

INSTALLATION INSTRUCTIONS FOR FURNACE WITH #890 CONTROL BOX  
[FIREYE FLAME SAFEGUARD] AND AUTOMATIC CONTROL OR MANUAL CONTROL

POSITION FURNACE IN DESIRED LOCATION. IT SHOULD BE SPACED FAR ENOUGH FROM WALLS TO ALLOW EASY ACCESS FOR MAINTENANCE AND OPERATION.

ANY WALLS, CEILINGS OR FLOORS MADE FROM COMBUSTIBLE MATERIALS THAT ARE SUBJECTED TO THE RADIANT HEAT SHOULD BE PROTECTED WITH INSULATION BOARD OR SIMILAR MATERIAL. ON THE INITIAL HEATUP, CHECK TO SEE IF PROTECTION IS REQUIRED.

FOR EXHAUSTING FUMES AND EXHAUST GASES, A METAL HOOD WITH AN EXHAUST FAN CAN BE USED. THE HOOD SHOULD BE HIGH ENOUGH SO THAT IT DOES NOT INTERFERE WITH THE OPERATOR. A STACK SHOULD NOT BE CONNECTED DIRECTLY TO THE EXHAUST OPENING ON THE FURNACE.

MAKE SURE THE SPARK IGNITER IS POSITIONED PROPERLY. CONNECT THE IGNITION CABLE FROM THE NO. 890 CONTROL BOX TO THE SPARK IGNITER.

MAKE SURE THE SCANNER FROM THE FIREYE CONTROL IS POSITIONED PROPERLY.

CONNECT THE GAS LINE TO THE GAS INLET. WHEN THE FURNACE IS IN OPERATION, THE PRESSURE, AT THIS POINT, SHOULD BE 4" TO 14" WATER COLUMN ON NATURAL GAS AND 11" ON L.P. GAS.

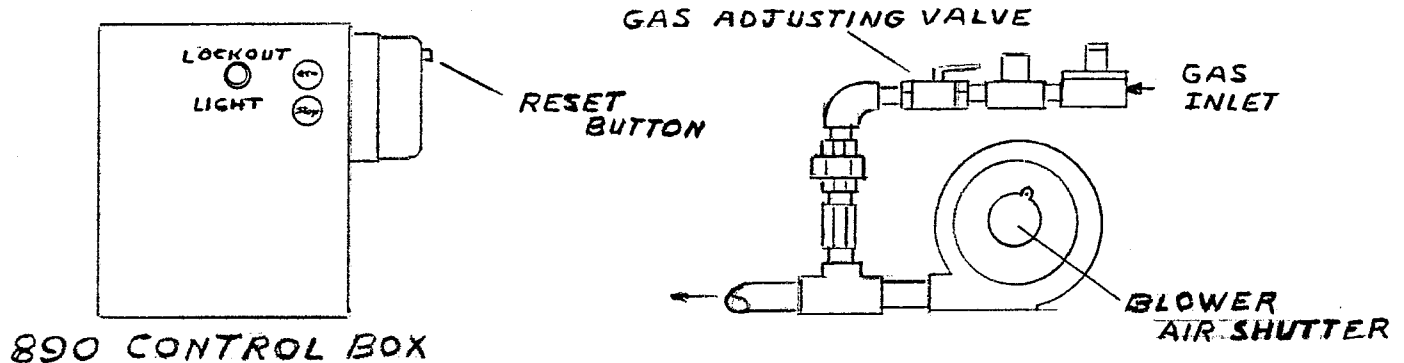
IF THE CONTROL WAS ORDERED WITH THE FURNACE, MOUNT THE CONTROL IN A CONVENIENT LOCATION, AWAY FROM ANY RADIANT HEAT. CONSULT THE ATTACHED WIRING DIAGRAM FOR WIRING AND CONSULT THE OPERATING AND SERVICE INSTRUCTION MANUAL.

