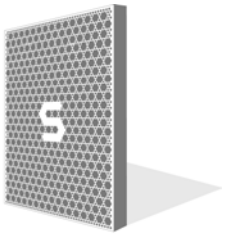
INSTALLATION / OWNER'S MANUAL

Schwank
infra-red gas heaters
ISO 9001:2000 REGISTERED



SCHWANK GAS FIRED

SEB/SEBU

SERIES

LOW INTENSITY TUBE TYPE INFRA RED HEATERS

FOR YOUR SAFETY:

Do not store or use gasoline or other flammable vapours and liquids in the vicinity of this or any other appliance.
If you smell Gas:
>Extinguish any open flames
>Don't touch electrical switches
>Call your Gas supplier immediately

FIELD CONVERTIBILITY:

"The conversion shall be carried out in accordance with the requirements of the authorities having jurisdiction and in accordance with the requirements of the B149.1 (latest edition) INSTALLATION CODE" in Canada, and the ANSI Z223.1 (latest edition) in the U.S.A.

CERTIFIED ®

FOR YOUR SAFETY
If you smell gas:
1) Open windows
2) Don't touch electrical switches
3) Extinguish any open flame
Immediately call your gas supplier

DESIGN CERTIFIED ®

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SEB Manual
RD: JUNE 2004
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NOTICE:

Schwank Inc., reserves the right to make changes to equipment and specifications without obligation or notification. All codes are current at the time of printing.

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Schwank
infra-red gas heaters
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SEB/SEBU
INFRA-RED GAS TUBE HEATERS

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SCHWANK GAS INFRA-RED TUBE HEATER
SEB/SEB(U) SERIES
INSTALLATION INSTRUCTIONS

1. GENERAL

It is recommended that this heater be installed by a professional gas heating equipment service person. Installation of the **Schwank SEB Series** gas-fired tube heaters must conform to all Schwank heating installation design procedures including ventilation. All local, provincial and national code requirements including the current latest edition B149.1 INSTALLATION CODE" in Canada, and ANSI Z223.1 in the U.S.A. for gas burning appliances and equipment. The latest edition Electrical Code PART 1 CSA C22.1 in Canada and ANSI/NFPA N0 70 in the U.S.A. must also be observed. Due to ever changing standardsand requirements, revision to our equipment and installation procedures may be necessary. In case of discrepancies, the latest installation manual will take priority. The **Schwank SEB** heater may be installed for heating of non-residential indoor spaces. It is beyond the scope of these instructions to embrace all conditions that will be encountered. All system piping must be supported in accordance with acceptable practice, local codes, and applicable standards.

2. INSTALLATION IN COMMERCIAL AIRCRAFT HANGARS

The **Schwank** Infra red Heaters are suitable for use in aircraft hangars when installed in accordance with the following:

A. A minimum clearance of 10 ft from bottom of the heater above the highest surface of the highest aircraft which may occupy the hangar.
B. A minimum clearance of 8 ft must be maintained from the bottom of the heater in other sections of the aircraft hangars, such as of fices and shops, which communicate with areas for servicing or storage. Refer to the proper mounting clearances to combustibles.
C. Heaters must be located so as to be protected from damage by aircraft and other objects, such as cranes and movable scaffolding.
D. Heaters must be located so as to be accessible for servicing and adjustment.

2.1 INSTALLATION IN COMMERCIAL GARAGES

A.The **Schwank** Infra red Heaters are suitable for use in commercial garages when installed in accordance with ANSI Z223.1 latest edition in the **USA** and CSA B149.1-00 in **Canada.** "Overhead heaters shall be installed at least (8) feet above the floor". In addition, they shall be located high enough to maintain the minimum distance to combustibles, as shown on the heater rating plate, between the heater and any vehicles parked below the heater.

3. INSTALLATIONS OTHER THAN SPACE HEATING

Use for process applications will void the C.S.A certification and may require field inspection and/or certification.

TABLE 1: MODEL CONFIGURATIONS		**OVERALL HEATER LENGTH ***	**BTU/HOUR INPUT 0 TO 4500 FT ABOVE ** SEA LEVEL**	**TURBULATOR REQUIRED LENGTH**	**GAS PRESSURE & ELECTRICAL**	**SHIPPING WEIGHT (LBS.)**
SEB 200-70		69 4”	200,000	10’	*LINE MINIMUM* 5" W.C. N.G. 11" W.C. L.P.	328
SEB 200-60		59’ 8”		10’		283
SEB 200-50		50’ 0”		10’		239
SEBU 200-30		**31’ 11”**		10’		287
SEB 175-70		69’ 4”	175,000	10’		240
SEB 175-60		59’ 8”		10’		283
SEB 175-50		50' 0”		10’		239
SEBU 175-30		**31’ 11”**		10’	*LINE MAXIMUM* 14" W.C. N.G. 14" W.C. L.P.	287
SEB 155-60		59’ 8”	155,000	Not Required		283
SEB 155-50		50’ 0”'		Not Required		239
SEB 155-40		40' 4”		10'		199
SEBU 155-30		**31’11”**		Not Required		287
SEBU 155-20		**22' 3”**		10'	*MANIFOLD* 3½" W.C. N.G. 10" W.C. L.P.	199
SEB 130-50		50' 0”	130,000	Not Required	½" INLET	239
SEB 130-40		40’ 4”		10'		195
SEB 130-30		30’ 8”		14'		150
SEBU 130-20		**22’ 3”**		10'		199
SEBU 130-15		**17’ 3”**		14’		150
SEB 110-50		50’ 0”	110,000	Not Required	ELECTRICAL 120V, 60 HZ	239
SEB 110-40		40’ 4”		10'		195
SEB 110-30		30’ 8”		14'		150
SEBU 110-20		**22’ 3”**		10'		199
SEBU 110-15		**17’ 3”**		14’		154
SEB 80-40		40’ 4”	80,000	10’		195
SEB 80-30		30’ 8”		14'		150
SEB 80-20		21’ 0”		14'		106
SEBU 80-10		**12’ 7”**		14'		110
SEB 60-30		30’ 8”	60,000	14’		150
SEB 60-20		21’ 0”		14'		106
SEBU 60-10		**12’ 7”**		14’		106

*Manufactured and shipped in 10’ lengths. Due to the swaged overlap total lengths are slightly shorter than multiples of 10’. Overall length includes the Burner (and Turn Box for U models). Where required, the series SEB/U heaters will be supplied with the turbulators, snugly installed into the end tube(s).

** 2000 feet above sea level for the USA – see Orifice Altitude Conversion Chart on page 29

4. PRE-INSTALLATION SURVEY

The **Schwank SEB /SEBU** heating system must have gas piping of the correct diameter, length, and arrangement to function properly. For this reason, a layout drawing is necessary.

Carefully survey area to be heated, and for best results, whenever possible, place burner and combustion chamber in coldest area.

