



TurboFire® II Burner

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

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TABLE OF CONTENTS

FOREWORD	i
SECTION 1: WARNINGS	1
SECTION 2: DESCRIPTION	2
SECTION 3: INSPECTION & HANDLING	3
INSPECTION	3
UNLOADING	3
SECTION 4: INSTALLATION	4
SECTION 5: START-UP	11
PRE START-UP CHECK LIST	12
START-UP PROCEDURE	15
LINKAGE TEST	16
PILOT TEST	17
MAIN FLAME TEST (GAS)	18
MAIN FLAME TEST (OIL)	20
MAIN FLAME TEST (LOW NO _x PACKAGE)	23
SECTION 6: MAINTENANCE	24
DAILY PROCEDURE	24
WEEKLY PROCEDURE	24
MONTHLY PROCEDURE	25
SEMI-ANNUAL PROCEDURE	25
ANNUAL PROCEDURE	25
SECTION 7: SERVICE	26
REFRACTORY REPLACEMENT	26
BURNER SHELL	26
OIL NOZZLE REPAIR	27
SECTION 8: TROUBLE SHOOTING	28
SECTION 9: PARTS LIST	32
APPENDIX	
FIRE TEST REPORT	A-1
BURNER SPECIFICATIONS	A-2
START-UP INSPECTION FORM	A-3
WARRANTY CERTIFICATE	A-4

TurboFire® II Burner

LIST OF FIGURES

	Page No.
Figure 1a. General Burner Arrangement.....	4
Figure 1b. General Burner Arrangement.....	5
Figure 2. Refractory Insert	6
Figure 3. Preparing Mounting Flange Area	7
Figure 4. Refractory Orifice.....	7
Figure 5. Preferred Burner Lifting Arrangement.....	8
Figure 6. Alternative Burner Lifting Arrangement	8
Figure 7. Burner Orientation and Insertion.....	9
Figure 8. Retrofit Gas Train (Main).....	10
Figure 9. Pressure Tap on Gas Train.....	15
Figure 10. Typical Linkage Arrangement.....	16
Figure 11. Pilot Gas Train.....	17
Figure 12. Oil Nozzle Assembly	27
Figure 13. Atomizing Air Compressor (No. 2 Fuel Oil).....	32
Figure 14. No. 2 Fuel Oil Piping Schematic.....	33
Figure 15. Fuel Oil Pump Set (No. 2 Fuel Oil)	34
Figure 16. Scanner Assembly	34
Figure 17. Forced Draft Blower Assembly	35
Figure 18. Pilot Gas Train Assembly	35
Figure 19. Main Gas Train Schematic (Standard Pressures).....	36
Figure 20. Modulation Assembly (Standard).....	37
Figure 21. Control Panel Assembly (YSH/L - N/2).....	38
Figure 22. Pilot Assembly Drawing.....	39

FOREWORD

The York-Shipley packaged boiler has been carefully designed and built in accordance with the Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers and the complete packaged boiler is listed by the Underwriters' Laboratory, Inc.

Manufacturing operations are constantly monitored by York-Shipley inspectors and an Authorized National Board commissioned inspector. The packaged boiler complies with the written York-Shipley Quality Control Procedure which has been reviewed and accepted by the authorized agencies which control boiler and pressure vessel manufacturing.

The packaged boiler operation is essentially automatic. It does require proper installation, trained operators, and maintenance to provide safe and efficient long-life service. This manual, which is shipped with the packaged boiler, presents information which will help the owner and operators to achieve that level of service.

It is very important that this manual be carefully studied and retained in a location where it is readily available to the packaged boiler operators for reference at all times.

If there are questions, consult York-Shipley before undertaking any unloading, movement, installation, operation, maintenance, or service, including parts replacement.

York-Shipley IS NOT RESPONSIBLE FOR THE OVERALL SYSTEM DESIGN (INCLUDING BREECHING AND STACK) AND THE SYSTEM'S PERFORMANCE OR ABILITY TO MEET THE REQUIREMENTS OF THE OWNER. DONLEE RECOMMENDS THAT THE OWNER AND/OR THE INSTALLER PLACE THAT RESPONSIBILITY WITH A COMPETENT ENGINEER.

Treatment of the boiler water is necessary to prevent excessive corrosion of the waterside surfaces of the boiler. DONLEE, recognizing the need for specific chemical analysis of local water to provide proper treatment, neither prescribes nor recommends the type or amount of water treatment. The owner shall engage a competent water treating company or consultant to recommend the proper water treatment and procedure of the boiler water in question.

The Limited Warranty applying to the packaged boiler is included with this manual. *Read it carefully.*

Additional copies of this manual are available from the York-Shipley Literature Department for a fee of \$15.00 per copy. The contact address is:

**York-Shipley Global
693 North Hills Road
York PA 17402**

- *Contents of this manual are subject to change without notice.*
- *Specific performance specifications will be provided with the job quotation.*

SECTION 1: WARNINGS

Inspect the burner when it arrives at its shipping destination to identify and record any shipping damage. Reporting this damage to the carrier is the responsibility of the consignee and **SUCH DAMAGE IS NOT COVERED BY THE WARRANTY**. Refer to Section 3 for more details.

If the burner is stored prior to installation, it is the responsibility of others (not York-Shipley) to provide the necessary protection from damage due to conditions such as:

- Freezing temperatures
- Flooding
- Dust and dirt
- Falling articles, etc.

SUCH DAMAGE IS NOT COVERED BY THE WARRANTY (see Section 3).

It is the owner's responsibility, in cooperation with the installer, to obtain the required inspections of the installation for compliance with state and local jurisdictional codes and requirements and to obtain boiler insurance, operating certification and periodic third-party inspections during the life of the burner.

The owner has the responsibility to provide qualified and trained operators and to assure that the burner is operated and maintained to provide efficient and safe operation. This manual provides information to assist the owner and operators but is not intended to supplant thoughtful and diligent dedication on the part of the owner and operators to this task. The owner and operators must comply with the regulations and requirements of the insurance carrier, and state and local jurisdictions. Their legal requirements take precedence over anything included in this manual.

The burner utilizes combustible fuels and water or steam at pressures higher than atmospheric. Industry accepted safety standards are met or exceeded in the design and manufacture of the burner. **INSTALLERS AND OPERATORS OF THE BURNER ARE WARNED THAT THEIR IMPROPER OR CARELESS ACTIONS CAN RESULT IN A HAZARDOUS CONDITION.**

The equipment is not intended for use in furnishing temporary heat to the structure in which it is installed prior to the completion and acceptance of such structure and installation by the owner or other person for whom the entire project is being constructed. Therefore, the warranty and warranty service normally issued with respect to this equipment will not apply during and after such use.

WHEN SERVICING THE BURNER, DISCONNECT ALL POWER SUPPLIES.

Equipment furnished by York-Shipley Global includes various safety, performance, temperature and operation systems and limits. **ANY ACTIONS BY THE PURCHASER, PURCHASER'S PERSONNEL OR PERSONS ACTING ON PURCHASER'S BEHALF WHICH TEND TO NULLIFY OR CHANGE SUCH SYSTEMS OR LIMITS WILL BE TAKEN AT PURCHASER'S SOLE RISK AND RESPONSIBILITY AND WILL VOID York-Shipley Global's WARRANTY AND PERFORMANCE RESPONSIBILITIES AND WILL RELIEVE York-Shipley OF ALL LIABILITIES RESULTING THEREFROM.**

SECTION 2: DESCRIPTION

The York-Shipley TurboFire® II unit is a packaged burner system consisting of a burner body, controls, forced draft blower, piping, gas and/or oil train, electric panel and other items. A lifting lug is attached to the burner for handling.

At the request of the purchaser or for foreign shipments, certain parts and/or assemblies may be removed from the packaged boiler and shipped separately. Reassembly of these parts and/or assemblies is completely the responsibility of the purchaser.

Gas, oil, steam and electrical supply power connections need to be made by the installer.

THE CONTROL SYSTEM VOLTAGE FOR THE BURNER IS ALWAYS 120 VOLTS REGARDLESS OF THE BOILER VOLTAGE.

The Cyclonic burner differs from existing forced draft burners and its operation is extremely simple. There are no internal baffles, dampers or other appurtenances in the burner.

The high tangential velocity created within the burner causes an intimate mixing of fuel and air resulting in extremely good combustion and low excess air.

This high tangential velocity is maintained throughout the length of the furnace which increases the convective heat transfer and the residence time of the combustion gases in the furnace resulting in the gases exiting from the furnace at a relatively lower temperature than with conventional burners.

The packaged burner is fire tested at the factory prior to shipment. A sample copy of the test report is included in the APPENDIX.

SECTION 3: INSPECTION & HANDLING

INSPECTION

York-Shipley Global is not responsible for damage to the burner and/or for items missing during shipment from the factory to the shipping destination. RESOLUTION OF SUCH CLAIMS AGAINST THE CARRIER IS THE RESPONSIBILITY OF THE CONSIGNEE.

Immediately upon the arrival of the shipment and before it is unloaded from the carrier's vehicle, the consignee or his agent shall make a thorough inspection of the shipment.

Look for the following:

- Is the blocking and/or strapping in place and tight?
- Has the unit shifted on the carrier's vehicle?
- Are the temperature and pressure gauges and controls in place and undamaged?
- Is the piping to accessories intact and undamaged?
- Do the skids and supports show evidence of stress or damage?
- Are the lifting lugs bent or distorted?
- Is the burner dented or marred?
- Is there evidence of pilfering?

If there is evidence of damage or items missing, notations of the specific damage and/or missing items shall be made on the freight bill and a record of such notations retained by the consignee. The consignee shall immediately advise the carrier's agent of the condition of the shipment in writing, demand an inspection of the damage and file the damage claim with the carrier.

UNLOADING

The packaged burner is a heavy and bulky piece of equipment which may be damaged if it is not handled properly by skilled persons using special equipment.

Unloading the burner from the carrier's vehicle and/or moving it into position requires skill and proper equipment and should not be attempted by those who lack the qualifications.

York-Shipley Global recommends that a competent rigger be engaged to perform that task. The consignee should advise the rigger as to the time when his services will be needed in order to eliminate charges for delays.

If delays do occur, it is important that the burner be protected from the weather, dust, dirt, pilferage and damage. Particular attention shall be given to protection of electrical items; controls, motors and wiring.

REFER TO FIGURES 5 & 6 FOR LIFTING INFORMATION.

