Babcock & Wilcox FM-103-70 Boiler Package
Size of Unit: 67,000 lb/hr
Design Pressure: 290 psia
Furnace Design Pressure: 18" H2O

Weights (lb)

Boiler	88,430
Economizer	10,690
FD Fan & Motor Assy	7,585
Ductwork	1,054
Stack	8,858
Total	116,617

Original Purchase Contract issued October 1981. Delivery of boiler December 1985.

The following pages are excerpts from the original instruction books for this auxiliary boiler. Additional documentation can be provided on request.

This boiler was designed for and has burned #2 fuel oil. The fuel lines were cut in 2012 which was the last time the system was started up. Up until this time, the lines were kept under a nitrogen blanket when they system was not in use.

It has been located indoors.

A summary of the most recent run logs is included on the following page.

Several pictures are on the last pages. Additional pictures available.

Complete original instruction books and copy of original contract will be provided.

Successful bidder will be responsible for providing all labor, equipment, and transportation to remove the system within an agreed upon period of time. All personnel on site will be required to complete Orlando Utilities Commission Stanton Energy Center's Contractor Orientation and comply with all safety procedures.

SUMMARY OF MOST RECENT AUXILIARY BOILER LOG SHEETS

Date	Time Fire In	Time Fire Out	Total Fire Time	Reason For Running
7/18/2012	9:51	9:54	0:03	Environmental Test and Preventative Maintenance (Flannery)
	10:03	10:43	0:40	
		Total Run Time	0:43	
1/11/2012	9:15	9:20	0:05	Preventative Maintenance (J Muniz)
	9:29	9:34	0:05	
	9:46	9:52	0:06	
	10:01	10:05	0:04	
	10:09	10:13	0:04	
	10:20	10:22	0:02	
	10:26	10:30	0:04	
		Total Run Time	0:30	
11/12/2010	12:10	12:16	0:06	Training (B. Blickley)
	12:20	12:25	0:05	
	12:36	12:40	0:04	
	12:47	12:53	0:06	
		Total Run Time	0:21	
5/17/2011	9:08	9:13	0:05	V.E. Testing (K Buchanan)
	9:34	9:40	0:06	
	9:53	9:56	0:03	
	9:59	10:04	0:05	
	10:19	10:35	0:16	
	10:44	11:20	0:36	
		Total Run Time	1:11	
5/5/2010	7:58	7:58	0:00	Preventative Maintenance (Ulmer, Orteg)
	8:01	8:04	0:03	
		Total Run Time	0:03	
1/26/2010	13:14	13:25	0:11	Preventative Maintenance (R. Crespo)
	13:28	13:34	0:06	
	13:41	13:43	0:02	
	13:47	13:52	0:05	
	14:01	14:06	0:05	
		Total Run Time	0:29	
9/10/2009	9:54	10:00	0:06	Preventative Maintenance (Munez, Flannery)
	10:12	10:22	0:10	
		Total Run Time	0:16	
5/28/2009	8:56	9:00	0:04	Preventative Maintenance (Flannery)
	9:09	9:19	0:10	
	9:27	9:37	0:10	
	9:46	9:56	0:10	
		Total Run Time	0:34	
2/12/2009	10:26	10:30	0:04	Preventative Maintenance (Crespo, Black, Munez, Flannery)
	10:35	10:40	0:05	
	10:45	10:50	0:05	
	10:53	10:56	0:03	
	11:00	11:05	0:05	
		Total Run Time	0:22	
7/15/2008	9:32	9:34	0:02	Training and preventative maintenance (Flannery)
	9:38	9:41	0:03	
	9:47	9:48	0:01	
	9:53	9:54	0:01	
	9:57	9:58	0:01	
		Total Run Time	0:08	

62.3404

SAMPLES OF ORIGINAL DOCUMENTATION. TABLE OF CONTENTS ON NEXT PAGE LINKED TO SAMPLE PAGES.

Babcock & Wilcox
a McDermott company

Power Generation Group
20 S. Van Buren Avenue
P.O. Box 351
Barberton, OH 44203-0351
(216) 753-4511

July 30, 1986

Black & Veatch
P.O. Box 8405
Kansas City, Missouri 64114

Attention: Mr. D. D. Schultz

RE: B&V Project 8927
B&W File 62.3404.02
Orlando Utilities Commission
Stratton Energy Center, Unit #1
Auxiliary Boiler
B&W Reference FM-2919

Dear Mr. Schultz:

We are forwarding two (2) copies of a document entitled, "Boiling-Out Procedures For New Industrial Boilers". This item was left out of the Operating Instructions submitted January 13, 1986. Please file this item under the Tab "Boiler" in Volume I.

Additional copies are being distributed as noted below.

Sincerely,

THE BABCOCK & WILCOX COMPANY

Henry M. Moser
Proposal Manager
Package Boiler Product Line

HMM:js
Enclosures
cc: Orlando Utilities Commission
500 South Orange Avenue
P.O. Box 3193
Orlando, FL 32802
Attn: Mr. F. F. Haddad/14

Black & Veatch
P.O. Box 27519
Orlando, FL 32867-7512
Attn: Mr. W. T. Mason/4

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For assistance in operating and maintaining this equipment, please contact:

BABCOCK & WILCOX DISTRICT OFFICE
2150 PARKLAKE DRIVE - NE - SUITE 300
ATLANTA, GA 30345
PHONE: (404) 939-6292
TWX: 810-766-0820

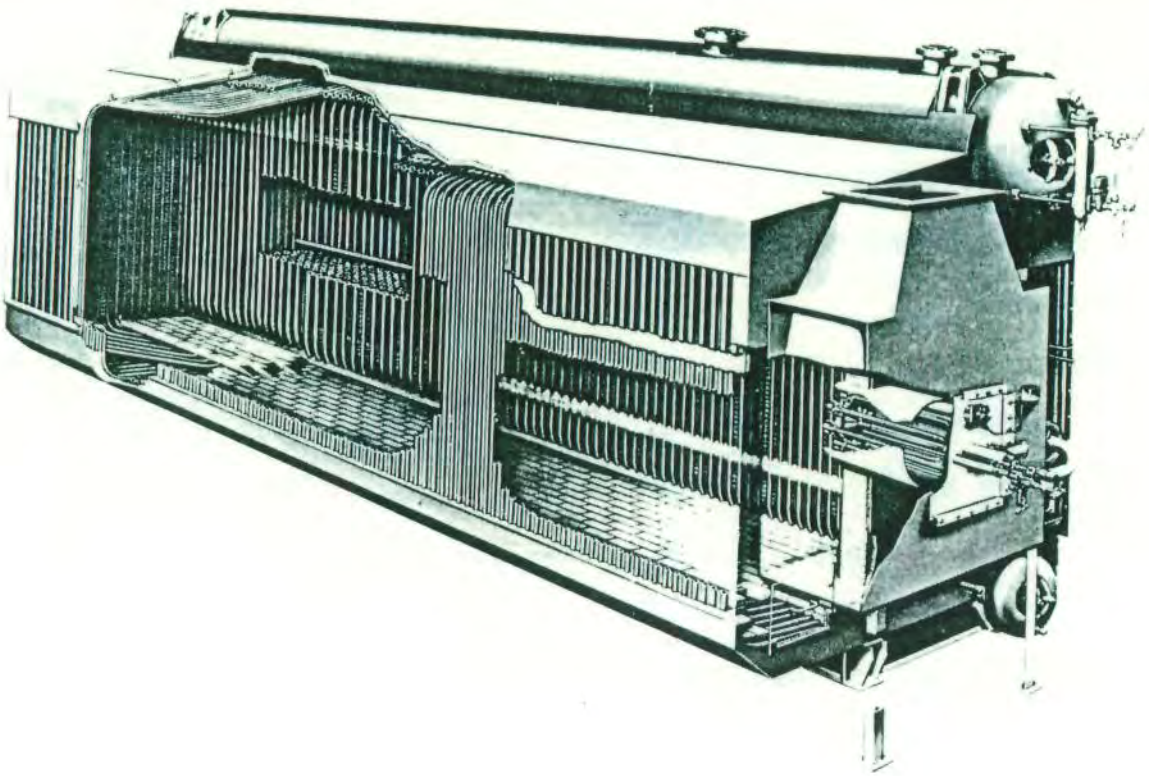
B A B C O C K & W I L C O X

INDUSTRIAL POWER GENERATION DIVISION

OPERATING INSTRUCTIONS

7A(IPGD)
1K285-7A3
8-83

INTEGRAL-FURNACE BOILERS - TYPE FM



7A(IPGD)
1K285-7A3
I/8-25-83

BABCOCK & WILCOX
INDUSTRIAL POWER GENERATION DIVISION

OPERATING INSTRUCTIONS

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GENERAL DESCRIPTION OF BOILER

The FM is a shop assembled, water tube, natural circulation boiler designed for pressure firing with oil and/or gas. Because the boiler is shipped substantially assembled, it often can be put into operation with a minimum amount of field construction time. The connections that usually must be made before it can be operated are the feedwater piping, the blowdown piping, steam piping, fuel piping, flue gas outlet, controls, electricity, foundation, safety valve vents, chemical feed piping, and drain connection piping.

The FM boiler may be furnished with a superheater, and an economizer or air heater.

Combustion of the fuel takes place in the furnace where heat is transferred by radiation to the furnace walls which are water cooled except for the burner wall which is refractory. The burner supplied with the boiler is designed for the fuel or fuels to be burned. It mixes fuel and air and discharges the mixture into the furnace. Combustion begins in the burner throat and is completed in the furnace. Separate operating instructions are provided for the burner.

At the rear of the furnace, the gases turn into the convection pass where they are cooled by the screen tubes, the superheater (if furnished), the boiler bank, and the economizer or air heater (if furnished).

Circulation in the boiler bank and furnace enclosure is accomplished by the natural pumping action which results when the steam produced in the tubes in the hottest zones decreases the fluid density in these tubes compared to the density of the fluid in the cooler tubes. These tubes in the hottest zones are called risers and are located in the furnace enclosure and the hotter gas temperature zones of the boiler bank. The cooler tubes are called downcomers and are located near the boiler bank outlet.

Steam generated in the risers is separated from the water in the steam drum and is discharged either to the plant steam supply or to the superheater. The separated water is mixed with feedwater and this fluid flows to the lower drum through the downcomers. The lower drum distributes the fluid properly into all heated riser tubes and circulation continues. The type and quantity of drum internals required to separate the steam and water depend on the particular design of each boiler.

To provide space for the separation of water and steam and for the flow of water to the downcomer end of the steam drum, the water level must be maintained at the design point which is 3 inches below the centerline on FM 9, FM 10, FM 101, and FM 103. On FM 106, FM 117, and FM 120 the water level is maintained at the centerline. The water level during operation is indicated by the gage glass connected to the front of the steam drum.

BABCOCK & WILCOX
INDUSTRIAL POWER GENERATION DIVISION

OPERATING INSTRUCTIONS

A feedwater pipe extends into the drum to admit feedwater so that complete mixing of feedwater and existing boiler water is accomplished before the water reaches the downcomer tubes. An open ended continuous blowdown pipe is installed to control boiler water solids. A chemical feed pipe discharges chemicals between the boiler feed discharge and downcomers so that complete mixing of chemicals and boiler water is accomplished before reaching the downcomers.

Safety valves are mounted on the steam drum to prevent over pressurizing of the boiler. These valves open when their set pressure is exceeded and close when the drum pressure is sufficiently reduced. Separate operating instructions are provided for the safety valves.

When the boiler is connected to a header system, two stop valves are required between the boiler and header to isolate the boiler for maintenance. A drain valve between the two shut-off valves is intended as a tell-tale to check the tightness of the shut-off valves.

Normally the valve next to the boiler is a non-return type valve and the other, a stop valve, is equipped with a by-pass. This by-pass is used to warm the steam lines, equalize the pressure before the stop valve is opened thus protecting the seat, and preventing surges in steam flow when the stop valve is opened.

The feedwater connection to the steam drum or economizer should contain a stop valve, a check valve, and a feedwater control valve. In case of feedwater pump failure the check valve prevents the back flow of feedwater through the feedwater pumps. A by-pass may be installed around the feedwater control valve with suitable block valves to isolate the control valve for maintenance.

The lower drum is equipped with blow-off valves which can be used for the reduction of boiler water solids and to drain the boiler for maintenance. On FM 103, FM 106, FM 117 and FM 120 there is also a drain connection at the front of the lower drum for draining. The care and operation of these valves are included in separate instructions.

Access to the furnace is through the lower part of the burner wall. The access door into the furnace must be lined with insulating firebrick. If two burners are provided, access is through the lower burner.

The port in the rear wall of the furnace is used to observe the flame and furnace conditions. This port is covered with glass. Cooling air piped from the forced-draft fan is used to cool the glass.

Since various combinations of burners and controls are used on FM boilers, separate instructions are supplied for these components. Each boiler does, however, have a water level gage glass and pressure gage.

The gage glass is always mounted on the front end of the steam drum. The pressure gage may be mounted on the boiler or on the control panel. The burner and controls must be adjusted initially by a qualified engineer. Any adjustments or maintenance after initial operation should be made by qualified personnel. This requires a complete knowledge of the burner, the combustion and flame safeguard controls, the feedwater controls, and interlocks.

PRE-START-UP INSPECTION

The boiler and its auxiliary equipment must be properly installed, with all necessary wiring and piping connected correctly before it can be operated. Before the boiler is installed any shipping damage should be determined and repaired. Shipping damage normally is indicated by dented outer casing, damaged burner refractory, or disturbed furnace floor bricks. Any indication of severe rough handling calls for a hydrostatic test to determine if tubes have been loosened in their seats. If a hydrostatic test is required, TEST AT NO MORE THAN 1-1/2 TIMES THE DESIGN PRESSURE WITH WATER AND BOILER METAL TEMPERATURE ABOVE 70°F. Be sure to gag the safety valves before the test following the separate instructions given for the safety valves.

Thermal expansion will occur when the boiler is fired; consequently, sufficient clearance for expansion must be provided. Safety valve vents must be supported so as not to impose strains on the safety valves. (See safety valve instructions). Steam lines must be supported and have sufficient expansion loops to prevent excessive reactive forces on the boiler. Refer to the applicable boiler arrangement drawing for specific information. The same applies to feedwater lines and blow-off lines.

All temporary cribbing, blocking, and bracing, both internal and external, must be removed before the boiler is started up. In some cases, cribbing is used inside the furnace to hold burner refractory in place during shipment. If allowed to remain, it may burn at an uncontrolled rate during initial firing and damage the units. External bracing can prevent the normal expansion of the boiler. There are cases where separately shipped items are shipped inside the furnace, therefore, the furnace access door must be removed to make sure all parts, cribbing, and bracing are removed from the furnace area. Refer to the General Assembly Drawing furnished for futher details.

The gage glass must be clean, visible, its gaskets tight, and it must show the correct water level in the steam drum.

The boiler pressure gage must be installed in such a manner that it is also visible to the operator. It should be calibrated, and its connecting piping should be filled with condensate to protect the gage from hot steam.

The burner and fuel lines must be clean and adjusted as called for in the burner instructions.

CAUTION: FOR PROTECTION OF PERSONNEL, ALL STEAM LINES, HEATED OIL LINES, WATER LINES, FLUES, AND DUCTS THAT MAY BE TOUCHED SHOULD BE INSULATED TO PREVENT INJURY. ALL BLOW-OFF AND DRAIN LINES SHOULD DISCHARGE AWAY FROM PERSONNEL.

