MANUAL NO. 90900-7-80

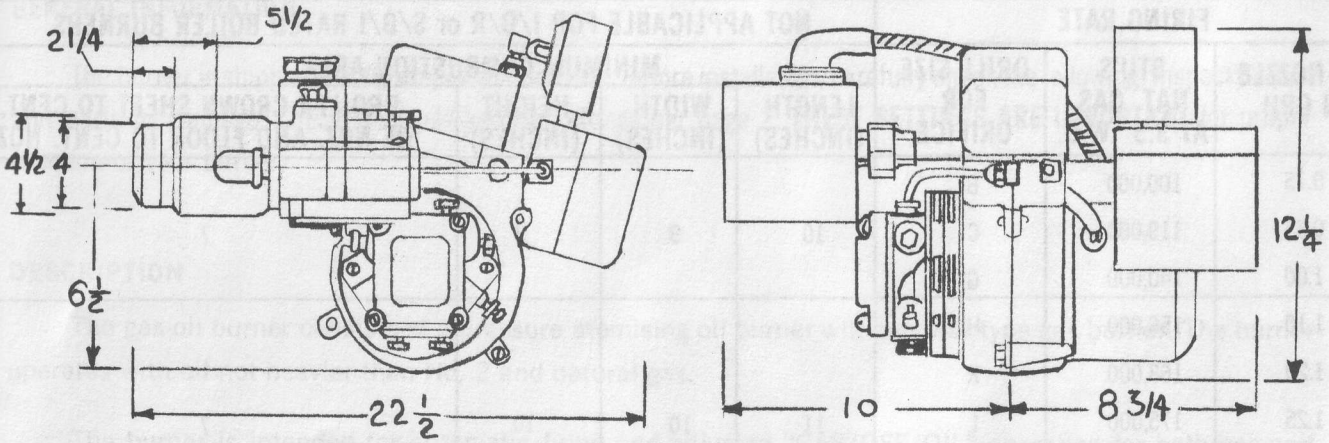
COMBINATION GAS/OIL BURNER

MODEL GC-210

100,000-240,000 B.T.U.H.
(.75-1.75 G.P.H. OIL)

THIS BURNER IS LISTED BY UNDERWRITERS LABORATORIES UNDER M.P. 1160 AND TESTED USING THE STANDARD FOR OIL BURNERS, UL 296, ALONG WITH ANSI Z21.17 FOR GAS

M.E.A. No. 82-80



ABC/SUNRAY CORPORATION
AN OERTLI GROUP CO.
45 SOUTH SERVICE RD. PLAINVIEW, N.Y. 11803 (516) 293-6800

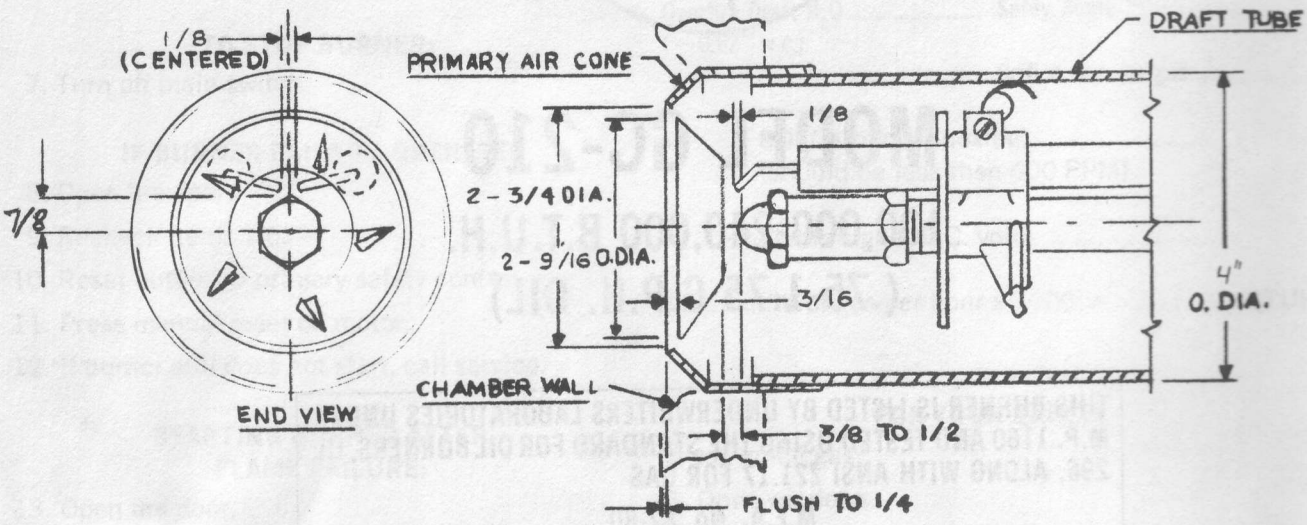
FAMOUS WORLD OVER FOR QUALITY AND ECONOMY

