

LS Series - 3" Tube Heater Installation, Operation, Maintenance and Parts Manual*

▲ WARNING: This heater must be installed and serviced by trained gas installation and service personnel only! Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment. Protect yourself and others by observing all safety information. Retain instructions for future reference.

LS Series

* For complete installation instructions, see Generic IOM this piece was inserted within. Also available at www.reverberray.com.

Project: _____ Date: _____
 Location: _____
 City: _____ State: _____ Zip: _____
 Customer Name: _____
 Local Representative: _____
 Contractor: _____
 Engineer: _____
 Address: _____
 City: _____ State: _____ Zip: _____
 Phone#: _____ Install Date: _____
 Serial#: _____
 Notes: _____

Table of Contents

	Page
Models	1
Warnings	2
Clearances to Combustibles	2
Product Summary	3
Mechanical Instructions	3
Heater Requirements	4
Theory of Operation	4
Wiring Diagrams	5-7
Flowchart	8-9
Parts Listing	10-11
Series Kit Contents	12

Commercial Models (Approved for commercial use)

Qty.	Model #	Gas Type (circle one)	BTU's	Length	U-Tube Length	Weight	Min. Mount Height	Combustion Chamber	Radiant Emitter Tube	"Type" Tube Pkg #1	Baffle Pieces
	LS 10-25	N or LP	25,000	12'-3"	N/A	70#	8 ft.	Titanium Coated	N/A	10-3 Titanium	3
	LS 10-30	N or LP	30,000	12'-3"	N/A	70#	8 ft.	Titanium Coated	N/A	10-3 Titanium	3
	LS 10-40	N or LP	40,000	12'-3"	N/A	70#	10 ft.	Titanium Coated	N/A	10-3 Titanium	3
	LS 15-40	N or LP	40,000	17'-0"	N/A	85#	8 ft.	Titanium Coated	Aluminized	15-3 Titanium	3
	LS 15-50	N or LP	50,000	17'-0"	N/A	85#	10 ft.	Titanium Coated	Aluminized	15-3 Titanium	3
	LS 20-40	N or LP	40,000	22'-0"	13'-0"	100#	8 ft.	Titanium Coated	Aluminized	20-3 Titanium	3
	LS 20-50	N or LP	50,000	22'-0"	13'-0"	100#	9 ft.	Titanium Coated	Aluminized	20-3 Titanium	3
	LS 30-50	N or LP	50,000	31'-3"	*17'-8"	120#	9 ft.	Titanium Coated	Aluminized	30-3 Titanium	3

Residential Models (Approved for both commercial and residential use)

Qty.	Model #	Gas Type (circle one)	BTU's	Length	U-Tube Length	Weight	Min. Mount Height	Combustion Chamber	Radiant Emitter Tube	"Type" Tube Pkg #1	Baffle Pieces
	LS 10-25	N or LP	25,000	12'-3"	N/A	70#	8 ft.	Titanium Coated	N/A	10-3 Titanium	3
	LS 10-30	N or LP	30,000	12'-3"	N/A	70#	8 ft.	Titanium Coated	N/A	10-3 Titanium	3
	LS 15-40	N or LP	15,000	17'-0"	N/A	85#	8 ft.	Titanium Coated	Aluminized	15-3 Titanium	3
	LS 20-40	N or LP	40,000	22'-0"	13'-0"	100#	8 ft.	Titanium Coated	Aluminized	20-3 Titanium	3
	LS 30-50	N or LP	50,000	31'-3"	*17'-8"	120#	9ft.	Titanium Coated	Aluminized	30-3 Titanium	3

*Model requires 5EA-Sub accessory package.

Warranty registration options:

1. Register online at www.reverberray.com/warranty
2. Fill out this page and fax to Detroit Radiant Products Co.
3. Fill out this page and mail a copy to Detroit Radiant Products Co.



Printed in U.S.A.
 © 2004 Detroit Radiant Products
 21400 Hoover Rd., Warren, MI 48089
 T. (586) 756-0950 F. (586) 756-2626
 Form# LIOLS-1M-3/04 (LES)
 Replaces Form# LIOLS-2M-10/02



LS Series

Warnings and Clearances to Combustibles

⚠ WARNING!

Only certain models are for residential use. Certified under American Gas Association (AGA) requirement for residential radiant tube heaters No. 7-89 Do not use in the home or sleeping quarters.

⚠ WARNING!

This heater must be installed and serviced by trained gas installation and service personnel only. Read and understand these instructions thoroughly before attempting to install, operate or service this heater. Failure to comply could result in personal injury, asphyxiation, death, fire, and/or property damage. Retain these instructions for future reference.

⚠ WARNING!

This is not an explosion-proof heater. Where there is the possibility of exposure to flammable vapors, consult the local fire marshal, the fire insurance carrier and other authorities for approval of the proposed installation.

⚠ WARNING!

In locations used for the storage of combustible materials, signs must be posted to specify the maximum permissible stacking height to maintain the required clearances from the heater to the combustibles. Signs must either be posted adjacent to the heater thermostats or in the absence of such thermostats in a conspicuous location.

⚠ WARNING!

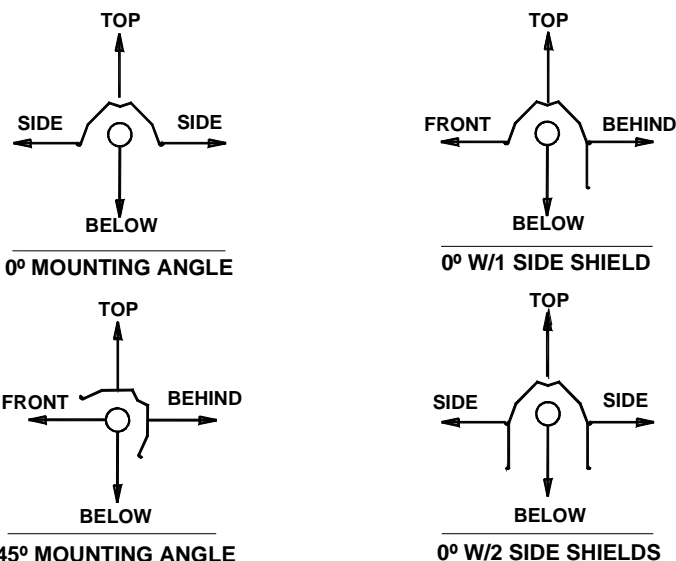
Failure to comply with the stated clearances to combustibles could result in personal injury, death and/or property damage.