ALL ATOMIZING STEAM LINES SHOULD BE INSULATED AND TRAPS INSTALLED TO PREVENT CONDENSATION FROM ACCUMULATING IN THE STEAM LINES CAUSING MALFUNCTION OF THE ATOMIZER.

A supply of feedwater must be available and at sufficient pressure to feed as required to maintain the correct water level.

The feedwater piping must be flushed with water to remove all debris. A temporary strainer (screen) may be installed upstream of the feedwater regulating valve to prevent debris from entering the valve and causing it to malfunction.

BOILING-OUT PROCEDURES

Although shop assembled boilers are normally cleaned internally of all foreign material before they are shipped, in some cases desiccant will have been placed in the drums. An inspection of both mud drum and steam drum must be made before filling unit with water.

CAUTION: ALL DESICCANT AND OTHER FOREIGN MATERIAL MUST BE REMOVED BEFORE UNIT IS FILLED WITH WATER.

A water soluble lubricant was used with the expanding equipment when the tubes were expanded into the drum. A boil-out procedure is recommended to remove this lubricant before the boiler is put into normal operation and is covered under separate instructions.

SETTING SAFETY VALVES

All safety valves should be tested for the popping and closing pressures, but should not be tested until the boilout water has been deconcentrated, otherwise the high concentration of boil-out chemicals can cause foaming and carryover of chemicals to the safety valves where valve seats may be damaged.

Separate instructions for the safety valves show how to install, gag, maintain, and adjust the safety valves. However, operation of the boiler during valve testing is normally not included in the safety valve instructions. The testing procedure should be as follows:

1. It is recommended that the boiler be off the line with the steam line stop valves closed. Inspect all valves to insure they are assembled and installed properly.

2. All safety valves not being tested must be gagged; only one valve should be tested at a time beginning with the lowest pressure valve. Attach a strong rope to the lift handle of the valve to be tested to allow it to be manually lifted from a remote location.

3. Maintain normal water level during the testing procedure.

4. Light the burner as described in the operating instructions for the burner and fire at minimum firing rate until the pressure approaches the popping pressure of the valve being tested.

5. Lift the valve by hand using the rope to test the valve action and reseating.

   CAUTION: USE SUFFICIENT LENGTH OF ROPE ON THE LIFTING LEVER TO STAY CLEAR OF THE VALVE THUS PREVENTING POSSIBLE INJURY FROM THE BLOWBACK OF STEAM OR WATER.

6. Let the valve cool for a few minutes, then raise the boiler pressure causing the valve to pop automatically. When the valve pops, stop firing and let the pressure decrease to below the closing pressure for that valve and the next valve to be tested.

7. Adjust the safety valves as required according to the instructions for the safety valves.

COLD START-UP

When the boiler is to be started from a cold condition, the following should exist:

1. Steam drum vent opened.

2. Blowdown valves closed.

3. Water level established at least two inches above the bottom of the gage glass.

4. Boiler steam stop valves closed but not tightly seated.

5. Boiler feed pump and a supply of feedwater available.

6. Drain the superheater. (If boiler is superheater equipped)

7. Open any dampers in flues between boiler and stack.

BABCOCK & WILCOX
INDUSTRIAL POWER GENERATION DIVISION

OPERATING INSTRUCTIONS

Follow the directions for the burner, controls, fan, and fuel systems, and start firing at the MINIMUM FIRING RATE.

CAUTION: FOR START-UP PROTECTION OF SUPERHEATER, SEE SEPARATE "SUPERHEATER" INSTRUCTIONS.

Maintain the water level between the high and low water level alarms. When the temperature of the water increases, its volume will increase and it may be necessary to blow down to maintain the water level.

At 15 psig drum pressure when a steady flow of steam from the vent indicates that all air has been expelled from the steam drum, close the steam drum vent.

THE MAXIMUM RATE OF INCREASING PRESSURE SHOULD NOT EXCEED 100°F PER HOUR INCREASE IN SATURATION TEMPERATURE.

Drain, vent, and warm the steam line. Before opening any steam stop valves, all condensate should be drained from both sides of the valves. To prevent stop valves and non-return valves from sticking during the pressure raising period, they should be checked frequently to be sure that they are not seated too tightly. By-pass valves should be used, when provided, to warm steam lines and to equalize pressures thus reducing the throttling action across the stop valves when they initially open.

In cases of a single boiler installation, the stop valves can be opened and throttled as necessary to warm the steam lines before the boiler pressure reaches normal operating pressure.

When a boiler is connected to a header system that is already up to pressure, the stop valves should not be opened until the boiler pressure is near header pressure. When a non-return type stop valve is installed next to the boiler, surges in steam flow caused by the sudden opening of the non-return valve can be avoided by first opening the main stop valve and then moving the stem of the non-return valve to approximately 25 percent open. When it is determined that the non-return valve has opened and the boiler is producing steam, the non-return valve can be opened to the full open position.

When the boiler is producing steam, start the boiler feed pump and place the water level regulator on automatic.

OPERATION

During operation, the desired steam output and normal operating pressures are maintained by regulating the firing rate as described in the instructions for the burner and controls. At extremely low loads, on-off firing may be required. Under no condition should the rated output or pressure of the boiler be exceeded.

Maintain the water level at approximately the centerline of the gage glass. To keep the gage glass clean and to be sure that the connections to the gage glass are open, it is recommended that the gage glass, water column, and low water level trip chamber be blown down daily. Test the low water cutout and alarm daily.

To prevent internal corrosion and the formation of scale, the quality of the feedwater and boiler water should be checked daily and maintained at the recommended quality.

NORMAL SHUTDOWN

The recommended procedure for a normal shutdown is to reduce the boiler load to minimum firing rate, stop firing and purge the unit as described in the instructions for the burner, stop the forced draft fan, isolate the unit by closing all steam and feedwater stop valves, and let the unit cool naturally to reduce the boiler pressure. When the steam pressure has dropped to 25 psig, open the steam drum vent valve to prevent the formation of a vacuum in the boiler. If the boiler is to be drained, drain after the pressure has been reduced to zero. If the boiler is not to be drained, it is recommended that the water level be maintained in the gage glass by adding feedwater as necessary during the pressure reducing period.

In some cases auxiliary equipment may require special attention, if so, separate instructions for the equipment involved should include this information. If chelants are used for boiler water treatment, it will be necessary to either flood the steam drum when the drum vent is opened or to connect a source of nitrogen to the vent in order to prevent corrosion which may result from chelant contact with air (oxygen). Storage procedures are discussed near the end of these instructions.

EMERGENCY SHUTDOWN

CAUTION: AN EMERGENCY SHUTDOWN PROCEDURE SHOULD BE INITIATED ANY TIME A CONDITION ARISES THAT ENDANGERS PERSONNEL OR EQUIPMENT.

Some of the conditions that call for emergency shutdown are loss of ignition, water level, or forced-draft fan. Any one of these conditions requires that the fuel be tripped immediately and the furnace purged, if possible, to remove any combustible gases.

IF THE WATER LEVEL GOES OUT OF THE BOTTOM OF THE GAGE GLASS, FOR ANY REASON, ALL FUEL SHOULD BE TRIPPED. If the water level remains out of sight and there is no positive proof that the water level is not above the bottom of the steam drum, water must not be added until the boiler has cooled within 100°F of the feedwater temperature.

If a tube rupture occurs, even though water level can be maintained and ignition is not lost, it is recommended that the boiler be taken out of service as soon as possible. The impingement of steam and water from a tube leak could cause the failure of additional tubes. In cases where a high sulfur fuel is used, it should be recognized that the moisture from a leak will cause gas side corrosion of boiler tubes and casing and that steps should be taken to neutralize the acid condition with a lime flush during the outage for repairs.

INSPECTION AND MAINTENANCE

The boiler should be taken out of service periodically for routine inspection and, when necessary, cleaning. The inspection is to check on the conditions of the boiler and furnace and the results of water treatment. The initial inspection should be made after approximately one month's operation; sooner, if conditions warrant. Subsequent inspections should be made at intervals based on the condition of the boiler at the last inspection and on the duty imposed on the boiler since the last inspection.

CAUTION: FOR THE PROTECTION OF THE PERSONNEL MAKING THE INSPECTION, THE FOLLOWING MINIMUM PRECAUTIONS ARE NECESSARY.

NEVER ENTER THE STEAM DRUM OR LOWER DRUM UNTIL ALL STEAM AND WATER VALVES, INCLUDING FEEDWATER, DRAIN, AND BLOWDOWN VALVES, HAVE BEEN CLOSED, AND LOCKED OR TAGGED. IT IS POSSIBLE FOR STEAM AND HOT WATER TO BACK UP THROUGH THE DRAIN AND BLOWDOWN PIPING, ESPECIALLY WHEN MORE THAN ONE BOILER IS CONNECTED TO THE SAME DRAIN OR BLOWDOWN TANK.

BEFORE REMOVING ANY MANHOLE COVER PLATES, BE SURE THAT THE UNIT IS COMPLETELY DRAINED AND ALL PRESSURE AND VACUUM IS OFF THE UNIT.

BEFORE ENTERING THE STEAM DRUM, LOWER DRUM, WINDBOX, FURNACE, OR ANY DUCTS, BE SURE THAT THE AREA HAS BEEN COMPLETELY PURGED OF COMBUSTIBLE AND DANGEROUS GASES, THE AREA IS PROPERLY VENTILATED, AND THE ENTRANCE CANNOT BE CLOSED. STATION A MAN AT THE ENTRANCE, NOTIFY A RESPONSIBLE PERSON, AND RUN AN EXTENSION CORD THROUGH THE ENTRANCE. OPERATING AND MAINTENANCE PERSONNEL SHOULD KNOW WHEN SOMEONE IS IN THE BOILER. ISOLATE FUEL SUPPLY (AND ATOMIZING STEAM) TO INSURE FUEL CANNOT ENTER THE FURNACE.

USE LOW VOLTAGE EXTENSION CORD OR CORDS WITH PROPERLY CONNECTED GROUNDS. BULBS ON EXTENSION CORDS AND FLASHLIGHTS SHOULD BE EXPLOSION PROOF.

NEVER USE TOXIC CLEANING FLUIDS SUCH AS CARBON TETRACHLORIDE IN CONFINED SPACES.

BEFORE INSPECTING OR WORKING ON POWER DRIVEN EQUIPMENT, BE SURE THAT THE POWER IS TURNED OFF AND THE EQUIPMENT HAS COME TO A COMPLETE STOP. ALWAYS LOCK OPEN CIRCUIT BREAKERS. ANY TYPE OF EQUIPMENT THAT CAN BE SET INTO MOTION SHOULD BE LOCKED IN PLACE WITH A CLAMP OR LOCKING DEVICE.

BEFORE ENTERING DRUMS TEST TO PROVE THAT THE OXYGEN CONCENTRATION IS AT LEAST 19.5 PERCENT. IF THE BOILER IS CONNECTED TO A FLUE OR STACK WHICH HAS OTHER BOILERS CONNECTED TO THEM, INSURE THE BOILER TO BE INSPECTED HAS BEEN ISOLATED TO PREVENT FLUE GAS FROM ENTERING INTO IT.

MAKE ALL OTHER PRECAUTIONS AS NECESSARARY TO INSURE THE PROTECTION AND SAFETY OF PERSONNEL INSPECTING AND WORKING ON THE BOILER, CONTROLS, BURNER, AND AUXILIARY EQUIPMENT. FOLLOW ALL MANUFACTURERS RECOMMENDATION AND INSTRUCTIONS AND IF THESE ARE UNAVAILABLE CONTACT THE MANUFACTURER FOR RECOMMENDATIONS PRIOR TO COMMENCING THE INSPECTION AND MAINTENANCE.

The water side inspection should include both drums, any drum baffles or internals, all connections to the drums, and tubes, where visible and accessible. Look for signs of corrosion and scale which may be caused by water conditions. If conditions attributed to water conditions are found, then the water treating process should be reviewed.

The method of removing deposits such as scale and sludge depends on the nature of the deposits. Some deposits may be removed by water washing while others may require turbining or chemical cleaning. If chemical cleaning is required, an experienced chemical cleaning firm should be retained to perform the cleaning without hazard to personnel or equipment.

During the inspection, results of severe operating conditions should be looked for. Low water or loads above design may cause overheating and discoloration, tube bowing, swelling, cracking, or tube seat leaks.

Drum cracking is a rare occurrence. It is important to differentiate between actual and apparent cracking since most indicated cracks turn out to be slag inclusions, pitting, or tool marks, which are observable by etching as a result of a chemical cleaning. If there is doubt, various tests can be made to determine if cracks exist. An ultrasonic or magnaflux test may be used or the indicated crack may be removed by grinding.

All abnormal conditions should be investigated, repaired, and their cause corrected. Of course, the method of repair must have the approval of the insurance carrier and local inspectors.

Particular care should be taken to see that all connections are clear of sludge, especially the water column connections and pressure gage connections.

BABCOCK & WILCOX
INDUSTRIAL POWER GENERATION DIVISION

OPERATING INSTRUCTIONS

In inspecting the fire side of the tubes and drums look for signs of overheating, leakage, erosion, and corrosion. Tube seats in the boiler bank can be inspected by removing the optional refractory knockout plugs in the furnace baffle wall as shown in Figure 1, Page 14.

Cleaning the boiler heating surfaces may be accomplished by either air lancing, or water washing. Cleaning refractories around the burner should be minimized. Cleaning slag from this refractory surface is normally unnecessary and will eventually tear away refractory requiring its replacement.

The fire side inspection should also include the burners. Separate instructions are included for the burners.

Any evidence of hot spots or corrosion of the casing should be investigated and repaired as required.

CAUTION: FIELD WELDING OF STRUCTURAL ATTACHMENTS TO THE DRUMS, TUBES OR HEADERS (PRESSURE PARTS) OF A BOILER IS NOT RECOMMENDED AND SHOULD BE AVOIDED BECAUSE OF POTENTIAL METALLURGICAL PROBLEMS THE WELDING MAY CAUSE. WHERE IT IS NECESSARY TO MAKE ATTACHMENT WELDS, IN PARTICULAR TO DRUMS, THE APPROPRIATE WELDING AND HEAT TREATING PROCEDURES MUST BE IN ACCORDANCE WITH APPROVED ASME CODE PROCEDURES. AN ALTERNATE SOLUTION TO A STRUCTURAL SUPPORT PROBLEM THAT DOES NOT REQUIRE PRESSURE PART WELDING IS USUALLY PREFERABLE BECAUSE THE THREE DIMENSIONAL EXPANSION OF THE BOILER NEED NOT BE A CONSIDERATION IN THE STRUCTURAL DESIGN. ADDITIONAL INFORMATION CAN BE OBTAINED FROM THE SERVICE DEPARTMENT OF THE BABCOCK & WILCOX COMPANY.

Separate maintenance instructions are provided for the fan, water column, gage glass, valves, and controls. Leaking valves should be lapped or repacked as necessary. Instruments and controls should be inspected, cleaned and recalibrated if required by qualified personnel.

STORAGE

Both the gas and water side of a boiler should be protected against corrosion during out-of-service periods. In cases where the idle boiler may be required for service on short notice, the wet storage method is recommended. When it is known that the boiler will be idle for six months or more, the dry storage method is recommended. Specific recommendations are covered under separate instructions.