CONNECT 115 VOLT, 60 CYCLE POWER SOURCE TO THE BLACK AND WHITE LEADS EXTENDING FROM THE CONTROL BOX. TURN ON MAIN GAS AND POWER SUPPLY. CONSULT LIGHTING AND OPERATING INSTRUCTIONS FOR STARTING THE FURNACE.

ON THE FIRST HEATUP, THE FURNACE SHOULD BE RUN AT A LOW RATE FOR ABOUT 2 HOURS. IT IS NORMAL TO SEE WATER RUNNING FROM THE FURNACE ON THE FIRST FEW HEATUPS.

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

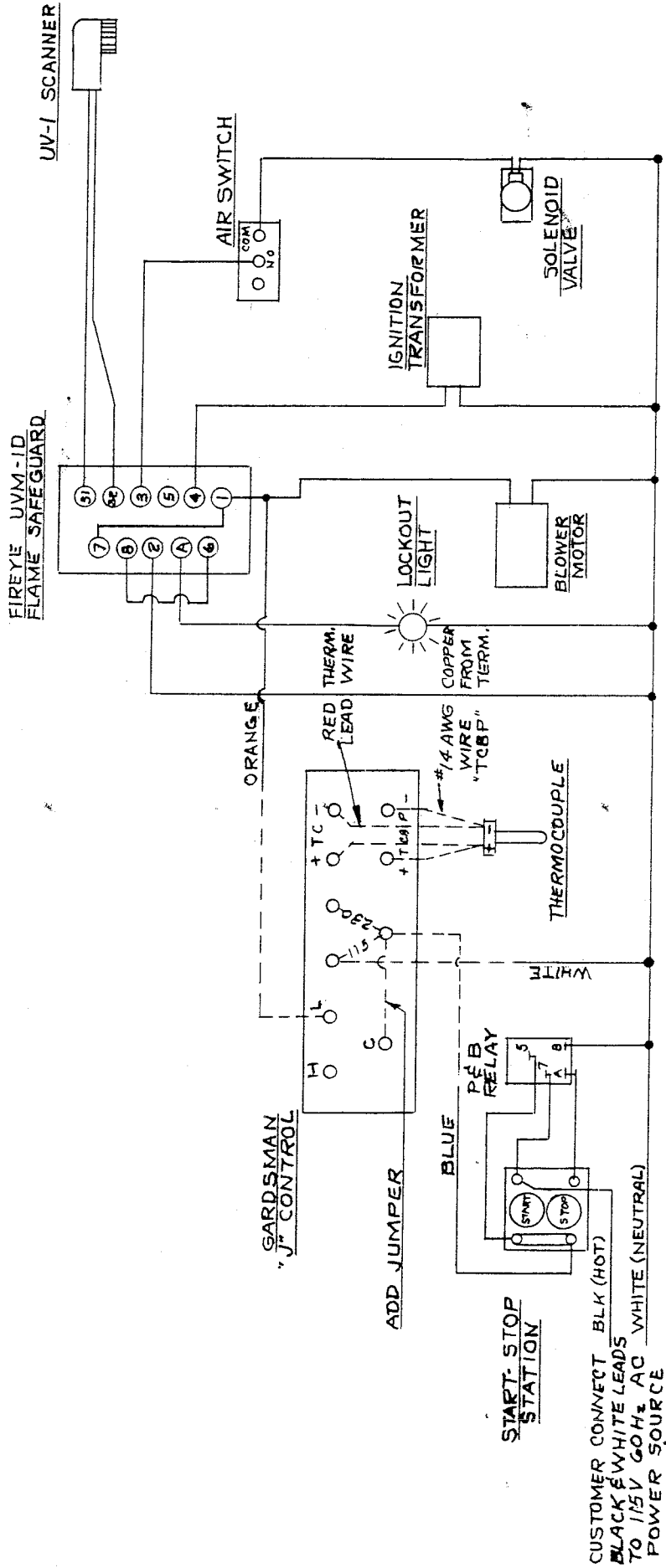
LIGHTING AND OPERATING INSTRUCTIONS FOR FURNACE WITH  
#890 CONTROL BOX (FIREYE UVM-1D FLAME SAFEGUARD) AND  
EITHER GARDSMAN "J" AUTOMATIC OR MANUAL TEMPERATURE CONTROL