⚠ WARNING!

This heater should be installed so that the minimum clearances to vehicles, as marked on the heater, will be maintained. If vehicle lifts are present, ensure that these clearances will be maintained from the highest raised vehicle.

LS CLEARANCES TO COMBUSTIBLES (IN.) *					
MODEL NO.	MOUNTING ANGLE	SIDE		TOP	BELOW
		FRONT	BEHIND		
LS (10) - 25,30	0°	8	8	4	36
	45°	39	8	10	36
W/1 side shield	0°	29	8	4	36
W/2 side shields	0°	9	9	4	36
20 ft from burner	0°	NA	NA	NA	NA
LS (10,15,20) - 40	0°	15	15	6	45
	45°	58	8	10	45
W/1 side shield	0°	42	8	6	45
W/2 side shields	0°	20	20	6	45
20 ft from burner	0°	NA	NA	NA	NA
LS (15) - 50	0°	11	11	6	48
	45°	39	8	10	48
W/1 side shield	0°	29	8	6	48
W/2 side shields	0°	16	16	6	48
20 ft from burner	0°	NA	NA	NA	NA
LS (20,30) - 50	0°	11	11	6	48
	45°	39	8	10	48
W/1 side shield	0°	29	8	6	48
W/2 side shields	0°	16	16	6	48
20 ft from burner	0°	7	7	6	30

*See cover page for models certified for residential use.



LS Series Mechanical Instructions

This supplement is designed to address the specifics of the LS Series - See page 12 for specific product features.

Product Summary

LS Series commercial/residential tube heaters are available from 10 to 30 foot, 25,000 through 50,000 BTU's, natural or LP gas. LS Series are positive pressure, single stage heaters and feature aluminized steel for it's radiant pipes.

IMPORTANT	
LS MODELS	APPROVED VENT PACKAGES
25,000 thru 50,000 BTUH	3-DSK RTVP-3

Figure 1

Specific Mechanical Instructions

Be sure to identify the titanium combustion chamber and place as the first tube section. **Do not** use the aluminized steel radiant tubing as the first tube (combustion chamber).

For residential installations it is **required** that the appliance be vented. Venting must be 3 in. diameter (4 in. diameter for common venting). Refer to the flue venting guidelines, figure 1 and on page 19 of the General Manual. For residential installations mounted below 8 feet, it is **required** that Protective Guards (part # PG) are installed on heater (see figure 2).

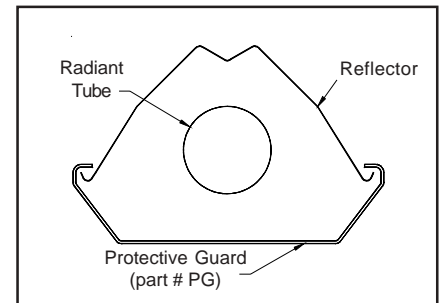


Figure 2

LS BAFFLE INSTRUCTIONS WITH TURBULATOR FINS

Insert assembled baffles with **HEAT** Baffle preceding the **PRESSURE** Baffles (fig. 1). Allow for turbulator fins so that the key hole is inserted first. All baffles must be placed vertically in the last radiant tube/heat exchanger (fig.2).

If the heater is installed with a U or Elbow fitting all baffle must still remain. There may be some instances where the baffle will be cut into two sections. Place as much baffle as possible downstream of the U or Elbow and the remainder of the baffle just before the U or Elbow fitting.

Figure 1

Figure 2

IMPORTANT: NOTE FIN DIRECTION & BAFFLE ASSEMBLY

SIDE VIEW

END VIEW

CROSS SECTION WITH BAFFLE

Figure 3



LS Series

Electrical Requirements

- ◆ 120 Volt - 60 HZ.
- ◆ Hot surface ignition.
- ◆ Starting Current 4.8 Amps.
- ◆ Running Current 1.1 Amps.
- ◆ 24V controls optional (24VAO).

Gas Requirements

- ◆ Manifold Pressure
 - Nat. 3.5" • LP. 10.0"
- ◆ Minimum Inlet Pressure
 - Nat. 5.0" • LP. 11.0"
- ◆ Maximum Inlet
 - Nat. 14.0" • LP. 14.0"

Ventilation Requirements

- ◆ Residential models must be vented.
- ◆ Consult the generic supplement for venting instructions and unvented operation.
- ◆ For unvented operation (commercial use only), there must be a positive air displacement of at least 4.0 CFM per 1000 BTU/H for natural gas or 4.5 CFM per 1000 BTU/H for LP gas. WVE-4 termination cap must also be used.
- ◆ Maximum vent length for all models is 20 ft.

Approved & Required Vent Caps

Sidewall Single

- ◆ 3" Duravent sidewall vent kit (3-DSK).
- ◆ 3" Vent terminal (SWD-3).

Sidewall Dual (Sharing common t-stat)

- ◆ 4" Duravent sidewall vent kit (4-DSK).
- ◆ 4" Vent terminal (SWD-4).

Roof Single

- ◆ Approved 3" rooftop raincap (RTVP-3).

Roof Dual (Sharing common t-stat)

- ◆ Approved 4" rooftop raincap (RTVP-4).

Important: Do not use sidewall caps for roof venting and do not use roof caps for sidewall venting.

Theory of Operation

Starting Circuit

When voltage is applied to L1 and L2 (see diagram on right), a circuit is completed from L1 via the blower motor to L2. The blower fan is mounted in the control box and rated to supply sufficient air for combustion.

