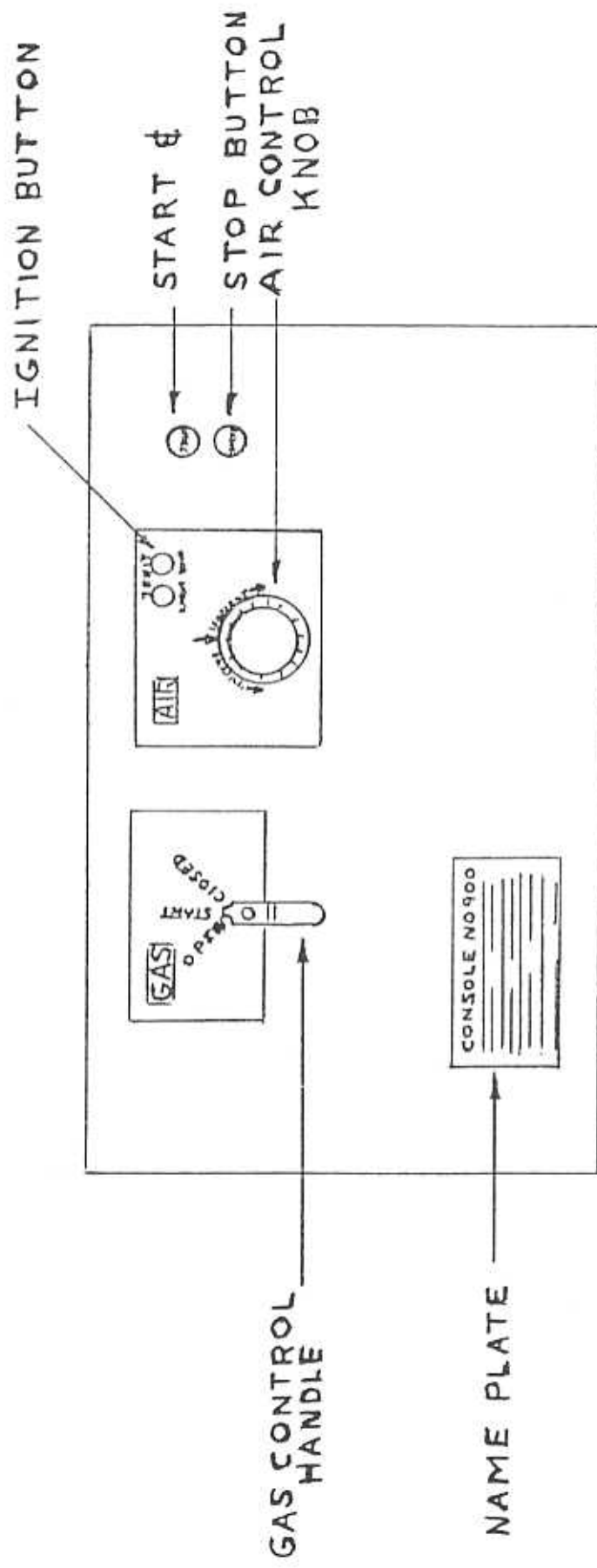
SOLUTION: FOR A BRAND NEW FURNACE, CONSULT FORM NO. 230 AND MAKE SURE THE SPACER SLEEVE IS POSITIONED PROPERLY ON THE THERMOCOUPLE.

FOR AN OLDER FURNACE, REPLACE THE THERMOCOUPLE. MAKE SURE THE THERMOCOUPLE IS THE SAME SIZE AND SHAPE AS THE ORIGINAL ONE.

PROBLEM: YOU DEPRESS AND RELEASE THE "START" BUTTON. THE BLOWER MOTOR RUNS AND THE RED LIGHT IS ON. YOU DEPRESS AND HOLD IN THE IGNITION BUTTON. YOU CAN HEAR THE SPARK IGNITER BUZZING, BUT YOU DO NOT GET ANY GAS.

SOLUTION: CHECK TO SEE IF YOU GET VOLTAGE TO THE SOLENOID VALVE. IF YOU DO, REPLACE THE SOLENOID VALVE. IF YOU DO NOT: THE AIR SWITCH OR IGNITION BUTTON NEEDS TO BE REPLACED.