SECTION 4: INSTALLATION

BURNER INSTALLATION INSTRUCTIONS

1. Familiarize yourself with the burner by studying Figures 1a and 1b "General Burner Arrangement."

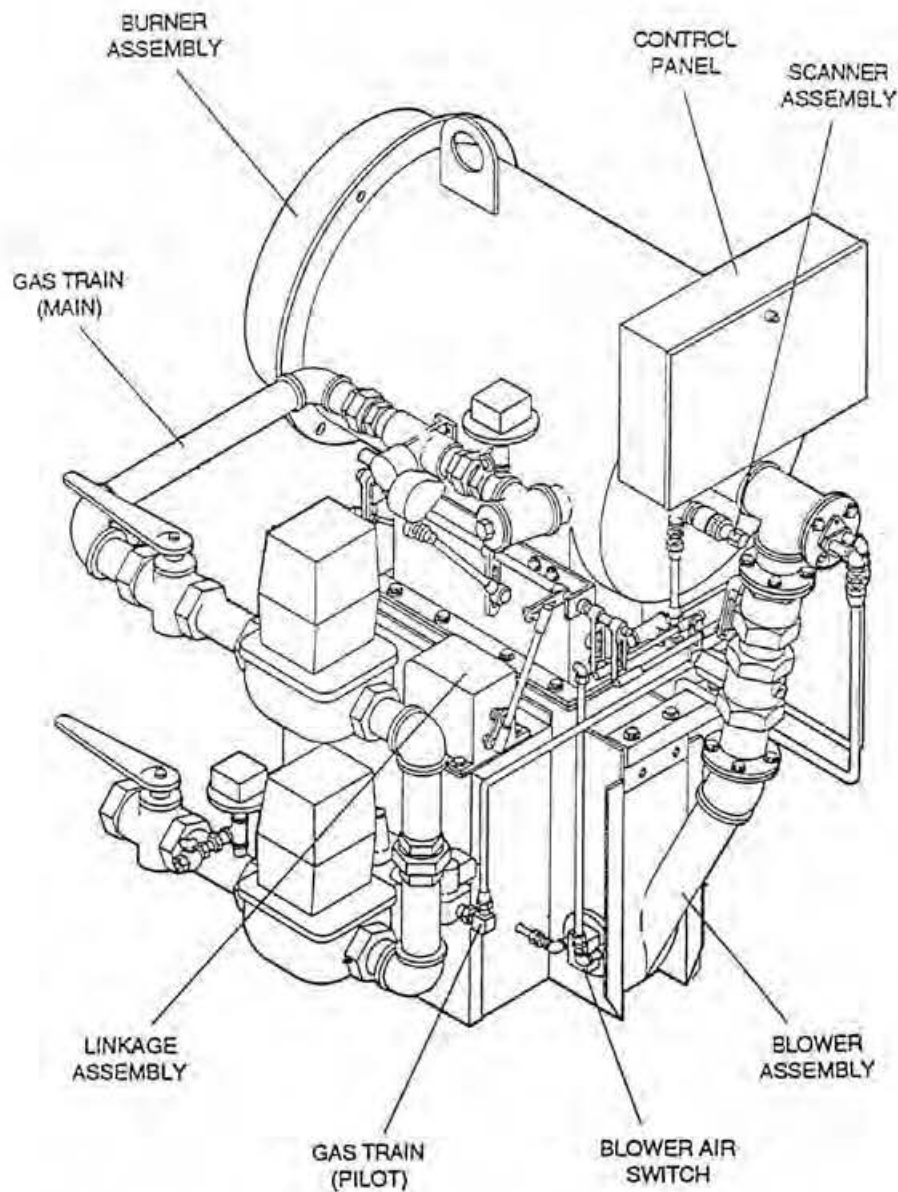


Figure 1a. General Burner Arrangement

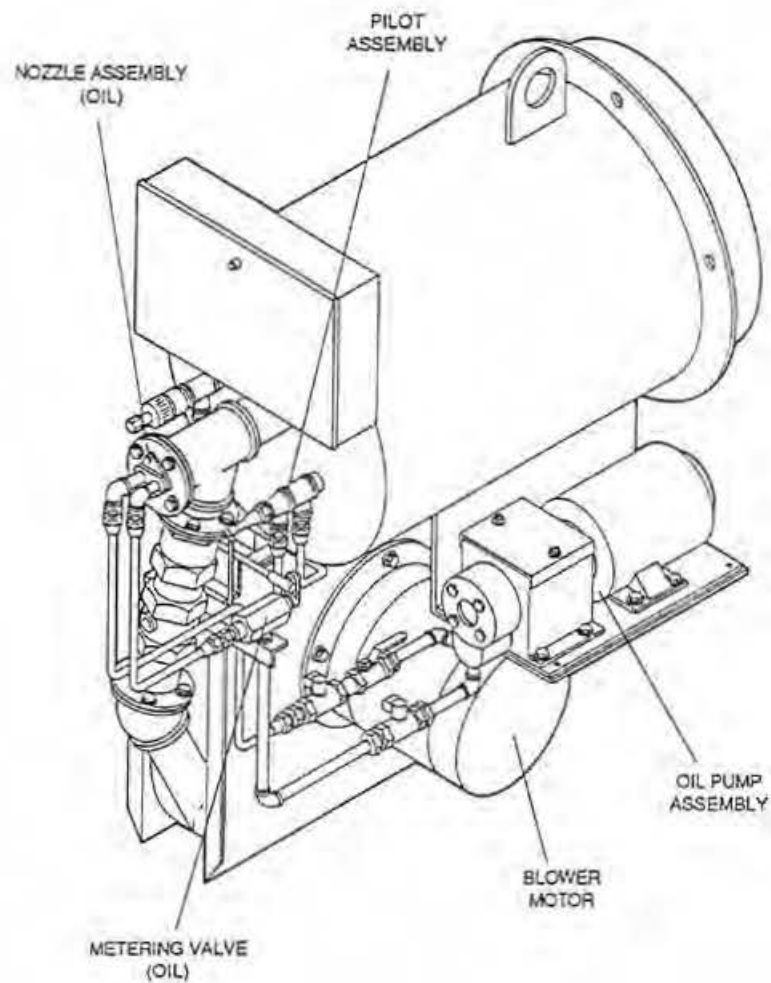


Figure 1b. General Burner Arrangement

2. Turn off all electrical power to the boiler.
3. Close **all** natural gas valves.
4. Disconnect and tag any electrical, gas or oil connections which may interfere with the removal of the existing burner or the gas train.
5. Read and follow the instructions for removal of the old burner which were supplied from the original manufacturer.

6. Remove the refractory cylinder into which your old burner was inserted. Figure 2 "Refractory Insert."

WARNING: Your TurboFire® II burner may require the installation of refractory tile. Consult a qualified TurboFire® II technician.

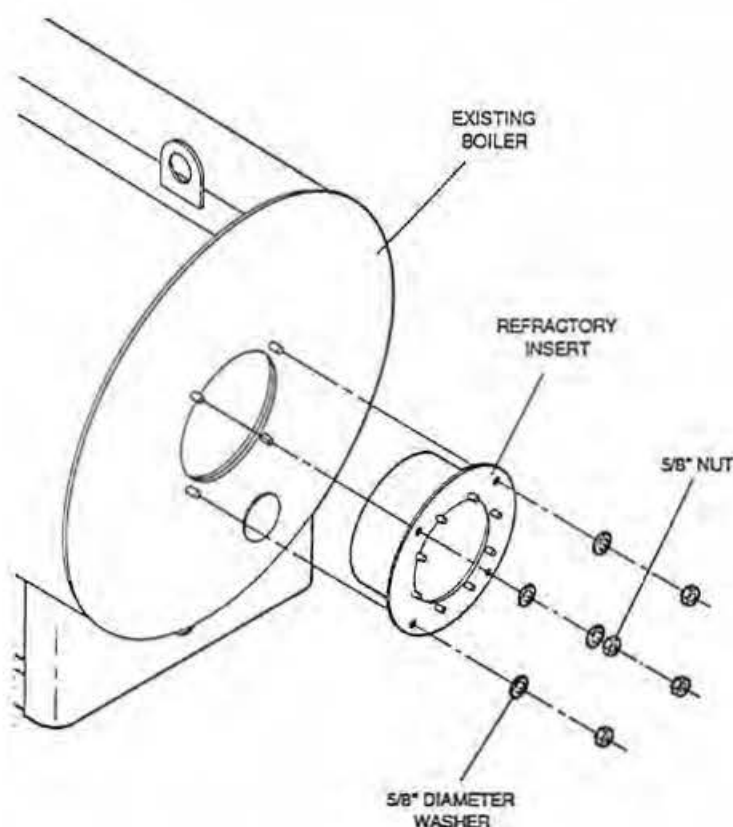


Figure 2. Refractory Insert

7. Remove any gasketing rope from the mounting flange area of the boiler.

8. Remove any rust, scale, rope or refractory left in the firing tube or the front mounting flange area with a wire brush. Figure 3 "Preparing Mounting Flange Area."
9. Inspect the refractory orifice located inside the firing tube. The orifice should be replaced if there are any loose or cracked bricks. Figure 4 "Refractory Target."



Figure 3. Preparing Mounting Flange Area

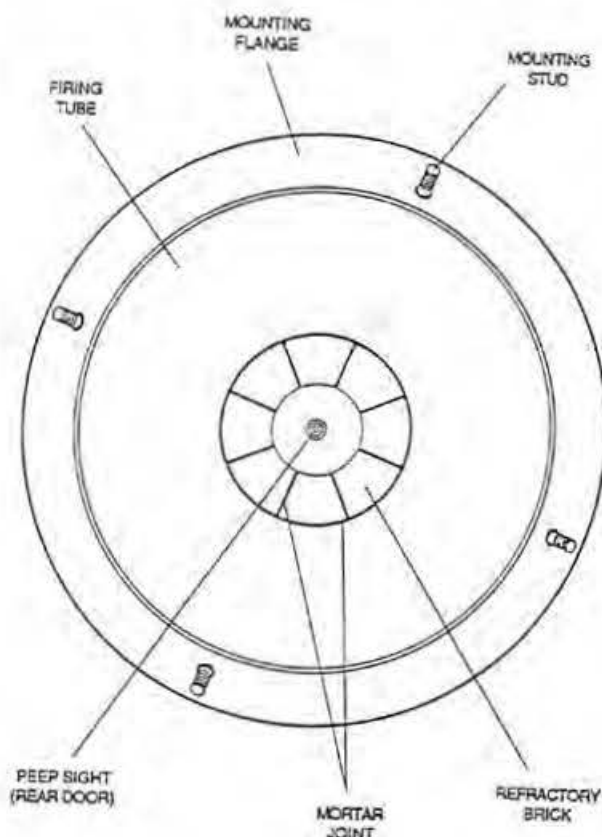


Figure 4. Refractory Target

NOTE: THE TURBOFIRE® II BURNER NORMALLY REQUIRES A REFRACTORY ORIFICE IN THE BOILER MORISON TUBE. CONSULT THE FACTORY REPRESENTATIVE FOR THE PROPER SIZE AND INSTALLATION INSTRUCTIONS.

<p>WARNING: Do not operate your TurboFire® II without a properly sized boiler orifice. Unsafe burner operation will result.</p>
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10. Place a chain, cable, or belt sling rated for a minimum of 2000 lb. around the burner between the mounting flange on the burner, and the blower. With a properly sized lifting device, pick up the burner. Figures 5 and 6 illustrate the preferred and alternative burner lifting arrangements.

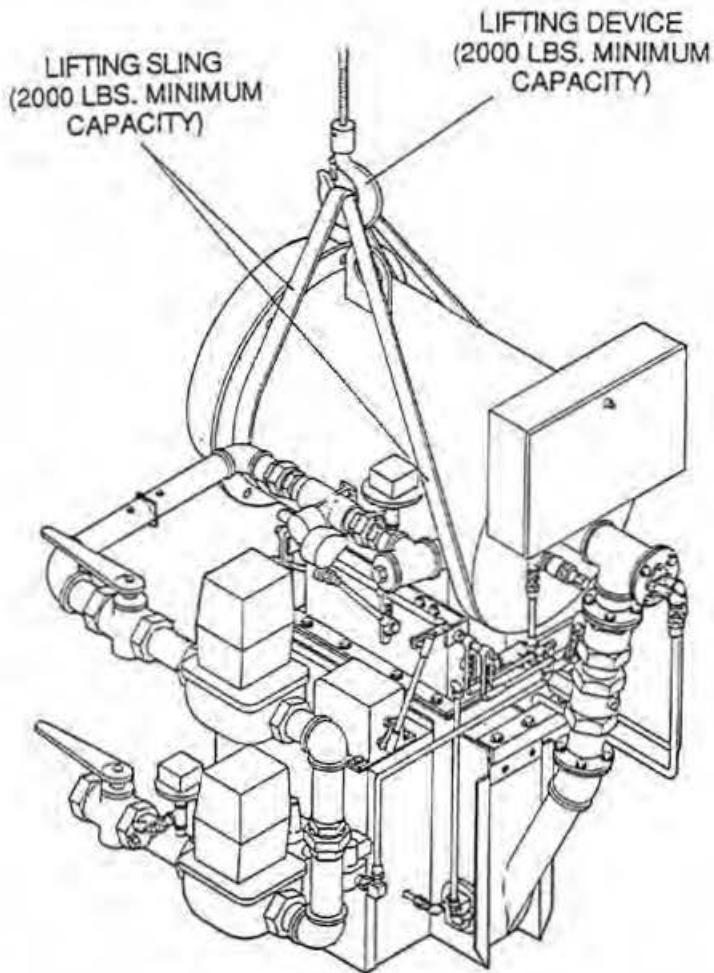


Figure 5. Preferred Burner Lifting Arrangement

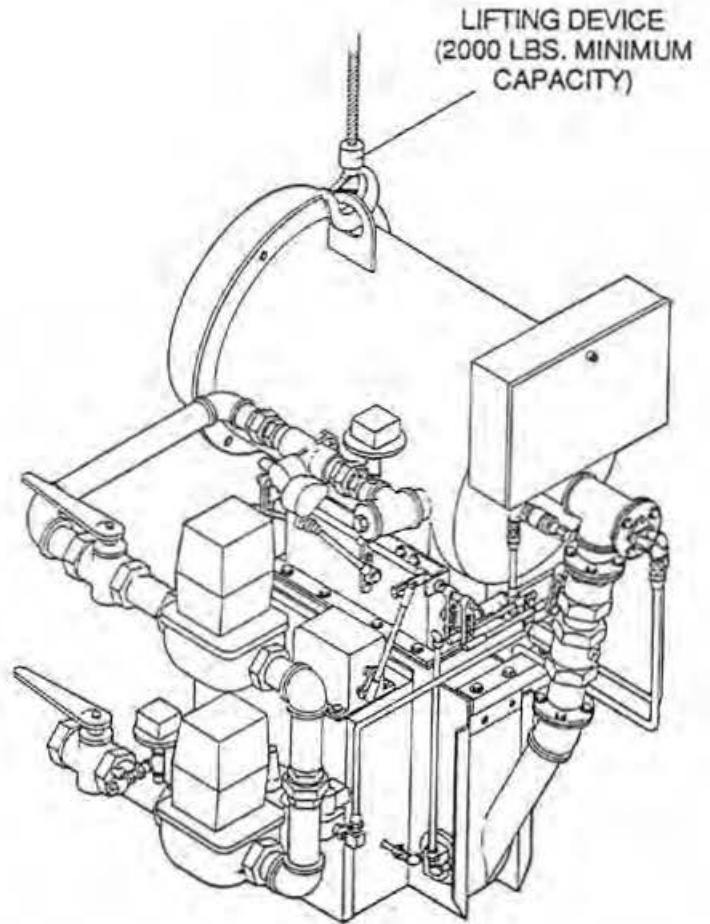


Figure 6. Alternative Burner Lifting Arrangement

11. Rotate the burner in the lifting sling so that the air inlet of the blower is square to the floor. Figure 7 "Burner Orientation and Insertion."

