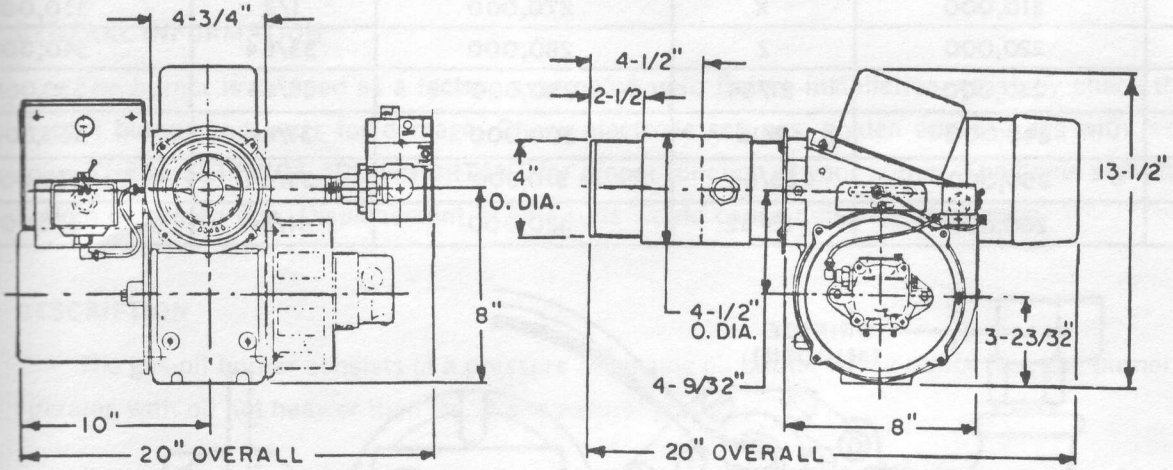
MANUAL NO. 10100—7/84 500

COMBINATION GAS/OIL BURNER

MODEL GC-385

200,000-375,000 B.T.U.H.
(1.5-2.7 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.



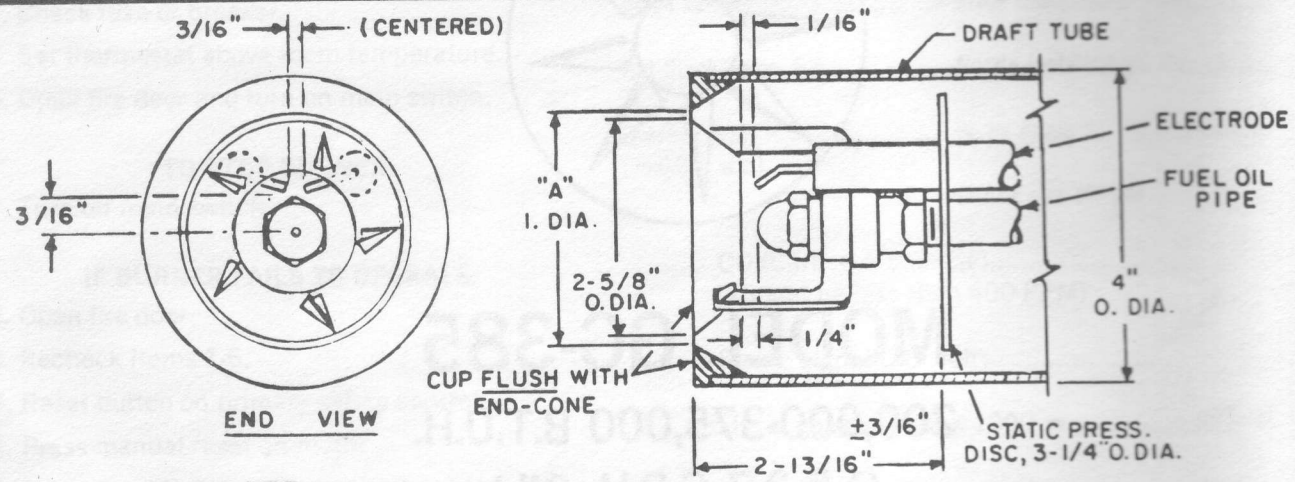
AMERICAN BURNER CORPORATION
ABC/SUNRAY • ŒRTLI

ABC/SUNRAY CORPORATION
85 Austin Boulevard • Commack, NY 11725
(516) 543-4600

"GC-385" SERIES BURNER SPECIFICATIONS

THESE SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT FURTHER NOTICE.