NO.900 CONSOLE FRONT PANEL



HINTS FOR MAXIMUM CRUCIBLE LIFE

DO NOT:

- . Drop crucible - it will break like a dish
- . Drop metal into crucible when charging
- . Wedge charging metal into crucible
- . Use excessive amounts of flux
- . Melt half a crucible of metal; "short heats" reduce crucible life
- . Use the same crucible for different kinds of metal or alloys
- . Allow metal to solidify in the crucible

DO:

- . Anneal graphite crucibles before charging the first time unless crucibles have been stored in a warm, dry place.
- . Use cardboard between base block and crucible to prevent their sticking together.
- . Handle hot crucibles with correctly fitting tongs and pouring shanks.
- . Empty extra metal into ingot molds.
- . Scrape inside of crucible carefully while it is still hot.

MAINTENANCE INSTRUCTIONS FOR JOHNSON FURNACES

Johnson equipment is designed to give the longest possible service at the lowest maintenance cost. Due to the high temperatures reached by Johnson furnaces certain repairs are required from time to time to keep them in good operating condition. We are listing below pertinent maintenance information.

OVEN TYPE HEAT TREATING FURNACES [#70, #120, #121, #142, #143, #654, #706]

A. GENERAL MAINTENANCE:

These furnaces are lined with high temperature insulating refractory. This refractory expands and contracts as the furnace heats and cools; and cracks will appear throughout the lining. These are normal and should not be cause for alarm and should NOT be filled with cement as it will cause the brick to spall. The door brick on the #70, #120, #121 & #654 furnaces should be replaced occasionally. It is furnished with inconel screws and washers to withstand the high temperatures. The door should NOT be used as a shelf or parts dragged across the door brick in the process of removing parts from the furnace. Also, avoid striking the sides of the furnace with tongs. The hearth plate will require replacement occasionally, as will the front and back hearth rests on which the plate is set. The hearth plate must be used with the channel edges up. Parts to be heated should be pre-heated or brought up to temperature with the furnace when possible; avoid placing a cold piece on a hot hearth plate. When the gas is turned off to the furnace, turn off the blower at once so the lining will cool gradually.

B. FURNACE RELINING AND FURNACE EXCHANGE:

The furnace should be used until the complete lining is considerably deteriorated. It should then either be replaced with a new lining or new furnace body from the factory. Complete sets of fire brick linings with special shapes to fit the furnace and cement for sealing the brick are available with easy-to-follow installation instructions. Many operators, however, prefer to take advantage of the special price on replacement furnace bodies. Check our repair parts list for prices. This method is popular because it insures an expertly relined furnace in operation at all times; it eliminates the time and trouble of relining the furnace in the customer's shop; and it eliminates the "down" time for returning to the factory for relining. WHEN ORDERING, SPECIFY IF FURNACE IS TO HAVE SAFETY PILOT PORT INSTALLED. FOR ADDITIONAL INFORMATION ON SAFETY EQUIPMENT SEE PAGE 3.

PYROMETER EQUIPMENT:

Occasional replacement must be made of the thermocouple elements, the protection tubes or of the complete thermocouple assembly. We carry replacement parts in stock for immediate delivery.

POT TYPE FURNACES [#920, #950, #568, #580, #565, #565A, #521, #575, #575A, & #575B]

A. FURNACE RELINING:

These furnaces are lined with a high-quality, wear-resistant, castable lining poured with molds used in our factory. These linings are very rugged, and the furnaces should be used until the linings are considerably deteriorated, and then replaced with new furnace bodies. The new bodies are furnished complete less blower equipment and pots or crucibles. Prices for the new bodies are given on the repair parts list. With this method the customers are assured of an expertly lined furnace; and they are never without a furnace to use in their shops. If the lid lining needs replacement before the furnace body, material can be supplied to be mixed with water and molded into the furnace lid or a refractory lid can be supplied.

B. FURNACE RELINING #900 CRUCIBLE FURNACE:

This furnace is lined with a precast lining that can be replaced in the shop or a new replacement body can be supplied.

C. USE OF POTS:

DO NOT use a pressed steel pot for melting aluminum. A graphite crucible is used in the crucible furnaces. A cast iron pot is also suitable when contamination of aluminum by the cast iron is not objectionable.

To extend pot life carry a neutral or slightly reducing flame [more gas than air]. A flame that is too blue is oxidizing and will cause rapid scaling of the pot.

Avoid infiltration of cyanide or other salts into the combustion chamber. If seepage or splashing is occurring, place a ring of dry, powdered fire clay under the flange of the pot.

Turn the pot a little each day so that a different part is exposed to the hottest gases.

Remove sludge or sediment from pot at least once a day. This acts as an insulator, causing local overheating of pot.

Remove the pot at regular intervals and thoroughly clean the inner surface. Also hammer off thin scale that forms on outside.

D. USE OF CRUCIBLES:

Crucibles should be kept in a warm, dry area. Before using a new crucible anneal it by placing it in a warm furnace and gradually raising the temperature at about five minute intervals over a period of forty five minutes until the crucible becomes red.