PRICE $2.00

GC-210 SERIES BURNER SPECIFICATION

THESE SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT FURTHER NOTICE

GPH RANGE NO. 2 OIL	BTU INPUT RANGE NATURAL GAS	MOTOR	TRANS - FORMER	PUMP	CONTROL
.75-1.75	100,000-240,000	1/7 H.P. 3450 RPM	12,000 VOLTS	A2VA-7416 SUND-STRAND	UVM - 2 WITH UV DETECTOR



FIRING RATE			NOT APPLICABLE FOR I/B/R or S/B/I RATED BOILER BURNERS			
			MINIMUM COMBUSTION AREA			
OIL NOZZLE IN GPH	BTU'S NAT. GAS AT 3.5" W.C.	DRILL SIZE FOR ORIFICE	LENGTH (INCHES)	WIDTH (INCHES)	HEIGHT (INCHES)	BROILER CROWN SHEET TO CENT. OF NOZ. AND FLOOR TO CENT. NOZ.
0.75	100,000	B	10	9	9	7
0.85	119,000	C				
1.00	140,000	G				
1.10	156,000	H	11	10	10	7
1.20	168,000	K				
1.25	175,000	L				
1.35	200,000	O				
1.50	210,000	Q	13	11	11	7
1.65	230,000	23/64				
1.75	240,000	⅜				

INTRODUCTION

This manual has been prepared to assist in the installation, operation and maintenance of your burner. Before installation, start-up or operation of the burner, read this manual carefully.

Due to the variation in engineering specifications, state and local codes, utility and insurance underwriters' requirements, the contents of this manual are of a general nature. If additional information is required or questions arise concerning specific requirements, please contact your local representative or the factory.

SECTION I

FUELS

Natural gas is used in this burner with specific gravity about 0.65 and thermal value ranging from 950 to 1,125 BTU per cu. ft. When burned perfectly the maximum Carbon Dioxide in the gases is about 12% with no Carbon Monoxide:

Number two fuel oil with thermal value around 140,000 BTU/gal. is used as a change over fuel. When this oil is burned perfectly, the maximum Carbon Dioxide in the gases is about 15% and there should be no smoke.

SECTION II

GENERAL INFORMATION

The burner is shipped as a factory assembled unit. Before installation, carefully check the following: Inspect burner and parts for damage. Check electrode settings, etc. as per page 2. **THESE SETTINGS ARE IMPORTANT** for proper function of your burner.

DESCRIPTION

The gas-oil burner consists of a pressure atomising oil burner with a power type gas burner. The burner operates with oil not heavier than No. 2 and natural gas.

The burner is intended for automatic firing and adjusted "GAS/OFF/OIL" operation for both gas and oil fuel.

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The gas-oil burner is provided with a direct spark ignition system for ignition of the main oil and gas supply.

The gas-oil burner is adjusted for "GAS/OFF/OIL" operation only. Change over from one fuel to another is accomplished by a manually operated gas-oil selector switch. The burner is rated 120V, single phase two wire, one side grounded.

MARKING

A combination U.L. label includes the specific model number with its range of fuel input and with other pertinent information is fastened at the back of the housing.