NOTE: THE BOILER DESIGN MAY REQUIRE THE TURBOFIRE® II BURNER TO BE INSTALLED WITH THE BLOWER ABOVE THE BURNER. CONSULT FACTORY REPRESENTATIVE.

12. Liberally spray adhesive onto the front mounting flange area of the boiler. Wait a few moments until the adhesive becomes "tacky". Wrap 3/8" gasketing rope around the circumference of the firing tube two (2) times on the inside of the mounting stud diameter on the front cover of the boiler.

NOTE: DO NOT USE FIBERGLASS GASKET

13. Slide the burner end head into the firing tube of the boiler. Rotate the burner so that the mounting flange holes of the burner are aligned with the mounting studs of the boiler and slide the burner onto the studs. Figure 7.

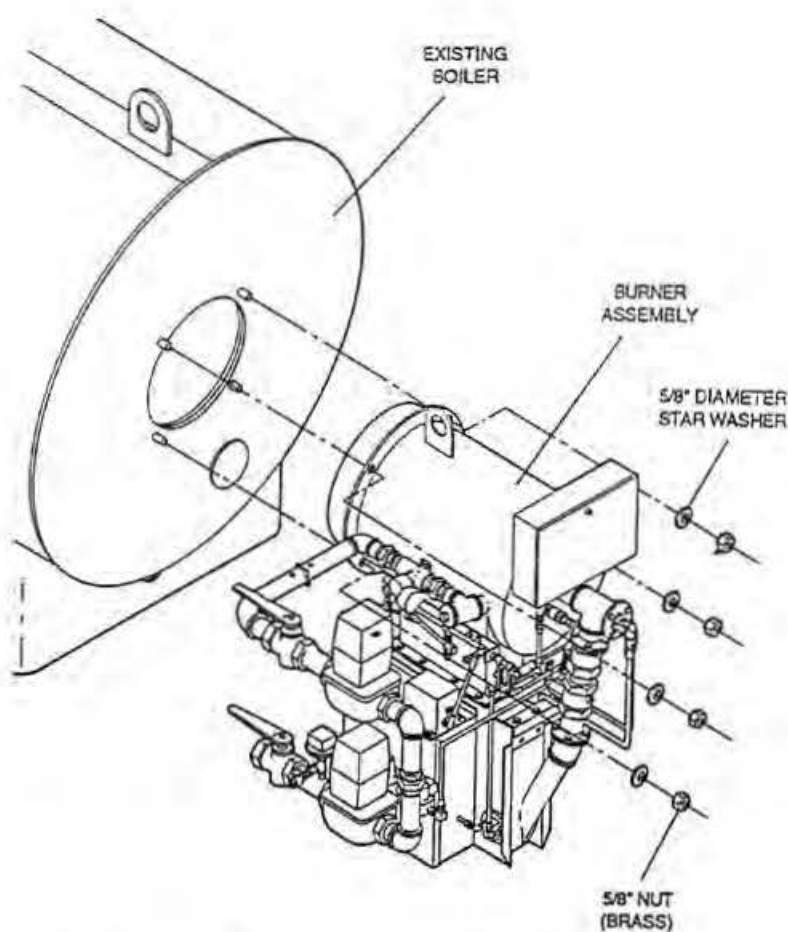


Figure 7. Burner Orientation and Insertion

14. Screw washers and brass nuts onto the boiler studs.
15. Lower the lifting device so that the studs support the burner and remove the sling from around the burner.
16. Tighten the brass nuts on the studs evenly to seal the burner to the boiler.

CAUTION: Failure to tighten the brass nuts may result in a combustion gas leak and burner overheating.

17. Connect main gas line to gas train connection on **TurboFire® II**. See Figure 8 "Retrofit Gas Train (Main)".
18. Have an electrical contractor connect all electrical connections to the gas train and boiler safety and control switches from the control panel provided with the burner exactly as shown in the provided wiring diagram.
19. Connect oil (and steam) supply to the burner.

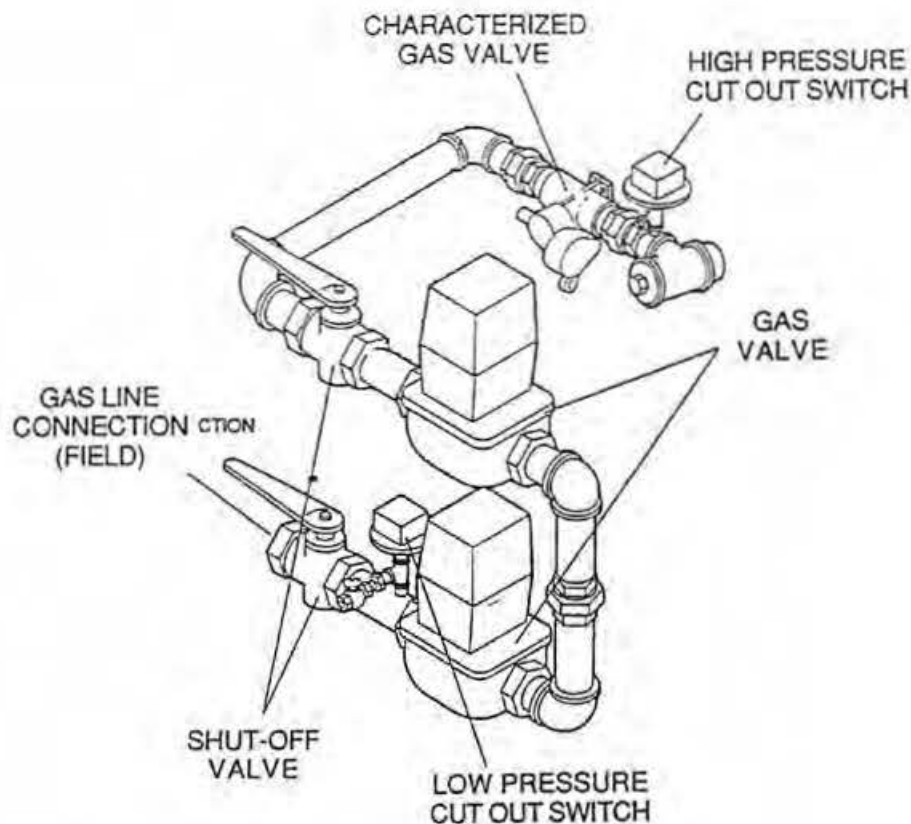


Figure 8. Retrofit Gas Train (Main)

SECTION 5: START-UP

Your **TurboFire® II** burner has been tested and adjusted at the factory to provide optimum performance and reliability. However, each burner installation is slightly different and your burner will require some fine tuning and safety checks once it is installed.

ATTENTION: A York-Shipley Global REPRESENTATIVE
MUST CONDUCT THE PRE-START-UP INSPECTION AND THE
ACTUAL START-UP PROCEDURE.

PRE START-UP CHECK LIST

GENERAL

If refractory has been added to the combustion chamber as part of the installation, is it completely dry, cured, and ready for firing at full boiler input? _____ ☐

Has the proper electrical voltage been connected to the burner control cabinet as shown on the burner wiring diagram? _____ ☐

Has the burner wiring been checked for completeness and accuracy? Have 3-phase motors been properly wired and checked for correct rotation? _____ ☐

Are the boiler mounted limit controls such as low water cutoffs, high limit controls, operating controls, modulating controls, etc., properly installed and wired? _____ ☐

Are the boiler controls the right type and adjusted to the proper setting and range for the installation? _____ ☐

Is the boiler water supply, including feed pumps, properly connected and is the boiler filled with water? _____ ☐

Is sufficient load connected to the boiler so that it can be fired continuously at full rating? _____ ☐

If the boiler load is not connected, can steam be wasted so that the boiler can be fired continuously at full rating without endangering personnel or equipment? _____ ☐

If the installation is a hot water boiler, have the circulating pumps been completely installed, wired and properly tested to assure proper operation so that the burner can be fired continuously at full rating? _____ ☐

For new boiler installations, has the boiler been boiled out in accordance with the boiler manufacturer's instructions? _____ ☐

Have the boiler breeching connections to the stack been completed and are they open and unobstructed? _____ ☐

Is draft control equipment required and, if so, installed? _____ ☐

Have adequate provisions for combustion air been installed? _____ ☐

Have the persons listed below been notified of the burner start-up date?

- ☐ Owner's Representative?
- ☐ Mechanical Contractor's Representative?
- ☐ Electrical Contractor's Representative?
- ☐ Service Organization's Representative?
- ☐ York-Shipley Representative?

Is all specified auxiliary equipment mounted and wired? This may include outdoor temperature controls, oil flow switches, space thermostats, water flow switches, motorized combustion air louvers, etc. _____ ☐

GAS FIRING

Are all gas train components installed and have they been properly selected, sized and assembled? _____ ☐

Have properly sized vent lines been installed on all gas train components which require venting? This includes such items as pressure regulators, normally open vent valves, diaphragm valves, low and high gas pressure switches, etc. _____ ☐

Have gas train piping and components been tested and proven gas tight? _____ ☐

Have the gas lines been purged? _____ ☐

Is the proper gas pressure available at the inlet to the controls which meets the requirement shown on the burner material list? _____ ☐

OIL FIRING

Is the oil tank installed and filled with the proper type and grade of fuel oil as required by the burner material list? _____ ☐

Is the proper oil pressure, temperature and viscosity available at the inlet to the controls which meets the requirements shown on the burner fire test report and/or oil system sheet? _____ ☐

Have oil supply and return lines been properly sized to meet the maximum pumping capacity of the pump and has the system been purged and proven leak proof? _____ ☐

SIGNATURE OF INSPECTOR(S)

_____ (Name)	_____ (Date)
-----------------	-----------------

_____ (Name)	_____ (Date)
-----------------	-----------------

_____ (Name)	_____ (Date)
-----------------	-----------------

_____ (Name)	_____ (Date)
-----------------	-----------------

_____ (Name)	_____ (Date)
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START-UP PROCEDURE

STEP 1: Tighten all electrical, conduit, air, steam and fuel lines.

STEP 2: Set the natural gas line pressure taken at the beginning of the gas train to the value listed in the burner fire test report, by adjusting the natural gas regulator. Figure 9 "Pressure Tap on Gas Train"

- Connect manometer to gas pressure tap.
- Place oxygen analyzer in boiler stack.

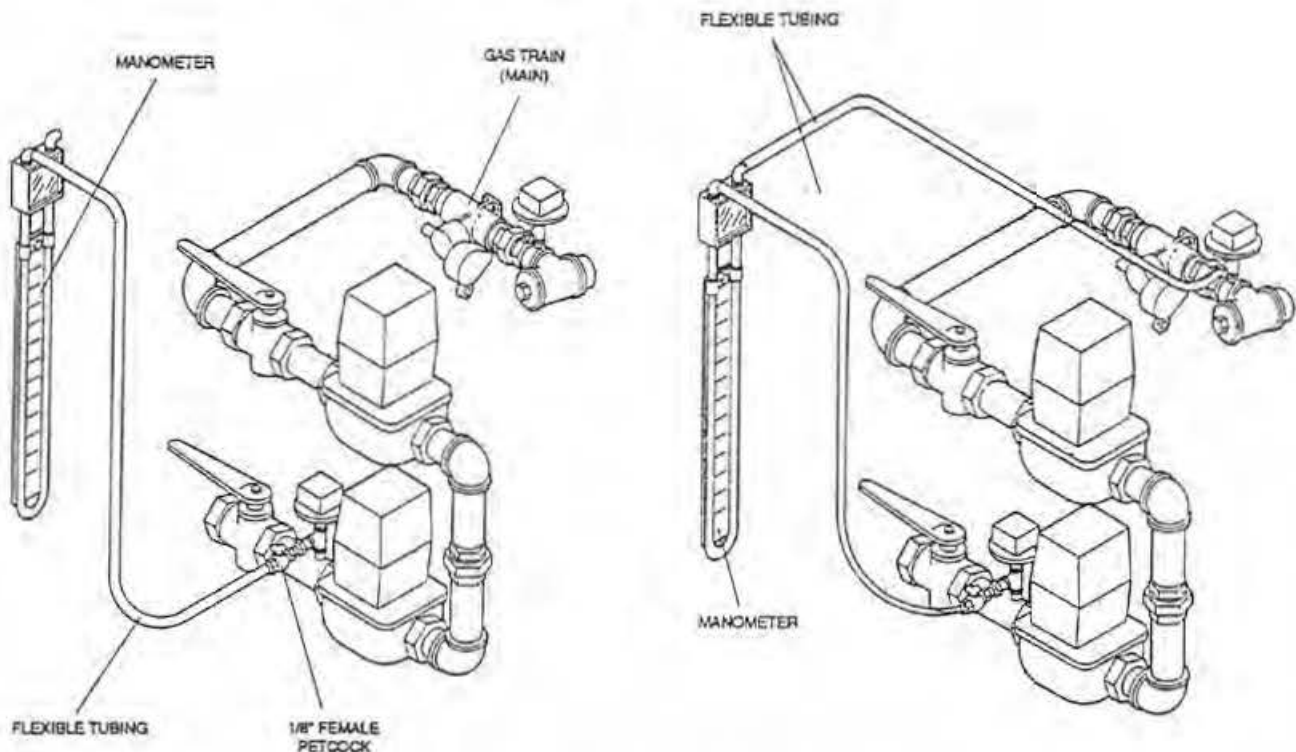


Figure 9. Pressure Tap on Gas Train

STEP 3: Read the Fireye E100, (or YS-7000 if so equipped) Flame Control Manual

NOTE: THE FIREYE E100 OR Y-S 7000 SYSTEM, WHICH IS USED ON YOUR **TURBOFIRE® II** BURNER, PROVIDES FLAME SUPERVISION AND SEQUENCING FUNCTIONS. YOU SHOULD BE THOROUGHLY FAMILIAR WITH ALL OF THEIR FUNCTIONS AND FEATURES BEFORE ATTEMPTING THE START-UP PROCEDURE.