Air pressure generated by the blower will cause the normally open burner pressure switch No. 1 to close. Another circuit is completed from L1 to the module ignition control and back to L2. There is a five second delay, then the glo-bar is powered. After the glo-bar has been powered for 45 seconds, the control module causes the gas valve to open and initiates the ignition trial.

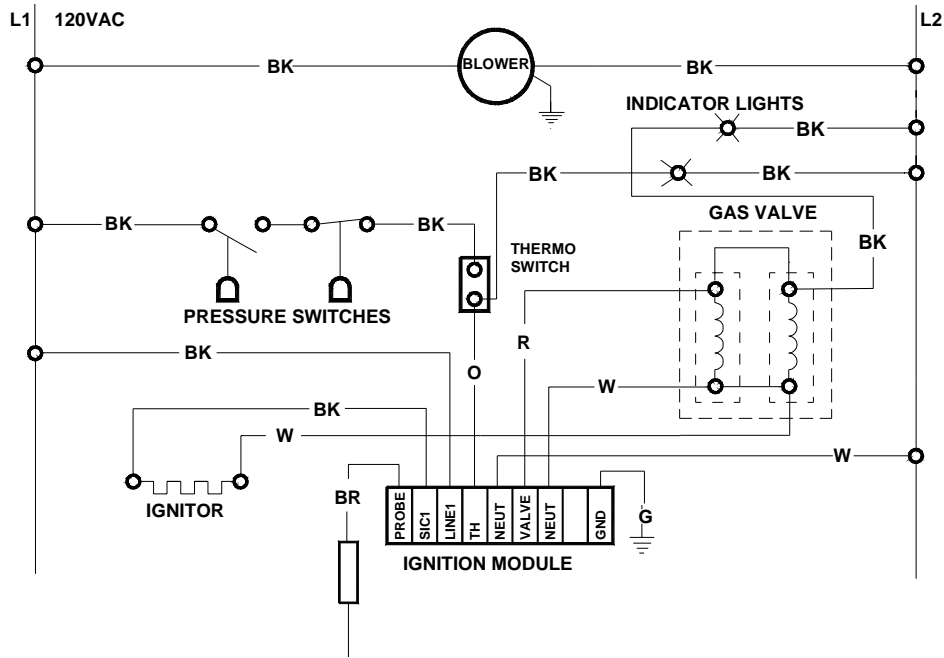
Power to the glo-bar is shut off during the last two or three seconds of the ignition trial.

Running Circuit

After ignition, the flame rod monitors the flame. As long as a flame is present, the valve is held open. If the flame is lost, the control acts to close the valve within one second, and a new trial sequence identical to that at start-up is initiated. If proof of flame is not established within 8.5 seconds, the unit will lock out. If lockout occurs, the control can be reset by briefly interrupting the power source.