NOTE: BEFORE INSTALLING BURNER, CAREFULLY CHECK THE FOLLOWING:

Combustion Air Supply—Boiler Room in which burner is located must be provided with an adequate fresh air supply to assure proper combustion. The ventilation opening should not be less than 1.0 sq. ft. of free opening per million BTU of burner input.

Stack and Breeching—Should be size recommended by boiler manufacturer. A barometric damper (double acting type for gas installations) should be used on all installations.

Electrical Connections—Power supply must agree with burner requirements. All wiring must be done in accordance with National Electrical Code and local requirements. Burner electric power should be provided from a separate fused disconnect switch located in the Boiler Room. (Fuse protection should be the "slow blow" type.) Follow National Electric Code ANS1 C1-1975 in absence of local codes.

BURNER GASKET

Cement asbestos rope gasket or install sheet gasket furnished with burner to the burner mounting flange for a seal to prevent leakage of combustion gases from the boiler firebox.

BURNER MOUNTING

Attach burner to the boiler front plate by firmly tightening nuts of the mounting studs or clamps so that a rigid installation is accomplished.

NOTE: MAKE SURE BURNER IS LEVEL OR PITCHED DOWN 2° BEFORE TIGHTENING CLAMPS.

WIRING

All burners are pre-wired at the factory as far as practical. Refer to burner and separate field wiring diagrams for complete wiring information and study thoroughly before making any connections. The burner must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code ANSI C 1-1978.

SECTION III

INSTALLATION INSTRUCTIONS

TANK

1. All oil storage tanks must be U.L. approved and installed according to National Board of Fire Underwriters or local ordinances whichever has precedence.
2. All pipe connections on underground buried tanks must have swing joints except the sounding well (stick well).
3. The fill line must pitch toward tank ¼" per ft.
4. The vent line should not be less than 1¼" I.P.S. and equipped with an approved vent cap. Pitch toward tank ¼" per ft.
5. The tank gauge should be installed so that the float will not be under the fill line. On underground tanks protect bulb and gauge line inside tank with rigid iron pipe.

Two Pipe System Only

OIL LINES

1. Use ½" O.D. copper tubing with flared fittings for suction and return lines to avoid underground connections. If local regulations require rigid pipe, use black wrought iron and malleable fittings with double swing joints to prevent breakage in case the tank settles. (Consult pump manufacturer's specifications for other sizes and iron pipe substitutions.)
2. Both suction and return lines should extend to within 4" of the tank bottom.
3. Slip fittings should be used on the tank for copper suction and return lines. Double-tapped bushings can be used with wrought-iron pipe; however, a bushing welded to the dip tube is preferred.
4. Install, in suction line at outside wall, an approved hand valve and spring loaded ball check. When the tank is vaulted and the bottom of tank is on same level as burner, install a vertical check valve as close to top of tank as practical.
5. If bottom of tank is above the level of the burner, an anti-syphon valve is usually required at the highest point.
6. Install an approved hand valve close to burner pump, before the filter, and connect from filter to pump with a copper tube pigtail.
7. Install a copper tube pigtail between pump and spring-loaded ball check in return line.

8. Avoid fastening suction and return lines to floor beams. If necessary to do so, use loose fittings hangers with soft rubber lining to prevent noise transmission.

9. A separate suction line must be used for each burner. A common return line may be used, provided a spring-loaded ball check is installed in the return pipe from each fuel unit.

NOTE: If The burner is used as a gas burner for extended time, it is advisable to disconnect oil pump coupling. But remember to connect the coupling when oil is fired!

FILTER

1. A filter is recommended in the suction line.

2. Use large filters on 2-pipe systems (20 to 30 g.p.h. rating).

SECTION IV

GAS PIPING TO BURNER

A separate gas service supply pipe should always be run from the gas meter to the burner. Use black steel pipe and malleable (not cast iron) pipe fittings. Use a suitable pipe dope on all male threads and rigidly support entire gas line with straps and hangers.

Consult local utility for correct pipe size. Usually 1½" pipe size or one size larger than main manual shut off . . . whichever size is larger is sufficient for 40 feet length and 6 to 8 elbows or tee's. Manual main shut off valve must be installed external to the jack where regulations require, and installation must comply with all applicable codes. A drip leg must be installed at the inlet of the gas connection to the unit. Piping must be supported independently from the burner.