STEP 4: Turn on electrical power to the boiler at the main boiler room electric panel.

STEP 5: LINKAGE TEST

Procedure:

1. Tighten all linkage nuts located on all linkage rods.
2. With the flame controller in the check mode and all fuel manual valves open except the manual valve located closest to the burner (Figure 10), place the boiler ON/OFF switch in the ON position. (The ON/OFF switch is located on the side of the burner control panel).

NOTE: THE BLOWER WILL NOT START UNLESS THE LOW GAS PRESSURE SWITCH (IF EQUIPPED) IS RESET.

The blower should start and the linkage should begin to move.

Repeat Step 2 several times to assure proper linkage movement.

3. Watch the linkage arrangement as it moves up and down.

The fuel valves, air damper, linkage rods and modulation motor should all move with a smooth action with no binding. The fuel valves and air damper should not bind at the FULL OPEN or CLOSED position.

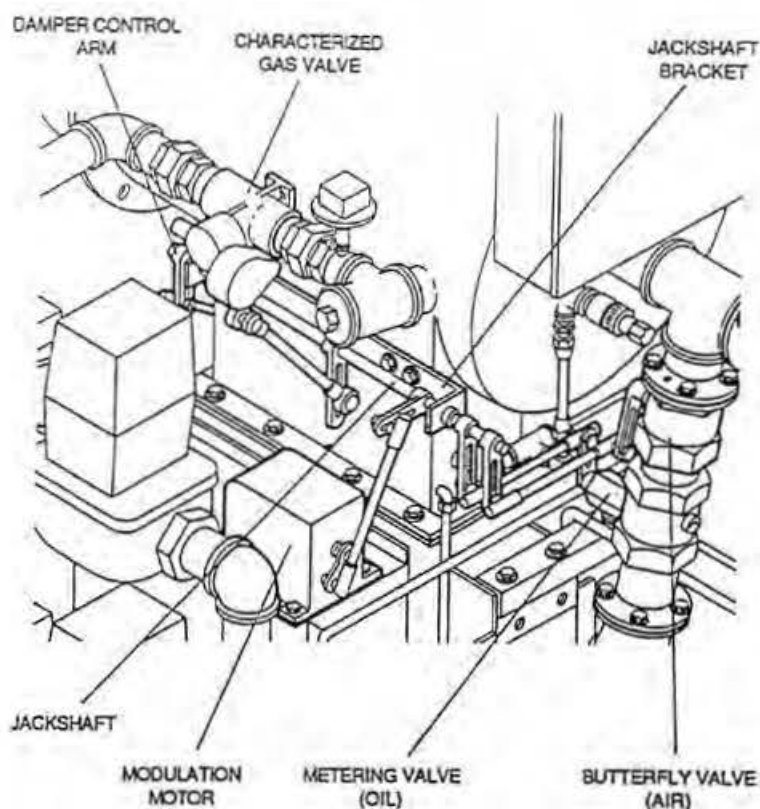


Figure 10. Typical Linkage Arrangement

STEP 6: PILOT TEST

NOTE: BEFORE BEGINNING THIS PROCEDURE, RECHECK MANUAL GAS VALVES TO MAKE SURE ALL VALVES ARE OPEN EXCEPT THE MANUAL VALVE CLOSEST TO THE MAIN GAS TRAIN AND THE MANUAL PILOT VALVE ON THE BURNER (FIGURE 11).

Procedure:

1. Turn the boiler ON/OFF switch to the OFF position.
 2. Make sure the pilot gas valve located on the side of the air inlet box and any other pilot gas valves located before the burner pilot gas train are OPEN.
- Adjust natural gas pressure at the inlet to the main gas train to the value indicated on the fire test report.

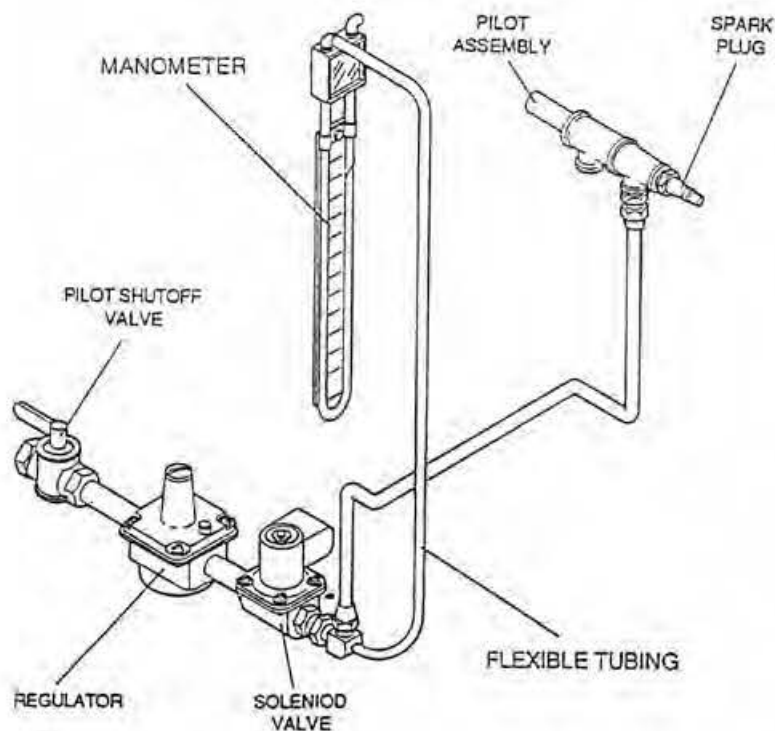


Figure 11. Pilot Gas Train

NOTE: CONNECT MANOMETER TO PILOT LINE AT THE PRESSURE TAP PROVIDED ON THE PILOT GAS LINE. NOTE THE NATURAL GAS PRESSURE AND ADJUST TO THE PRESSURE INDICATED IN THE FIRE TEST REPORT BY ADJUSTING THE PILOT NATURAL GAS REGULATOR.

3. Place the controller in the RUN position.
4. Put the boiler ON/OFF switch in the ON position.

The boiler will run through the pre-purge cycle. When the modulation motor returns to the FULL CLOSED position, the IGNITION TRIAL light on the controller will come on.

The FLAME ON light on the flame controller will then come on indicating the presence of the pilot flame in the boiler.

5. When the FLAME ON light appears, place the RUN/CHECK switch on the controller in the check position immediately.

NOTE: ON THE FIRST TRY IGNITING THE PILOT BURNER, IT IS COMMON NOT TO ACHIEVE IGNITION. THIS IS DUE TO AIR IN THE PILOT GAS TRAIN. IF THE PILOT BURNER DOES NOT IGNITE ON THE FIRST TRY, CYCLE THE BURNER BY PRESSING THE RESET BUTTON ON THE CONTROLLER AND PLACING THE CONTROLLER IN THE RUN MODE.

6. Look through the rear peep sight of the boiler. The pilot should appear blue at the narrow base and yellow at the broad tip with a swirling action. The flame should not be entirely yellow or smokey. The flame should not blow out and then reignite.

Insert microamper meter, if equipped with Y-S 7000, into the connection provided on the controller. Note the signal should not fluctuate or stay below the minimum safe reading given in the controller manual.

7. Turn the boiler OFF and repeat the Pilot Test to assure a reliable pilot.

STEP 7: MAIN FLAME TEST (GAS)

Recheck natural gas pressure at the beginning of the gas train and adjust to pressure specified in the fire test report.

1. Put the boiler in the manual and gas firing mode by using the switch on the boiler control panel. Place the controller in the RUN mode.

NOTE: IF YOUR TURBOFIRE® II IS A DUAL FUEL BURNER, THE AXIAL AIR DAMPER MUST BE PLACED IN THE NATURAL GAS FIRING POSITION.

2. Turn manual potentiometer located on the boiler control panel to the CLOSED position.

WARNING: Make sure all safety devices are connected and operating correctly prior to attempting main flame test.

3. OPEN all natural gas valves.

4. Turn the boiler ON.

The burner will cycle through the pre-purge and pilot ignition trial.

After a proof-of-pilot test, the electric gas shut-off valve(s) in the main gas train will begin to open.

After a proof-of-main flame trial, the RUN INDICATOR on the controller will light.

THE BOILER IS NOW ON LOW FIRE.

NOTE: CHECK CONTROLLER AMPLIFIER SIGNAL MICROAMPEREMETER. THE READING SHOULD BE STEADY ABOVE MINIMUM INDICATED IN THE FLAME CONTROL MANUAL.

WARNING:
If the linkage arrangement begins to move after the RUN light appears, turn the boiler OFF immediately. The manual potentiometer, low fire hold, and/or modulation controller is not operating correctly or is wired wrong.
The flame in this burner normally appears yellow at lower firing rates. DO NOT ATTEMPT TO REDUCE FUEL FLOW AND MAKE THE FLAME BLUE.
IF AT ANYTIME DURING MAIN FLAME TESTING, THE BURNER EXHIBITS UNSTABLE OPERATION (PULSING, EXCESSIVE NOISE, VIBRATING STACK, ETC.), TURN BURNER OFF IMMEDIATELY.

5. Note the oxygen concentration of the flue gas.

- Repeat main flame ignition to ensure smooth light off.

6. Allow the boiler to come up to operating pressure/temperature (approximately 45 minutes).

- Slowly rotate the manual potentiometer in increments toward the OPEN position, noting oxygen concentration as the mod motor modulates, until the manual potentiometer is in the FULL OPEN position.

THE BURNER IS NOW AT HIGH FIRE.

- Adjust natural gas pressure to the value listed in the fire test report.
- Note oxygen concentration
- Modulate the burner to low fire by rotating the manual potentiometer to the CLOSED position, noting oxygen concentration as the burner modulates down.

- Adjust linkage rod lengths and air/fuel value settings to maintain oxygen concentrations between 1 and 4% at all firing conditions.
 - Repeat steps until the burner operates from low fire to high fire with oxygen concentrations always between 1 and 4 % and maintains the proper natural gas differential pressure (See fire test report) at high fire.
7. Turn the boiler OFF. Check and adjust all controls such as high limit, safety limit, operating limit, low fire hold, hi/low gas pressure switches, etc. to their operating settings and verify that they are operating properly.

WARNING: ALL BOILER/BURNER SAFETY EQUIPMENT SHOULD BE TESTED AND VERIFIED OPERATIONAL BEFORE THE BOILER IS ALLOWED TO OPERATE UNATTENDED.

8. Connect the boiler to the plant steam system if required.

CAUTION: Make sure all steam fittings are sealed to prevent steam leaks.

- Check all burner/boiler safety devices to assure proper operation.
9. Place the boiler in the AUTOMATIC mode.
- Your gas burner/boiler is now ready to go ON-LINE. Monitor the operation of the burner/boiler for the first several hours while it is running in the AUTOMATIC mode to make sure that the system is operating properly. Oxygen concentration should stay above 1% and below 4% while operating automatically. Record stack temperature, O₂ and line pressure when the boiler is on high fire.
10. Fill out start-up forms.
11. Instruct maintenance person.

STEP 8: MAIN FLAME TEST (OIL)

- Install Oxygen Analyzer
 - Open oil lines from tank.
1. Turn burner/boiler OFF
 2. Place axial air switch to the OIL FIRING position
 3. Place the gas/oil switch (Located on the side of the control panel) in the OIL position
 4. Place Manual/Automatic switch in the MANUAL position
 5. Rotate the manual potentiometer to the CLOSED position.