5. MOUNTING CLEARANCES

This heater must be mounted and positioned to maintain the minimum clearance to combustible materials as shown in FIGURE 1 (PAGE 4) TABLE 3 (PAGE 4). For recommended heater placement refer to TABLE 2 (below). Heaters should also be located and installed with respect to building construction and equipment to provide a minimum clearance of 24 inches from the end of burner housing for servicing and cleaning of burner, blower and controls. A minimum horizontal clearance of 4 ft. from electrical meters, gas meters, regulators and relief equipment is required by ANSI Z223.1.& CSA B149.1-00.

TABLE 2: RECOMMENDED HEATER PLACEMENT

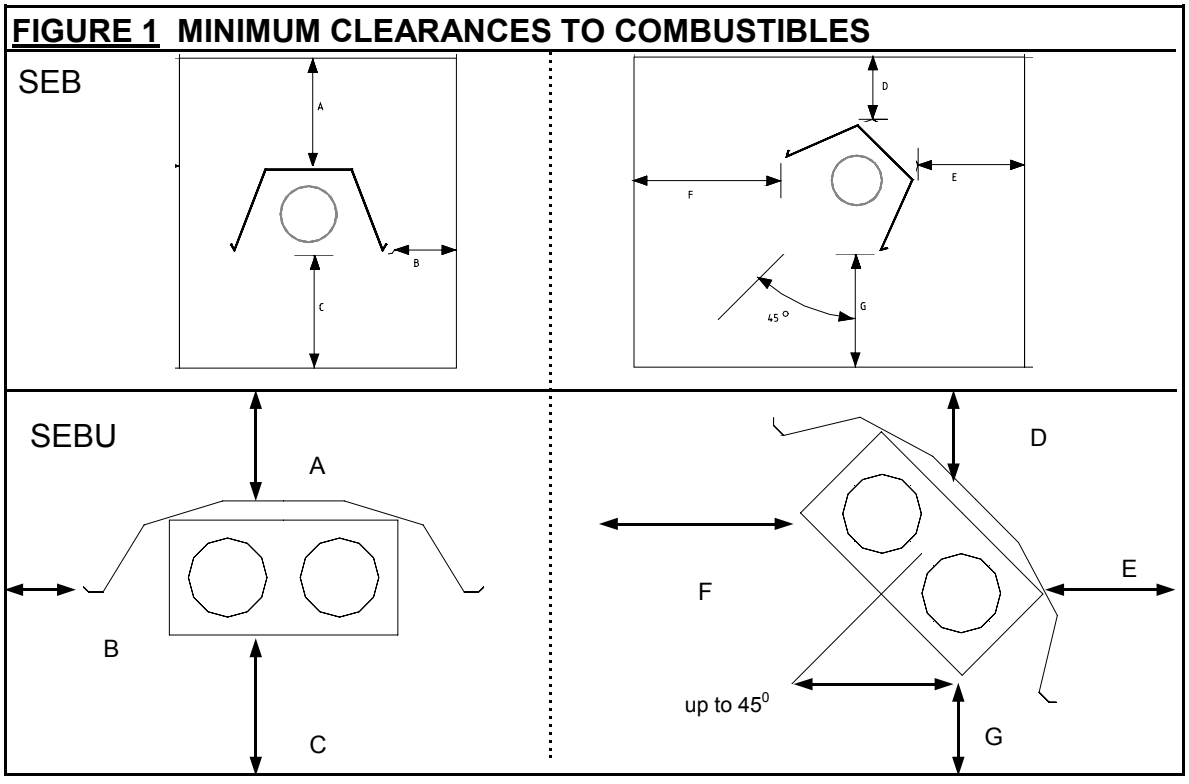
MODEL	MOUNTING HEIGHTS (FEET)	MAXIMUM DISTANCE BETWEEN HEATERS (FEET)	DISTANCE-OUTSIDE WALL TO HEATER LONG AXIS PARALLEL TO WALL (FEET)	
			HORIZONTAL	ANGLE
SEB/U 200	18 – 25	50	17 – 25	COMBUSTIBLE CLEARANCE
SEB/U 175	18 – 25	50	17 – 25	
SEB/U 155	16 – 21	45	15 – 20	
SEB/U 130	15 – 21	40	15 – 20	
SEB/U 110	13 – 19	35	13 – 18	
SEB/U 80	10 – 16	30	12 – 16	
SEB/U 60	8 – 14	25	11 – 15	

IMPORTANT: Continuous operation of single or multi-heater placement must not cause any combustible material in storage to reach a temperature in excess of 160^{O}F.

TABLE 3 MINIMUM CLEARANCES TO COMBUSTIBLES

MODEL	SUSPENDED HORIZONTALLY			SUSPENDED AT AN ANGLE UP TO 45 DEGREES			
	TOP	SIDE	BELOW	TOP	REAR	FRONT	BELOW
	A	B	C	D	E	F	G
SEB 200	7"	22"	68"	7"	1"	57"	68"
SEB 175	6.5"	20"	68"	6.5"	1"	47"	68"
SEB 155	6"	19"	64"	6"	1"	44"	64"
SEB 130	4"	10.5"	60"	5”	1"	35"	56"
SEB 110	4"	9.5"	54"	4.5"	1"	26"	54"
SEB 80	2.5"	6"	36"	3.5"	1"	23"	38"
SEB 60	2.5"	5.5"	34"	3"	1"	17"	34"
SEBU 200	7"	22"	68"	7"	1"	57"	68"
SEBU 175	6.5"	20"	68"	6.5"	1"	47"	68"
SEBU 155	6"	19"	64"	6"	1"	44"	64"
SEBU 130	4"	10.5"	60"	5”	1"	35"	56"
SEBU 110	4"	9.5"	60"	4.5"	1"	26"	54"
SEBU 80	2.5"	6"	42"	3.5"	1"	23"	38"
SEBU 60	2.5"	5.5"	33"	3"	1"	17"	34"