BLOWER MOTORS:

Motors on the blowers should be oiled occasionally. The brushes should be checked and replaced periodically to avoid wear on the armature.

FORGE FURNACES [#122 & #133]

The forge furnaces are lined with hard firebrick on all wearing surfaces. Individual firebricks can be easily replaced when desired. Lining for the lid or complete lining can be replaced when necessary. Sets of linings are furnished with simple instructions for installation.

SOFT METAL MELTING FURNACES [#379, #313 & #616]

A. FURNACE RELINING:

These furnaces can be relined with brick and castable material supplied by our Company. An instruction sheet accompanies the shipment.

B. GENERAL MAINTENANCE:

Avoid permitting metal to solidify in the pots. If the metal does "freeze" in the pot, turn one burner only on until the metal melts slowly; do not turn all burners on at once or the pot will crack. When melting metal, let small amount of metal form a molten pool before adding additional metal.

SMALL BENCH FURNACES [#101, #112, #108 & #118]

The burner tubes on these furnaces are slotted on the ends to retain the flame, and care should be taken about striking the ends with soldering irons. These tubes are made of cast iron and will give long service, but when the slots are knocked off, the tubes should be replaced to insure good combustion. The #108 and #118 furnaces are equipped with individual valves for each burner. The #101 and #112 furnaces are equipped with double valves. After considerable use the valve plugs will tighten causing the valves to "freeze". When this happens the complete valve will should be replaced as prompt replacement of the complete valve will avoid gas leakage. Linings for all these furnaces are carried in stock. Lining sets are supplied for those in which both hood and bottom are lined. This set consists of material to be molded in to the furnace body and includes a new angle iron.



APPROVED COMPONENTS FOR INDUSTRIAL FURNACES

Approved components used on our industrial furnaces and power burners with flame rod or thermocouple safety and ultra-violet safety.

JOHNSON PARTS	APPROVAL		
	UL	CSA	OTHER
Baso Switch	√		
Baso Valve		√	AGA
Baso Thermocouple			AGA
Baso Pilot w/Orifice		√	AGA
Air Switch	√		
ITT Solenoid Valve	√		Factory Mutual
Transformer	√	√	
Lock Out Light	√		
Ignition Button	√	√	
1/30 Motor Bodine	√	√	
1/7 Carter Motor	√		
1/3 Motor w/ back Contact	√		
P & B Relay	√	√	
Speed Control Switch	√	√	
Start - Stop Switch			Top/Application Only
Ignition Wire	√		
All Other Wire	√		
3/4 Gas Pressure Regulator			AGA
OJ21 Ignitor Plug	√		
Gas Adjustment Valve	√		
Fireye Control	√		
Flame Rod 12"	√		
Scanner	√		

NOTE: All Johnson Gas Industrial Furnaces are factory tested for proper function of all systems and all piping is leak tested.

JOHNSON GAS APPLIANCE COMPANY • 520 E AVENUE N.W. • CEDAR RAPIDS, IOWA 52405

1-800-553-5422 • 319-365-5267 • FAX 319-365-6282

Manufacturers since 1901 / Heat Treating Furnaces / Industrial Gas Burners / Stock Tank Heaters / Concrete Curing Systems



WARRANTY

We warrant our equipment to be free of workmanship or material defects. Should any material prove defective within one year after shipment due to faulty material or improper workmanship we will furnish without charge to the original purchaser, replacement or repair of said defective part or parts returned freight prepaid to Johnson Gas Appliance Company, Cedar Rapids, Iowa. The foregoing shall not apply to equipment that has been altered or repaired after shipment to you by anyone except our authorized employees, and the Company will not be liable in any event for alterations or repairs except those made with its written consent. On material not of our manufacture, the manufacturer's guarantee to us is extended. This paragraph does not cover ordinary wear and tear, corrosion or improper handling or storage after leaving our point of shipment. If inspection by the Company does not disclose any defect in workmanship or material, the Company's regular charges will apply. Any refractories supplied with this order will be warranted as to quality and will be selected in accordance with good practice for the service intended. The foregoing obligations are in lieu of all other obligations and liabilities including negligence and all warranties, or merchantability or otherwise, express or implied in fact or by law, and state our entire and exclusive liability and buyer's exclusive remedy for any claim or damages in connection with the sale or furnishing of goods or parts, their design, suitability for use, installation or operation. We will in no event be liable for any special or consequential damages whatsoever, and our liability under no circumstances will exceed the contract price for the goods for which liability is claimed.

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