6. Turn the burner/boiler ON.

NOTE: AS SOON AS THE BURNER/BOILER IS TURNED ON, THE OIL PUMP AND AIR COMPRESSOR (IF SO EQUIPPED) SHOULD OPERATE. IF THEY DO NOT, TURN THE BURNER/BOILER OFF AND REFER TO THE TROUBLE SHOOTING GUIDE ON PAGE 28 OF THIS MANUAL.

7. As the burner proceeds through the pre-purge cycle, observe the oil pressure and air compressor gauges. Adjust to the pressures given in the fire test report.
8. The ignition trial light will come on. After the flame on light appears, place the RUN/CHECK switch (located on the controller) in the CHECK position.

NOTE: IF THE FLAME ON LIGHT DOES NOT APPEAR, TURN THE BURNER/BOILER OFF AND REPEAT THE PRE-PURGE AND IGNITION TRIAL SEQUENCE. IF THE PILOT LIGHT DOES NOT APPEAR AGAIN, REFER TO THE PILOT TROUBLE SHOOTING GUIDE ON PAGE 28 OF THE MANUAL.

9. Observe the pilot to assure proper flame shape and color.
10. Repeat pilot trial sequence to assure a stable, reliable pilot.
11. Place the RUN/CHECK switch in the RUN position. The burner will now go through the main flame ignition trial.

The burner is now at LOW FIRE.

NOTE: WHEN THE MAIN FLAME TRIAL IS OVER, THE ON LIGHT WILL APPEAR. IT IS COMMON FOR THE BURNER NOT TO IGNITE ON THE FIRST TRY AFTER INSTALLATION DUE TO AIR IN THE OIL LINES. IF THE BURNER WILL NOT LIGHT AFTER SEVERAL TRIALS, REFER TO THE TROUBLE SHOOTING GUIDE ON PAGE 28 OF THE MANUAL.

WARNING: If the linkage begins to move after the flame on light appears, turn the burner OFF immediately. Refer to the Trouble Shooting Guide on Page 28 of this manual.

12. Observe the flame. It should be stable and not "smokey". Note the reading on the bypass pressure gauge, the oxygen concentration in the stack and flame scanner signal.

WARNING: The scanner signal should be steady and above the minimum value indicated in the flame controller manual.

13. Take and note a Backarach Spot sample.

WARNING: If at any time during the start-up or operation of the TURBOFIRE® II, excessive noise or vibration is noticed, turn the burner off immediately. Serious injury can result.

WARNING: Your TURBOFIRE® II is designed to operate at low excess air without producing smoke or soot. The smoke spot number should never exceed a Number 2. A smoke spot number greater than the Number 2 indicates an UNSAFE burner operation

14. Allow the burner/boiler to "warm up".
15. Adjust the oil pump pressure, oil valve position and/or linkage rod length to maintain between 3 and 7% excess oxygen and the the (by-pass) pressure value indicated in the fire test report.
16. Slowly rotate the manual potentiometer knob in small increments to the FULL OPEN position. Note oxygen concentrations as the burner modulates.

The burner is now at HIGH FIRE.

17. Note excess oxygen concentrations, by pass pressure and Bacharach smoke spot number.
18. Adjust the oil pump pressure, oil valve position and/or linkage rod length to maintain between 3 and 7% excess oxygen and the by pass oil pressure indicated in the fire test report without the burner producing a smoke spot number greater than Number 2.
19. Turn the manual potentiometer to the CLOSED position noting the excess oxygen concentrations as the burner modulates.
20. Adjust linkage to maintain between 3 and 7% excess oxygen at all firing rates between high and low fire.
21. Check and verify that all burner/boiler safety controls are set correctly and operating properly.
22. Place the boiler in AUTOMATIC mode.

Your TURBOFIRE® II is now ready to go on-line. Monitor the burner/boiler for the first several hours while it is operating in the AUTOMATIC mode to assure safe, proper operation. Monitor and note excess oxygen and stack temperature, oil (by pass) pressure.

23. Fill out START-UP forms
24. Instruct Maintenance Personnel.

MAIN FLAME TEST (LOW NO_x PACKAGE)

1. Familiarize yourself with the components of the burner and the low NO_x package.
2. Install and calibrate NO_x analyzer in boiler stack.
3. Turn boiler on FIRING NATURAL GAS in the manual mode.
4. Place boiler on HOLD once low fire is achieved.
5. Allow boiler to "warm up" until operating boiler pressure is achieved.
6. Adjust steam valve mercury switch to 1 psi.
7. Observe flame and adjust steam flow and excess oxygen.
8. Modulate the burner to high fire, adjusting the steam valve and gas valve until the proper NO_x and excess oxygen levels are reached.
9. Adjust steam regulator to give desired steam flow at high fire.
10. Modulate burner from high fire to low fire several times in increments; adjusting the steam flow and gas valve to achieve the desired rates.
11. Turn boiler OFF and switch to back up fuel (if so equipped).

WARNING: The second fuel is meant as a standby fuel only. Do not operate on the second fuel unless a natural gas curtailment is in effect.

12. Modulate burner to high fire and adjust steam regulator until desired NO_x level is achieved.
13. Adjust fuel valve until proper excess air level is reached.

SECTION 6: MAINTENANCE

DAILY PROCEDURE

- The burner should cease firing at the low boiler water cutoff level. Investigate and correct a failure of the burner to cease firing at that water level.
- The steam injection system includes a steam trap which purges condensate from the steam piping. Verify that this trap is operating. Correct any failure immediately.
- Check fuel supply system.
- Check oil supply system.
- Check compressor lubrication.
- Check linkage for tightness and ease of travel.
- Observe flame and check stack temperature. If flame appears abnormal or stack temperature is above 500°F, have a qualified TurboFire® II service technician inspect the burner.

WEEKLY PROCEDURE

- Check program controller for proper sequencing.
- Check limit controls to determine proper operation.
- Check oil nozzle.
- Check all alarms associated with the control system.
- Tighten burner mounting flange.
- Check flue gas composition.

MONTHLY PROCEDURE

- Check motors, pumps and other moving parts for wear. Lubricate and replace as needed.
- Check and clean strainers.
- Check air compressor air intake.
- Check for flue gas leaks and correct.
- Check and clean steam trap.

SEMI-ANNUAL PROCEDURE

- Have a qualified TurboFire® II service technician inspect, test and adjust the burner.
- Clean pilot and scanner tubes.

ANNUAL PROCEDURE

- Inspect refractory burner end head and cyclone vanes for damage. Repair as necessary.
- Remove, inspect and clean all solenoid valves, regulators and metering valves. Repair or replace as necessary.
- Clean gas, oil and steam piping.
- Clean blower inlet and wheel.
- Replace burner rope gasket with new rope.
- Check target for wear or damage. Repair and replace as needed.

SECTION 7: SERVICE

REFRACTORY REPLACEMENT

TARGET

The target location relative to the burner is based on the boiler Morison tube diameter and is very important for proper operation of the burner. The target should be properly positioned by the installer and shall not be relocated except upon the advice of York-Shipley Global. Doing so may cause serious deterioration of burner and boiler performance.

If it becomes necessary to replace the target, proceed as follows:

1. Lay up the bricks dry at the end of the furnace.
2. Determine the amount of cement needed on the back and ends of the bricks.
3. Cement the first brick into position at the designated location.
4. Use the same amount of cement on all bricks so the target opening will be in the center of the furnace.
5. Tap the bricks when they are positioned to set them in the cement.
6. Allow approximately 1/4" to 3/8" clearance for expansion between the top bricks and the furnace.

BURNER END-HEAD

Consult Factory

BURNER SHELL

Consult Factory

OIL NOZZLE REPAIR

The nozzle is a precision machined device consisting of the body, disc, cap and core. Refer to Figure 12 for the relative location of the parts of the nozzle assembly. Proper assembly of the nozzle is as follows:

1. The flat surface of the disc faces toward the front of the nozzle body and the cap fits into the disc.
2. The nozzle core slips over the end of the oil supply tube.
3. The "O" ring on the oil supply tube seals the nozzle core to the oil supply tube.
4. The base of the core must seat firmly against the rim of the air tube which surrounds the oil supply tube. The oil supply tube must extend beyond the air tube a measured distance.
5. Exercise extreme caution when cleaning and handling the nozzle parts. No metal instruments should be used to clean the nozzle.
6. Tighten the reassembled nozzle firmly without excessive pressure.

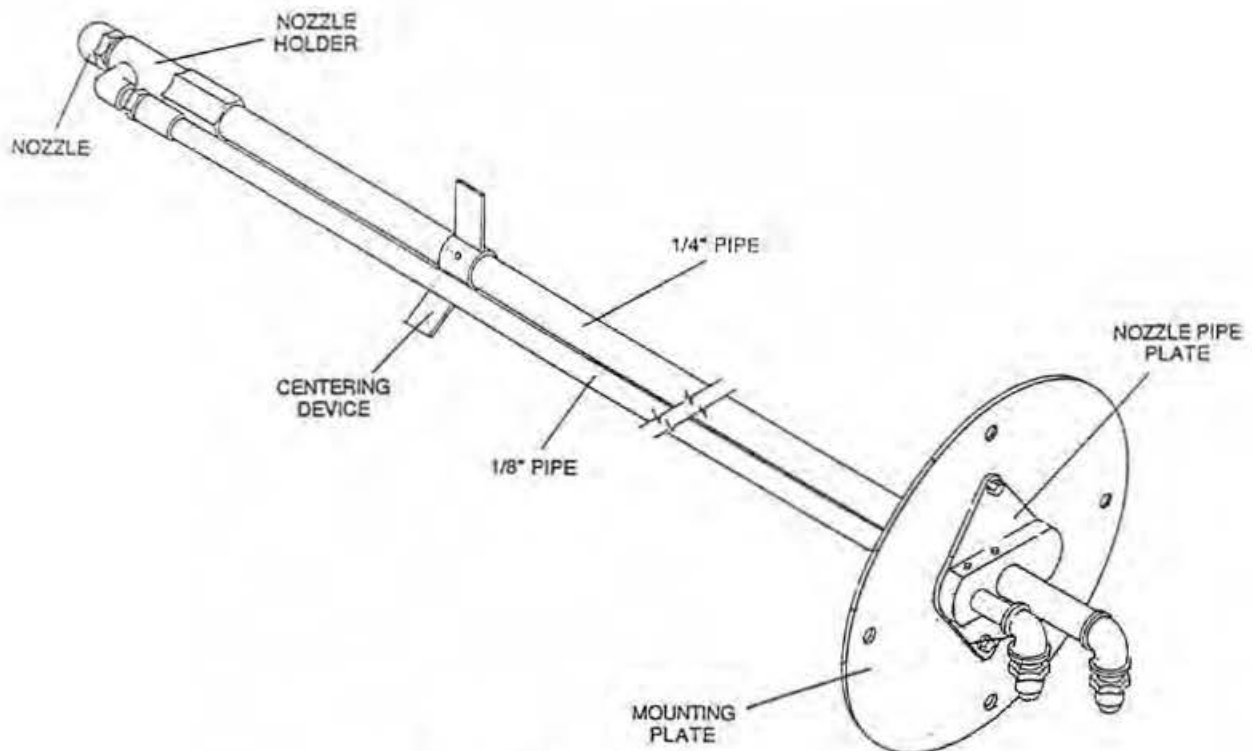


Figure 12 - Oil Nozzle Assembly

SECTION 8: TROUBLE SHOOTING

PROBLEM	CAUSE	ACTION
BLOWER DOES NOT START WHEN THE ON/OFF SWITCH IS ON	<ul style="list-style-type: none"> • NO POWER TO THE BLOWER MOTOR CONTROL PANEL • LOW PRESSURE GAS SWITCH IS TRIPPED. (IF THE BURNER IS EQUIPPED) • LWCO SWITCH IS TRIPPED • BLOWER STARTER IS TRIPPED • OPEN LIMIT OR PROOF OF CLOSURE SWITCH 	<p>CHECK WIRING</p> <p>RESET</p> <p>RESET</p> <p>RESET</p> <p>RESET/ CHECK WIRING</p>
BLOWER STARTS BUT THE MODULATION MOTOR WILL NOT MOVE.	<ul style="list-style-type: none"> • LINKAGE BINDING • MODULATION MOTOR NOT WIRED CORRECTLY OR THE MOTOR IS DEFECTIVE • NO POWER TO MOD MOTOR 	<p>ADJUST LINKAGE</p> <p>CHECK WIRING</p> <p>CHECK WIRING</p>
LINKAGE BINDING	<ul style="list-style-type: none"> • BENT LINKAGE ROD 	REPLACE
GAS OR OIL VALVES, OR AIR DAMPER OVER TRAVELING	<ul style="list-style-type: none"> • VALVES HAVE ROTATED • LINKAGE HAS CHANGED • CONTROL ARM HAS SLIPPED. 	<p>ADJUST POSITION</p> <p>ADJUST</p> <p>ADJUST POSITION</p>
PILOT WILL NOT LIGHT	1. NO GAS FLOW	<ul style="list-style-type: none"> • MAKE SURE PILOT GAS VALVES ARE OPEN • CHECK PILOT ELECT SOLENOID VALVE
	2. NOT ENOUGH GAS FLOW	<ul style="list-style-type: none"> • INCREASE PILOT GAS PRESSURE BY TURNING PILOT GAS REGULATOR ADJUSTMENT SCREW
	3. SPARK PLUG NOT FUNCTIONING	<ul style="list-style-type: none"> • CHECK TRANSFORMER TO DETERMINE IF IT IS FUNCTIONING • CHECK AND ADJUST SPARK PLUG TIP TO GROUND GAP • MAKE SURE PILOT IS NOT GROUNDING AGAINST THE PILOT GAS PIPE • REPLACE SPARK PLUG