BURNER MODEL	END CONE DIM. "A"	GPH RANGE NO. 2 OIL	BTU INPUT RANGE NATURAL GAS	MOTOR	TRANSF-FORMER	PUMP	CONTROL
GC 385-1	3-1/8	1.5-2.0	210,000-280,000	1/4 HP 3450 RPM	12,000 VOLT	A2VA7016 SUND-STRAND	UVM-2 WITH UV DETECTOR
GC 385-2	3-1/4	2.0-2.65	280,000-375,000				



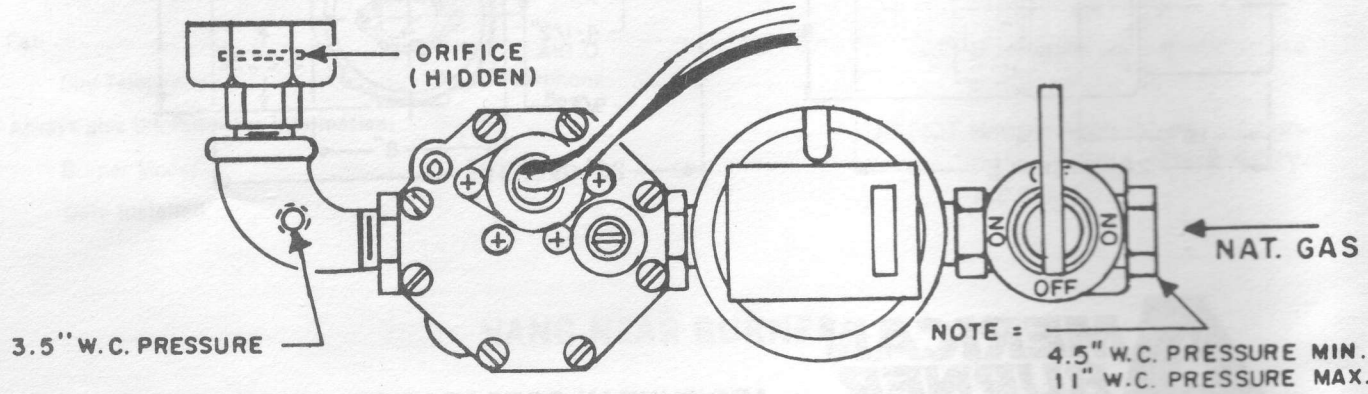
NOTE = ALL DIMENSIONS MUST BE CLOSELY MAINTAINED.

OIL NOZZLES 30°, 45°, OR 60° ALL SOLID SPRAY

INPUT OF GAS AT 3.5" W.C. MANIFOLD PRESSURE

EMPIRICAL FORMULA; BTU = $-2307044 + 1789946X - 1302721X^2$

DRILL SIZE	BTU	DRILL SIZE	BTU	DRILL SIZE	BTU
21/64	210,000	X	270,000	1/2	330,000
R	220,000	Z	280,000	33/64	340,000
S	230,000	27/64	290,000	35/64	350,000
23/64	240,000	7/16	300,000	37/64	360,000
3/8	250,000	29/64	310,000	39/64	370,000
W	260,000	15/32	320,000	41/64	375,000



GAS MANIFOLD TRAIN

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, golden cup settings with respect to end cone. **THESE SETTINGS ARE IMPORTANT** for proper function of your burner. The flame sight tube is at the bottom of golden cup. Displacement of this tube would cause nuisance shut down.

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.

In All Communications State Burner Model and Serial Numbers

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. Burner head should be flush or 1/8" recessed from the inside of the chamber.

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.

In All Communications State Burner Model and Serial Numbers

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 cover and slide plate. Holding the bus bar and oil pipe, push assembly away from turret side to motor side. Revolve assembly up. Then make it parallel to tube and pull straight back. Note: spring pressure will cause some resistance. **Do not** force or bend the pipe and/or cup!
2. Loosen clamp screw on cup bracket and remove from nozzle adaptor. Examine cup for distortion. A bent cup will alter the firing characteristics of the burner.
3. 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.
4. Reinstall the cup on the nozzle adaptor, with the leg having the part number centered between the electrodes. Set cup to dimension and tighten clamp screw. Check that the cup bracket does not touch the electrode insulator.
5. Set electrodes as shown.
6. Reinstall firing assembly by reversing the procedure in paragraph No. 1.
7. Tighten all screws and copper fittings. (If additional clarification is required, please call factory for Drawing AA10105.)
8. For gas, select proper orifice from chart equivalent to oil input and install it in the union as shown on page 2.

SECTION VI

Now burner is ready for installation. Follow minimum combustion area for conversion given below.