FIGURE 1 MINIMUM CLEARANCES TO COMBUSTIBLES



6. SYSTEMS INCORPORATING 90° ELBOWS

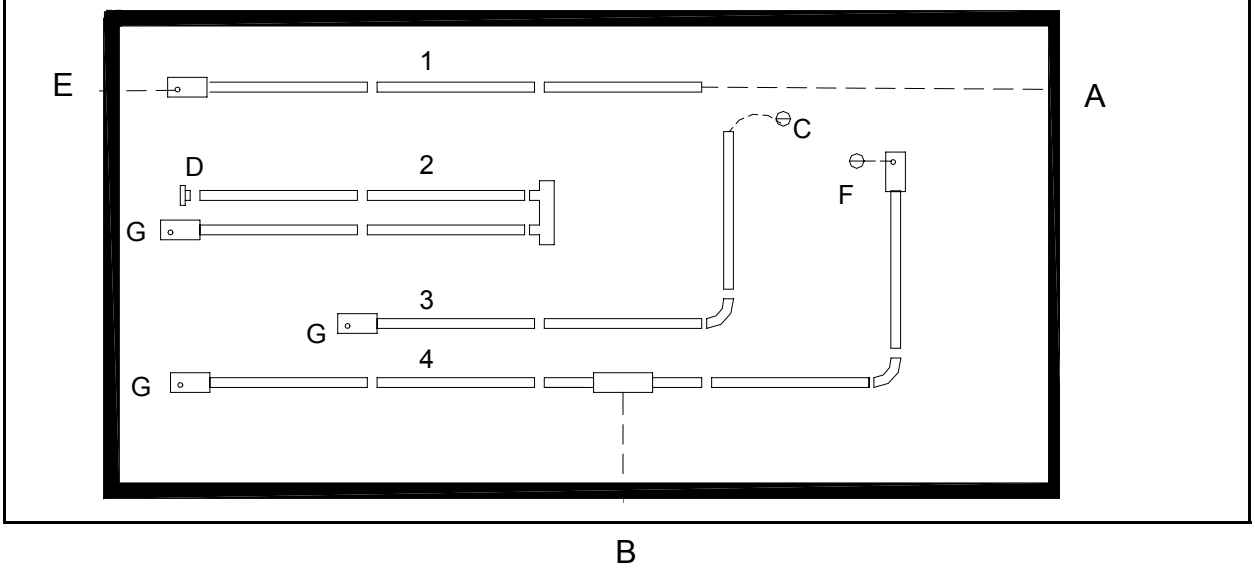
The SEB Series radiant tube heater can be installed in configurations as illustrated in Fig 2 (below) with a maximum of two 90^0 elbows per heater. The use of radiant elbows reduces the total maximum vent allowable. (See Section 10 Page 11: Flue Venting)

The 90^0 elbows are shipped as a kit with one tube coupler.

IMPORTANT:

On Models SEB 200, 175 a minimum of 30´ of straight radiant tube must be connected to the burner before any elbow. On Models SEB 155, 130, and 110 a minimum of 20´ of straight radiant tube must be connected to the burner before any elbow. And on Models SEB 80 and 60, a minimum of 10´ of straight radiant tube must be connected to the burner before any elbows.

FIGURE 2 SYSTEM CONFIGURATIONS



System Configuration

1 Straight line
2 "U" tube with Turn Box
3 "L" tube with 90^0 elbow kit
4 Twinned tubes into common TEE flue vent
*** Note: Both heaters must be connected with a single common thermostat**

Venting Options

A Flue vent through wall 4"
B Flue vent through wall or roof 6"
C Flue vent through roof
D Flue vent into building, exhaust fan inter locked with heater
E Combustion air intake from outside through wall.
F Combustion air intake from outside through roof
G Combustion air intake from inside building

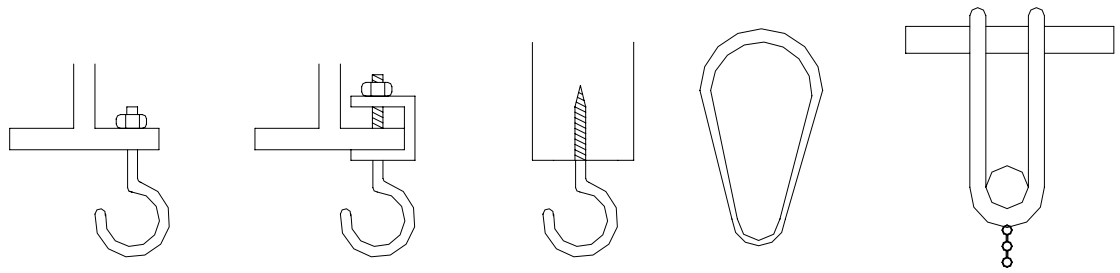
7. SUSPENSION SYSTEM

The system configuration and available support locations must be considered in order to locate the radiant tubes correctly. Labour and material can be reduced by locating (system configuration permitting) directly under structural members such as joists, steel or wood beams, etc.

Chain is recommended for hanging the tube system, connecting the hangers to beam support as illustrated in FIGURE 3 (below).

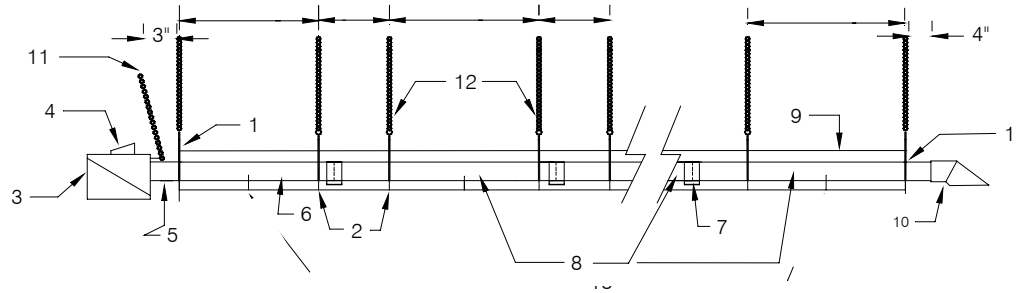
To support burner and keep it level, a separate suspension chain must be attached to the eye hook at flange end of burner angled slightly back over burner, FIGURE 4 (below). This will permit normal expansion and contraction of the tube system. (If rigid devices such as rods are used in place of chain, swing joints or other means of sufficient length must be provided to compensate for expansion.)

FIGURE 3: SUGGESTED MOUNTING HARDWARE



EYE BOLT THROUGH HOLE IN BEAM	BEAM CLAMP WITH EYE SCREW	EYE SCREW	PIPE RING OR CLEVIS	BAR-JOIST CLAMP

FIGURE 4: SEB TYPICAL HANGER & SUPPORT SPACING



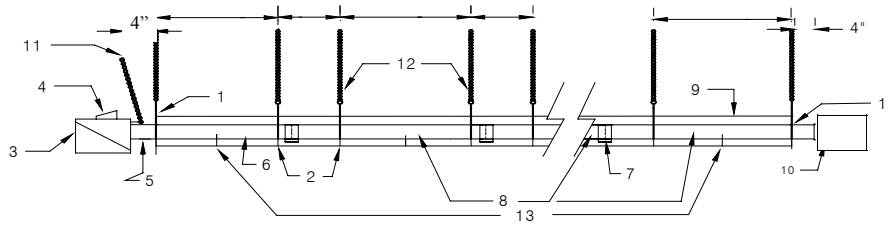
"ALL TUBES MUST BE SUSPENDED BY TWO (2) HANGERS PER 10' LENGTH, MOUNTED APPROXIMATELY 6" TO 12" IN FROM EACH TUBE END.

ALL TUBES MUST BE SUSPENDED BY TWO (2) HANGERS PER 10' LENGTH, MOUNTED APPROXIMATELY 6" TO 12" IN FROM EACH TUBE END.