TROUBLE SHOOTING

PROBLEM	CAUSE	ACTION
PILOT LIGHTS BUT BLOWS OUT	1. NOT ENOUGH GAS FLOW	• INCREASE PILOT LINE GAS PRESSURE
	2. INCORRECT AIR FLOW	• ADJUST PILOT AIR FLOW
	3. UNSTEADY IGNITION ARC	• CHECK SPARK PLUG TIP TO GROUND GAP
PILOT FLAME IS YELLOW OR SMOKEY	1. TOO MUCH GAS FLOW	• REDUCE PILOT LINE GAS PRESSURE
	2. UNSTEADY IGNITION ARC	• CHECK SPARK PLUG TIP TO GROUND GAP
"FLAME ON" LIGHT DOES NOT COME ON BUT THERE IS FLAME IN THE FIRING TUBE	1. DEFECTIVE AMPLIFIER	• CHECK AND/OR REPLACE
	2. SCANNER WIRING INCORRECT	• REWIRE
	3. TOO MUCH AIR FLOW IN SCANNER TUBE	• REDUCE AIR FLOW BY PARTIALLY BLOCKING AIR PASSAGE
	4. DEFECTIVE SCANNER	• CHECK AND/OR REPLACE
	5. OBSTRUCTED SIGHT TUBE	• CLEAN
BURNER WILL NOT IGNITE AFTER PILOT	1. NO NATURAL GAS TO BURNER	• OPEN NATURAL GAS MANUAL VALVES. • CHECK ELECTRIC SHUT-OFF VALVES
	2. BURNER NOT GETTING ENOUGH GAS	• CHECK NATURAL GAS REGULATOR AND ADJUST • ADJUST GAS VALVE SETTING
BURNER LIGHTS BUT WILL NOT MODULATE WHEN PTENTIOMETER IS TURNED TO OPEN	1. LOW FIRE HOLD	• LET BOILER "WARM UP"
	2. FAULTY WIRING IN MOD MOTOR OR POTENIOMETER	• CHECK & REWIRE OR REPLACE
BURNER UNSTABLE	1. INCORRECT AXIAL AIR DAMPER SETTING	• ADJUST THE VALUE LISTED IN FIRE TEST REPORT
	2. OXYGEN LEVEL TOO HIGH	• INCREASE GAS FLOW • DECREASE AIR FLOW
	3. INCORRECT BOILER ORIFICE	• REPLACE
	4. BLOCKED AIR FLOW	• REMOVE OBSTRUCTION • VENTILATE BOILER ROOM
	5. INCORRECT DRAFT	• ADJUST DRAFT CONTROL • REMOVE OBSTRUCTION IN STACK

TROUBLE SHOOTING

PROBLEM	CAUSE	ACTION
HIGH CO EMISSIONS	1. POOR FUEL/AIR RATIO	<ul style="list-style-type: none"> • INCREASE OXYGEN CONCENTRATIONS BY ADJUSTING LINKAGE
HIGH CO AT LOW FIRE	1. POOR FUEL/AIR RATIO	<ul style="list-style-type: none"> • DECREASE OXYGEN CONCENTRATION AT LOW FIRE TO BETWEEN 1 AND 4%.
BURNER WILL NOT MODULATE IN AUTOMATIC MODE	1. FAULTY OR INCORRECTLY WIRED MOD CONTROLLER	<ul style="list-style-type: none"> • CHECK/CORRECT
	2. MANUAL/AUTOMATIC SWITCH IN MANUAL POSITION	<ul style="list-style-type: none"> • PLACE SWITCH IN AUTOMATIC POSITION
	3. LOW FIRE HOLD	<ul style="list-style-type: none"> • ALLOW BURNER/BOILER TO WARM UP.
OIL MAIN FLAME WILL NOT LIGHT	1. OIL VALVES NOT FULLY OPEN	<ul style="list-style-type: none"> • CHECK/OPEN MANUAL VALVE • CHECK/REPLACE ELECTRIC VALVES
	2. NOZZLE, OIL LINES, FILTER AND/OR PUMP PLUGGED.	<ul style="list-style-type: none"> • CHECK/CLEAN
	3. OIL PUMP/AIR COMPRESSOR NOT OPERATING	<ul style="list-style-type: none"> • CHECK/CORRECT WIRING • UNBIND OIL PUMP/ MOTOR SHAFT • CHECK/REPLACE MOTORS • CHECK/REPLACE PUMP OR COMPRESSOR
	4. OIL METERING VALVE/ OR COMPRESSOR IMPROPERLY ADJUSTED	<ul style="list-style-type: none"> • ADJUST TO VALUE LISTED IN FIRE TEST REPORT
	5. INSUFFICIENT PILOT	<ul style="list-style-type: none"> • ADJUST PILOT GAS PRESSURE TO VALUE LISTED IN FIRE TEST REPORT
SMOKE SPOT NUMBER GREATER THAN NUMBER 2	1. INSUFFICIENT AIR FLOW	<ul style="list-style-type: none"> • INCREASE AIR/DECREASE FUEL FLOW BY ADJUSTING PUMP PRESSURE, METERING VALVE POSITION AND/OR LINKAGE ROD LENGTH
	2. NOZZLE MISALIGNED	<ul style="list-style-type: none"> • ADJUST NOZZLE SO THE TIP IS FLUSH WITH THE REFRACTORY END HEAD OF THE BURNER
	3. AXIAL AIR DAMPER NOT SET CORRECTLY	<ul style="list-style-type: none"> • ADJUST TO VALUE GIVEN IN THE FIRE TEST REPORT
	4. DEFECTIVE NOZZLE	<ul style="list-style-type: none"> • REPLACE

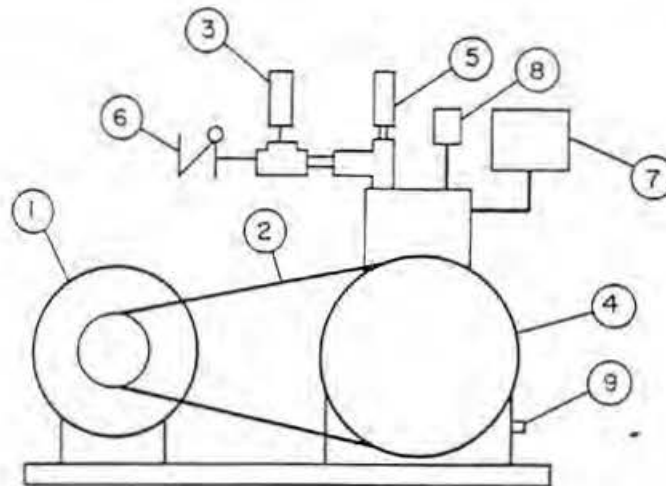
TROUBLE SHOOTING

PROBLEM	CAUSE	ACTION
BURNER UNSTABLE	1. NOZZLE INCORRECTLY ALIGNED	• ADJUST POSITION SO TOP OF NOZZLE IS FLUSH WITH REFRACTORY END HEAD
	2. AXIAL AIR DAMPER INCORRECTLY SET	• ADJUST TO VALUE LISTED IN FIRE TEST REPORT
	3. BURNER IS "OVER FIRED"	• ADJUST OIL (BY PASS) PRESSURE AT HIGH FIRE TO VALUE LISTED IN FIRE TEST REPORT
	4. INCORRECT BOILER DRAFT	• CORRECT

SECTION 9: PARTS LIST

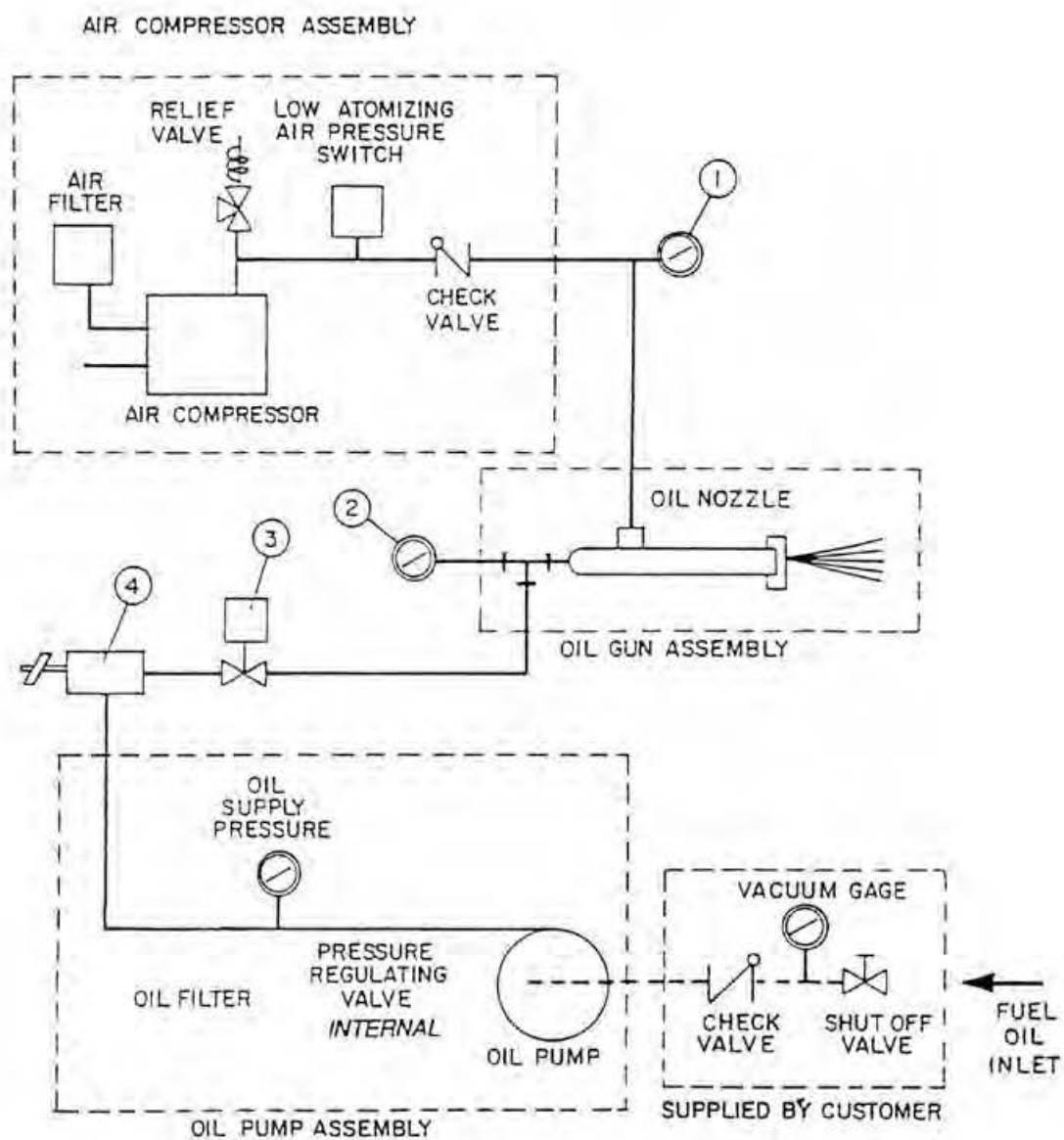
PARTS LIST INDEX

<u>DESCRIPTION</u>	<u>FIGURE NO.</u>	<u>PAGE NO.</u>
Oil Nozzle Assembly	12	27
Atomizing Air Compressor (No. 2 Fuel Oil).....	13	32
No. 2 Fuel Oil Piping Schematic.....	14	33
Scanner Assembly	16	34
Forced Draft Blower Assembly	17	35
Pilot Gas Train Assembly	18	35
Main Gas Train Assembly	19	36
Modulation Assembly.....	20	37
Control Panel Assembly.....	21	38
Pilot Ignitor Assembly.....	22	39