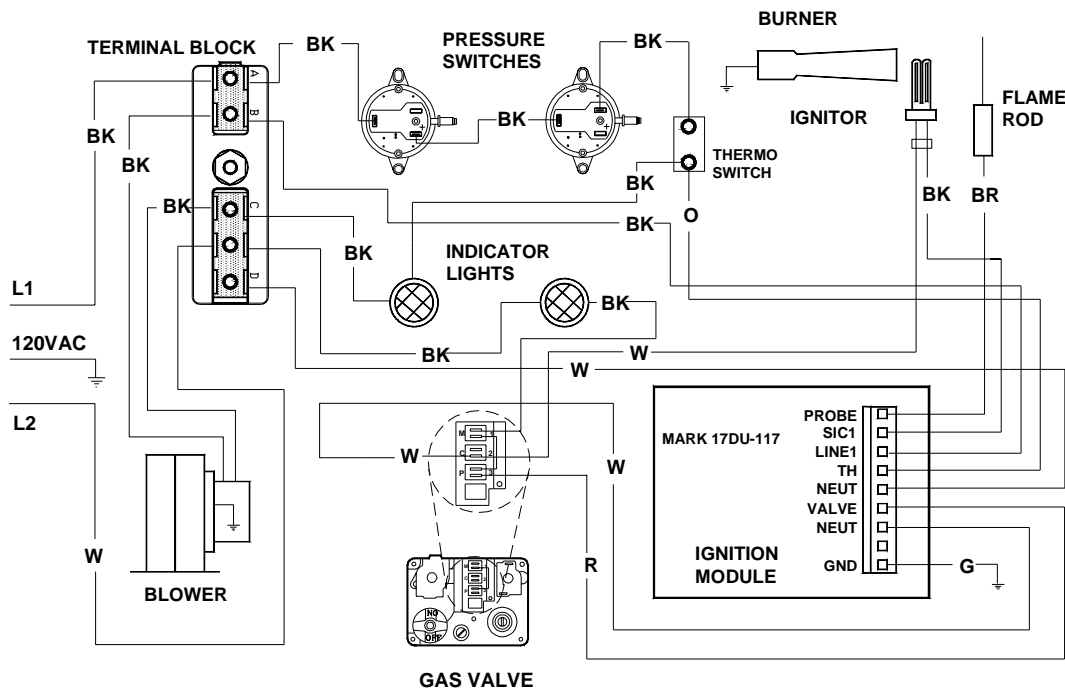
Internal Wiring Diagrams

LADDER DIAGRAM - MARK17DU-117 WITH THERMO



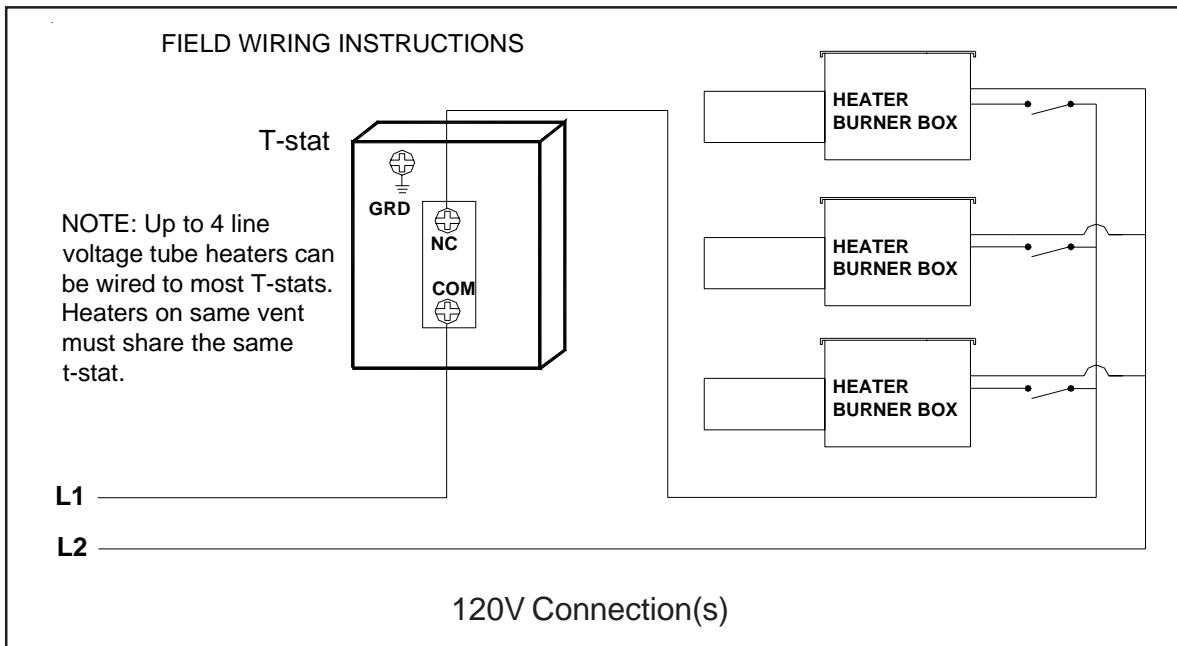
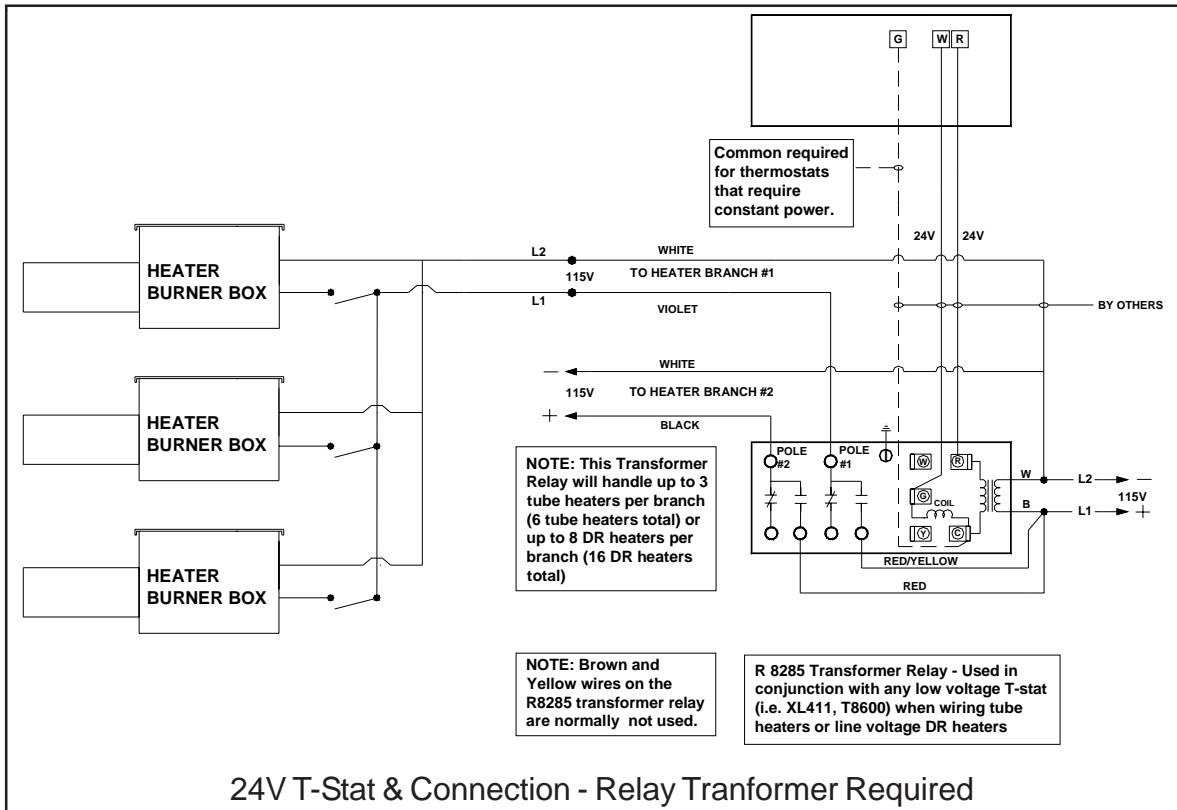
IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMPERATURE RATING OF AT LEAST 105 C.