Before burner is started, check piping for leaks. Attach a 20" manometer to the valve. Turn off Main Shut off Valve. Turn on gas at meter. Open valve, read manometer, then turn off gas at meter. If manometer reading changes in 10 minutes elapsed time, check each pipe joint from meter to burner with a soap suds solution to locate gas leak. Tighten and repeat procedure until manometer reading remains unchanged.

SECTION V

FIRING ASSEMBLY—REMOVAL AND ADJUSTMENT

1. To install the nozzle, the firing assembly must be removed: Remove copper tubing and screws holding ignition transformer. Pull transformer sideways. Push and pull straight back. Note: spring pressure will cause some resistance. **Do not** force or bend the pipe.

2. Inspect the nozzle adaptor seat for any defects. A loose or improperly seated nozzle will cause an oil leak and poor oil cut off. Use an "Ideal" type nozzle wrench or two wrenches to remove or tighten the nozzle.

3. Set electrodes as shown on page 2.

4. Reinstall firing assembly by reversing the procedure in paragraph No. 1.

5. Tighten all screws and copper fittings.

6. For gas, select proper orifice from chart on page 2 equivalent to oil input and install it in the union.

SECTION VI

BURNER OPERATION

Initial Start . . .

1. Before starting burner, check gas supply lines for leaks . . . (see last paragraph under Gas Piping.)
2. Bleed the gas line to let the air out. This can be done by opening side nut on "A" cock. Watch the gas meter until about 1 cu. ft. is bled out and then shut off cock and reconnect.
3. Procedure for the type of gas to be used is shown on the instruction plate on the burner. It is advisable to open the furnace firing door (or flame observation door) during the entire procedure to provide safety relief for delayed ignition, should unforseen difficulties be present.

To Light Burner on Oil

1. Turn on manual switch to oil side.
2. Set thermostat so that the system is calling for heat.
3. Reset the safety switch if tripped.
4. Turn on electric power. The operating control closes and powers the solid circuit. The motor lead relay is energized and the burner motor runs to provide a 30-second prepurge. As repurge ends, trial-for-flame begins. The ignition transformer and valve are energized and the burner lights. 4 seconds is the trial for ignition.
5. Take combustion readings and record as on last page.
6. Set thermostat at desired temperature.
7. If the burner is shut down for maintenance purposes, also turn off electric power and the manual main gas valve.

To Light Burner on Gas

1. Turn on manual main gas valve.
2. Turn the switch to gas side.
3. Follow the same procedure as for oil.

Adjusting Combustion Air

Open the air shutter slightly, but be prepared to open it further. The flame should be blue for gas and bright white for oil. (Flue gas analysis for gas side should indicate 8% to 10% CO_2, with no trace of CO (Carbon Monoxide) indicated **at 0.02" w.c. draft over fire** while for oil 10% to 12% CO_2 with no smoke on test paper). Flue gas analysis should be conducted with proper instruments. After proper air adjustments, tighten the air bands. A qualified serviceman for gas as well as for oil should do the installation and adjustment of air bands.

Control

UVM-2 with UV scanner is used in this burner. For more specific information on the control refer to Bulletin C400878 of Fireye Division of Electronic Corporation of America. Flame signal at test jacks should be 4 to 6 D.C. volts.

Flame Signal Testing

A. Manually open the main fuel valve.

B. Set the test meter on the DC seal and insert the meter leads into test jacks.

C. Initiate a normal start-up.

D. When flame is established, the test meter reading should be normal. If not, check position of sight tube and recheck the operation.

To Check Safety-Lockout

1. Shut off the main fuel.

2. Reset the safety switch if tripped.

3. Turn on electric power.

4. After 30 seconds of prepurge, there would be ignition noise for 4 seconds only. Control might recycle with prepurge; but should go on safety and lockout should occur.