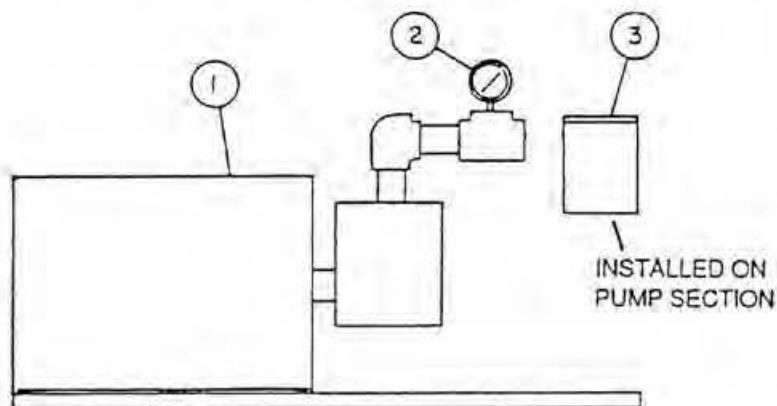
ITEM	DESCRIPTION	PART NO.
1	Electric Motor	Consult Factory
2	"V" Belts	Consult Factory
3	Low Atomization Pressure Switch	Consult Factory
4	Air Compressor	Consult Factory
5	Relief Valve	Consult Factory
6	Check Valve	Consult Factory
7	Air Filter	Consult Factory
8	Oil Reservoir Assembly	Consult Factory
9	Low Oil Switch	Consult Factory
10	Lube Oil	Consult Factory
11	Lubricator	Consult Factory

FIGURE 13 - ATOMIZING AIR COMPRESSOR
(NO. 2 FUEL OIL)



ITEM	DESCRIPTION	PART NO.
1	Nozzle Atomizing Air Pressure Gage	Consult Factory
2	Oil Nozzle Pressure Gage	Consult Factory
3	Oil Solenoid Valve	Consult Factory
4	Metering Valve (Std.)	Consult Factory

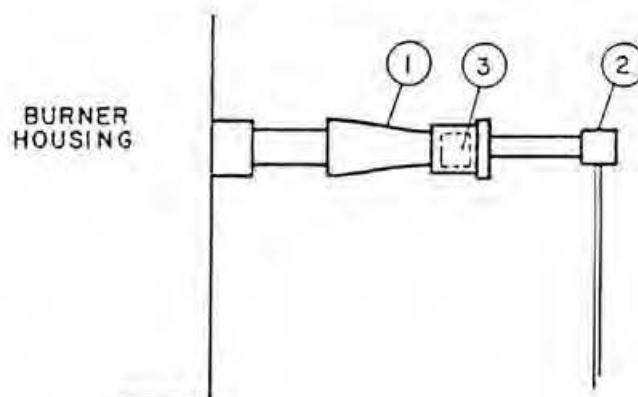
FIGURE 14 - NO. 2 FUEL OIL PIPING SCHEMATIC



ITEM	DESCRIPTION	PART NO.
1	Pump Set with Motor and Relief Valve*	Consult Factory
2	Oil Pressure Gage	Consult Factory
3	Oil Filter	Consult Factory

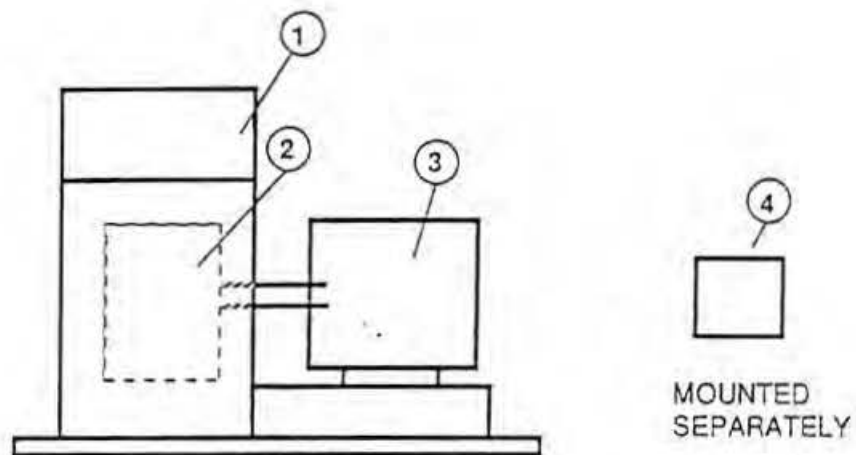
FIGURE 15 - FUEL OIL PUMP SET (NO. 2 FUEL OIL)

* Oil Pump (only) - Part No. 303853; 1/3 HP Motor (only) - Part No. 303854; Coupling Pump Motor (only) - Part No. 303855.
Relief valve is internal on pump.



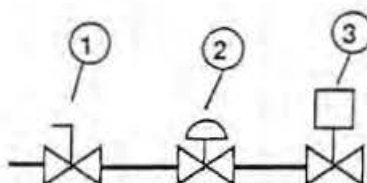
ITEM	DESCRIPTION	PART NO.
1	Heat Shield	63631
2	Scanner Amplifier	108627
3	Scanner Cell	101383

FIGURE 16 - SCANNER ASSEMBLY



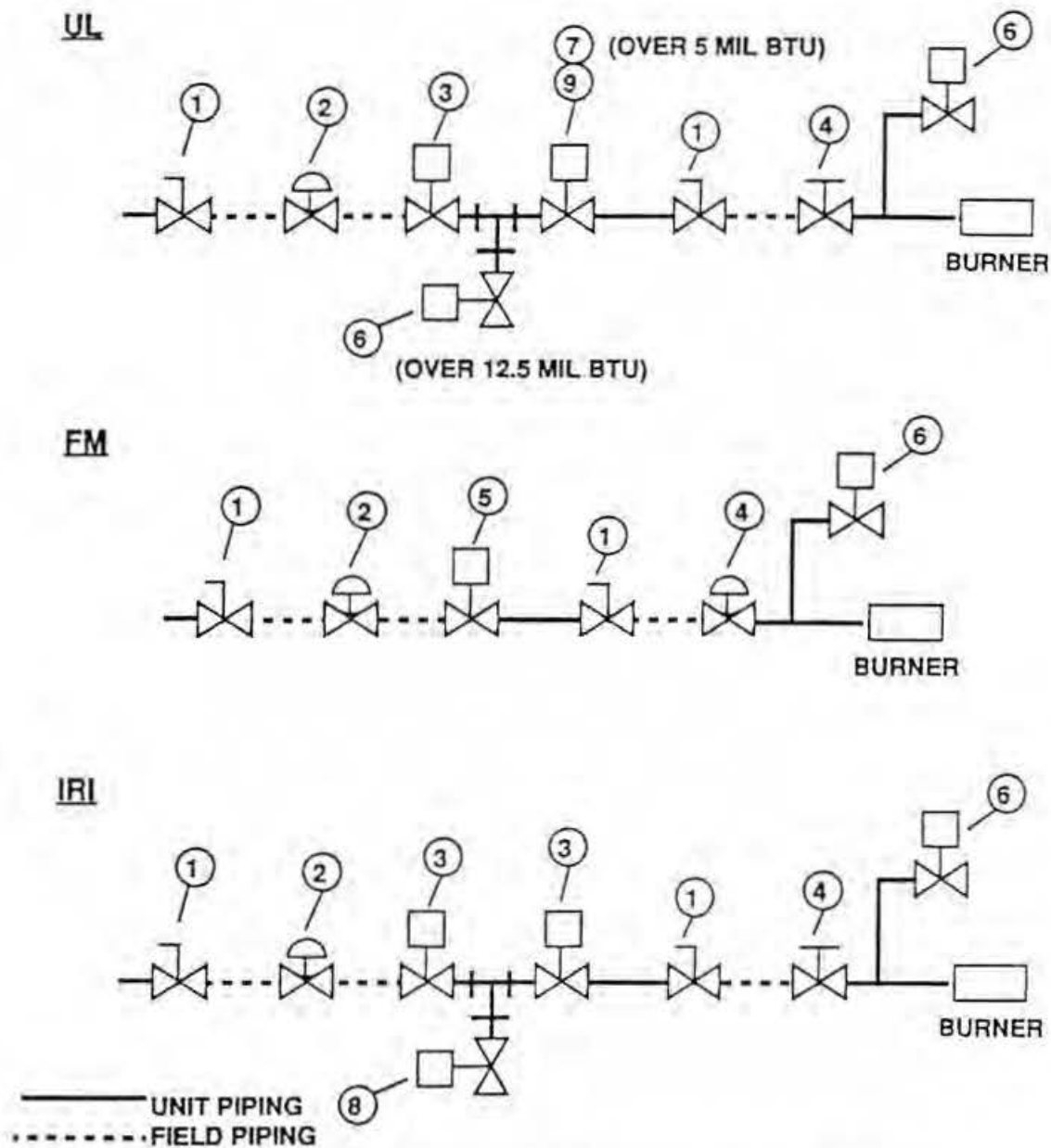
ITEM	DESCRIPTION	PART NO.
1	Fan Housing	Consult Factory
2	Fan Wheel	Consult Factory
3	Electric Motor	Consult Factory
4	Air Proof Switch	Consult Factory

FIGURE 17 - FORCED DRAFT BLOWER ASSEMBLY



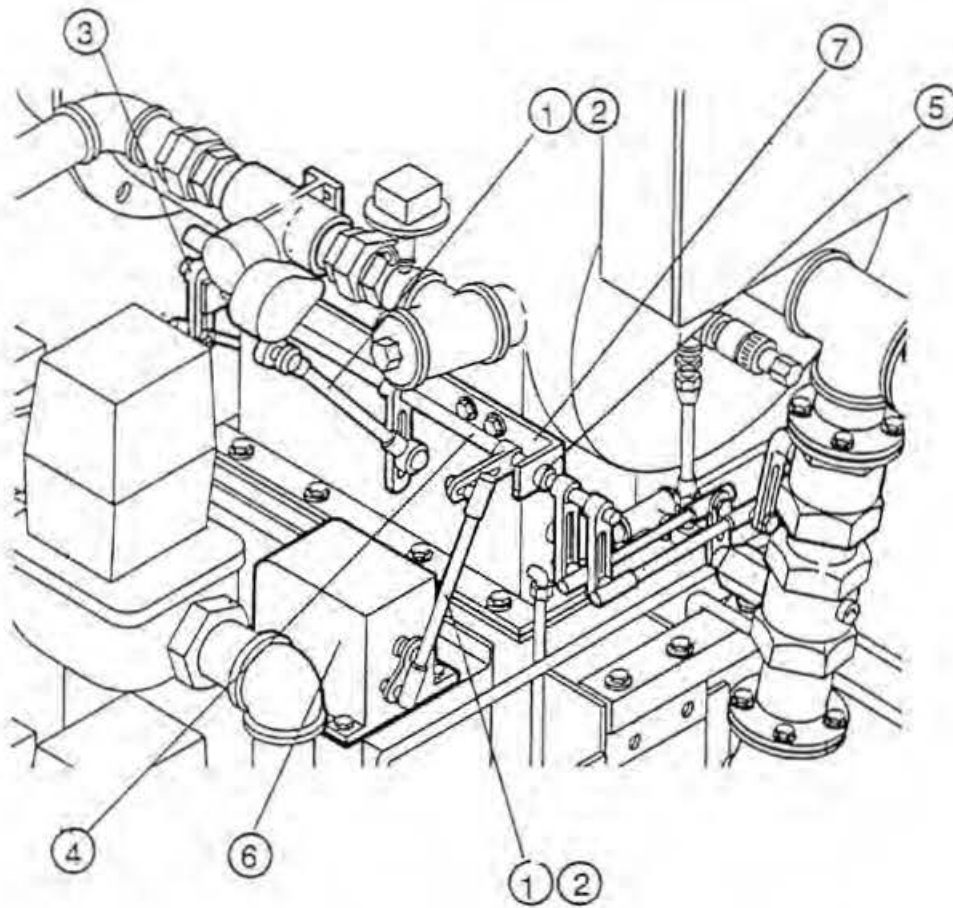
ITEM	DESCRIPTION	PART NO.
1	Gas Cock (3/4")	64732
2	Regulator (3/4")	102305
3	Solenoid Valve (3/4")	68028