BLOCK DIAGRAM - MARK17DU-117 WITH THERMO

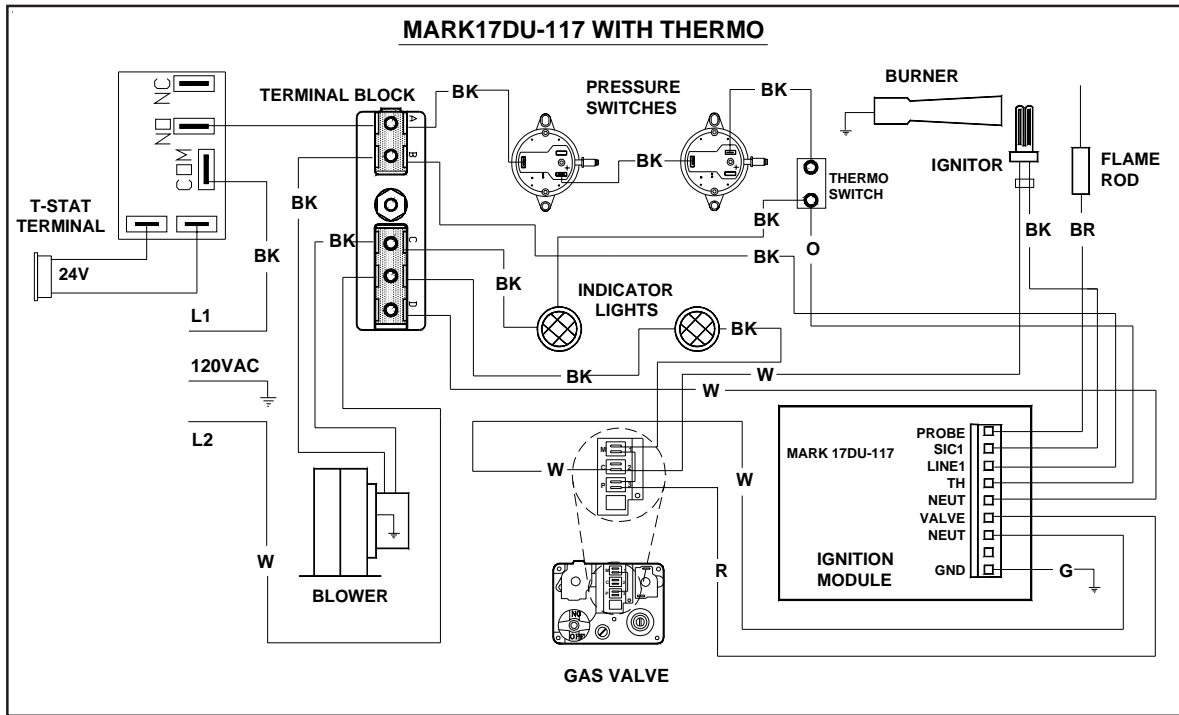


LS Series

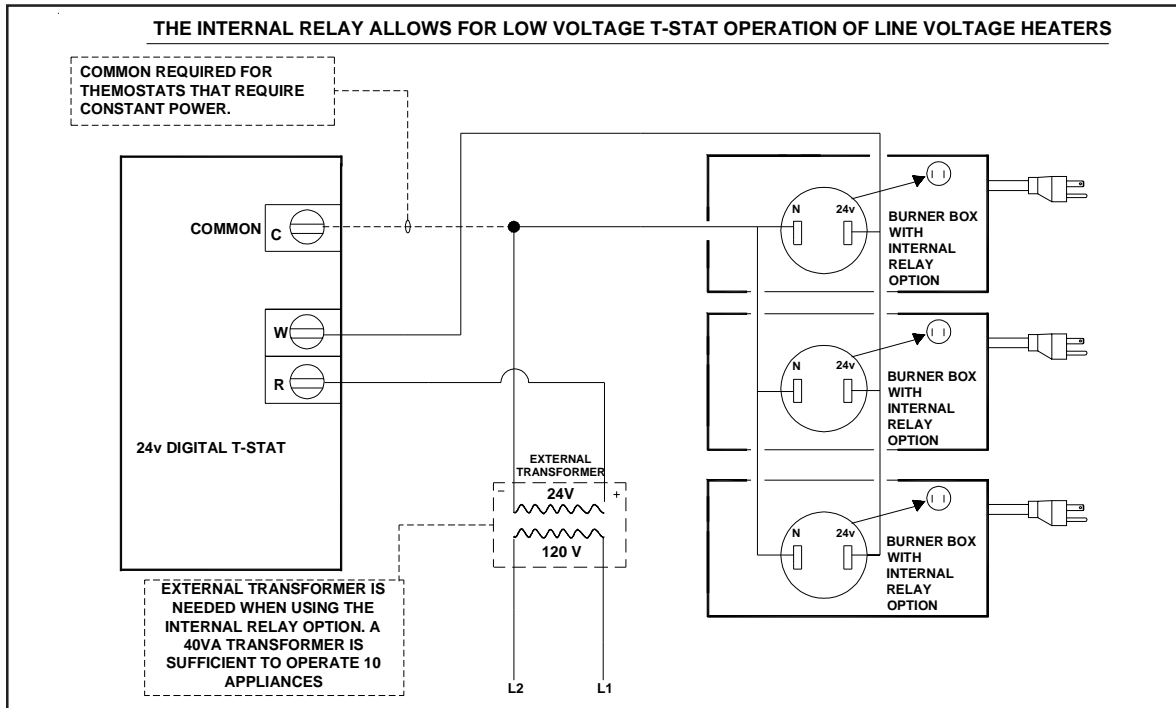
Field Wiring Diagrams



Alternative Wiring Diagrams



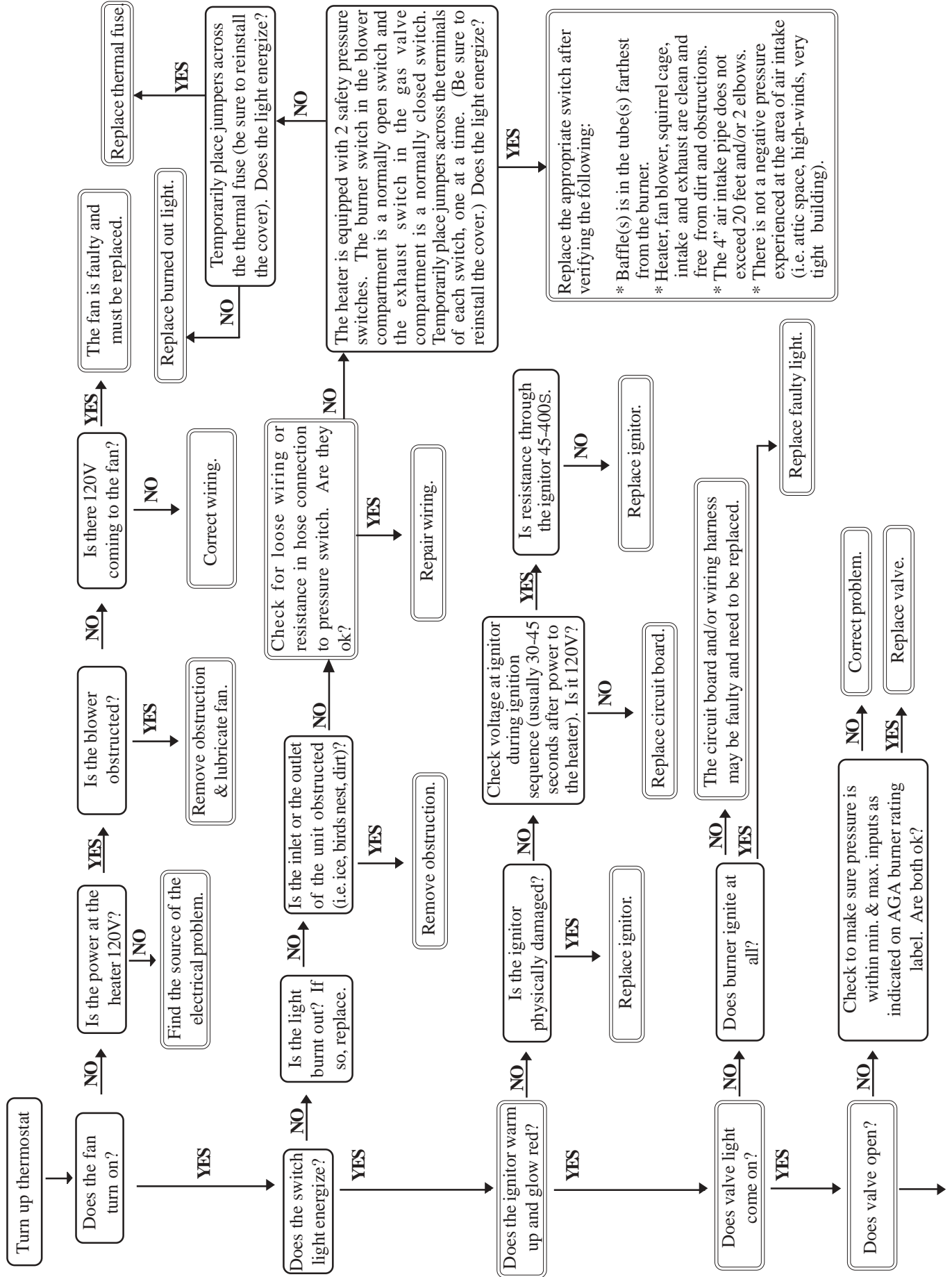
BLOCK DIAGRAM FOR INTERNAL RELAY OPTION

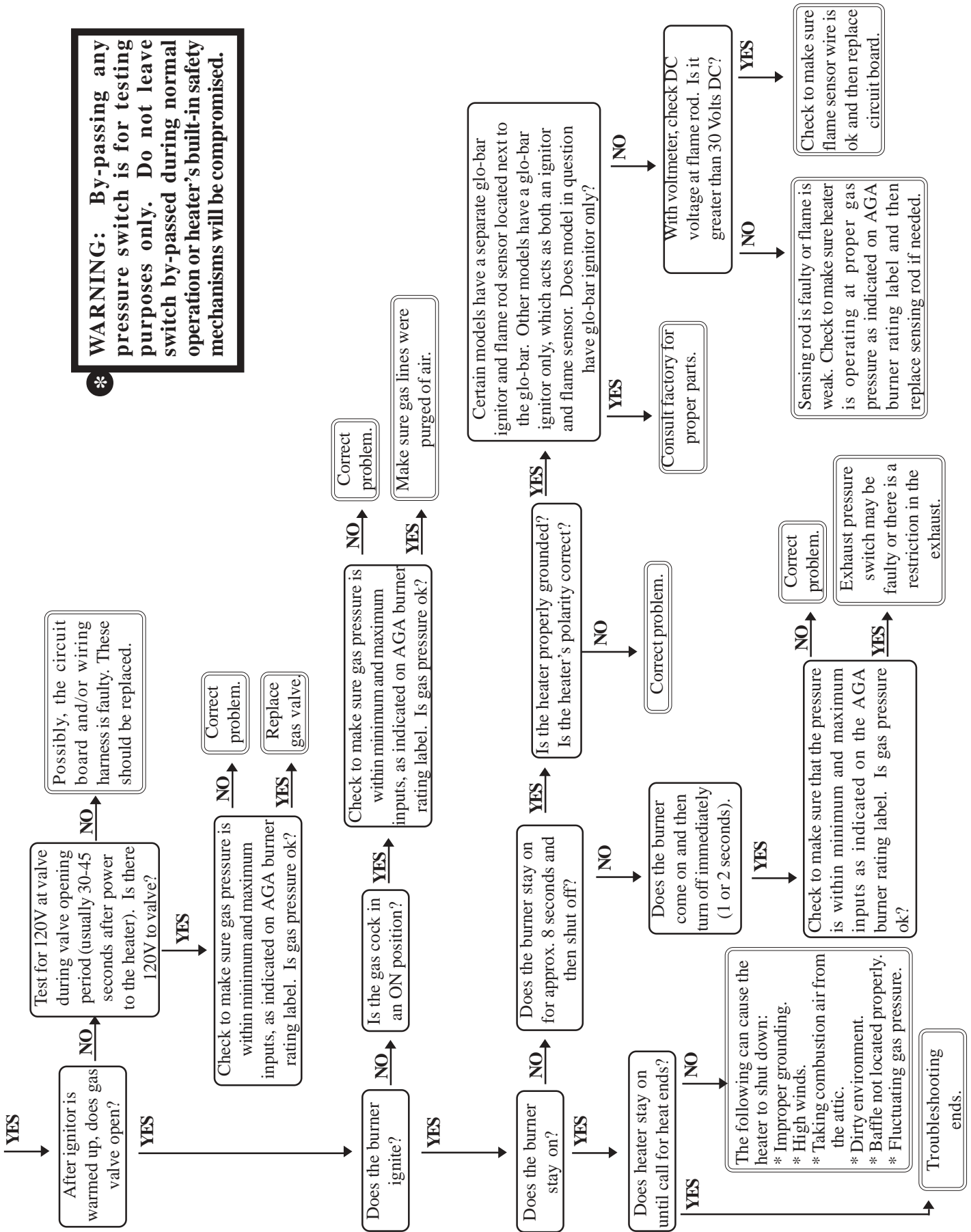


FIELD WIRING FOR INTERNAL RELAY OPTION



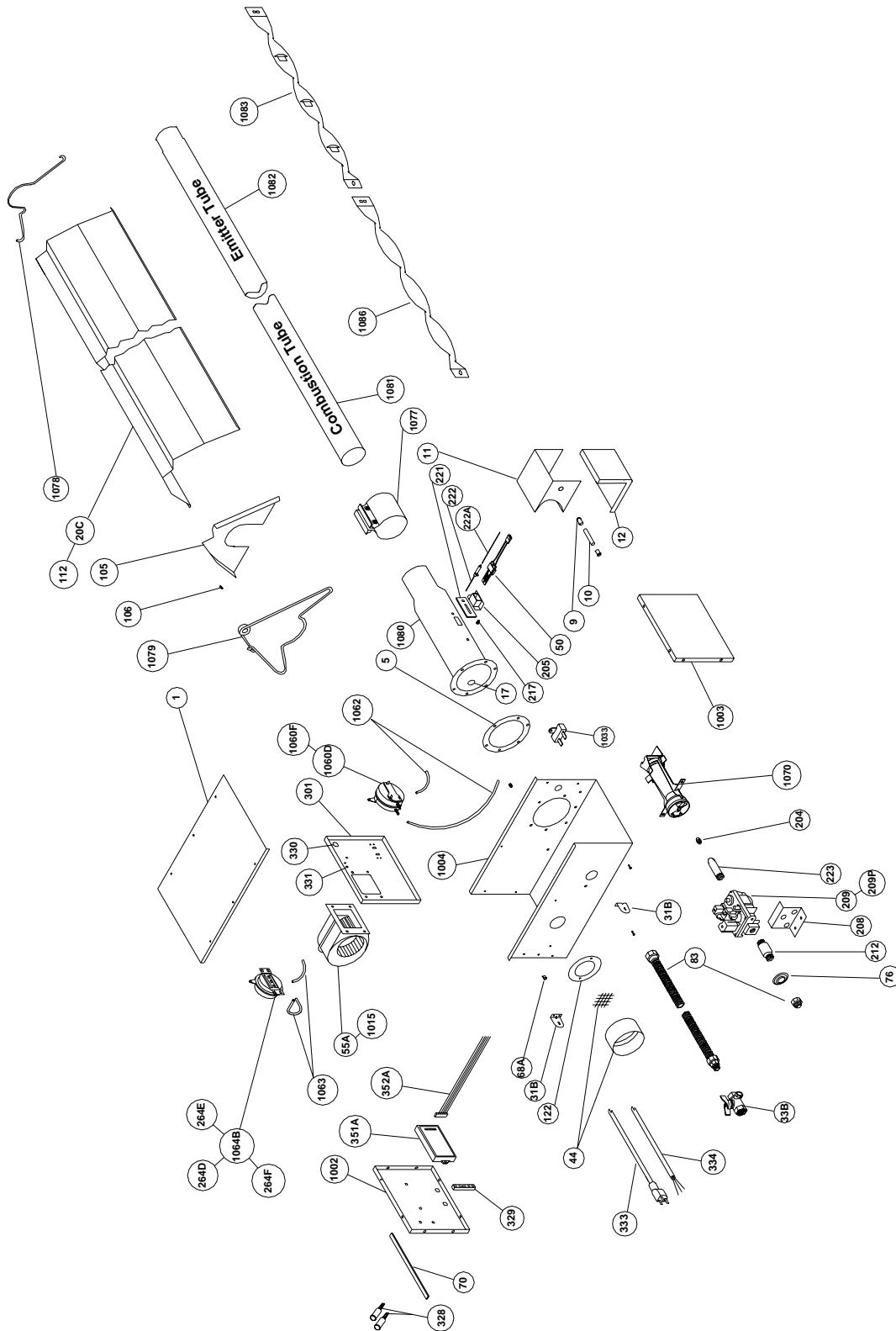
LS Series Troubleshooting Flow Chart





LS Series

Parts Breakdown



Basic Parts List

LS SERIES PARTS LISTING

TP#	ITEM	TP#	ITEM
TP-1	CONTROL BOX COVER	TP-264D	N.O. BURNER PRESS. SWITCH (30MBTU/H)
TP-5	FLANGE GASKET	TP-264E	N.O. BURNER PRESS. SWITCH (25MBTU/H)
TP-9	CONDUIT COUPLING	TP-264F	N.O. BURNER PRESS. SWITCH (40 MBTU/H)
TP-10	CONDUIT 4" X 1/2"	TP-301	DIVIDER PANEL W/ P.S. MOUNTING TABS
TP-11	GLO-BAR IGNITOR BOX	TP-328	120V INDICATOR LIGHT
TP-12	GLO-BAR IGNITOR BOX COVER	TP-329	1/4" NEUTRAL TERMINAL BLOCK
TP-17	SIGHT GLASS KIT	TP-330	DIVIDER GROMMET
TP-20C	120" ALUMINUM REFLECTOR	TP-331	GREEN SELF TAP GROUND SCREW
TP-31B	CONTROL BOX BRACKET	TP-333	3' BLACK 120V PLUG
TP-33B	1/2" GAS COCK	TP-334	YELLOW 24V CONTROL WIRE
TP-44	AIR ORIFICE W/SCREEN - CONSULT FACTORY	TP-351A	MARK 17DU-117 POTTED CIRCUIT BOARD