FIRING RATE	NOT APPLICABLE FOR I/B/R OR S/B/I RATED BOILER/BURNER UNITS						RADIATION	
G.P.H.	LENGTH (IN.)	WIDTH (IN.)	HEIGHT (IN.)	BOILER CROWN SHEET TO CENTER OF NOZZLE & FLOOR TO CENTER OF NOZZLE (IN.)	FLOOR AREA (SQ. IN.)	STEAM (SQ. IN.)	WATER (SQ. IN.)	AIR BTU x 1000
1.50	12	11	11	7	132	600	960	168
1.65	13	12	12	7	156	660	1056	185
1.75	13	13	13	7	169	700	1120	196
2.00	15	13	13	7	195	800	1280	224
2.50	16	14	14	7	224	1000	1600	280
3.00	17	15	15	7½	255	1200	1920	336

In All Communications State Burner Model and Serial Numbers

SECTION VII

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 Gas

1. Turn on manual main gas valve.

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. Set thermostat at desired temperature.

6. If the burner is shut down for maintenance purposes, also turn off electric power and the manual main gas valve.

To Light Burner on Oil

1. Turn the switch to oil side.

2. Follow the same procedure as for gas.

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.

In All Communications State Burner Model and Serial Numbers

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

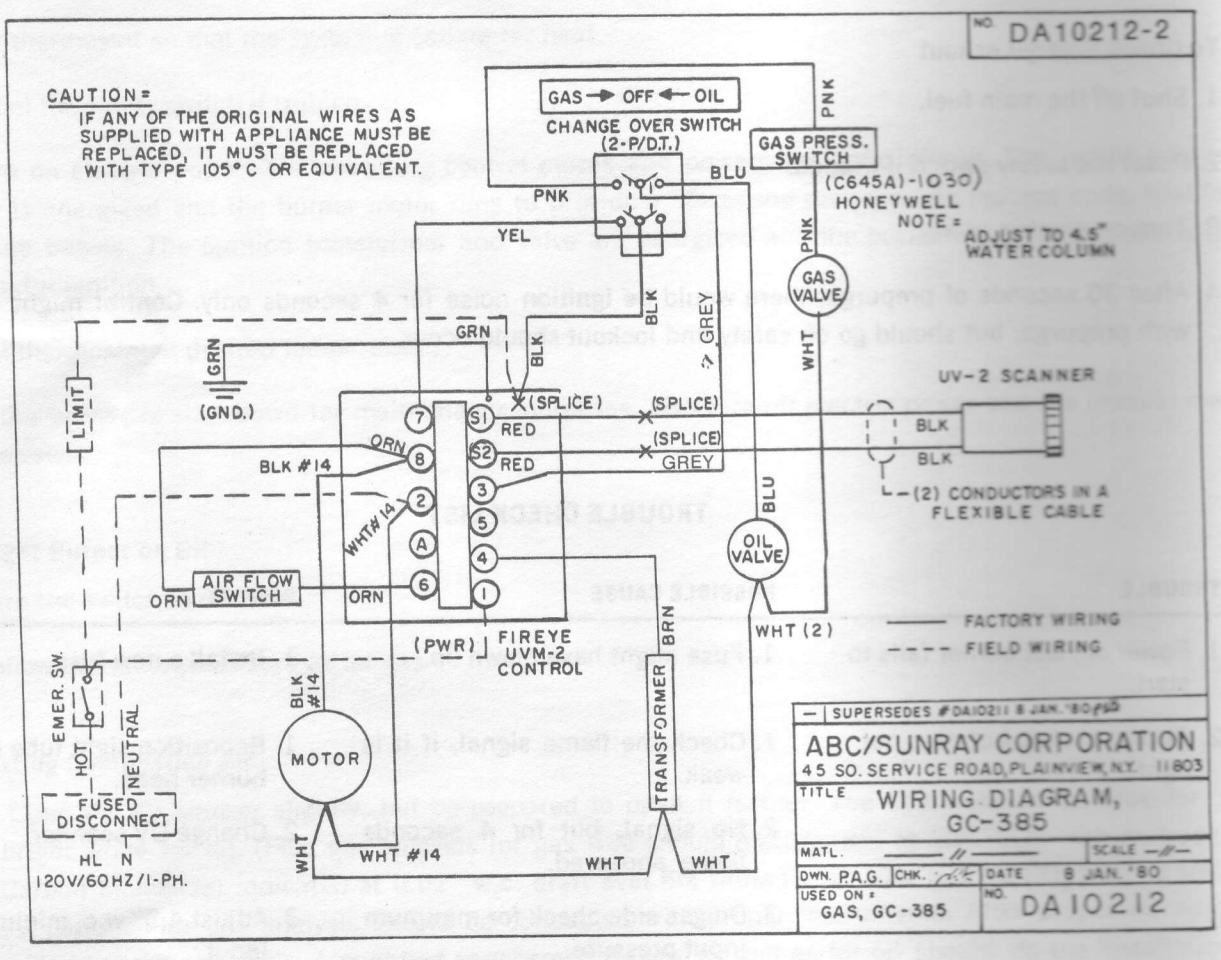
TROUBLE	POSSIBLE CAUSE	REMEDY
1. Power on, but burner fails to start.	1. Fuse might have blown up.	1. Install a new fuse.
2. Burner cycles, but does not light.	1. Check the flame signal, if it is weak.	1. Reposition sight tube in the burner head.
	2. No signal, but for 4 seconds flame appeared.	2. Change UV scanner.
	3. On gas side check for minimum input pressure.	3. Adjust 4.5" w.c. minimum input.