1 Heater Support Chain
2 Burner Assembly
3 Igniter / Sensor
4 Focus Shield Reflector
5 Aluminized Tube with Flange
6 Tube Coupler
7 Steel Tube
8 Flue Vent terminal
9 Burner Support Chain
10 Wall Vent Terminal
11 Suspension Hanger
12 Gas Line

* *Distances shown are recommendations and may be varied to match field requirements.*

FIGURE 5 SEBU TYPICAL HANGER & SUPPORT SPACING

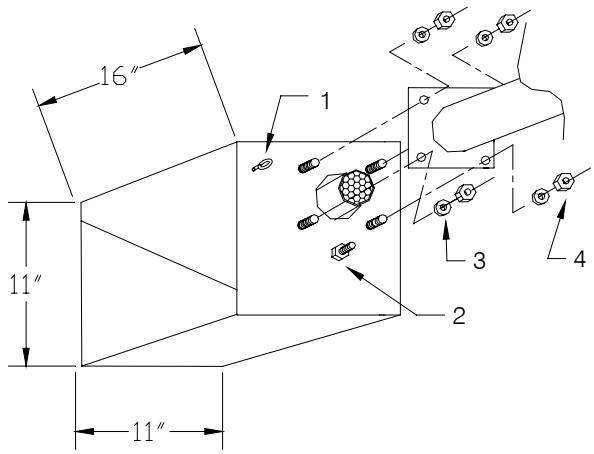


"ALL TUBES MUST BE SUSPENDED BY TWO (2) HANGERS PER 10' LENGTH, MOUNTED APPROXIMATELY 6" TO 12" IN FROM EACH TUBE END.

ALL TUBES MUST BE SUSPENDED BY TWO (2) HANGERS PER 10' LENGTH, MOUNTED APPROXIMATELY 6" TO 12" IN FROM EACH TUBE END. **Exception: First and last hanger must be mounted 4" away from end of tube.**

1 Heater Support Chain
2 Burner Assembly
3 Igniter/Sensor
4 Reflector
5 Alumatherm Tube with Flange
6 Tube Coupler
7 Steel Tube
8 Flue Vent terminal
9 Burner Support Chain
10 Turn Box
11 Suspension Hanger
12 Gas Line

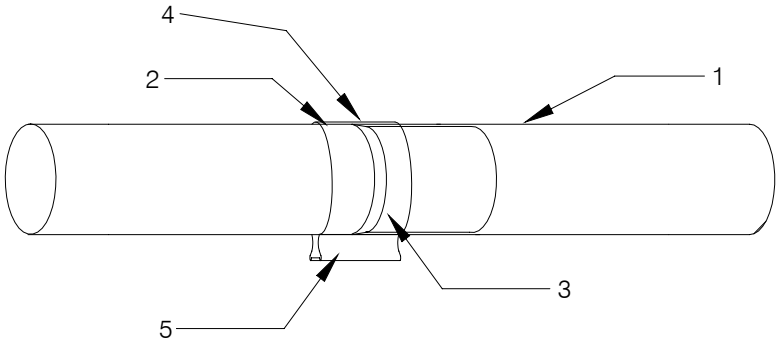
FIGURE 6
BOLTING BURNER TO FLANGED TUBE



1 Eye Hook
2 Fifth Nut (Holding Inner Burner to Housing)
3 Lock Washers (4) Four
4 Nuts (4) Four
Note: Nuts may be shipped c/w lock-washers as one piece

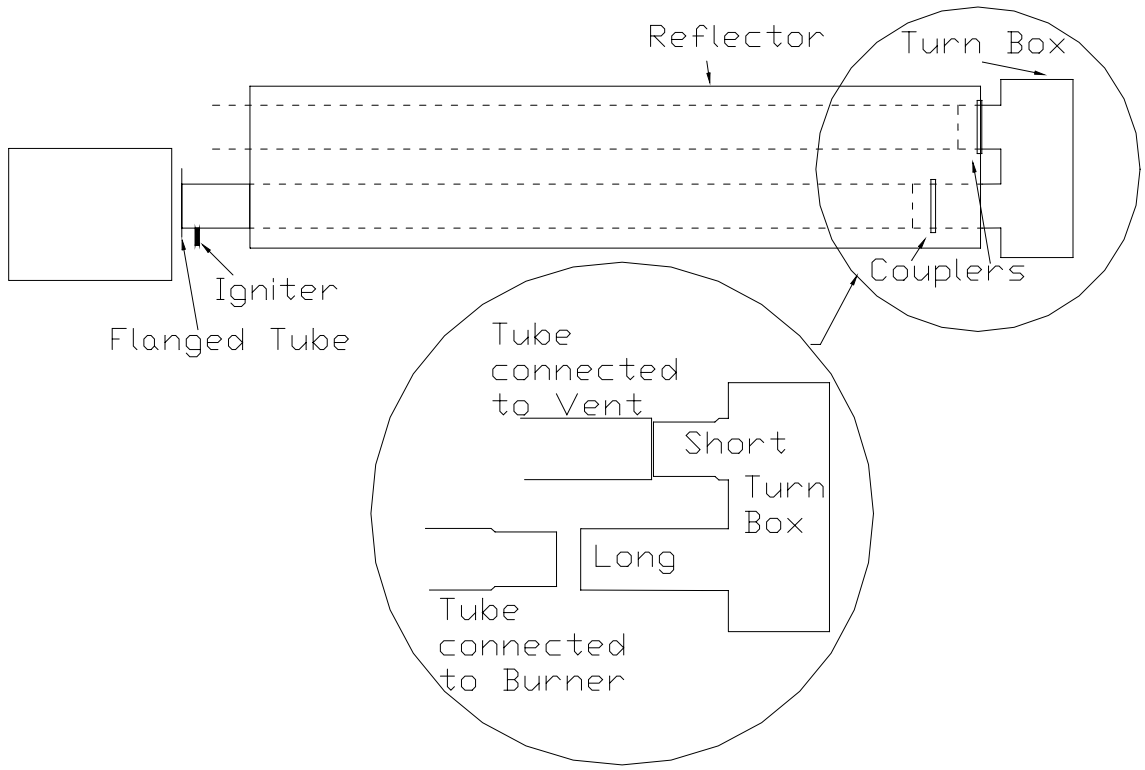
- Align the four burner bolts through the tube flange, secure tightly with lock washers and nuts.
- Note: A Flange Gasket is not required for this application
- Do not loosen or remove fifth nut (#2) directly below burner cup
- Secure suspension chain to eye hook in order to stabilize burner

FIGURE 7: COUPLER



1 Tube
2 Tube Coupler
3 Swaged section of tube
4 Point at which the Swaged tube slides into other section of tube
5 Once the two tubes are joined together , place the centre of the Coupling over the line of the joint and tighten.

FIGURE 8 TURN BOX



8. BURNER AND TUBE INSTALLATION

With all hangers suspended at the same height, insert first aluminized tube section, through 4" hole into first two wire hangers. Bolt burner to flange on first tube section, SEE FIGURE 6 (page 7). Subsequent lengths of tube can then be installed, by joining them together one inside the other and locking the joints using the aluminized steel clamp. SEE FIGURE 7 (page 7).