TROUBLE CHECK LIST

TROUBLE	POSSIBLE CAUSE	REMEDY
1. Power on, but burner fails to start.	1. Fuse might have blown up.	1. Install a new fuse.
2. Burner cycles, but does not light.	1. Check the flame signal, if it is weak.	1. Reposition sight tube in the burner head.
	2. No signal, but for 4 seconds flame appeared.	2. Change UV scanner.

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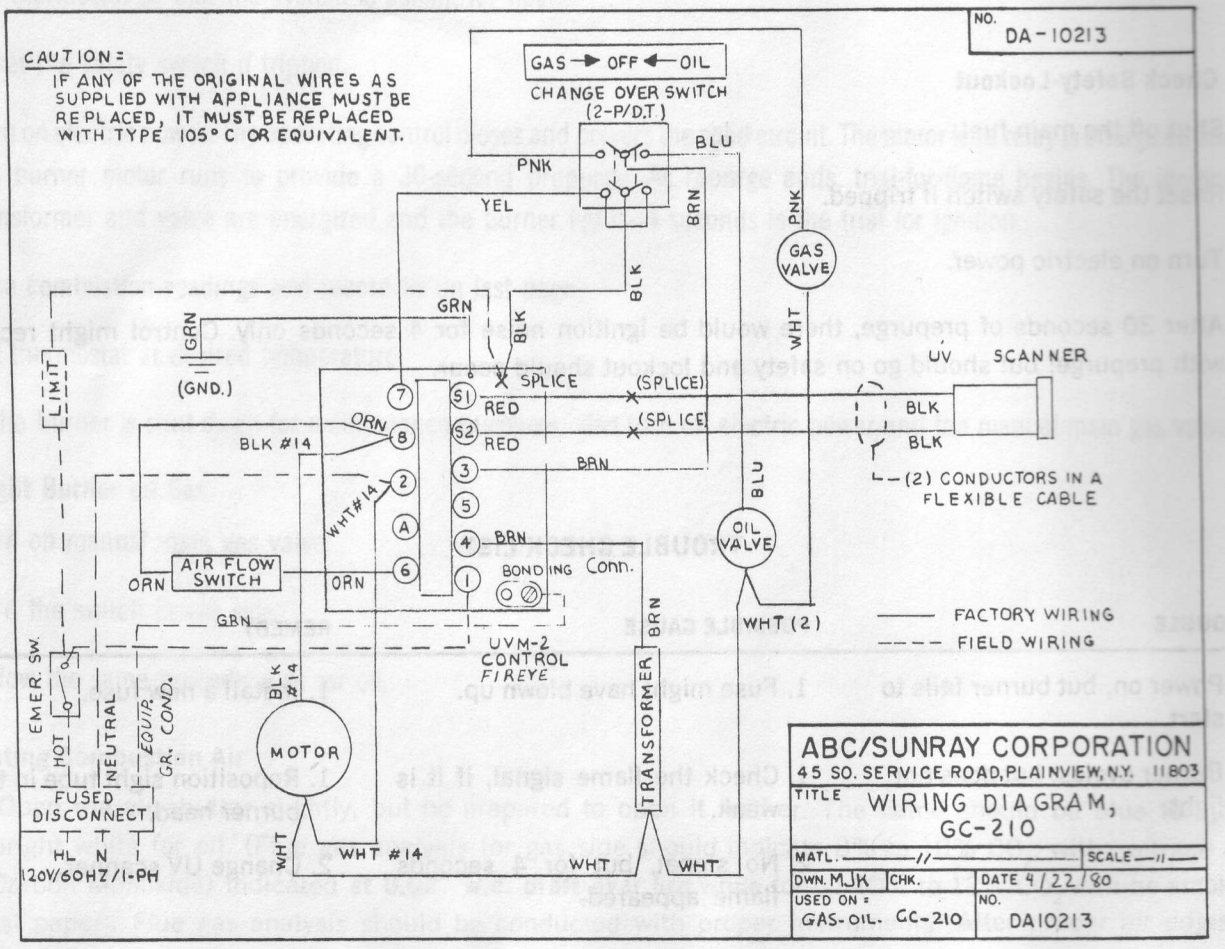
TROUBLE	POSSIBLE CAUSE	REMEDY
Burner cycles, but does not light.	3. Manual reset might be in off position on pressure switch.	3. Reset the lever on pressure switch.
	4. Air flow switch might not be working.	4. Check the continuity on air flow switch when burner motor is on. If there is no continuity, change the switch.
3. Nuisance shut down.	Check Troubles 1 and 2.	