SOOTBLOWERS

Even though separate instructions are supplied for sootblowers, certain features and precautions peculiar to the FM boiler and piping are not included in those instructions.

Sootblowers are supplied on all oil fired boilers to clean the gas side of the convection pass. Steam is normally used as the cleaning medium with Diamond G9B blowers and a blowing pressure ranging between 80 and 250 psi. Normally, 155 psi is sufficient for most fuel oils, but the actual blowing pressure required depends on the fouling characteristics of the fuel.

Since at least 80 psi is required, boilers operating below 80 psi normally use the Diamond type A2E air puff blower with the blowing pressure ranging between 75 and 200 psi.

When only one blower is supplied, it is located in the front of the boiler. Boilers requiring two sootblowers have one at the front and one at the back.

G9B Blower

With this blower the blowing pressure is adjusted by an adjustable orifice in the head of the sootblower. This blower also has a shut-off valve built into the head. It opens and closes when the blower is rotated. Normally the cam that operates this valve is set to let the sootblower blow throughout its complete revolution.

A2E Blower

The air puff cleaning system consists of automatically valved, fixed position, multinozzle rotating element blower(s). The system utilizes compressed air from a 125 psig source as the blowing medium. When the blower element has rotated and blown through the first 17-1/2 degrees of its cleaning arc, the valve in the sootblower head shuts off and the blower stops rotating. The compressor then restores original air pressure in the receiver and the next valve reopens, the blower emits a second puff as it rotates through the next 17-1/2 degrees. This "puff-stop-puff" action continues automatically. It is impossible for air to be emitted at ineffective low pressures because the blower cannot operate until the compressor has established "puffing" pressure in the receiver.

Steam Supply

When steam is used as the blowing medium, it is normally supplied by the steam drum or superheater on that boiler. At least two valves are supplied in the steam supply line to the blowers. One is normally chain operated and can be opened and closed from the operating floor. The second is a stop valve which normally remains open. In some cases, the chain-operated valve is replaced with a motor-operated valve with interlocks to prevent sootblowing at loads below one-half load.

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INDUSTRIAL POWER GENERATION DIVISION

OPERATING INSTRUCTIONS

The steam supply line to each sootblower has a drain valve in the lowest part of that line. This valve has a 3/16 inch hole drilled through the seal to permit the escape of condensate. Since dry steam is required, the operator should be able to observe the discharge from this valve. If nothing escapes when the steam is turned on, the 3/16 inch hole is plugged. If water escapes, the valve should be opened until all condensate is removed from the supply line.

All FM boilers are designed for pressure firing, that is, furnace pressure above atmospheric pressure. Units operating below 12 inches H_2O are equipped with a floating stuffing box seal at the front and rear sootblower and units operating at above 12 inches H_2O are equipped with a floating stuffing box seal at the front blower and a seal air box at the rear blower to seal the wall opening through which the blower is installed thus minimizing flue gas leakage.

All blowers require scavenging air to prevent corrosion of the blowing elements by corrosive flue gases. This air is piped from the forced-draft fan outlet to the sootblower head. There must be a check valve in this line to prevent the back flow of steam through this line when the blowers are operated.

Operation

Depending on the size of the boiler and blowing pressures, sootblowers will upset furnace conditions and at low loads may blow out the flame. For this reason blowers should not be operated at loads below one-half rated boiler load. In some cases it may be necessary to switch the combustion controls to manual during sootblower operation. Where half load or more is not being maintained, high firing rates can be obtained for sootblowing by placing the controls on manual and under firing for short periods to lower boiler pressure and then over firing to restore pressure at firing rates equivalent to half load for the sootblowing operation. This procedure is not recommended for boilers with superheaters.

A check of all sootblowers and the areas cleaned by these blowers should be included in the regular boiler inspection. Boiler tubes should be inspected closely for sign of metal loss due to steam cutting, corrosion, and rubbing of blower elements against tubes. Metal loss can result from the direct impingement of high pressure steam, especially wet steam, on boiler tubes. Corrective measures may require reducing the blowing pressure, realigning the nozzles with gas lanes to prevent impingement, realigning boiler tubes to prevent rubbing, repairing steam shut-off valves to prevent leakage, or providing adequate drainage of sootblower lines to prevent blowing condensate through the blowers. Corrosion can occur on units with leaky sootblower steam shut-off valves if the unit is shut down frequently.

STEAM SEPARATING EQUIPMENT

Steam separating equipment is provided in the boiler steam drum to obtain separation of steam and water. Low solids, dry steam is produced if the correct water level is maintained, boiler water solids and alkalinity do not exceed the maximum limits, boiler load does not exceed design rating, and the equipment is installed and maintained properly.

The attached sketch shows a sectional end view of the steam drum and typical internals.

Drum internals are installed in the shops, however it is recommended to inspect them before initial operation. When the drum has been opened, an inspection should be made to make sure that no debris has found its way into the drum and that all bolts and baffles are in place and are tight.

During routine internal inspections, certain indications will tell if the internals are not installed properly. Markings above the water level which are left by boiler water solids are indications of baffle leaks. The normal water level maybe indicated by a line on the drum left between the water and steam space after the drum has been drained. A poorly defined or extremely uneven water line can indicate poorly controlled feedwater level, baffle leaks, or improperly installed feedwater pipe. Sludge is an indication of high boiler water solids and or poor control of boiler water chemistry.

Some operators prefer to remove the drum internals for boiler chemical cleaning. If they are removed, all mating parts should be match-marked before removal so that they can be replaced in the same position.

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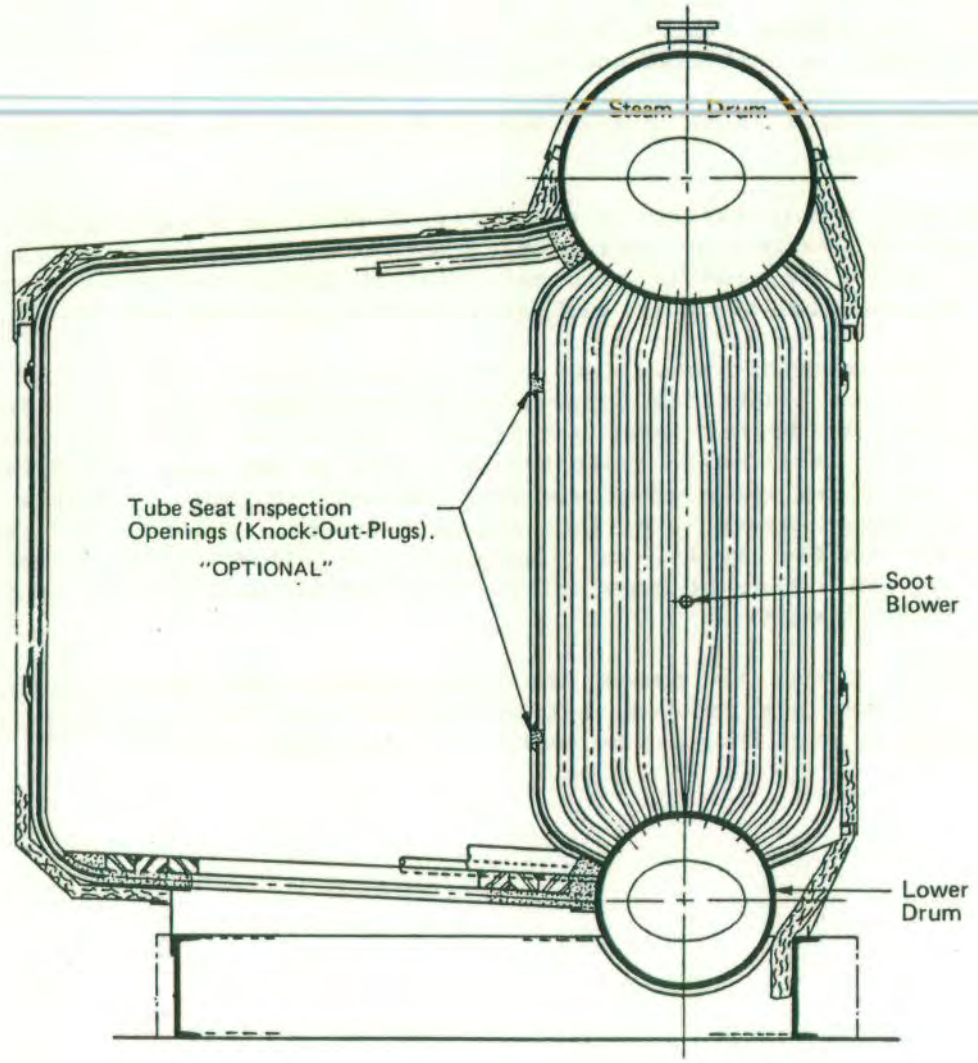
OPERATING INSTRUCTIONS

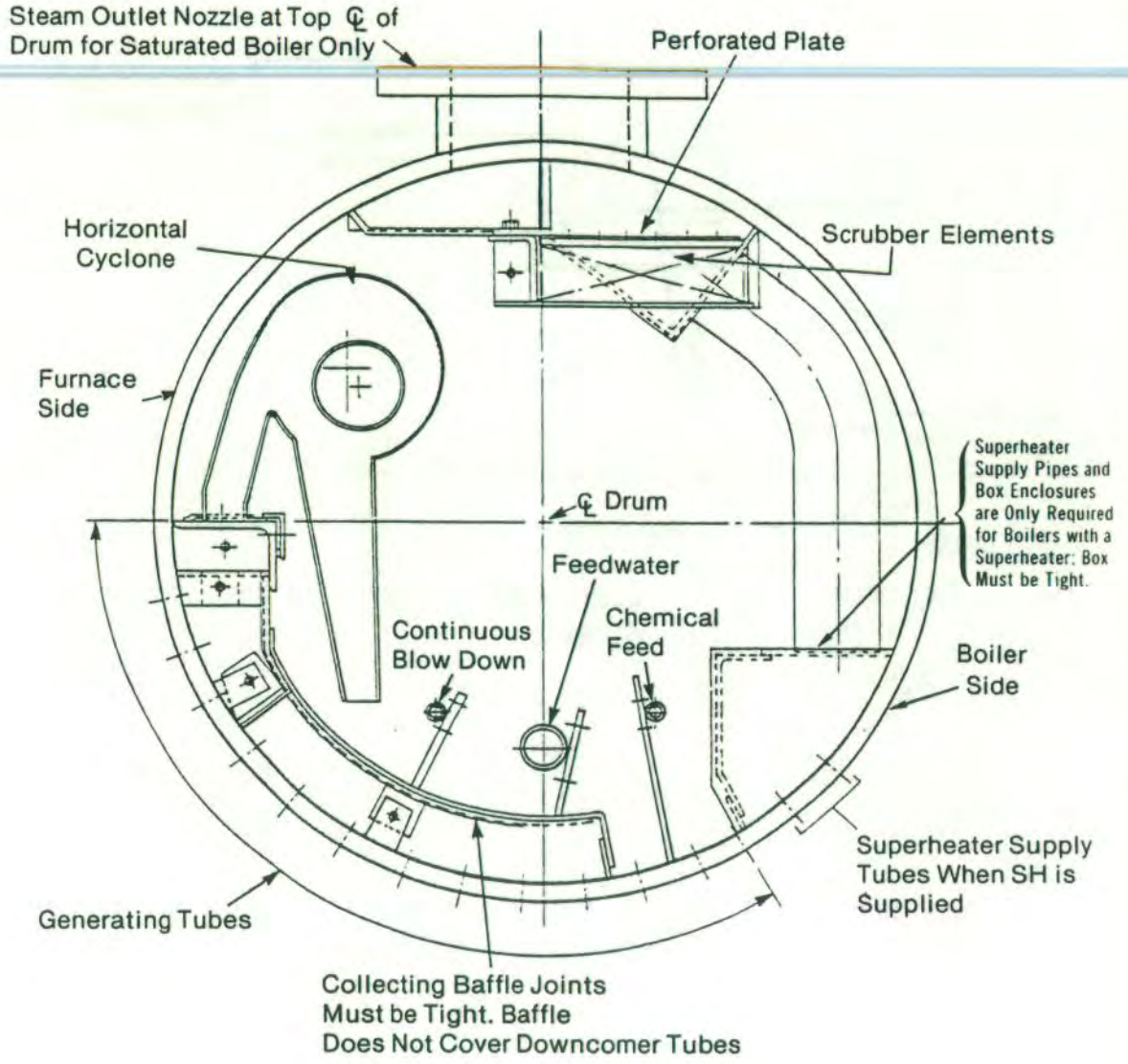
Figure 1

INSPECTION OPENING LOCATIONS IN BAFFLE WALL



Drum Internals

TYPICAL ARRANGEMENT OF "C" TYPE DRUM INTERNALS



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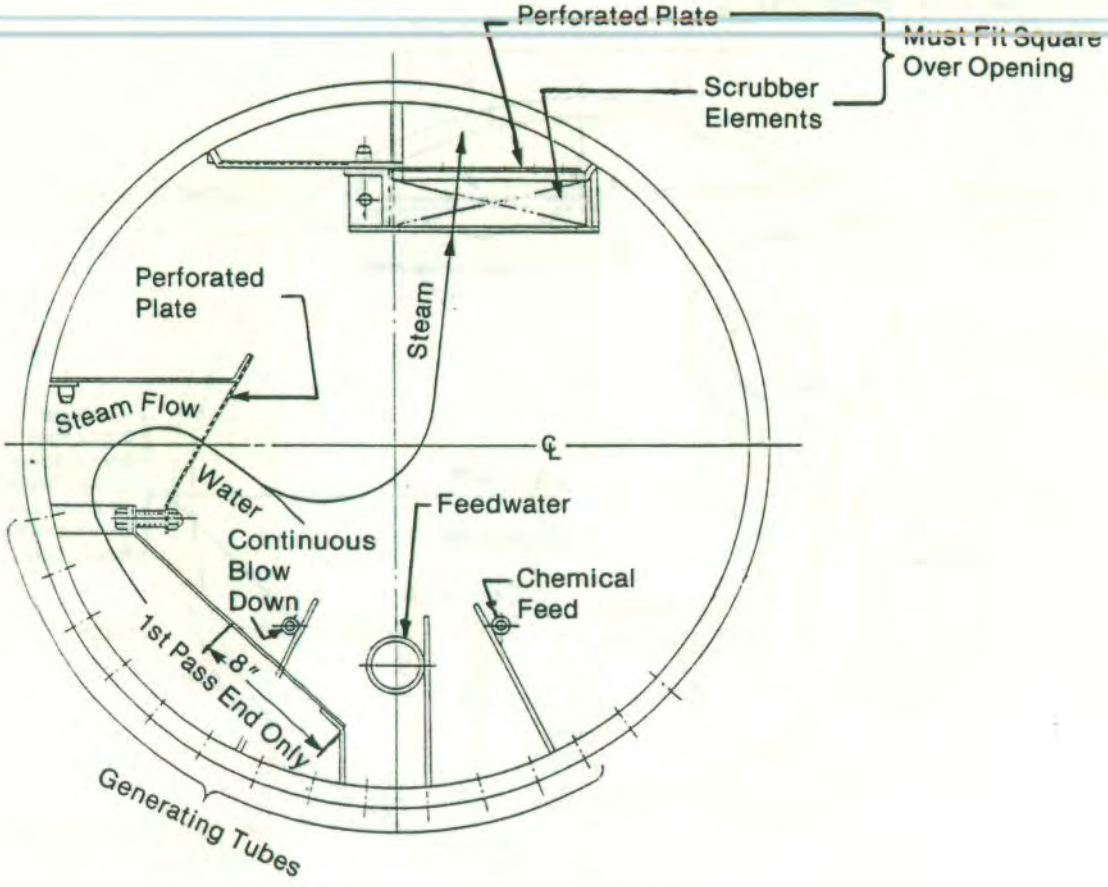
OPERATING INSTRUCTIONS

Drum Internals
TYPICAL ARRANGEMENT OF "B" TYPE DRUM INTERNALS



ADDENDUM TO FM INSTRUCTIONS

SUPERHEATER

Saturated steam from the steam drum is heated as it passes through the superheater which is located in the gas inlet end of the convection pass where it receives heat by convection. The superheater is drainable with inverted tube loops connected to headers. It is sized to produce design steam temperature when the boiler is operating at rated load and pressure with the recommended excess air. At loads below design, the temperature will be slightly below design.