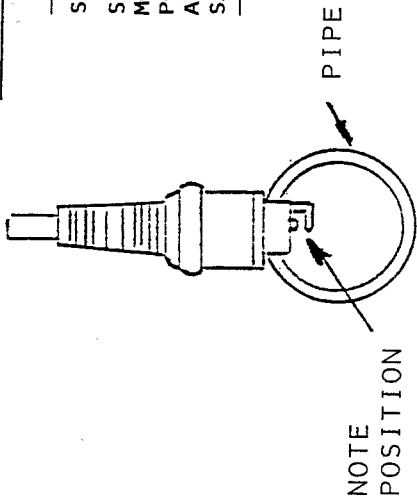
AFTER ALL WIRING AND PIPING ARE COMPLETED:

1. SET BLOWER AIR SHUTTER 1/2" OPEN. GAS ADJUSTING VALVE SHOULD BE CLOSED.
2. IF YOU HAVE AUTOMATIC TEMPERATURE CONTROL, SET THE POINTER TO YOUR DESIRED OPERATING TEMPERATURE.
3. DEPRESS AND RELEASE THE START BUTTON. THE BLOWER MOTOR WILL COME ON AND IN ABOUT 5 SECONDS, YOU WILL HEAR THE FIREYE CONTROL CONTACTS CLICK AND THE SPARK IGNITER "BUZZING". YOU THEN SLOWLY OPEN THE GAS ADJUSTING VALVE JUST TO THE POINT WHERE THE BURNERS IGNITE. NOTE: IF YOU DEPRESSED THE START BUTTON AND THE RED LOCKOUT LIGHT IS ON, YOU WILL HAVE TO DEPRESS THE RED RESET BUTTON THAT IS ON THE FIREYE CONTROL. THE LIGHT SHOULD GO OUT AND THE SPARK IGNITER WILL START "BUZZING". YOU CAN THEN SLOWLY OPEN THE GAS ADJUSTING VALVE TO THE POINT WHERE THE BURNERS IGNITE. IF YOU DEPRESSED THE RESET BUTTON AND THE LIGHT DID NOT GO OUT, WAIT ABOUT 30 SECONDS AND THEN DEPRESS THE RESET BUTTON.
4. AFTER THE FURNACE HAS WARMED UP ABOUT 10 MINUTES, ADJUST THE GAS ADJUSTING VALVE TO OBTAIN A SHARP TAIL OF FLAME OUT THE EXHAUST OPENING OF THE FURNACE. IF YOU HAVE NO FLAME, INCREASE THE AMOUNT OF GAS. IF YOU HAVE A HIGH, LAZY FLAME, DECREASE THE AMOUNT OF GAS.
5. TO INCREASE THE GAS INPUT, INCREASE THE BLOWER SHUTTER OPENING A SMALL AMOUNT AND THEN ADJUST THE GAS VALVE TO OBTAIN THE SHARP TAIL OF FLAME. REPEAT THIS PROCEDURE UNTIL THE DESIRED OR MAXIMUM GAS INPUT IS REACHED.
6. TO DECREASE THE AMOUNT OF GAS, DECREASE THE BLOWER SHUTTER OPENING A SMALL AMOUNT AND THEN ADJUST THE GAS VALVE TO OBTAIN A SHARP TAIL OF FLAME. REPEAT THIS PROCEDURE UNTIL THE DESIRED OR MINIMUM GAS INPUT IS REACHED.
7. TO SHUT DOWN THE FURNACE, DEPRESS AND RELEASE THE STOP BUTTON. THEN TURN THE GAS VALVE TO THE CLOSED POSITION.