Maintenance

Lubricate burner motor twice yearly with 4 drops of #10 S.A.E. motor oil. The complete heating system should be cleaned, adjusted and checked by a serviceman before the start of each heating season.



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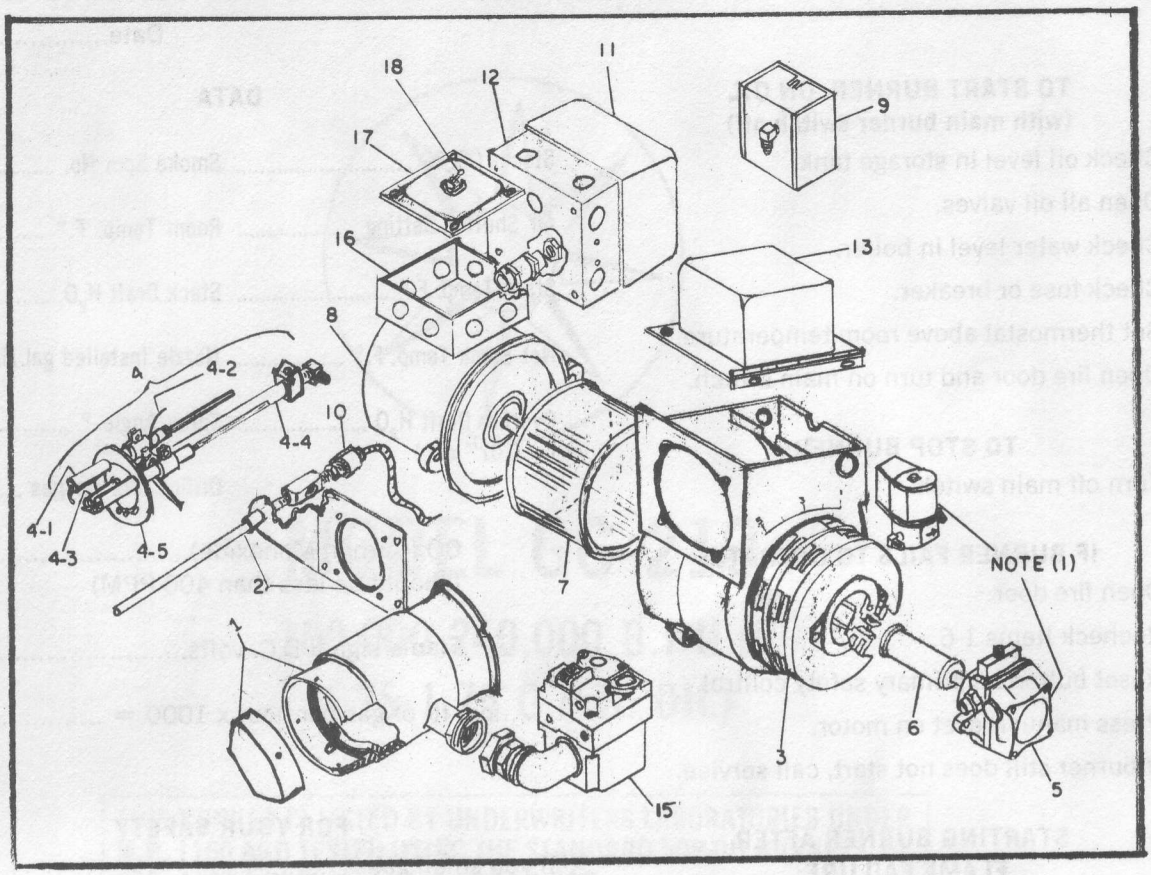
BURNER PARTS LIST