During the pressure raising period, little or no steam passes through the superheater even though the header drains are open. Consequently, care must be taken to not overheat the superheater during start-ups. The firing rate must be regulated to maintain the temperature of the gas entering the superheater below a safe superheater metal temperature.

During the first few starts, a temporary portable thermocouple is inserted through the capped nipple at the rear of the boiler to measure gas temperature entering the superheater section. A constant minimum firing rate is normally used. The initial temperature will be low but will increase as the boiler pressure increases. Unless stated otherwise, the maximum temperature of the gas must not exceed 900°F until the boiler is producing 10% of rated steam flow. This safe firing rate should be used for all subsequent start-ups.

CAUTION: REMOVE THE TEMPORARY PORTABLE THERMOCOUPLE BEFORE THE FIRING RATE IS INCREASED FOR BOILER LOADING, BECAUSE IT WILL BE DAMAGED BY THE HIGH TEMPERATURES THAT EXIST DURING NORMAL OPERATION.

Before lighting the burner, all superheater header drains should be opened wide until the superheater is completely drained. They may be throttled during the pressure raising period to conserve steam and reduce noise. They should remain cracked open to assure removal of condensate until the boiler is producing 10% of full load steam flow. Steam traps may be used, but they should have open drains for checking their action.

To prevent the backup of water from other drains, superheater drains should not be connected to the boiler drains nor to the drains of other boilers.

Prior to placing the boiler on the line from a hot bank, open all superheater drains wide to clear condensate from the superheater. This procedure should be used each time the boiler is started, even though it has been shut down only for a few minutes. Condensate can form in the superheater as soon as firing is interrupted. As mentioned previously, properly functioning traps will serve the same purpose.

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OPERATING INSTRUCTIONS

External inspections during outages should be for signs of overheating, corrosion, and erosion. If metal loss is suspected, the tube outside diameter should be measured to determine the extent of metal loss. One method of determining metal loss is to mark the tubes with a center punch and inspect the mark during the next outage. If metal loss is severe, the cause should be determined and corrected.

Internal inspections should be for deposits caused by carryover. Internal deposits may increase superheater steam pressure drop or cause the tube to fail from overheating. If internal deposits are suspected, tube sections should be removed for inspection. The cause should be determined and corrected, and the superheater cleaned.

Boilers with superheater may use either the wet or dry storage methods for protection against corrosion during out-of-service periods. When the wet method is used, be sure that treated water is used to flood the superheater. In some cases the superheater is backfilled to keep boiler water from entering the superheater.

ONE WORD OF CAUTION: TO PREVENT CORROSION AT THE WATER LINE AND ULTIMATE FAILURE, ALWAYS STORE THE SUPERHEATER EITHER COMPLETELY FLOODED OR COMPLETELY DRY -- NEVER PARTIALLY FILLED.

ADDENDUM TO FM INSTRUCTIONS

ECONOMIZER

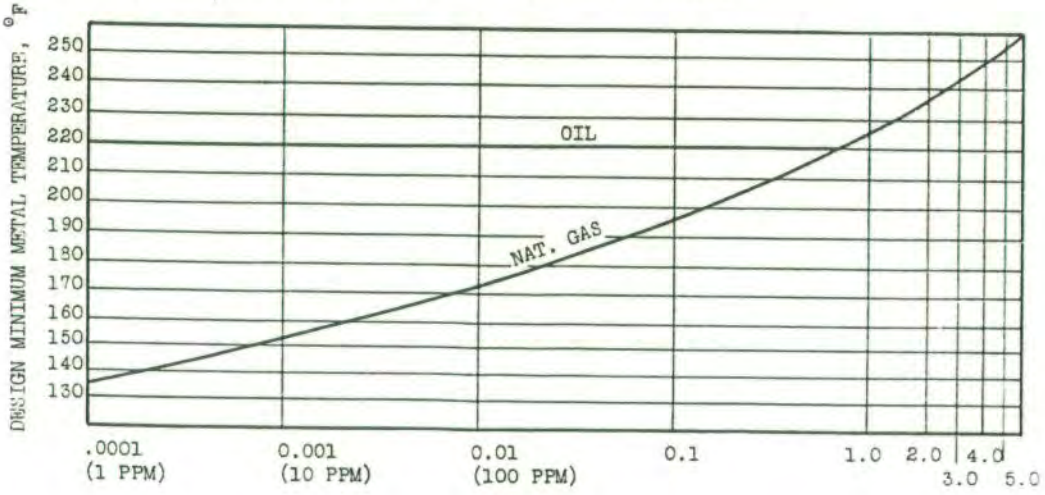
Before entering the steam drum, the feedwater passes through the economizer where heat is recovered from the flue gases leaving the boiler and the temperature of the feedwater is increased. This recovery of heat from the flue gases improves the economy of the boiler, hence, the term "economizer."

Economizers may be arranged for water flow either counter to or parallel with flue gases, which may flow either up or down. The tubes may be either bare, covered with studs or a combination of the two. The temperature of the feedwater; the temperature, dewpoint and fouling characteristics of the flue gases; and the space available determine the economizer design.

Both internal and external corrosion are possible in the economizer if certain conditions exist. Internal corrosion can be prevented by maintaining the feedwater at a pH of 8 to 9 and the dissolved oxygen content at 0. This involves the use of deaerating heaters or condensers and the injection of chemicals into the feedwater upstream from the economizer, for oxygen scavenging and pH control. The injection point must be far enough away to allow complete oxygen scavenging before entering the economizer.

External corrosion is a function of the sulfur, hydrogen, and moisture in the fuel, economizer metal temperatures, and method of firing. Maintaining metal temperature above the minimum shown in the following curve for a given percentage of sulfur in the fuel should prevent external corrosion. For all practical purposes, economizer metal temperature is the same as water temperature. Therefore, metal temperature can be maintained by providing proper feedwater temperatures.

Fig. 1 LOW TEMPERATURE CORROSION LIMITS



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INDUSTRIAL POWER GENERATION DIVISION

OPERATING INSTRUCTIONS

Sootblowers are supplied to clean the economizers on oil fired units. These sootblowers must be ready for service during start-up. Draft losses across the economizer and gas temperatures leaving the economizer are affected by deposits in the economizer and may be used as indications of fouling.

The boiler should always be filled through the economizer. By doing this, the economizer is always filled with water and no delay is encountered in purging air from the economizer when feedwater is required.

In some cases, the economizer outlet header may be installed at a higher elevation than the steam drum. In this case, a vent is supplied at the highest elevation in the piping between the economizer and steam drum to permit fast draining. This vent is a vacuum breaker. Its only use is for draining.

Routine inspections should be made for signs of corrosion and fouling.

BURNERS
OPERATING INSTRUCTIONS
STS OIL BURNER
SINGLE BURNER INSTALLATION

1. INTRODUCTION

This operating instruction deals only with the burning of oil in units with one STS Burner. Additional operating instructions are provided if the same burner is equipped to burn gas. The information contained herein is based on actual operating experience and, therefore, forms a practical set of rules for operation. Before attempting to operate the burner, the operator should familiarize himself with the limitations and characteristics of the burner, its controls, and related equipment.

2. DESCRIPTION

The STS Burner is designed for furnaces requiring a long, small cross-sectional flame. The burner is particularly suited where cold combustion air is used.

The burner mixes atomized oil with the combustion air and imparts to this mixture the turbulence essential for complete combustion. The STS Burner is a single throat burner equipped with a swirler.

3. FUEL REQUIREMENTS

The burner will burn any of the fuel oils classified as No. 2 through No. 6 by the Commercial Standard CS 12-48 of the National Bureau of Standards, U.S. Department of Commerce or fuel oils P.S. 200 through 400 as designated by fuel oil suppliers on the West Coast.

The fuel oil should not contain any acid, grit, fibrous or other foreign material likely to clog or injure the atomizers and valves. The fuel oil should be strained through filters or wire gauze of 16 meshes to the inch (No. 16 USS sieve, ASTM designation 1,190 micron) before the pumps. The clearance area through the strainers should be at least twice the area of the connecting pipe. Filters after oil heaters should be 32 meshes to the inch.

In order to obtain the required atomization and capacity out of the atomizers, the viscosity of the fuel oil must not be greater than 135 Saybolt Universal Seconds (18 Saybolt Furol Seconds). The viscosities at several temperatures should be determined so that the correct operating temperature is known.

THE BABCOCK & WILCOX COMPANY
POWER GENERATION GROUP
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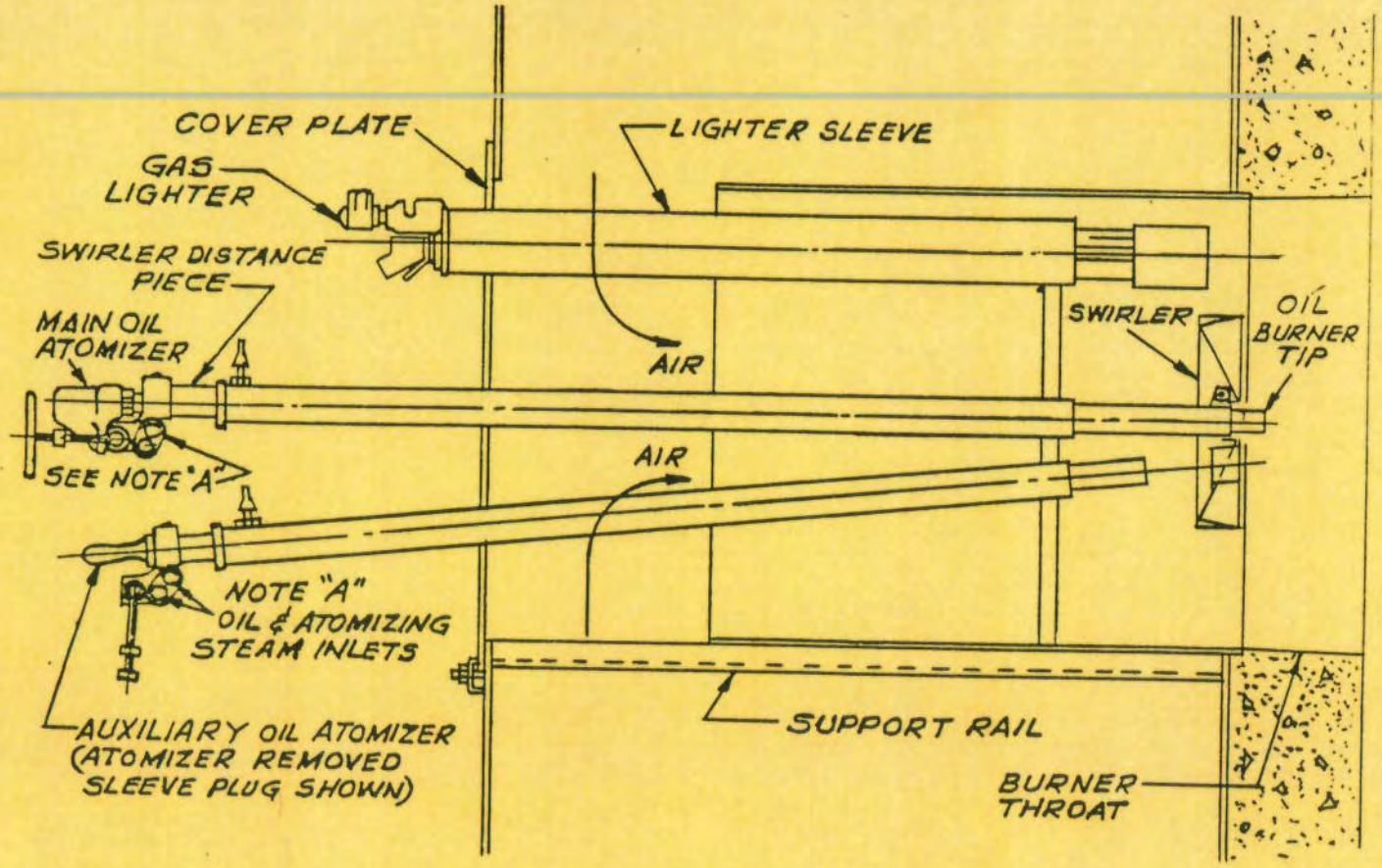
BURNERS
OPERATING INSTRUCTIONS
STS OIL BURNER
SINGLE BURNER INSTALLATION

FIGURE 2 SECTIONAL VIEW OF
BURNER - OIL (DUAL ATOMIZER)



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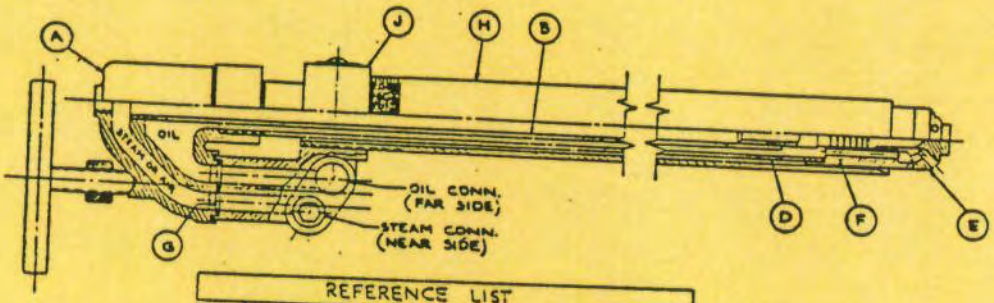
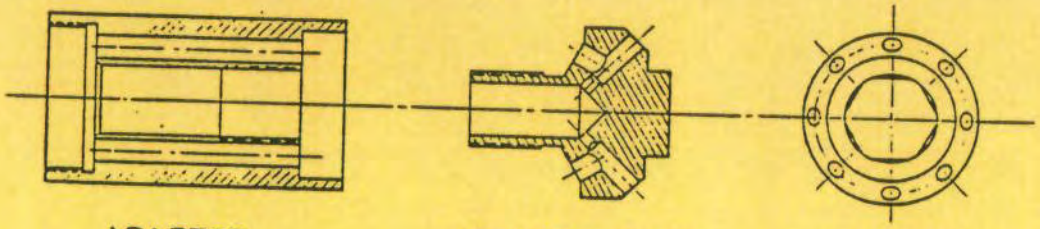
BURNERS
OPERATING INSTRUCTIONS
STS OIL BURNER
SINGLE BURNER INSTALLATION

FIGURE 3 ASSEMBLY YTA-JET ATOMIZER



REFERENCE LIST			
SYM	DESCRIPTION	DWG Nº	MK
A	ATOMIZER BODY	943158	1
B	INTERNAL TUBE	516263	1
D	BARREL	516258	1
E	SPRAYER PLATE	1132088	—
F	ADAPTOR	1132095	—
G	GASKET	116997A	1
H	REGULATING ROD	SEE S/O	—
J	YOKE & COUPLING ASSY	943508	1



ADAPTOR (F)

SPRAYER PLATE (E)

END VIEW

	OIL TYPE	NUMBER OF JETS	JET TYPE	DRILL SIZE OF EXIT HOLES	DRILL SIZE OF STEAM HOLES	DRILL SIZE OF OIL HOLES	INCLUDED ANGLE OF EXIT HOLES	EXPECTED FULL LOAD OIL PRESS.	ATOM. MEDIUM DIFF. PRESS
TYPICAL SYMBOLS	—	8	YTA	34	50	39	70	—	—
LOAD CARRYING									35
LOAD CARRYING									35
START-UP									35
START-UP									35
OTHER:									35

SPRAYER PLATE IDENTIFICATION

200 SERIES POWER ARC IGNITORS

General

The Power Arc Ignitor is a non-fouling, inextinguishable, high energy ignitor for all common oil and gas fuels.