In All Communications State Burner Model and Serial Numbers

TROUBLE	POSSIBLE CAUSE	REMEDY
Burner cycles, but does not light.	4. Manual reset might be in off position on pressure switch.	4. Reset the lever on pressure switch.
	5. Air flow switch might not be working.	5. 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

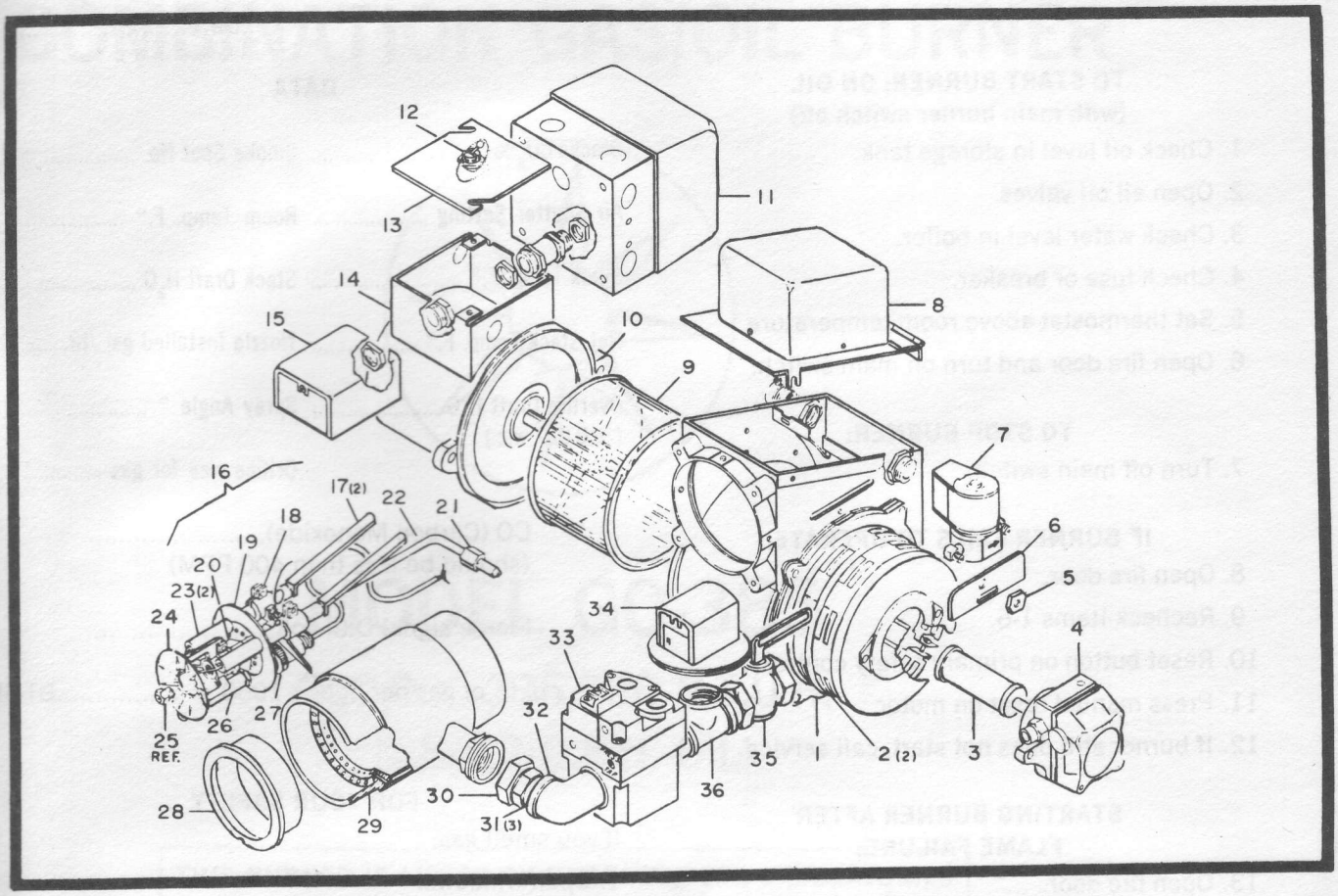
Lubricate burner motor twice yearly with 4 drops of #10 S.A.E. motor oil. The complete heating system should be cleaned, adjusted and checked by a serviceman before the start of each heating season.