TP-50	GLO-BAR IGNITOR	TP-352A	LONG WIRING HARNESS FOR 17DU-117
TP-55A	FAN BLOWER (40, 50, 60 MBTU/H)	TP-1002	LEFT END PANEL W/ LIGHT HOLES
TP-68A	STRAIN RELIEF BUSHING	TP-1003	RIGHT END PANELS - NO HOLES
TP-70	CONTROL BOX COVER GASKET (PER FOOT**)	TP-1004	CONTROL BOX
TP-76	RUBBER GROMMET	TP-1015	FAN BLOWER (25, 30 MBTU/H)
TP-83	STAINLESS STEEL FLEX CONNECTOR	TP-1033	THERMAL FUSE
TP-105	REFLECTOR END CAP	TP-1060D	EXHAUST PRESS. SWITCH (25,30 MBTU/H)
TP-106	REFLECTOR CLIP	TP-1060F	EXHAUST PRESS. SWITCH (40,50 MBTU/H)
TP-112	5' REFLECTOR	TP-1064B	N.O. BURNER PRESS. SWITCH (50 MBTU/H)
TP-122	GASKET FOR AIR ORIFICE & AIR COLLAR	TP-1062	EXHAUST PRESSURE TUBE (VINYL)
TP-204	GAS ORIFICE - CONSULT FACTORY	TP-1063	1/4" ATMOSPHERIC & PRESSURE TUBES (VINYL)
TP-205	GLO-BAR HOLDER	TP-1070	BURNER (25 TO 50 MBTU/H)
TP-208	"Z" MOUNTING BRACKET	TP-1077	TUBE CLAMP
TP-209	36E36A-246 GAS VALVE - NAT GAS ASSY	TP-1078	REFLECTOR CENTER SUPPORT
TP-209P	36E36A-240 GAS VALVE - LP GAS ASSY	TP-1079	WIRE HANGER W/ SPRING CLIP
TP-212	1/2" X 3" PIPE NIPPLE	TP-1080	16" BURNER TUBE WITH FLANGE
TP-217	PRESSURE BARB FITTING	TP-1081	10 FT. TITANIUM COMBUSTION TUBE
TP-221	GLO-BAR HOLDER GASKET	TP-1082	10 FT. STAINLESS RADIANT TUBE