A controlled capacitor discharge produces a high temperature arc that will ignite fuel oils more efficiently than a gas or torch ignitor.

The 76-90 Power Pack supplies high voltage D.C. to the power arc ignitor where it charges a capacitor in the power head. When the capacitor is charged to a preset level, it discharges through a gas filled 'Spark Gap' to the arc tip, where the electric energy is dispersed in the form of a high temperature arc, which lights the oil. This cycle repeats approximately 15 times/sec.

The energy output is rated in Joules. A Joule is equal to one watt-second. Each pulse of the Ignitor disperses 12 Joules of energy. Since the duration of each pulse is approximately 6 microseconds, the power output of each pulse is 2 megawatts. Model #76-90 Power Pack coupled with a 12 joule Ignitor will draw 480 watts.

This is a Heavy Duty system: The 76-90 Power Pack is capable of running continuously.

Storage

For long-term storage it is advisable to store the Ignitor in a heated facility to minimize condensation build-up. Normal temperature extremes (-20 degrees F to +180 degrees F) will not affect the unit. However, if it is suspected that the unit has seen excess water or temperatures, it is advisable to trouble-shoot the system outlined under the "No Spark" section or to return the unit for evaluation before a startup is tried.

Installation & Initial Checkout

Since the Ignitor will be moving in and out during normal operation, one should insure that the Ignitor will not hit any physical obstructions such as the burner's diffuser on insert and over head obstructions on retraction. Also, one should anticipate outside clearance for removing the Ignitor as well as the thermal expansion of the boiler tubes with respect to the foundation.

Positioning of the Ignitor should be done according to the burner manufacturer's recommendation. Generally speaking, one wants to insert the Ignitor into a volital fuel-air zone and retract it into a relatively cold zone. The inserted arc tip should intersect the oil spray at as perpendicular an angle as possible.

It is best to operate the Ignitor and its control system before a light-off is actually tried. This can often be accomplished by manually shutting off the oil valve and by by-passing various interlocks.

ZURN **AIR SYSTEMS**

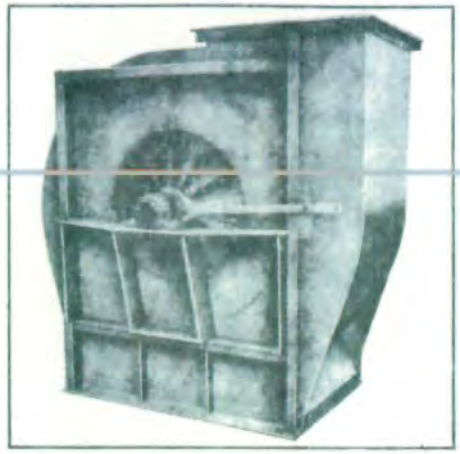
COMBINING THE RESOURCES OF

CLARAGE FLY ASH ARRESTOR

BULLETIN
SM-153A

INSTALLATION AND MAINTENANCE INSTRUCTIONS FOR TYPE RHP PACKAGED FANS SERIES 1600

Type RHP Fans are furnished for direct drive in Arrangement 4 (fan wheel mounted on the motor shaft) and in Arrangment 3 (fan wheel mounted between two bearings which are supported by the fan housing).



Type RHP in arrangement 3, UBD with vortex control and inlet screen.
Construction typical for sizes 80 and larger.

INSPECTION

Upon delivery the shipment should be checked against the bill of lading for shortage and carefully inspected for evidence of damage in transit. Shortage or damage should be promptly reported to the carrier for tracing or adjustment.

INSTALLATION

Type RHP Fans are aligned, run, and inspected at the factory prior to shipment. To retain this alignment the following precautions must be observed:

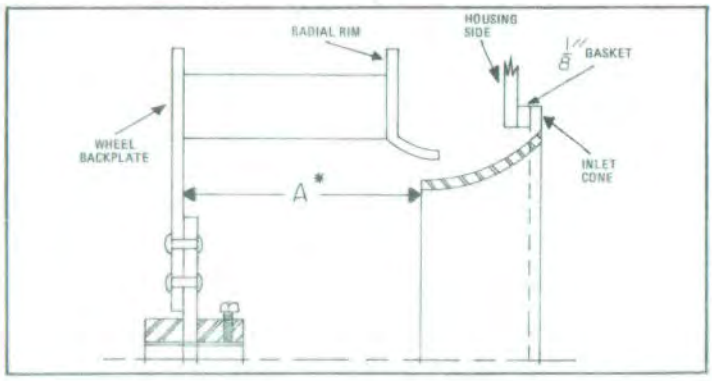
1. Foundations must be flat, level, and rigid. Where foundation is not flat and level, shims must be placed under fan support at each foundation bolt as required. Install and tighten foundation bolts.

2. Check for uniform clearance between wheel rim and inlet cone. If clearance is not uniform, loosen inlet attaching bolts, adjust inlet cone position for uniform clearance and retighten bolts.

3. Check axial position of fan wheel relative to inlet cone as shown in Figure 1. Where necessary to change position, loosen wheel hub set screws, reposition wheel and tighten set screws securely.

FIG. 1

FAN SIZE	A		
	SW-SI SERIES 61000	SW-SI SERIES 62000	SW-SI SERIES 63000
60	4 1/2	6 5/8	9 1/16
66	4 13/16	7 9/16	10 1/8
73	5 7/16	8 1/16	11
80	5 7/8	8 3/4	11 15/16
89	6 5/8	9 13/16	13 9/16
98	7 1/8	10 5/8	14 11/16
108	7 11/16	11 9/16	16



Note: Table shows correct measurement in inches between the inside edge of inlet cone and the inside face of wheel backplate for each size and series of Type RHP Fans. Dimension "A" should be measured at four points approximately 90 degrees apart.

4. Coupling alignment - Arr. 3 fans - Fan and driver coupling hubs must be accurately aligned in accordance with coupling manufacturer's instructions, in order to obtain smooth operation. Adjust position of driver to align couplings.

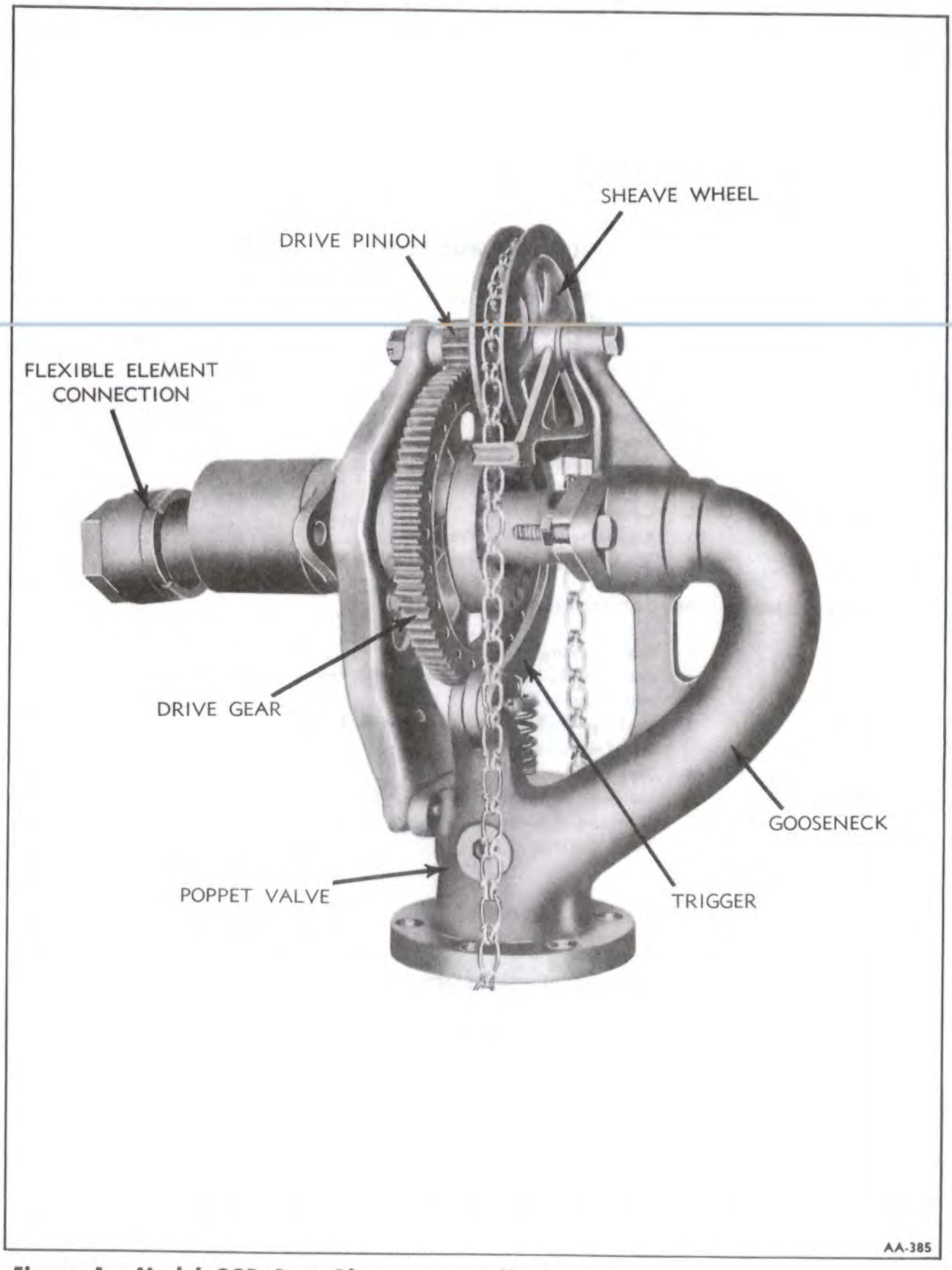
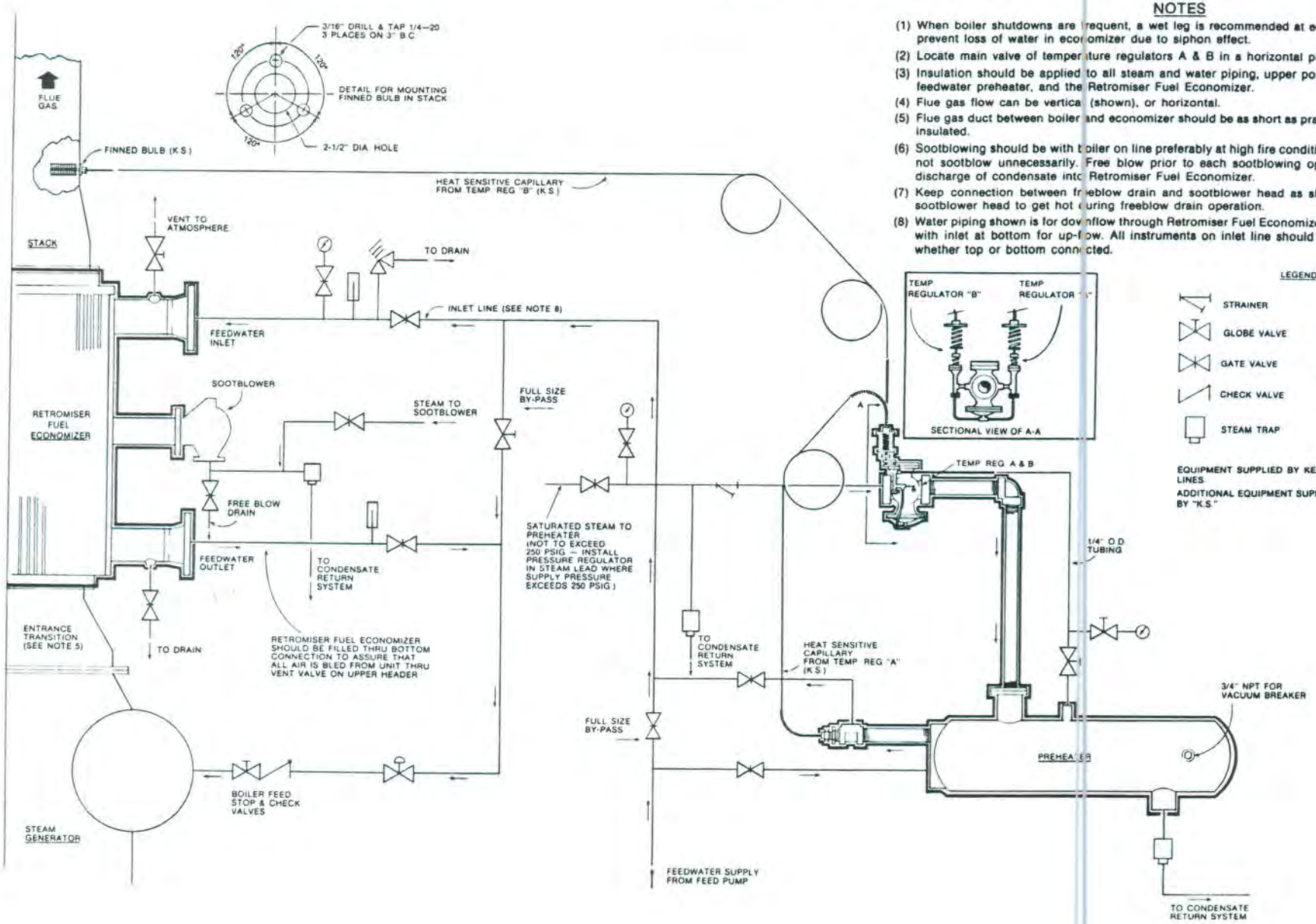


Figure 1 Model G9B Soot Blower, over-all view

Retromiser Fuel Economizer with Kentube Feedwater Preheat System*

Recommended Piping Diagram

*U. S. Pat. 4173949



NOTES

(1) When boiler shutdowns are frequent, a wet leg is recommended at economizer water outlet to prevent loss of water in economizer due to siphon effect.

(2) Locate main valve of temperature regulators A & B in a horizontal piping run.

(3) Insulation should be applied to all steam and water piping, upper portion of regulators A & B, feedwater preheater, and the Retromiser Fuel Economizer.