FIGURE 18 - PILOT GAS TRAIN ASSEMBLY



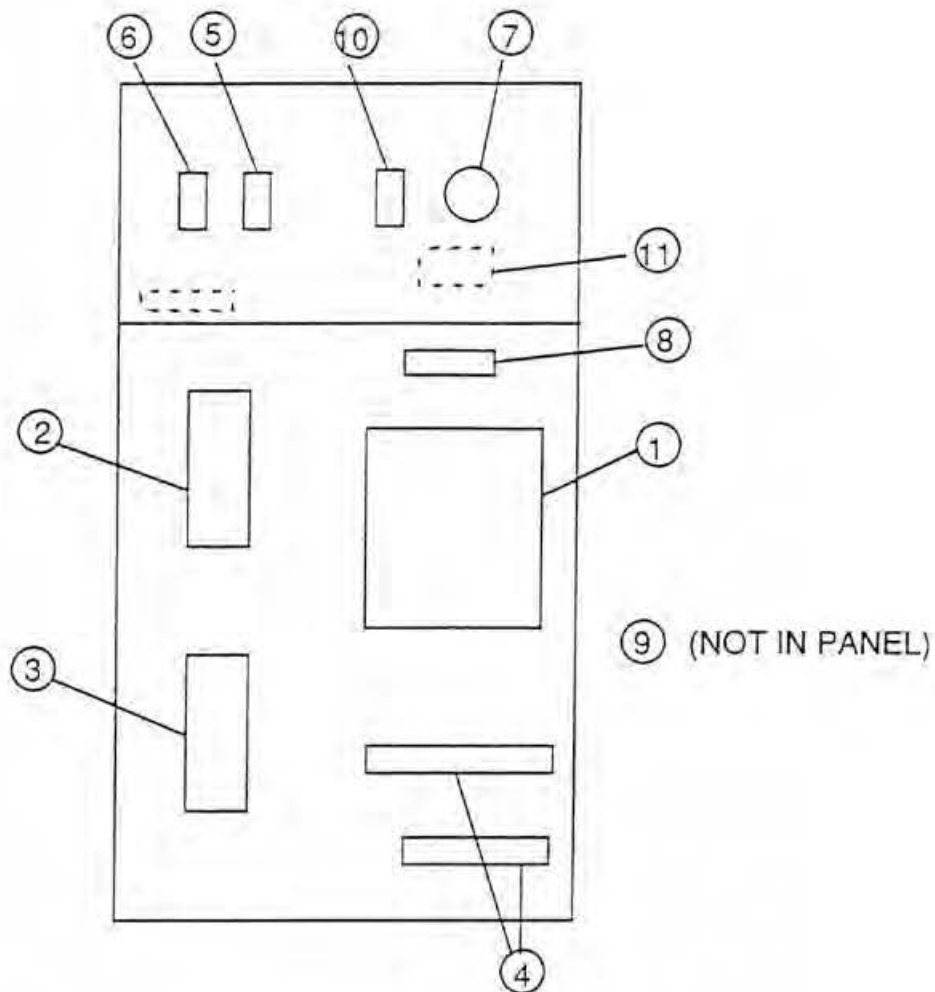
ITEM	DESCRIPTION	PART NO.
1	Lube Cock	Consult Factory
2	Pressure Regulator (opt.)	Consult Factory
3	Safety Shut-off Valve	Consult Factory
	Actuator	Consult Factory
4	Modulation Valve	Consult Factory
5	Safety Shut-off Valve (FM)	Consult Factory
	Actuator	Consult Factory
6	Vent Valve (3/4" NPT)	Consult Factory
7	Safety Shut-off Valve w/POC	Consult Factory
	Actuator	Consult Factory
8	Vent Valve 1-1/4 NPT	Consult Factory
9	Safety Shut-off Valve	Consult Factory
	Actuator	Consult Factory

**Figure 19. Main Gas Train Schematic
(Standard Pressures)**



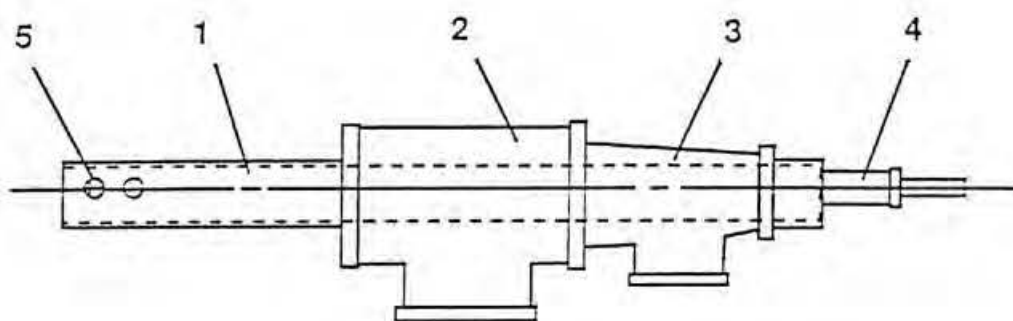
ITEM	DESCRIPTION	PART NO.
1	3/8" Diameter Linkage Rod	Consult Factory
2	3/8" Ball & Socket Rod End	Consult Factory
3	1/2" x 4" Metering Arm	Consult Factory
4	1/2" Diameter Jackshaft	Consult Factory
5	1/2" Shaft Collar	Consult Factory
6	Modutrol Motor	Consult Factory
7	Jackshaft Bracket	Consult Factory

**Figure 20. Modulation Assembly
(Standard)**



ITEM	DESCRIPTION		PART NO.
1	Flame Safeguard	Sub-Base	108079
		Chassis	109798
		Amplifier - IR	108627
		Program Module - UL	109802
		Detector - IR	101383
2	Blower Motor Starter (230/460/3/60)		108031
3	Compressor Starter (230/460/3/60)		108031
4	Terminal Strip		108695
5	Gas/Oil Switch		51288
6	Operator Switch		61280
7	Manual Potentiometer		62281
8	Control Fuse		68368
9	Control Transformer (opt.) - 1/2 KVA		54697
10	Auto/Manual Selector Switch (opt.)		301536
11	Mod Motor Transformer		57068

FIGURE 21 - CONTROL PANEL ASSEMBLY (YSH/L - N/2)



- | | | |
|-----|---------|--------------|
| 1 - | 2081841 | IGNITOR PIPE |
| 2 - | 056671 | IGNITOR TEE |
| 3 - | 051438 | GAS TEE |
| 4 - | 2081842 | IGNITOR PLUG |
| 5 - | 105173 | ARC SCREW |

Figure 22. Pilot Drawing Assembly

TurboFire® II Burner

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

APPENDIX

Fire Test Report.....	A-1
Burner Specifications.....	A-2
Start-up Inspection Form.....	A-3
Warranty Certificate.....	A-4

APPENDIX

FIRE TEST REPORT

Test Inspector _____

Date _____

**TurboFire™
TEST AND DATA
REPORT
York-Shipley**

H.No. S No

Model _____ S. No. _____
Fab. No. _____

Sq. Ft. _____ Shell No. _____

1	L.W.C.O. (By Steam Down)	Feed Pump Start	Stop	2	Burner Head Setting from Flush										
3	Primary L.W.C.O.	(G Boiler Coupling to G of Lower Gage Set)			4	Air Band	Open.								
5	Secondary L.W.C.O.	(G Boiler Coupling to water line on casting)			6	Limit Setting	On	Off							
7	Type Nozzles				8	Wiring Diag.	Rev.								
9	() Safety Valve, Fig.	Size	Lb/Hr	Set	10	Gas Butterfly-Notches Open- Hi	Lo								
	() Safety Valve, Fig.	Size	Lb/Hr	Set	11	Motor Voltage	Control Voltage								
12	Turns Open - "A" Valve	"B" Valve			14										
13	LIGHT OIL, FIRING RATE					GAS, FIRING RATE					TEST VOLTS & AMPS	VOLTS	—AMPS— RECORD HIGHEST —LEG ONLY—		NAME PLATE RATED AMPS
	20	40	60	80	100	20	40	60	80	100			Hi	Lo	
	Boiler (From Long Steam Press)														
	Fuel Pump Pressure														
	Air Comp. Pressure														
	Fuel Rate - G.P.H.														
	Oil Temperature to Nozzle														
	Nozzle Oil Pressure														
	Steam Nozzle Pressure														
	Stack Temperature														
	Fuel Rate Cubic Ft/Hr														
	Line Gas Pressure														
	Pilot Gas Pressure														
	Manifold Gas Pressure														
	Windbox Pressure														
	CO ₂														
	O ₂														
17	Comb. Control	S. No.	18	Sensing Device	19	Min. Pilot Test	20	Flame Sig. V.							
21	Mod. Motor	S. No.	22	End Switch	23	Ign Trans.	S. No.								
24	Step $\frac{up}{down}$ Trans.	From	To	KVA	25	Main Gas Valve	S. No.								
26	Air Transducer	S. No.			Main Gas Valve		S. No.								
27	Oil Transducer	S. No.			28	Ref. ARRGT.									
	Gas Transducer	S. No.			29	Burner ARRGT.									
Comb. Control Computer				S. No.	30	Air Comp.	S. No.								
Motor		S. No.	Frame	Volts	O'load	31	Pilot								
32	Blower Motor	S. No.			Frame	Volts	O'load								
33	Oil Pump	Motor	S. No.	Frame	Volts	O'load									
34	Main Gas Reg.	(Press) In	Out	35	F.W. Pump	S. No.									
	Motor	S. No.	Frame	Amps	O'load										
36	F.W. Pump	S. No.	Motor	S. No.	Frame										
	Volts	Amps	O'load	Blower Mtr.	Size	S. No.									

BURNER SPECIFICATIONS

HORSEPOWER	60	70	80	100	125	150	175	200	250	300	350	400
FUELS	GAS/GAS NO. 2 OIL COMBINATION											
INPUT (CFH) (1000 BTU/CU.FT.GAS)	2500	2900	3300	4100	5200	6200	7250	8300	10400	12500	14500	16600
INPUT (GAL/HR) (141,000 BTU/GAL OIL)	17	21.5	24	29.5	37	43	52	59	74	89	104	125
NOx EMISSIONS	LESS THAN 30 PPM GUARANTEED											
EXCESS AIR (%)	LESS THAN 10%											
TURNDOWN	MORE THAN 5 TO 1											
ATOMIZATION TYPE	PRESSURE					AIR						
STANDARD GAS TRAIN (IN. DIA)	2					3						
OIL PRESSURE (PSI)	150					80						
FORCED DRAFT BLOWER (RPM)	3450											
FORCED DRAFT BLOWER (CFM)	950				1900				3100			
FORCED DRAFT BLOWER SIZE (HP)	5				10				15		20	
COMPRESSOR MOTOR SIZE (HP)	---				3							
OIL PUMP MOTOR SIZE (HP)	3 / 4				2							
STD. CONTROL CIRCUIT VOLTAGE	115 VAC/ 1 PHASE/ 60 HERTZ											
STD. MOTOR VOLTAGE	440/3/60 - 230/60/3											
MODULATION TYPE	FULL											
MODULATION MOTOR TYPE	HONEYWELL M941											
FLAME CONTROL	FIREYE E100											
SCANNER TYPE	PHOTOCELL/ INFRARED											
IGNITION TYPE	GAS/ELECTRIC											

Notes:

- It is the policy of York-Shipley to continually improve product quality. Therefore, specifications are subject to change without notice.
- TurboFire® II Low NOx burner meets or exceeds the Southern California Best Available Control Technology (BACT) Specifications.
- Consult factory for 500 - 800HP data.

START-UP INSPECTION FORM

PRE START-UP INSPECTION

Addressed To: _____ Date: _____

The installation of _____ installed at _____
and identified by "H" No. _____ has been inspected by me and the following points checked for completeness:

- | | | | |
|--|--------------------------|---|--------------------------|
| 1. Voltage of _____ volts is connect to boiler | <input type="checkbox"/> | 5. Breeching connected to stack | <input type="checkbox"/> |
| 2. Tank vent line installed | <input type="checkbox"/> | 6. Water connected to boiler | <input type="checkbox"/> |
| 3. Fuel oil suction line tested by installer | <input type="checkbox"/> | 7. Steam lines or water lines connected | <input type="checkbox"/> |
| 4. Fuel oil tank filled with _____ grade oil | <input type="checkbox"/> | | |

The foregoing has been checked by me this date of _____ and for this reason the start-up should be performed.

Signature of Agent or Representative _____ Date. _____

START-UP FORM FOR INDUSTRIAL EQUIPMENT

Zone Number _____ Date _____ Unit Model No. _____
Serial Number _____ Type Fuel Used _____ Voltage/Frequency/Phase _____
Installed at _____ Address _____ City _____
Type Pilot: Electric: _____ Gas & BTU cu.ft. _____ Light Oil _____
Installation Appearance: Dirty ☐ Completed ☐ Incomplete ☐ Temporary Heat ☐

OPERATION CHECK DATA

CHECK POINTS	-----HIGH FIRE DATA-----		-----LOW FIRE DATA-----	
	GAS	OIL	GAS	OIL
1. Stack Temperature (Net. °F)				
2. Breeching CO ₂ (%)				
3. Fuel Oil Pump Pressure (Lbs)				
4. Nozzle Air Pressure (Lbs)				
5. Nozzle Oil Temperature (°F)				
6. Pilot Gas Pressure (In. H ₂ O)				
7. Main Gas Pressure (In. H ₂ O)				
8. Gas Rate (cu.ft./hr)				
9. Pump Suction Vacuum				
10. Windowbox Pressure ((In. H ₂ O)				
11. Nozzle Oil By-pass Pressure				
12. Safety Shut-off Time				

TYPE OF PILOT

13. Type Combustion Control _____ Control Test Voltage _____ Ignition Timing _____ Main Cut off Time _____

14. Has Maintenance Person been instructed? ☐ YES ☐ NO

Maintenance Person's Signature _____

15. Customer Remarks _____

CUSTOMER

START UP AGENCY

(Signature)

(Date)

(Signature)

(Date)