WIRING DIAGRAM FOR FURNACE WITH GARDSMAN "J" CONTROL AND FIREYE UVM-ID FLAME SAFEGUARD CONTROL



NOTE:  
 1. ALL WIRING SHOWN IN SOLID LINES COMPLETED AT FACTORY  
 2. ALL WIRING SHOWN IN BROKEN LINES TO BE COMPLETED BY CUSTOMER

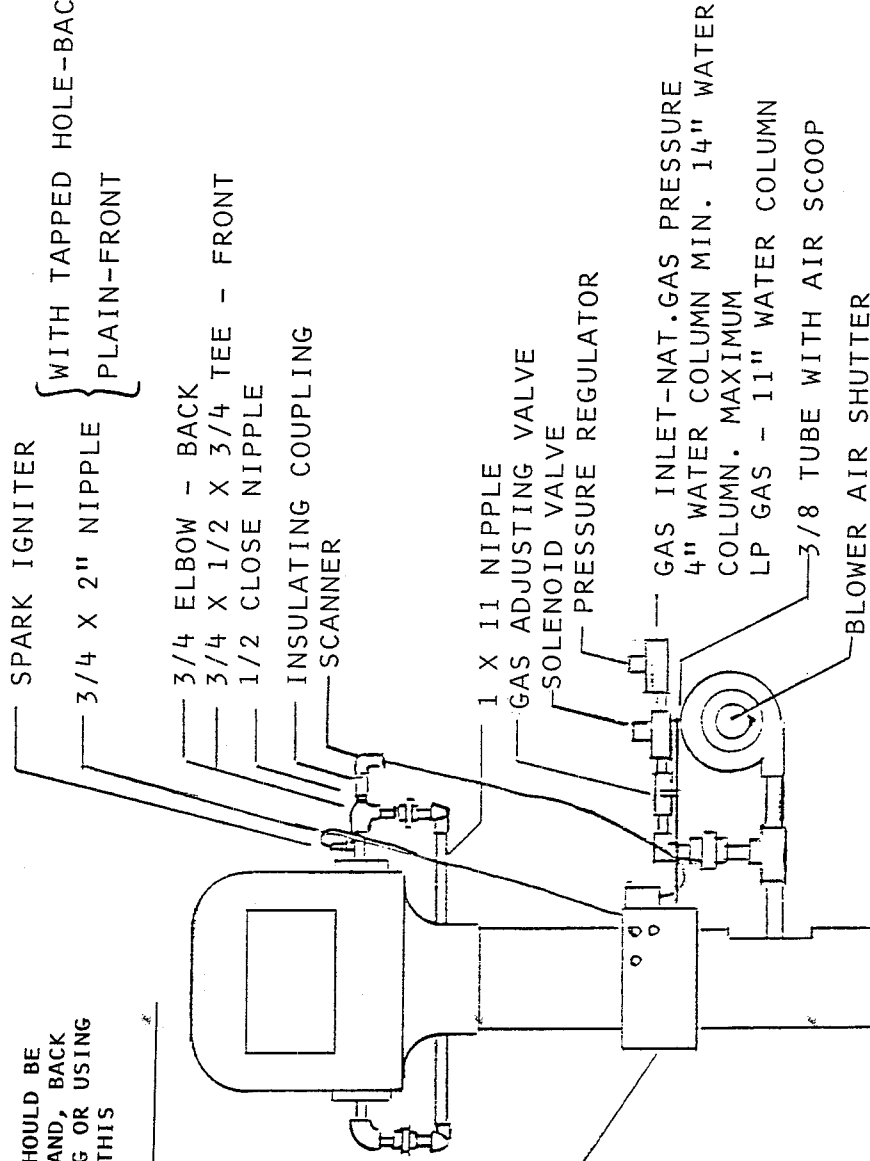


NOTE  
POSITION

FOR PROPER IGNITION  
POSITION SPARK PLUG  
AS SHOWN.

**SPECIAL NOTE:**

SPARK IGNITOR SHOULD BE  
MOVED TO LEFT HAND, BACK  
PORT WHEN ADDING OR USING  
A CONTROL WITH THIS  
SAFETY SYSTEM!