Models SEB and SEBU 200 & 175 have alumatherm as the first section with a welded Flange, the second section is **aluminized**, and subsequent lengths are steel.

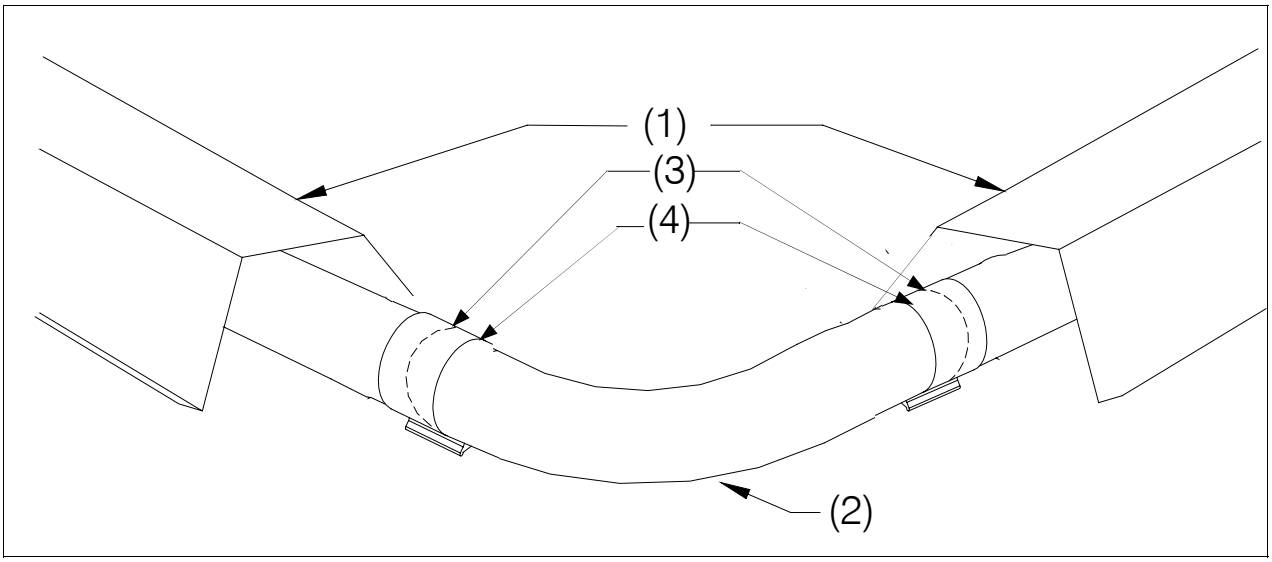
Slacken the bolts and slip the coupler over the end of the pipe to be joined, making sure the swaged end of the tube is fully inserted into the plain end of the tube before re-positioning the coupler. The coupler should then be centred across the joint before tightening up. If a turbulator is necessary it will be factory installed into the tube(s). The tube(s) will be marked stating where it must be installed in the system, see TABLE 4 (page 10) for the models which do require turbulators. **Note: Turbulators are ALWAYS installed at the vent end of the heater .**

9. REFLECTOR INSTALLATION

After burner and tubes have been installed, slide the focus shield reflectors one at a time into the wire hangers. As each successive focus shield reflector is installed on an in-line installation, the ends of the focus shield reflectors will overlap to provide continuous coverage over the entire tube system. The overlapping joints **MUST BE FASTENED** together.

Note that for both horizontal and angle mounting, the tube must be level. Improper mounting can result in overheating of controls and combustible materials. Use only non-combustible mounting hardware. Side reflectors can be added to the heaters as an option. They should be secured directly to the focus shield reflector using "S" hooks or chain. Drill three holes into the focus shield reflector flange along side, matching up with three holes already in side reflector. Mount side reflector as close as possible to the focus shield reflector.

FIGURE 9 90 DEGREE ELBOW INSTALLATION



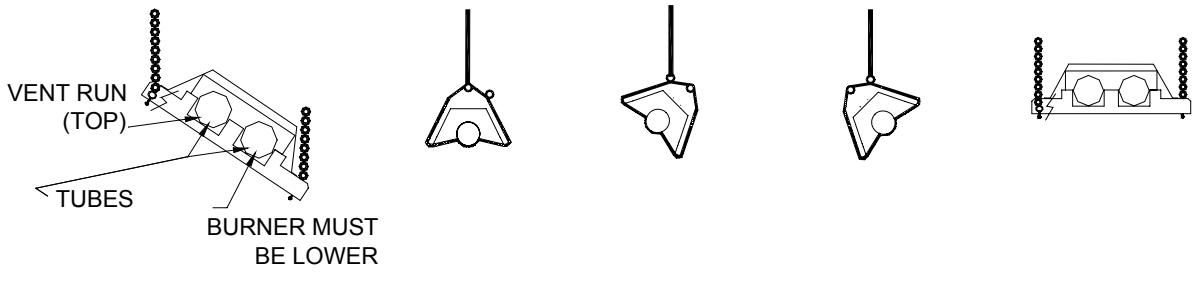
1. Reflectors
2. 90^0 Elbow
3. End of Swaged Tube (fully inserted)
4. Couplers

TABLE 4

MODEL	TURBULATOR LENGTH (IF REQUIRED)	MODEL	TURBULATOR LENGTH (IF REQUIRED)
SEB 200-70/60/50	10’		
SEB 175-70/60/50	10’	SEB 110-40	10'
SEB 155-60/50	not required	SEB 110-30	14'
SEB 155-40	10'	SEBU 110-20	10’
SEBU 155-30	not required	SEB 80-40	10’
SEBU 155-20	10’	SEB 80-30	14'
SEB 130-50	not required	SEB 80-20	14'
SEB 130-40	10'	SEBU 80-10	14’
SEB 130-30	14'	SEB 60-30	14’
SEBU 130-20	10’	SEB 60-20	14’
SEB 110-50	not required	SEBU 60-10	14’

NOTE: Where required the SEB/SEBU Series Heaters will be supplied with the turbulators, snugly installed into the vent end tube (s) of the system configuration.

FIGURE 11 REFLECTOR ARRANGEMENTS



10. FLUE VENTING

The SEB/SEBU series is approved for both direct vented and indirect vented applica-

NOTE: 1

The system must not be operated in a negative air condition, unless combustion air is brought in from outside directly to the burner. If a severe negative pressure is experienced or anticipated, the second port (barb) on the blocked flue switch should be connected directly to outside of building (not supplied).