ITEM	DWG. NO.	DESCRIPTION	QTY.
	AA10200	GC-210 ASSEMBLY	1
1	AA10127	DRAFT TUBE & END CONE ASSY.	1
2	TA10047	SCANNER SIDE TUBE	1
3	SA42211	AIR INLET BAND	2
4	AA10240	FIRING HEAD (DRAWER) ASSY.	1
4-1	EA41452	5" ELECTRODES	2
4-2	SA41102	TORQUE SPRING	1
4-3	SA41851	NOZZLE ADAPTER (SHORT)	1
4-4	TA40221	OIL LINE STRAIGHT	1
4-5	SA10070	STATIC DISC 3¼" DIA.	1
5	PA10015	FUEL PUMP A2VA-7416	1
6	GA46068	FLEX COUPLING	1
7	FA40161	BLOWER WHEEL	1
8		MOTOR 1/7 HP 3450 RPM	SELECT
8-A	MA40181	MOTOR (MARATHON 48S34S54ASE	(1)
8-B	MA40191	MOTOR (WESTINGHOUSE 316 P 906	
9	EA46071	AIR SWITCH	1
10	EA10072	SCANNER ASSY. UV-2	1
11	EA41280	CONTROL "FIREYE" UVM-2	1
12	EA41275	MOUNTING BASE CONTROL	1
13	AA40233	IGNITION TRANSFORMER ASSY.	1
14	AA46301	TUBE ASSEMBLY	1
15	EA10186	VALVE	1
16	Sa41131	JUNCTION BOX ASSY.	1
17	SA10076	JUNCTION BOX COVER	1
18	EA10077	OIL OFF GAS SELECTOR SWITCH	1

NOTES:

1. USE SOLENOID VALVE (NO. V4046B-1007) AND FUEL PUMP SUNDSTRAND, NO. A2VA7016. AS ALTERNATE TO ITEM NO. 5. (DWG. NO. PA10015) NO. A2VA-7416

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OPERATING INSTRUCTIONS

Date.....

TO START BURNER: ON OIL (with main burner switch off)

1. Check oil level in storage tank.
2. Open all oil valves.
3. Check water level in boiler.
4. Check fuse or breaker.
5. Set thermostat above room temperature.
6. Open fire door and turn on main switch.

TO STOP BURNER:

7. Turn off main switch.

IF BURNER FAILS TO OPERATE:

8. Open fire door.
9. Recheck Items 1-6.
10. Reset button on primary safety control.
11. Press manual reset on motor.
12. If burner still does not start, call service.

STARTING BURNER AFTER FLAME FAILURE:

13. Open fire door.
14. Do not attempt to start if chamber is hot or if there are fumes or oil in chamber.
15. If Item 14 is satisfactory, reset primary safety control, BUT DO NOT RESET MORE THAN TWICE.

TO STOP BURNER FOR PROLONGED PERIODS:

Turn off main switch, remove fuse, close oil line valves and fill oil tank to prevent condensation.

DATA

Stacks CO_2% ..... Smoke Spot No. .....

Air Shutter Setting ..... Room Temp. F.° .....

Stack Temp. F.° ..... Stack Draft H_2O .....

Net Stack Temp. F.° ..... Nozzle Installed gal./hr. .....

Overfire Draft H_2O ..... Spray Angle ° .....
(— 0.02" w.c.)

Orifice size for gas .....

CO (Carbon Monoxide).....
(should be less than 400 PPM)

Flame signal D.C. volts.....

.....cu. ft. of gas per hour x 1000 = ...BTUH

FOR YOUR SAFETY

If you smell gas:

1. Open windows.
2. Don't touch electrical switches.
3. Extinguish any open flame.
4. Immediately call your gas supplier.
5. Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

CAUTION

DO NOT use gasoline, crankcase oil or any oil containing gasoline.

DO NOT incinerate garbage or refuse in this unit.

DO NOT tamper with burner or controls — CALL YOUR SERVICE MAN.

WHEN SERVICE OR REPAIRS ARE REQUIRED

Call .....

Day Telephone..... Night Telephone.....

Always give the following information:

Burner Model..... Serial No.....

Date Installed.....

HANG NEAR BURNER