SPARK IGNITER

3/4 X 2" NIPPLE

{ WITH TAPPED HOLE - BACK  
PLAIN - FRONT

3/4 ELBOW - BACK

3/4 X 1/2 X 3/4 TEE - FRONT

1/2 CLOSE NIPPLE

INSULATING COUPLING  
- SCANNER

1 X 11 NIPPLE

GAS ADJUSTING VALVE

SOLENOID VALVE

PRESSURE REGULATOR

GAS INLET - NAT. GAS PRESSURE

4" WATER COLUMN MIN. 14" WATER

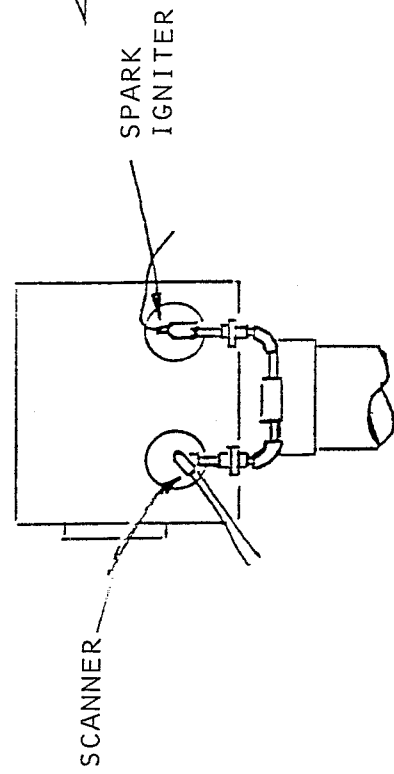
COLUMN. MAXIMUM

LP GAS - 11" WATER COLUMN

3/8 TUBE WITH AIR SCOOP

BLOWER AIR SHUTTER

NO. 890 CONTROL BOX. [ON  
BENCH TYPE FURNACE BOX IS  
MOUNTED ON BENCH]