INDIRECT VENTED APPLICATION

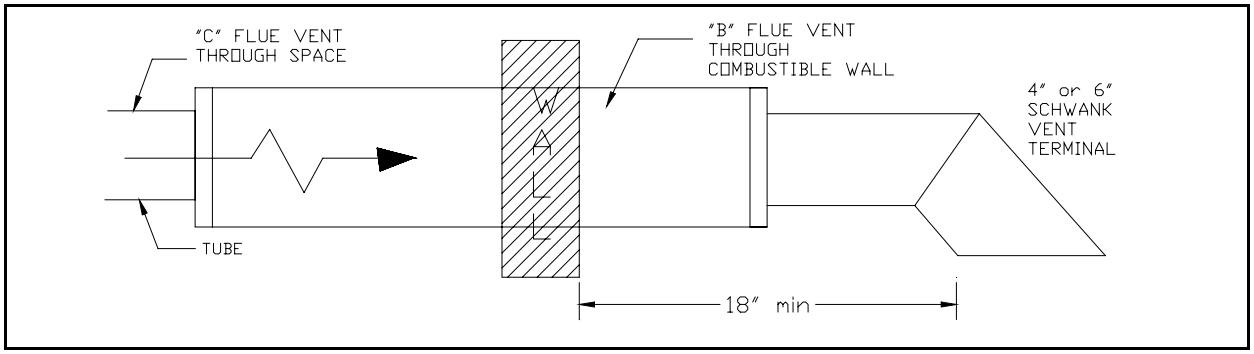
When the heater is installed and indirectly vented, it is required in Canada that the heater be electrically interlocked to an independent exhaust fan by means of an Air Proving Switch. The exhaust fan must be sized to create 3CFM for every 1000 Btu/hr or fraction thereof, of total input of installed equipment. Consult CSA.B149.1-00 latest edition for requirements.

In the USA when a heater is installed unvented the system requires consideration of normal infiltration and introduction of outside air by natural or mechanical means, and /or electrically interlocked to an independent exhaust fan. Consult your local codes and ANSI Z223.1 latest edition. to determine the specific requirements.

DIRECT VENTED APPLICATION

All venting must be single wall "C" vent except that portion of vent passing through a combustible wall or roof then type "B" vent may be used as per CSA's interim requirement. When venting horizontally, the flue vent system must slope downwards approximately 1/4" per foot toward the vent terminal, starting at the termination of the radiant tube. For horizontal through the wall venting, the approved Schwank 4" or 6" vent terminal should be used. Install the flue vent terminal 18" from the outside wall to the inside end of terminal opening. The flue vent terminal used must be of the approved type supplied by Schwank or supplied by an approved "B" vent manufacturer. It is the responsibility of the installer to be familiar and current with local codes or ANSI Z223.1/ CSA.B149.1-00 latest editions for all venting requirements and practices.

FIGURE 12 FLUE VENT



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The total maximum allowable length of vent and combustion air duct is 80' for SEB/SEBU 200, 175, 155 and 130, and 50' for SEB/ SEBU 110, 80 and 60. The total maximum allowable vent and duct is reduced by ten feet for every 90^{o} vent elbow installed in the vent or duct. Should the system be installed with a 90 or 180 degree elbow in the radiant tube, 10ft or 20ft respectively must be deducted from the length of vent and duct. Neither the flue vent nor the combustion air duct is to exceed 50ft in length. Lengths greater than those allowed may create condensation problems and will void CSA design Certification. The horizontal flue vent shall not terminate less than the following distances: Canada and the USA follow the same guidelines except where indicated in brackets.

- Three feet above grade level, unless its location is adjacent to public walkways, then it has to be not less than seven feet.
- Directly below a soffit or over-hang.
- Directly above a gas utility meter or service regulator.
- Uninsulated single-wall metal pipe shall not be used outdoors in cold climates for venting gas utilization equipment.
- Twelve inches from the combustion air inlet of any heater with input up to 100,000 Btu/hr. (**Canada**)
- Three feet from combustion air inlet of any heater over 100,000 Btu/hr. (**Canada**)
- Within six feet of a mechanical air supply inlet to any building. (**Canada**)
- Shall terminate three feet above any forced air inlet within ten feet. (**USA)**
- Shall terminate at least four feet below or one foot above any door window or gravity air inlet into any building. (**USA)**
- Twelve inches from sides and bottom and eighteen inches from top when installed close to the corner of a building.

The previous references to Gas codes and practices are meant to be a guide only to the authoritative ANSI Z223.1 / CSA B149.1-00 latest edition current Gas Codes for the USA and Canada respectively. The references in this manual are not a fully comprehensive list of the current Gas Codes and practices and should not be used solely as such. They are to guide the installer as a reference point to the ANSI Z223.1/ CSA B149.1-00 Natural Gas and Propane Installation Codes (latest edition) It is the responsibility of the installer to be acquainted with and to consult all relevant codes, practices and local requirements before installing the equipment.

Two heaters may be vented through an approved common 4" X 4" X 6" flue Tee, supplied by Schwank Inc., as an option. The two heaters must be controlled by one common thermostat or "ON/OFF" switch.

All vent pipe used with a slip-fit connection must be mechanically secured. Where the vent pipe passes through areas where the ambient temperature is likely to produce condensation of the flue gases, the vent pipe shall be insulated with a suitable material as approved and specified by the insulation manufacturer. Check with Schwank Tech Support as to the maximum vent temperature requirements. The vent system must always be adequately supported to prevent sagging.

PLEASE SEE SECTION 13 PAGE 15: HEATER EXPANSION

11. COMBUSTION AIR INTAKE DUCT

Order Optional Parts:
Air Intake Flange: Heater Model Required
Air Intake Vent Cap: JS-0532-VC

Where heater is operated in a negative air condition or in contaminated air atmosphere such as woodworking shops, air for combustion must be ducted from outside to optional intake flange on blower. The total maximum length of vent and combustion air duct is 80' for SEB / SEBU 200, 175, 155 and 130, and 50' for SEB/SEBU 110, 80 and 60. Neither the flue vent or combustion air duct is to exceed 50'. The total maximum vent allowable is reduced by ten feet for every 90^{o} vent elbow installed.

The air intake inlet shall not be located less than the following distances:

- Three feet above grade
- Twelve inches from flue vent terminal of any heaters with input up to 100,000 BTU
- Three feet from flue vent terminal of any heaters over 100,000 Btu/hr.

If drawing in fresh air from outside, it is recommended as per common Engineering practice, that the combustion air intake duct be insulated. **Do not use** flexible dryer hose for air inlet duct. The corrugated sides of this tubing add too much restriction to the air flow.

CAUTION:

In installations where:
Chlorinated Hydrocarbons are in use, such as Trichloroethylene or Chloroethylene Nu, it is essential that combustion air be brought in from non-contaminated areas.
Burning the fumes from these gases will create Hydrochloric Acid fumes, which are detrimental to humans, equipment and buildings.

12. GAS SUPPLY INSTALLATION

- To ensure proper performance and full input capacity, the gas line should be properly and adequately sized.
- Installation of a manual shut off valve is required on the gas supply line inlet to the heater.
- All components upstream of the control valve are field supplied by the installer.
- Installation of a pipe joint union is required at the gas inlet connection to the control valve on the heater. (It is recommended that the approved flexible gas connector supplied by **Schwank** be installed between the heater and the gas piping).
- Installation of a gas line "Drip Leg" is required at the inlet connection to heater.
- Heater must be isolated from the gas supply piping system by closing its individual manual shutoff valve, supplied by the installer, during any pressure testing of the gas supply piping system in excess of 1/2 psig.