(4) Flue gas flow can be vertical (shown), or horizontal.

(5) Flue gas duct between boiler and economizer should be as short as practical, gas tight, and well-insulated.

(6) Sootblowing should be with boiler on line preferably at high fire condition for better cleaning. Do not sootblow unnecessarily. Free blow prior to each sootblowing operation to eliminate any discharge of condensate into Retromiser Fuel Economizer.

(7) Keep connection between freeblow drain and sootblower head as short as possible to allow sootblower head to get hot during freeblow drain operation.

(8) Water piping shown is for downflow through Retromiser Fuel Economizer. Piping can be arranged with inlet at bottom for up-flow. All instruments on inlet line should be installed on inlet line whether top or bottom connected.

LEGEND

- STRAINER
- GLOBE VALVE
- GATE VALVE
- CHECK VALVE
- STEAM TRAP
- PRESSURE GAUGE
- THERMOMETER
- SAFETY VALVE
- FEEDWATER REGULATOR VALVE

EQUIPMENT SUPPLIED BY KENTUBE OUTLINED BY HEAVY LINES.

ADDITIONAL EQUIPMENT SUPPLIED BY KENTUBE DENOTED BY "K.S."

Kentube RETROMISER® fuel economizer

STATIONARY SOOTBLOWER OPERATING PROCEDURES

The stationary sootblower, shown in Figure A, is used on the smaller Cylindrical RETROMISER units (units with numerically increasing Model Numbers from 100000 to 490000). Those units with Model numbers incorporating an "8" or "9" as the fourth digit (i.e., 200830) have a single blower element (E-1) near the flue gas inlet connection. All other units with stationary sootblowers have the twin elements (E-1 and E-2).

With the sootblower's lane blowing design, the nozzles of each element are aligned with the tube lanes. This allows the cleaning vehicle (steam or compressed air) to reach the full length of each finned tube coil.

Steam or compressed air at 85 psig minimum pressure (250 psig maximum) should be piped to each 1½" IPS external sootblower connection. A stop valve should be located in the supply line as close to the RETROMISER connection as practical. If necessary, for ease of operation, the stop valve should be equipped with a drive chain. For outdoor installations, or where a drive chain is impractical, an electric valve with remote push-button controls should be utilized.

The sootblower should be used as the exit water temperature drops appreciably below normal operating level, and with boiler on load as near high fire as possible. The steam lead to the blower must be well drained of condensate before the stop valve is opened. See the "Recommended Piping Diagram" for details.

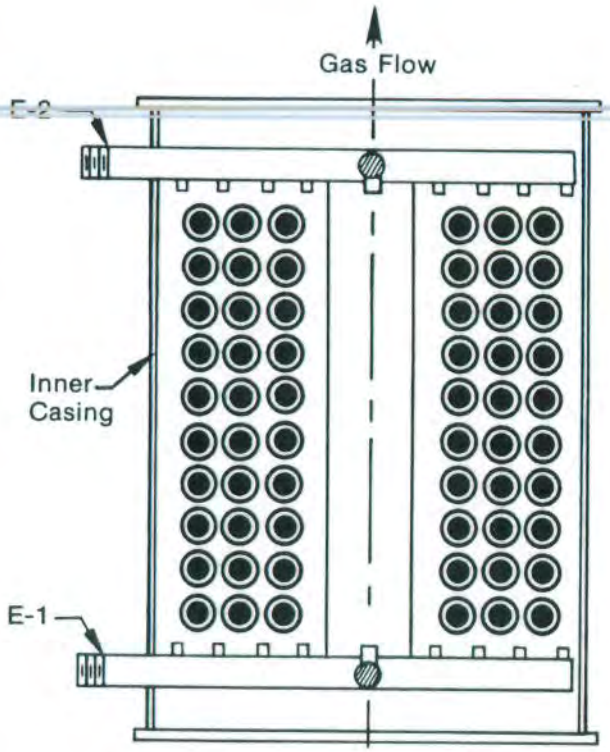


Figure A
Cylindrical RETROMISER Fuel Economizer with Stationary Sootblowers.

IMPORTANT

On units with two sootblower elements, open the valve to the lower blower (E-1) first. After closing E-1 valve, open valve to the upper blower (E-2). DO NOT operate both blower elements simultaneously.

Kentube

THE heat transfer people tranter

Kentube RETROMISER® Fuel Economizer

ROTARY SOOTBLOWER OPERATING PROCEDURES

The rotary sootblower, shown in Fig. A, features a chain-driven rotating element providing effective cleaning of the Cylindrical RETROMISER unit's finned tubing. With the sootblower's lane blowing design, the nozzles in the rotating element are aligned with each tube lane. This allows the cleaning vehicle (steam or compressed air) to reach the full length of each finned tube coil through 360° rotation.

Steam or compressed air at 85 psig minimum pressure (250 psig maximum) should be piped to the 2" IPS external sootblower connection. A stop valve should be located in the supply line as close to the RETROMISER connection as practical. If necessary, for ease of operation, the stop valve should be equipped with a drive chain. For outdoor installations, or where a drive chain is impractical, an electric valve with remote pushbutton control should be utilized.

The sootblower should be used as the exit water temperature drops appreciably below normal operating level, and with boiler on load as near high fire as possible. The steam lead to the blower must be well drained of condensate before the stop valve is opened. See the "Recommended Piping Diagram" for details.

It is recommended that 120 feet of drive chain rotation be pulled to assure complete coverage of all the heating surfaces.

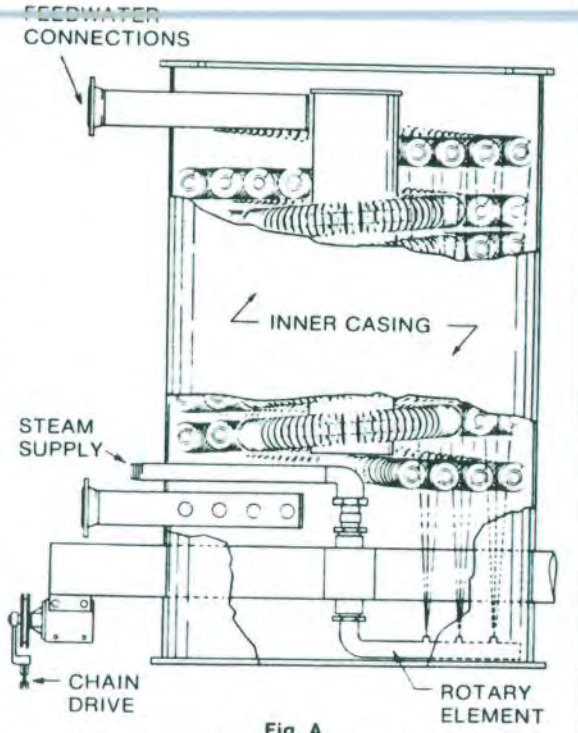


Fig. A
Cylindrical RETROMISER Fuel Economizer with rotary sootblower.

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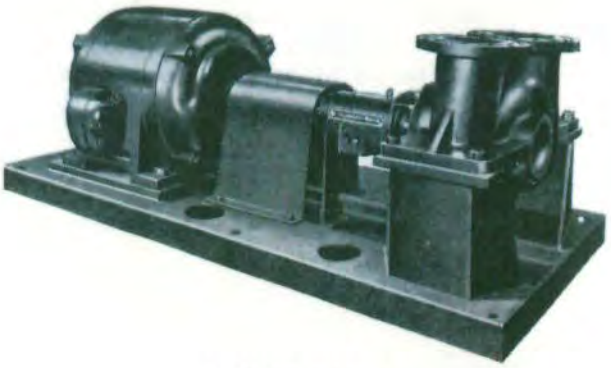
Form 7970-D
8/76

INSTRUCTIONS

for
INSTALLATION — OPERATION
and
MAINTENANCE
of
OVERHUNG PROCESS PUMPS



DOUBLE SUCTION

FORM 7970-D

SINGLE SUCTION

Ingersoll-Rand®

CAMERON PUMP DIVISION

11 Broadway, New York, N. Y. 10004

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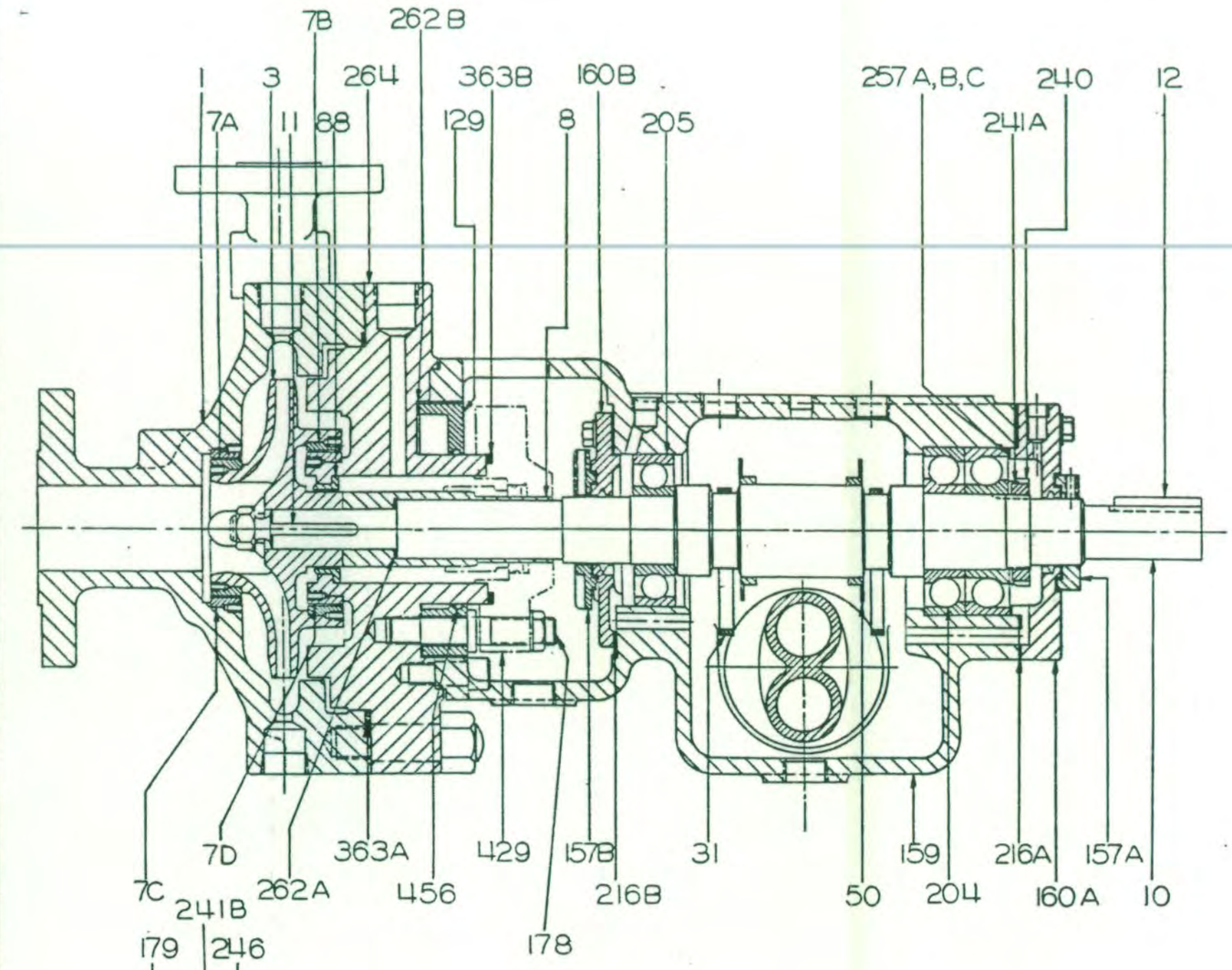
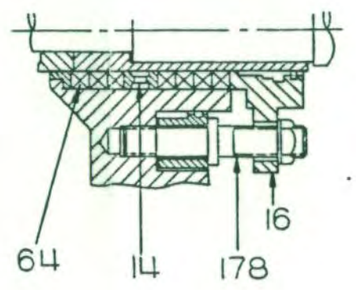
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



IMPELLER-NUT

PACKED BOX

—WHEN SPECIFIED—



THIRD ANGLE PROJECTION	INGERSOLL-RAND. PUMPS	
DRAWN K.M.P DATE 15 MAY 91	ENGINEERED PUMP DIVISION PHILLIPSBURG, N.J. 08865	
CHECKED JB 15 MAY 91	TITLE A-LINE PUMP	
APPROVED	SIZE C	CODE IDENT NO. 88032
ENG. APPVL.	SCALE NONE	SHEET 1 OF 1

INSTRUCTIONS — READ CAREFULLY BEFORE INSTALLING

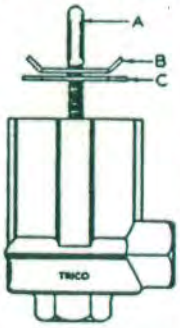
AUTOMATIC TRICO LUBRICATION

REG. U. S. PAT. OFF.

OPTO-MATIC GLASS OILERS

OPTO-MATIC Oilers are attached to the tapped hole in the side or bottom of the bearing reservoir. Check the center line through the oiler stem or pipe to see if it is level. Use spirit level if possible. If the hole in the bearing reservoir or the stem or pipe leading from the OPTO-MATIC is on an angle, oil will not flow from the oiler (see Fig. 1). This must be corrected by retapping the hole or by adjusting the pipes. Ream inside of pipes so that oil can flow freely. Be sure that all chips and dirt are carefully removed.

When oiler is level (see Fig. 2), fill bottle, screw it on to the lower reservoir of the OPTO-MATIC oiler and allow the oil to flow into the bearing reservoir. Several fillings of the bottle may be required before the oil level in the bearing reservoir is equal to the level for which the oiler is adjusted. NEVER FILL BEARING RESERVOIR THROUGH LOWER RESERVOIR OF THE OPTO-MATIC.



When level is reached and no more oil runs out of the bottle, start motor or machine. Check whether the oil ring is bringing up oil. This can be done by looking through the opening at the top of the bearing. The oil level should be just above the inside diameter of the oil ring (see Fig. 2).

If ring is not bringing up oil, remove bottle, pull out level adjuster "A", raise cross-arm "B" a trifle, secure same with lock "C", drop assembly back into lower reservoir and replace bottle. If level is still too low, repeat operation until proper level is obtained. No further adjustments are necessary at any time. Thereafter, it is only necessary to keep bottle filled with oil.

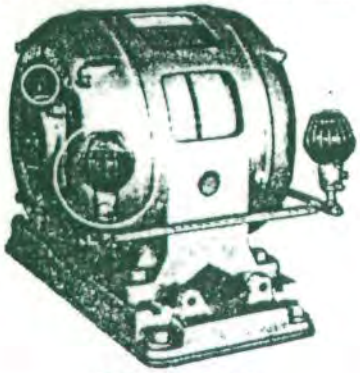
SIMPLE, QUICK LEVEL ADJUSTER

An exclusive TRICO FEATURE

Provides quick, accurate adjustment of oil level when installation is made. No need to saw or file off spouts, bend pipes or use excess fittings—no guess-work. IMPORTANT — Level adjuster is an integral part of the OPTO-MATIC. Do not remove it.

A TYPICAL INSTALLATION

A ball bearing motor modernized with OPTO-MATICS—visible and accurate oil supply—safe, clean and dependable operation. Note breather tube.