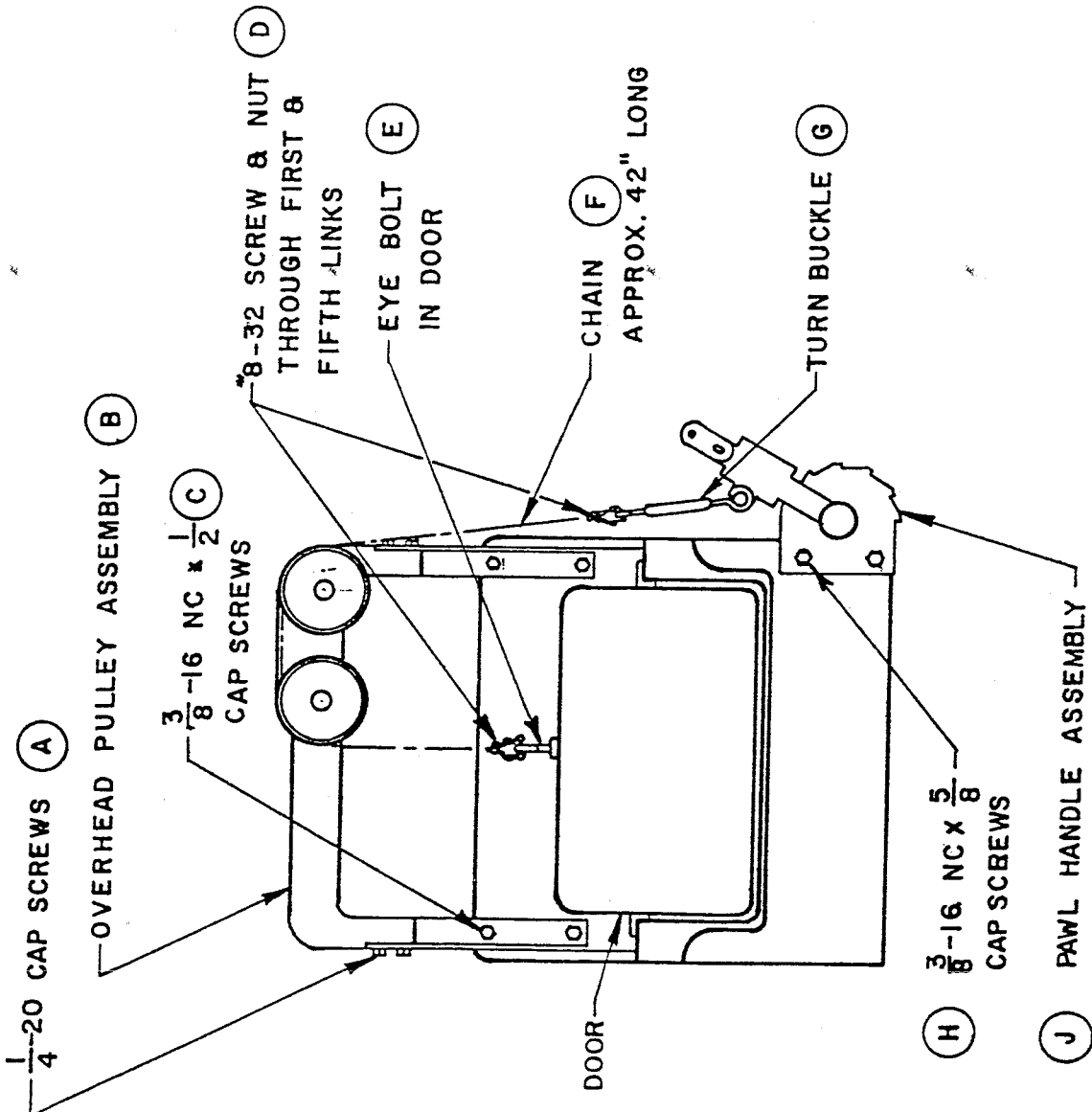


SCANNER

SPARK  
IGNITER

VIEW OF RIGHT SIDE

DOOR ASSEMBLY - FOR - FURNACES NOS. 142-143-175-706



- DOOR ASSEMBLY -

1. LOOSEN SCREWS "A" AND POSITION OVERHEAD PULLEY ASSEMBLY "B" ON DOOR FRAME.
2. FASTEN PULLEY ASSEMBLY "B" TO DOOR FRAME WITH SCREWS "C".
3. TIGHTEN SCREWS "A".
4. FASTEN PAWL HANDLE ASSEMBLY "J" TO DOOR FRAME WITH SCREWS "H".
5. SET THE DOOR IN POSITION AS SHOWN.
6. SET HANDLE IN FIRST NOTCH AND THREAD CHAIN "F" THROUGH PULLEYS.
7. LOOSEN TURNBUCKLE "G" AND FASTEN CHAIN TO EYEBOLT "E". [USE 5 CHAIN LINKS]
8. TAKE UP CHAIN SLACK BY TIGHTENING THE TURNBUCKLE.
9. RAISE AND LOWER THE DOOR SEVERAL TIMES AND MAKE MINOR ADJUSTMENTS BY TIGHTENING OR LOOSENING THE TURNBUCKLE.

JOHNSON GAS APPLIANCE CO.  
CEDAR RAPIDS, IA 52405

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 HOOLD.

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.



## MAINTENANCE INSTRUCTIONS FOR JOHNSON FURNACES

Johnson equipment is designed to give the longest possible service as 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 AND #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 and #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 prick 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 insured 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 ports 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 in to 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. It is suggested by motor manufacturers that brushes be replaced every 500 hours of operation or when they are worn down to ¼" long.



## **FORGE FURNACES (#122 AND #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 AND #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 additional metal.

## **SMALL BENCH FURNACES (#101, #112, #108 AND #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 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 into the furnace body and includes a new angle iron.