In All Communications State Burner Model and Serial Numbers

COMBINATION GAS/OIL BURNER MODEL GC 385-1/-2

BURNER PARTS LIST



ITEM	DWG. NO.	DESCRIPTION	QTY.	ITEM	DWG. NO.	DESCRIPTION	QTY.
—	AA10100	GC-385-1/-2 Final Assembly	REF.	17	EA10081	Bus Bar, Flat, 4⅝"	2
1	AC46786	Blower Housing Assembly	1	18	AA10112	Stabilizer Assembly	1
2	AB46608	Air Inlet Band Assembly	2	19	AA10111	Static Disc (Perforated) Assembly	1
3	GA46064	Flex. Coupling, 5¼ x ½ Dia. x 5/16 Dia. 'ENF"	1	20	SA41851	Nozzle Adaptor	1
				21	SA46020	Drawer Pipe Connector Bushing	1
	PA40381(W)	Fuel Pump Webster,1-Stage,		22	TA46249	Drawer Fuel Oil Pipe,	
4		#M34DB-3	Select			9½" Long	1
	PA40381(S)	Fuel Pump Sundstrand, 1-Stage, #A2VA7016	(1)	23	EA40393	Ignition Electrode with Hardware	1
5	YA42829	Drawer Pipe Jamb Hex. Nut	1	24	AA40752	Golden Cup Assembly	1
6	SA46811	Drawer Adjustment Plate	1	25	——	Nozzle (by request only)	REF.
7	EA41220	Oil Valve, Instantaneous, #V4046B-1007	1	26	TA10001	Scanner Sight Tube	1
8	MA10001	Hinged Transformer Assembly, 12,000V	1	27	EA10072	Scanner, UV-2, Assembly	1
9	FA40051	Blower Wheel, Torrington #AA-610-325-2 (1/-2 Bore x 6-5/16 Dia. x 3-13/16 (32) Blades	1	28	CA41341-2	End Cone, GC-385-1 (3⅛ I.D.)	Select
					CA41341-3	End Cone, GC-385-2 (3¼ I.D.)	(1)
				29	AB10104	Draft Tube with Gas Injector	1
				30	TA10081	Pipe Union, ¾" Am. Std. Pipe	2
				31	TA10041	Close Nipple, ¾" Am. Std. Pipe	3
10	MA46848	Motor ¼ HP, 3450 RPM	1	32	TA10124	90° Street El, ¾" Am. Std. Pipe	1
11	EA41280	Fireye Control, UVM-2, 61-3060 MTG Base, with MT 30-4	1	33	TA10069	Regulator/Valve, ¾" Am. Std. Baso-Penn, Basatrol #G50DAA-2 (or Listed Equiv.)	1
12	EA10077	"Oil-Off-Gas" Switch, D.P.D.T.	1	34	EA10079	Gas Pressure Sw., H. C645A1030 (or Listed Equiv.)	1
13	SA10076	Junction Box Cover 4" Square	1				
14	SB46441	Motor Junction Box, Contoured 4" Square	1	35	TA10051	Gas Shut Off Cock, ¾" Am. Std. Pipe	1
15	EA46071	Air Flow Switch, "SMP"	1	36	TA10031	Tee, ¾" x ¾" x ½" Am. Std. Pipe	1
*16	AA10110	Drawer Pull (Firing Head) Assembly	x				

NOTES:

*Item 16 consists of 17 thru 27.

(4) REF. DWGS. = Nozzle Settings per KA10546; Wiring per DA10211; Removal of Drawer Pull AA10105; Envelope Dwg. per KA10541.

In All Communications State Burner Model and Serial Numbers

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.

WHEN SERVICE OR REPAIRS ARE REQUIRED

Call .....

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

Always give the following information:

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

Date Installed.....

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.

HANG NEAR BURNER