TP-222	FLAME ROD	TP-1083	3" S.S. INTERLOCKING 33" PRESSURE BAFFLE WITH TABS
TP-222A	FLAME ROD WIRE	TP-1086	3" S.S. INTERLOCKING 33" HEAT BAFFLE SECTION
TP-223	GAS MANIFOLD		

** 6' TOTAL NEEDED TO COVER OUTER EDGES OF A BURNER BOX (TP-70).



KIT CONTENTS AND PRODUCT FEATURES

Kit contents for the LS Series are shown below. Reference the proper column for your particular models length.

FILLED BY:		LS SERIES KIT CONTENTS			
TP#	DESCRIPTION	10 FOOT	15 FOOT	20 FOOT	30 FOOT
TP-1077	3" TUBE CLAMPS	1	2	2	3
TP-1079	3" HANGERS	2	3	3	4
TP-1078	3" REFL. CNTR. SPRT.	1	1	2	3
TP-105	REFL. ENDCAPS	2	2	2	2
TP-106	REFL. ENDCAP CLIPS	8	8	8	8
TP-33B	1/2" GAS COCK	1	1	1	1
TP-83	24" SS FLEX LINE	1	1	1	1
IOM	INSTALL / OP MANUAL	1	1	1	1



3" Reflector Center Support
TP-1078



24" SS Flex Connect
TP-83



3" Hanger
TP-1079



3" Butt Clamp
TP-1077



1/2" Gas Cock
TP-33B



Reflector End Caps
TP-105



Bag of Reflector endcap clips
TP-106



General IOM (LIOGT) **AND** Series Insert (LIOLS)

Product Features

APPROVALS

- IAS, CGA, AGA, CSA.
- Certain models are residentially certified to AGA No. 7-89.
- Outdoor Approval with OD-KIT.

BURNER SIGHT GLASS

- For burner inspection.

COMBUSTION AIR INLET & VENT

- 4" air inlet duct.
- 3" vent duct.

CONTROLS