OTHER USES

OPTO-MATICS can and are being used for many other purposes such as feeding oil to comb boxes in textile mills, moistening tobacco and fabrics, moistening felt pads on labeling machines, etc.

BALL AND ROLLER BEARINGS

When OPTO-MATICS are used on ball or roller bearings, the installation is the same as for ring bearings, except that the oil level should never cover more than 1/16" to 1/8" above the inside diameter of the outer race at lowest point of bearing. When the level is too high, the oil splashes, foams, and seeps out along the shaft, wasting oil and deteriorating motor windings. High oil levels also cause excessive heating of bearings.

BREATHER TUBES

On ball or roller bearings, breather tubes should be used as shown in Figure 3, but piped to the outside of the fan housing, away from suction area, if it is found that the fan or pulley "sucks" the oil out of the bearing. (See Fig. 4).

Where it is necessary to obtain high oil level or to approach bearing from the bottom, or have pipe extensions through walls, guards, etc., the connections can be made as shown in Figure 5.

LARGE CAPACITY CONSTANT LEVEL OILERS

- *10 oz., 1 Pt., 1 Qt. and 2½ Qt. capacities*
- *Glass or Plastic Reservoirs*

For use where large quantities of oil or other liquids are consumed. Also extend refilling time. Feed light or heavy oils, also water. Can also be used for many other purposes.

Send for Bulletin

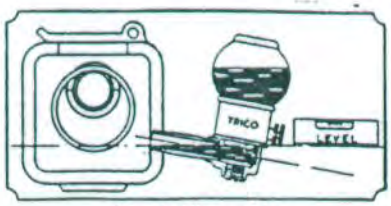


Fig. 1 Wrong Way

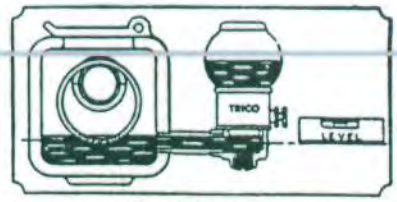


Fig. 2 Right Way

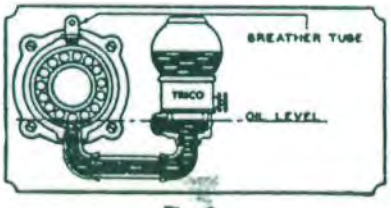


Fig. 3

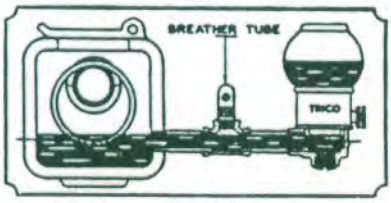


Fig. 4

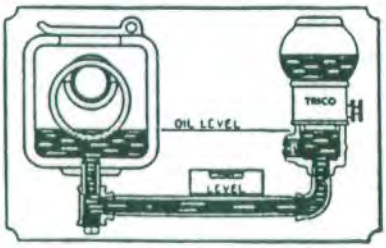


Fig. 5

NOTE: Oil level, at minimum setting, is ¼" on #1 and #2 Oilers and 3/32" on #3, #5 and #10 Oilers, above center line of side outlet.

USE THREAD COMPOUND on all threaded plugs and stems before tightening.

Also available in Unbreakable types with crystal-clear plastic bottles — send for Bulletin

TRICO MFG. CORP. MILWAUKEE, WIS. 53212, U.S.A.

RELIANCE ELECTRIC COMPANY

I.R. PO #011-36216-Ref. 595968

A-C. MOTOR PARTS LIST

Babcock & Wilcox Company
PO #326136 RH Item Auxiliary
Boiler Feed Pump

Customer Ingersoll-Rand, Cameron Customer P.O.

Reliance S.O. 923702			Motor Serial No. P40 G 11C			
Encl. TEFC						
Frame Size	HP	Type/Form	PH/CYC	RPM	Volts	Amps
EA 405TS	100	P	3/60	3565	230/460	115

Duty	Rise	Mech. Specs	Electrical Spec.	D/S No.
cont.	40 amb.	E400-103-A	596200	602531-1

Qty.	Part Name	Part Number	Qty	Part Name	Part Number
1	Stator	414717-1-AA	1	Frame	83169-A
1	Conduit Box	74874-24-A	set	Stator Coil *	E/S 596200
1	Shaft *	67775-RA	1	Rotor *	414721-1-AE
1	BBrg FE *	405850-90-K	1	BBrg BE *	405850-90-K
1	Bracket FE	83170-18-A	1	Bracket BE	83170-18-A
1	Mtrg Plate FE	403733-18-A	1	Mtrg Plate BE	403733-18-A
1	Wave Wshr FE	none	1	Fan Outer	77132-2-RB
1	Cover Fan	83198-A	1	Clamp Fan	none
1	Cap Inner FE	67880-2-A	1	Cap Inner BE	67880-2-A
1	Cap FE CutFanCvr	406099-A			
	Model #	P40 G 11C		Inst. Manual #	B3620-

ORDERING INSTRUCTIONS: When ordering, please specify: Part Name, Part Number Nameplate Data (see above), Serial and/or Model Number

*Recommended for Stock

Get Production Insurance With Genuine Factory-Built Parts

RE 478V1 Pr in U.S.A.

SIEMENS-ALLIS

Installation • Operation • Maintenance

Instructions

Induction Motors 143-449 Frame
Type RGZ, RGZ-CH, RGZE, RGZE-CH TEFC
Type RGZZ, RGZZ-CH, RGZZE, RGZZE-CH
TEFC Explosion-Proof

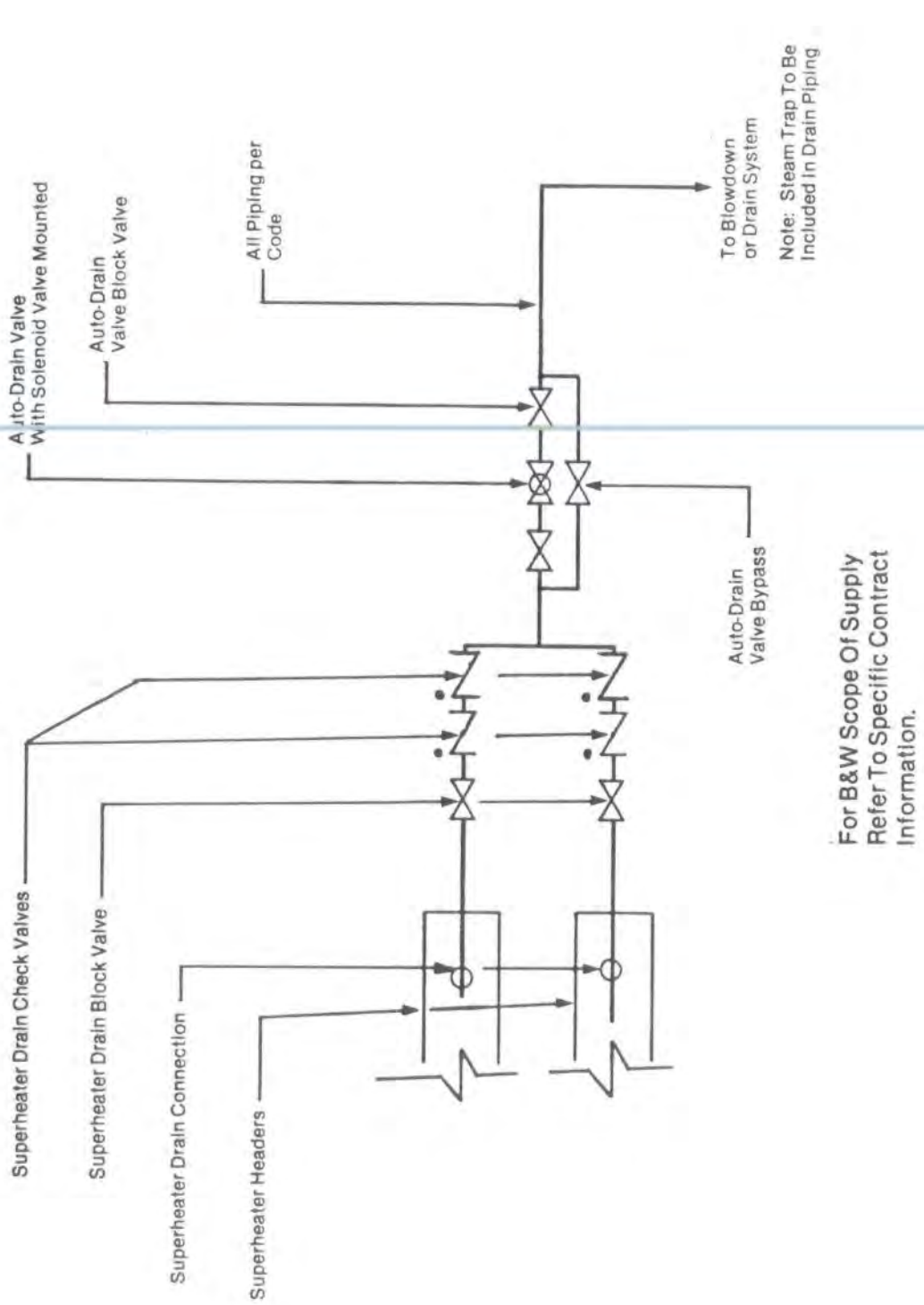


FIGURE 1
PIPING DIAGRAM FOR SUPER HEATER AUTO-DRAIN SYSTEM

Transamerica Delaval

IMO® PUMP

INSTRUCTIONS AND PARTS LIST

SERIES A3D

WARNING

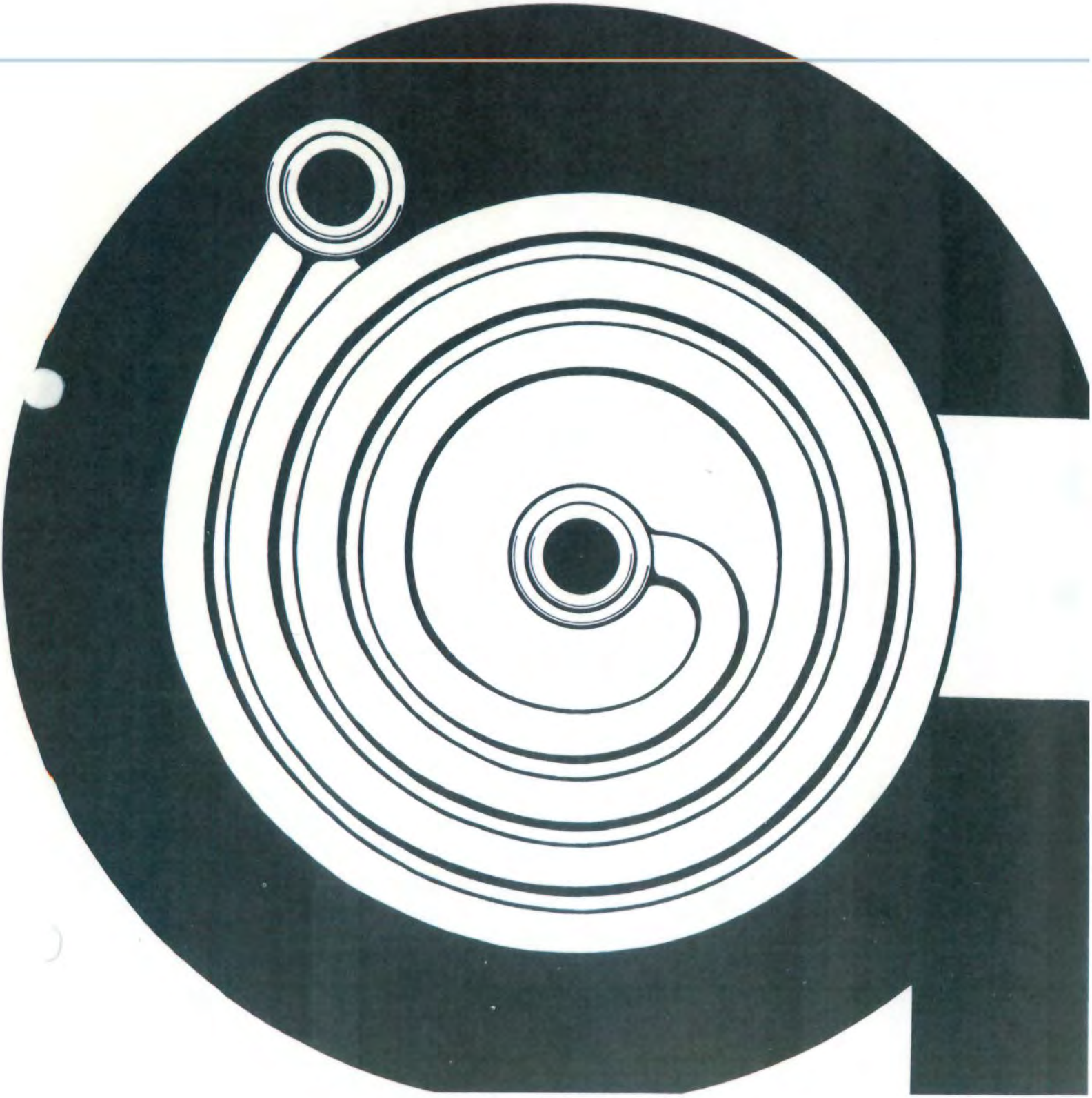
READ CA-1 AND THIS INSTRUCTION BOOK BEFORE
INSTALLATION, OPERATION, OR MAINTENANCE