CAUTION:
If rigid gas pipe connection is made, compensation for normal gas supply pipe expansion and radiant tube expansion must be provided. All piping must conform to local codes.

SEE SECTION 13: (PAGE 15) HEATER EXPANSION

DO NOT use pressures greater than 1/2 psig. to pressure check the heater.

TEST FOR LEAKS: All gas piping and connections must be tested for leaks after the installation is completed.

Apply soap suds solution to all connections and joints and if bubbles appear, leaks have been detected and must be corrected. **DO NOT USE A MATCH OR OPEN FLAME OF ANY KIND TO TEST FOR LEAKS. NEVER OPERATE THE HEATER WITH LEAKING CONNECTIONS.**
The supply system should be checked first with heater turned "OFF" followed by another check with heater turned "ON".

IMPORTANT:

The minimum supply-line pressure at the inlet to the heater regulator must not, in any instance, be lower than 5.5 inches of water column pressure for natural gas and 11.0 inches of water column pressure for propane gas. The gas supply line pressure must be checked with all the heater(s) operating.

TABLE 5

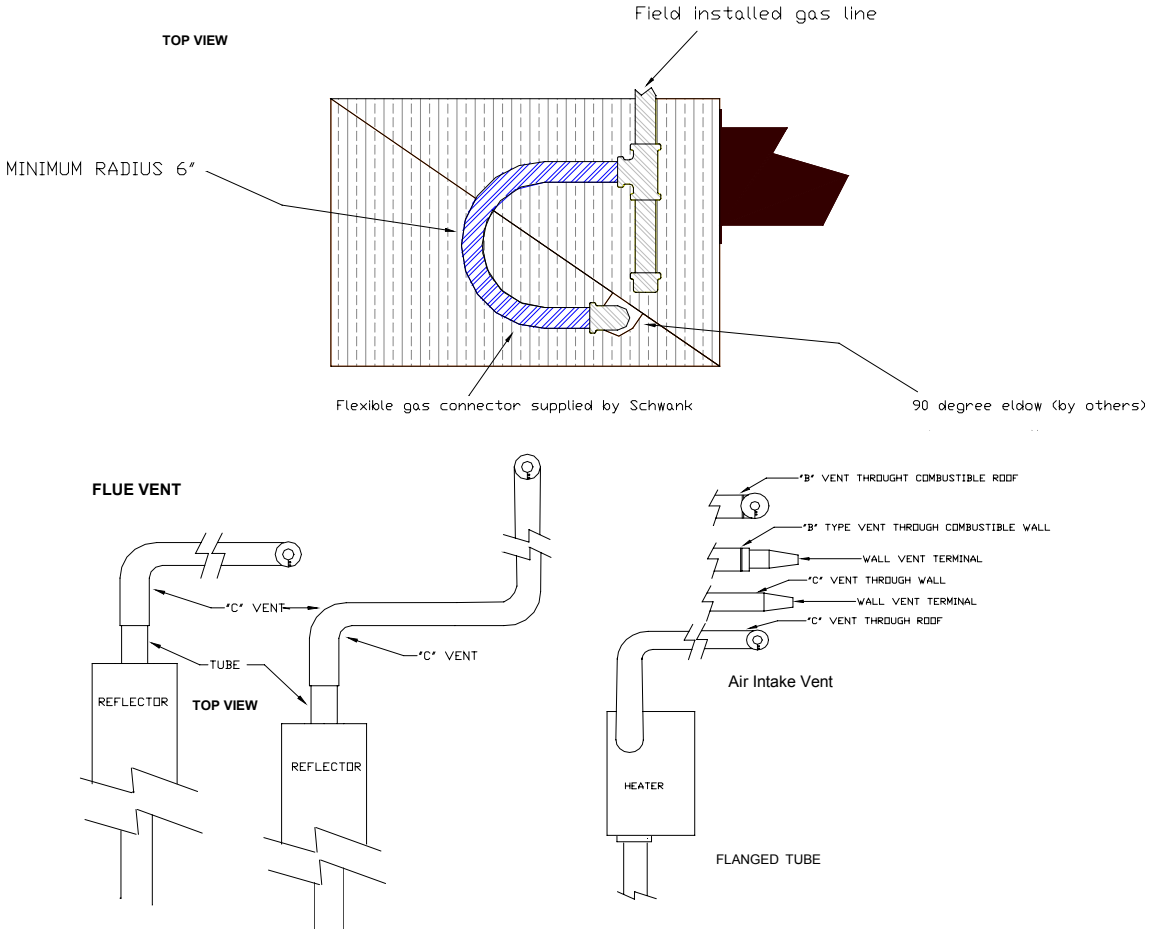
GAS TYPE	LINE PRESSURE INCH WATER COLUMN MINIMUM	MAXIMUM	MANIFOLD PRESSURE INCH WATER COLUMN AT-TAP IN GAS VALVE
Natural Gas	5.5	14.0	3.5
Propane	11.0	14.0	10.0

NOTE: Access to the manifold pressure test port is on the top of the valve. A 3/16" Allen Wrench is necessary to check this. When checking or setting the manifold pressure, a **water manometer** should be used. Gauges which measure in ounces per square inch or pounds per square inch are not accurate enough to properly measure or set the pressure. PLEASE SEE NEXT SECTION ON HEATER EXPANSION.

13. HEATER EXPANSION

Due to the characteristics of tube heaters, the installer must allow for 1" expansion for every 10' length of tube. In order to address this characteristic, it is suggested that the gas line, flue vent, and combustion air intake (if used) be installed in such a manner, that normal expansion of the heater will be accommodated.

FIGURE 13 ALLOWANCE FOR HEATER EXPANSION



14. ELECTRICAL AND THERMOSTAT WIRING

(SEE WIRING DIAGRAMS PAGES 19)

Wiring must be done in accordance with local codes. The total load of all heaters must be considered in determining the required contact rating of the controlling thermostat or switch.

Each individual tube heater requires 120Volts 60 Hz electrical power sized for 145VA. The heater can be controlled by a line voltage thermostat or "ON/OFF" switch.

IMPORTANT:
Do not install the thermostat in the direct radiant stream.

The voltage at the spark ignition control is 110V. Note that proper functioning of the heater will be adversely affected if the input voltage varies by more than +/- 10%

WARNING:
The heater must be electrically grounded in accordance with the current Electrical Code.

It is good wiring practice and the installers responsibility to ensure that correct wiring polarity is maintained throughout installation. The Fenwal DSI control is polarity sensitive and **WILL** malfunction if the polarities are reversed. The black wire **MUST** be wired to Hot, and the white wire **MUST** be wired to Neutral. If the polarity is reversed the module will not function correctly and will eventually burn out.

15. HIGH ALTITUDE INSTALLATIONS

In **Canada** all of the **SEB/SEBU** radiant tube heaters are approved for altitudes zero to 4500 feet above sea level and do not require de-rating.