- 100% safety shut off.
- Moisture and corrosion resistant ignition module.
- Dual differential pressure switches.
- Silicon carbide hot surface igniter.
- Flame rod sensing.
- Pre-purge controls.
- Indicator lights.

ENAMELED CONTROL BOX

- Outside air collar (4") attached.
- Totally enclosed components.

EMMITER & COMBUSTION TUBES

- 16ga. 3" O.D. titanium coated combustion chamber.
- 16ga. 3" O.D. aluminized steel radiant tubes.

OPTIONAL FEATURES

- 24VAO - Used when operating heater with 24V thermostat. Includes internal relay, power cord and indicator lights. External transformer required.

GAS CONNECTION

- 1/2" gas cock included.
- 24" x 1/2" flex connector included.

RADIANT SURFACE AREA (SQ. FT.)

- 10' models - 7.6
- 20' models - 15.2
- 30' models - 22.8

WARRANTY*

- 1 year - Burner box components.
- 3 years-Combustion and radiant tubes.
- 5 years-Stainless steel burner.
- * See cover for warranty registration information.

OTHER

- One reflector center support per reflector.
- Stainless steel turbulator baffle included.
- Stainless steel upgrades (burner box and reflectors only) are available.
- Silicone sealed control box available.
- Made in U.S.A.
- Visit www.reverberray.com for additional information & parts.