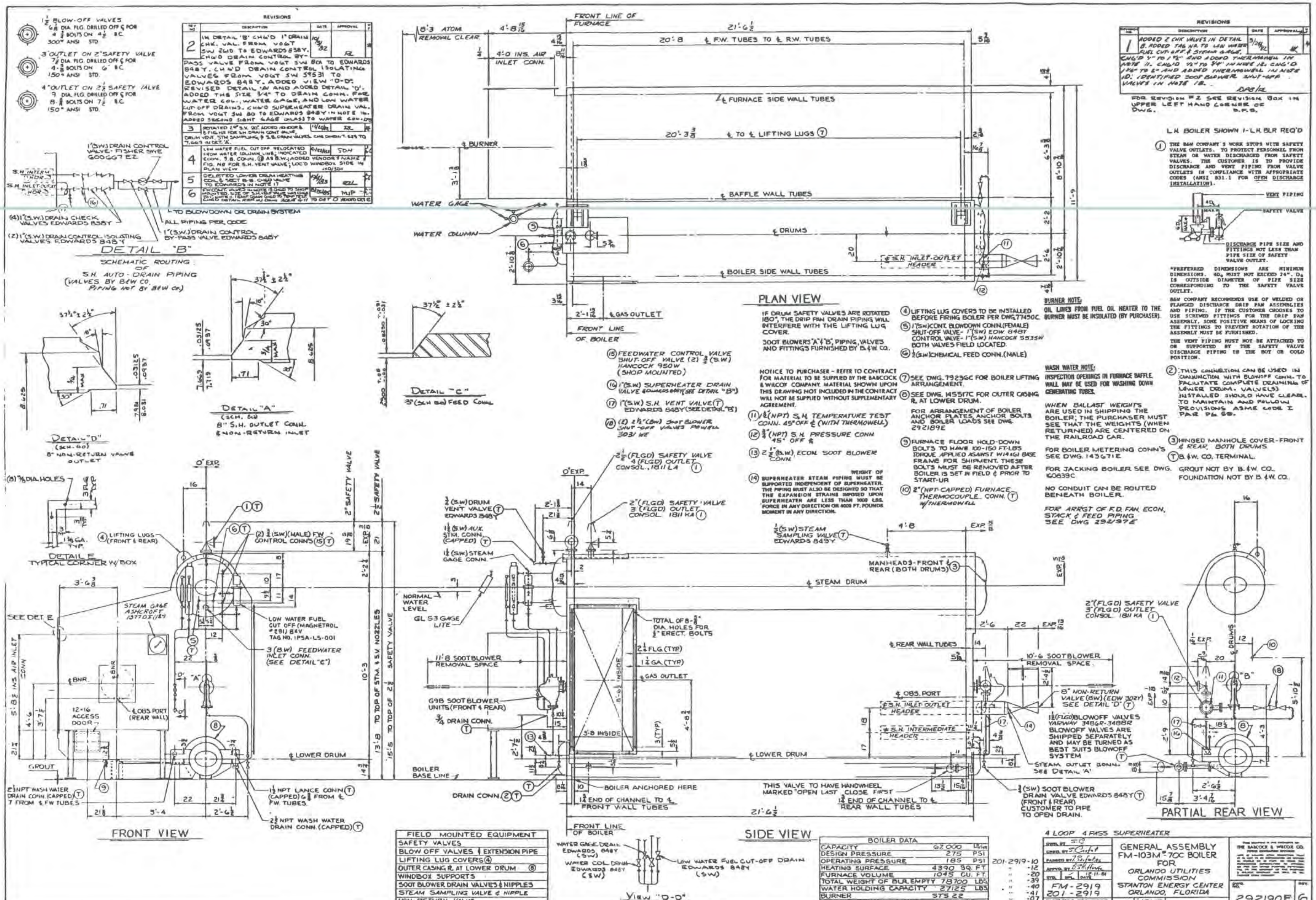
Instructions A3D-6 (R-5)

Transamerica Delaval Inc.
IMO Pump Division
Box 447
Airport Road
Monroe, NC 28110

October 1981

Heliflow®
installation, operation and maintenance





GENERAL ASSEMBLY
FM-103M-70C BOILER
FOR
ORLANDO UTILITIES COMMISSION
STANTON ENERGY CENTER
ORLANDO, FLORIDA
SCALE 1/2"=1 FOOT
FM-2919
201-2919
292190E
6
4 LOOP 4 PASS SUPERHEATER
THE BABCOCK & WILCOX CO.
BOILER DATA
CAPACITY 62 000 LB/HR
DESIGN PRESSURE 275 PSI
OPERATING PRESSURE 185 PSI
HEATING SURFACE 4390 SQ. FT
FURNACE VOLUME 1045 CU. FT.
TOTAL WEIGHT OF BLR. EMPTY 78700 LBS
WATER HOLDING CAPACITY 27125 LBS
BURNER STS 22
STEAM TEMPERATURE 526 °F
201-2919-10
-12
-20
-39
-40
-41
-07
FIELD MOUNTED EQUIPMENT
SAFETY VALVES
BLOW OFF VALVES & EXTENSION PIPE
LIFTING LUG COVERS (4)
OUTER CASING ℄ AT LOWER DRUM (8)
WINDBOX SUPPORTS
SOOT BLOWER DRAIN VALVES & NIPPLES
STEAM SAMPLING VALVE & NIPPLE
NON-RETURN VALVE
REVISIONS
L.H. BOILER SHOWN 1-L.H. BLR REQ'D
PLAN VIEW
FRONT VIEW
SIDE VIEW
PARTIAL REAR VIEW
VIEW "D-D"
DETAIL "B"
SCHEMATIC ROUTING OF S.H. AUTO-DRAIN PIPING
(VALVES BY B&W CO. PIPING NOT BY B&W CO.)
DETAIL "A"
DETAIL "C"
DETAIL "D"
DETAIL E
TYPICAL CORNER W/ BOX
STEAM DRUM
LOWER DRUM
FURNACE SIDE WALL TUBES
BAFFLE WALL TUBES
BOILER SIDE WALL TUBES
REAR WALL TUBES
GAS OUTLET
FRONT LINE OF BOILER
BURNER
WATER GAGE
WATER COLUMN
BOILER ANCHORED HERE
BURNER NOTE:
OIL LINES FROM FUEL OIL HEATER TO THE BURNER MUST BE INSULATED (BY PURCHASER).
WASH WATER NOTE:
INSPECTION OPENINGS IN FURNACE BAFFLE WALL MAY BE USED FOR WASHING DOWN GENERATING TUBES.
GROUT NOT BY B.&W. CO.
FOUNDATION NOT BY B.&W. CO.

BAILEY INSTRUCTION BOOK

TECHNICAL MANUAL

FOR

ORLANDO UTILITIES COMMISSION
ORLANDO, FLORIDA

CUSTOMER ORDER NO.: 326133RH
BCCO. JOB NO.: 19D

VOLUME I

MANUAL ASSIGNED TO

DEPARTMENT

TO MANAGEMENT

It is essential to the reliable and efficient operation of this equipment that these instructions be fully understood and carried out. It is important that only personnel capable of understanding the functions and operations of the equipment be utilized. Our Service personnel are available for consultation should information or procedures beyond those outlined in the instructions be found necessary.

Give at least one copy of this book to your instrument technician. It is suggested that a record be kept of the recipient so that any new or revised data may be forwarded promptly to him.

TO INSTRUMENT TECHNICIAN

This Instruction Book* contains a description of your Bailey equipment, and includes instructions on its installation, operation, and maintenance. Observance of these instructions will enable you to obtain optimum performance from your instruments and controls.

Throughout this Instruction Book there are specific WARNING AND CAUTION notes relating to the installation, operation and/or maintenance of your Bailey equipment. Notwithstanding these WARNING/CAUTIONS, the safety of your equipment and operating personnel are dependent upon the observance of these instructions and good operating practices, and the use of proper tools in the performance of required equipment calibration and maintenance.

*Prices for additional instruction sections and complete manuals may be obtained from the office serving your territory.

10-1-85
Form E 1044-281

Bailey Controls Company
Babcock & Wilcox, a McDermott company

Bailey Control Systems

Table of Contents

Customer: ORLANDO UTILITIES COMMISSION
ORLANDO, FLORIDA

Purchaser:

Order No. 326133RH

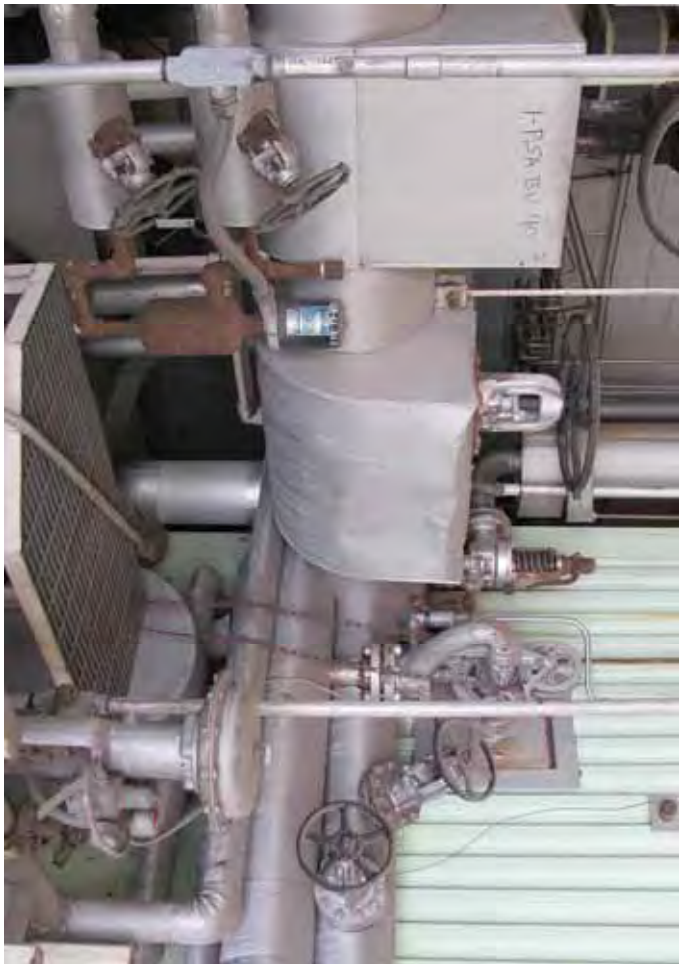
Bailey Controls Company Job No. 19D

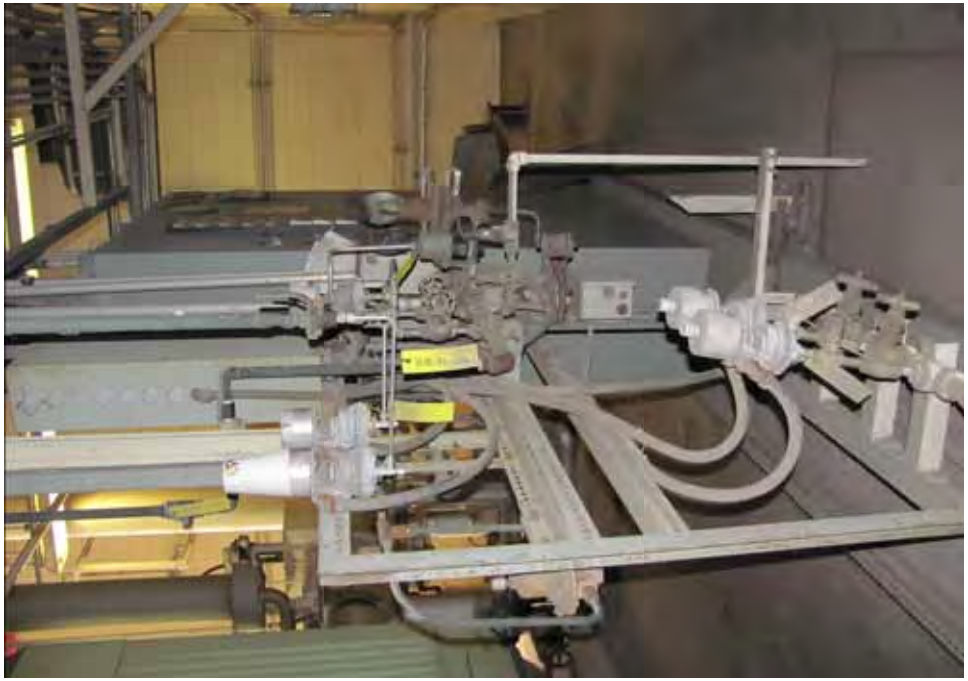
For explanation of Bailey nomenclature including ranges, refer to the appropriate instruction sections. (See the equipment list for Instruction Section Numbers.)

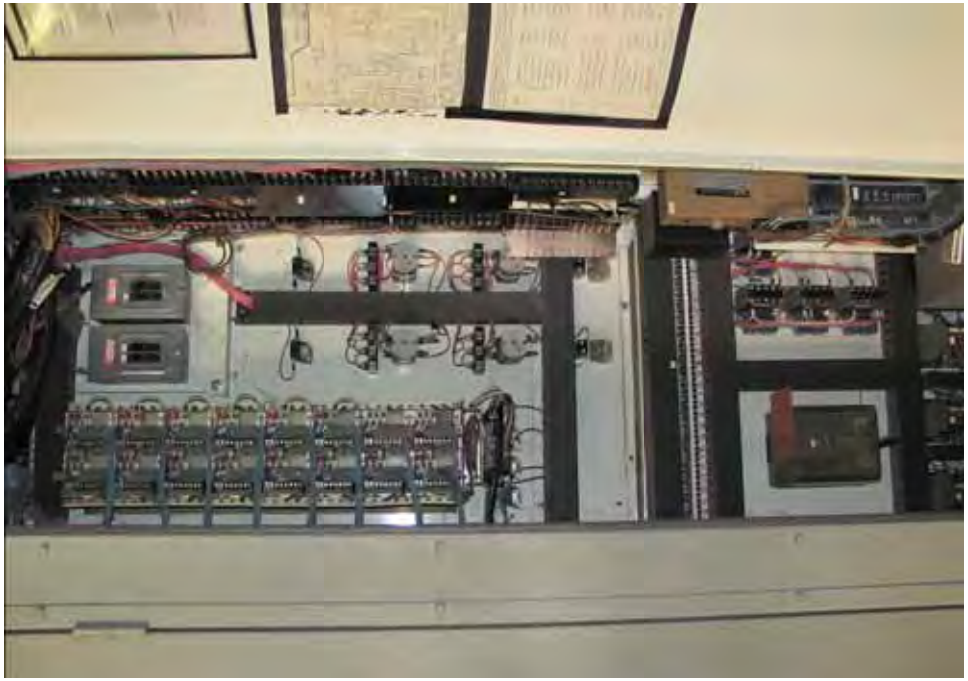
Customer: ORLANDO UTILITIES COMMISSION
ORLANDO, FLORIDA

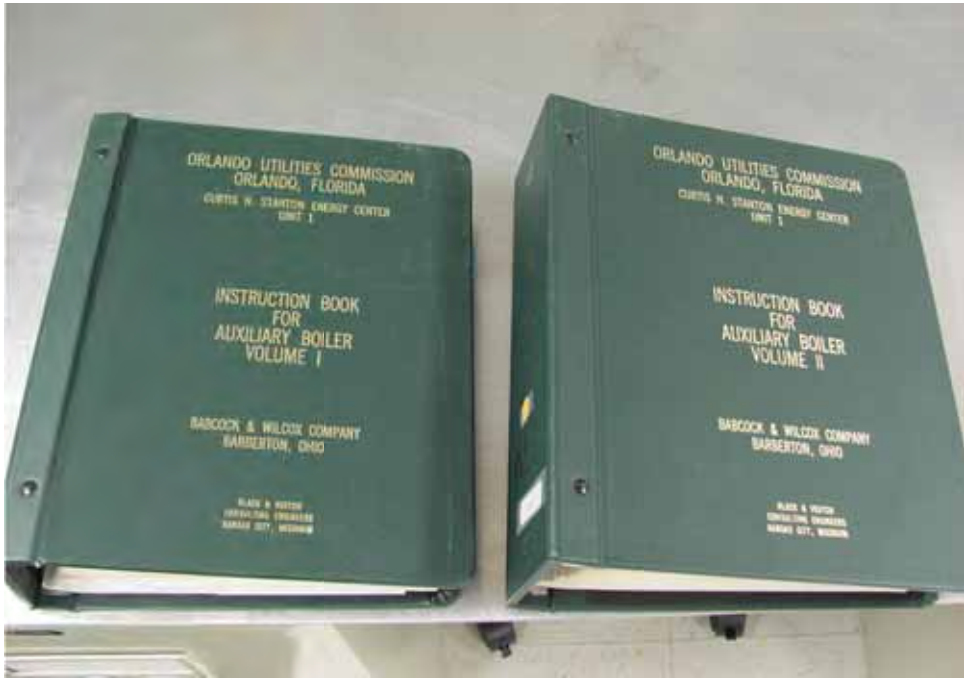
B.M. Co. Job No. 19D


BABCOCK & WILCOX
BABCOCK & WILCOX








ORLANDO UTILITIES COMMISSION
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INSTRUCTION BOOK
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AUXILIARY BOILER
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