In the USA if a heater is to be installed at altitudes above 2000 ft, the input must be reduced by 4% per 1000 ft and the orifice must be changed according to the chart on page 29.

16. SEQUENCE OF OPERATION / FLAME RECOVERY/ SAFETY LOCKOUT

Start up - Heat Mode

When the thermostat is set above the ambient temperature, 120 VAC is supplied to the L1 terminal. When this occurs the control will power up and perform a self-check routine and begin a prepurge*, if selected. Following the pre-purge, the gas valve is energized and sparks commence until flame is detected or the Trial For Ignition (TFI) period expires.
When flame is detected, the spark is shut off and the gas valve remains energized. The thermostat and burner flame are constantly monitored to ensure that the system is functioning properly. When the thermostat is satisfied and the demand for heat ends, the gas valve is de-energized immediately and the flame is extinguished.

Flame Failure During TFI Period

Should the burner fail to light or flame is not detected during the first trial for ignition period, the gas valve is de-energized and the control starts the inter-purge sequence before another ignition attempt. After inter-purge, the control will attempt two additional ignition trials. If these attempts are unsuccessful the control will go into lockout mode.

Flame Failure of Established Flame

Re -Ignition

If the established flame signal is lost while the burner is operating, the control responds and begins sparking within 0.8 seconds. The spark will be energized for the duration of the trial-for-ignition period in an attempt to re-light the burner. If flame is re-established, normal operation resumes.
If the Burner does not light after the first attempt, the inter-purge sequence is completed between attempts to re-light the burner. If the burner fails to light after the third try, the control will de-energize the gas valve and go into lockout mode. See Lockout Recovery

Lockout Mode (On-Board Safety System)

After single or multiple attempts to light the burner have failed or flame is not established, the control automatically enters lockout The control will not open the gas valve unless there is intervention by the user. See Lockout Recovery.

Lockout Recovery

For lockout recovery, reset the thermostat below ambient temperature or remove the 120 VAC power supply for 5 seconds

17. LIGHTING INSTRUCTIONS

Refer to the lighting instructions on the inside cover of the burner housing. Again, if the unit goes off on safety, main power to the unit must be manually interrupted for a 30 second reset period before the heater can be restarted.

NOTE:

On initial installation, the unit may lock out on safety owing to the length of time required to bleed air from the gas piping system.

LIGHTING SEQUENCE:

- Rotate gas valve knob to ON position.
- Set Thermostat to the desired setting.
- Turn Power ON to heater.
- This should start the Blower, sending the DSI Control into its pre-purge cycle, then into ignition, and light off.
- If heater fails to light, shut down heater and wait 5 minutes before relighting it
- To shut down the heater just reverse the previous steps..

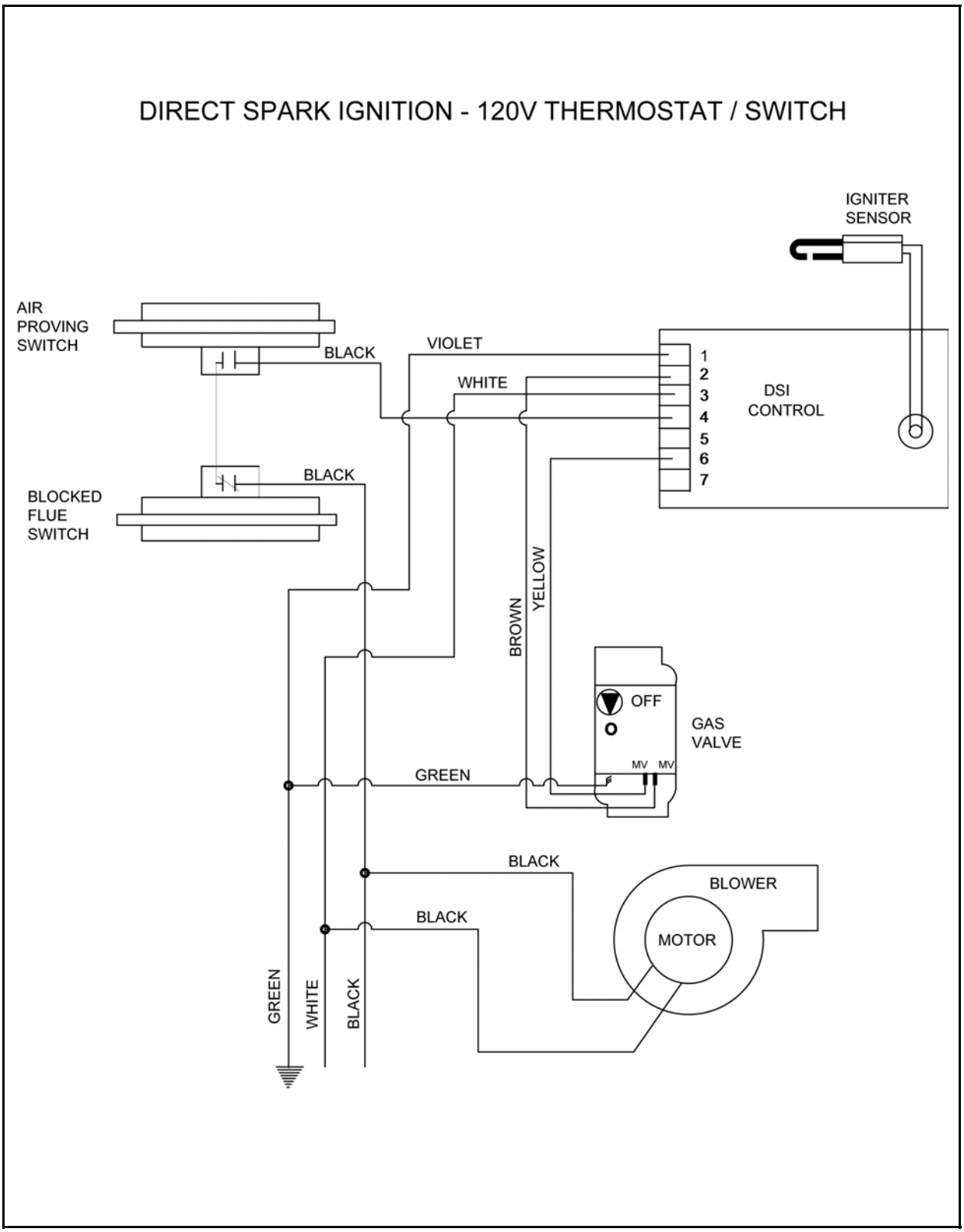
18. RECOMMENDED MAINTENANCE

1. Inspect the venting system each heating season and repair or replace worn parts as required.
2. Check the inlet air opening and the blower periodically, cleaning off any lint or foreign matter, as it is important that the flow of combustion and ventilation air must not be obstructed. In addition we recommend the entire system be checked once a year by a qualified service technician.
3. Lubricate Blower motor, by adding several drops of oil to oil ports located on the left hand side of the motor.

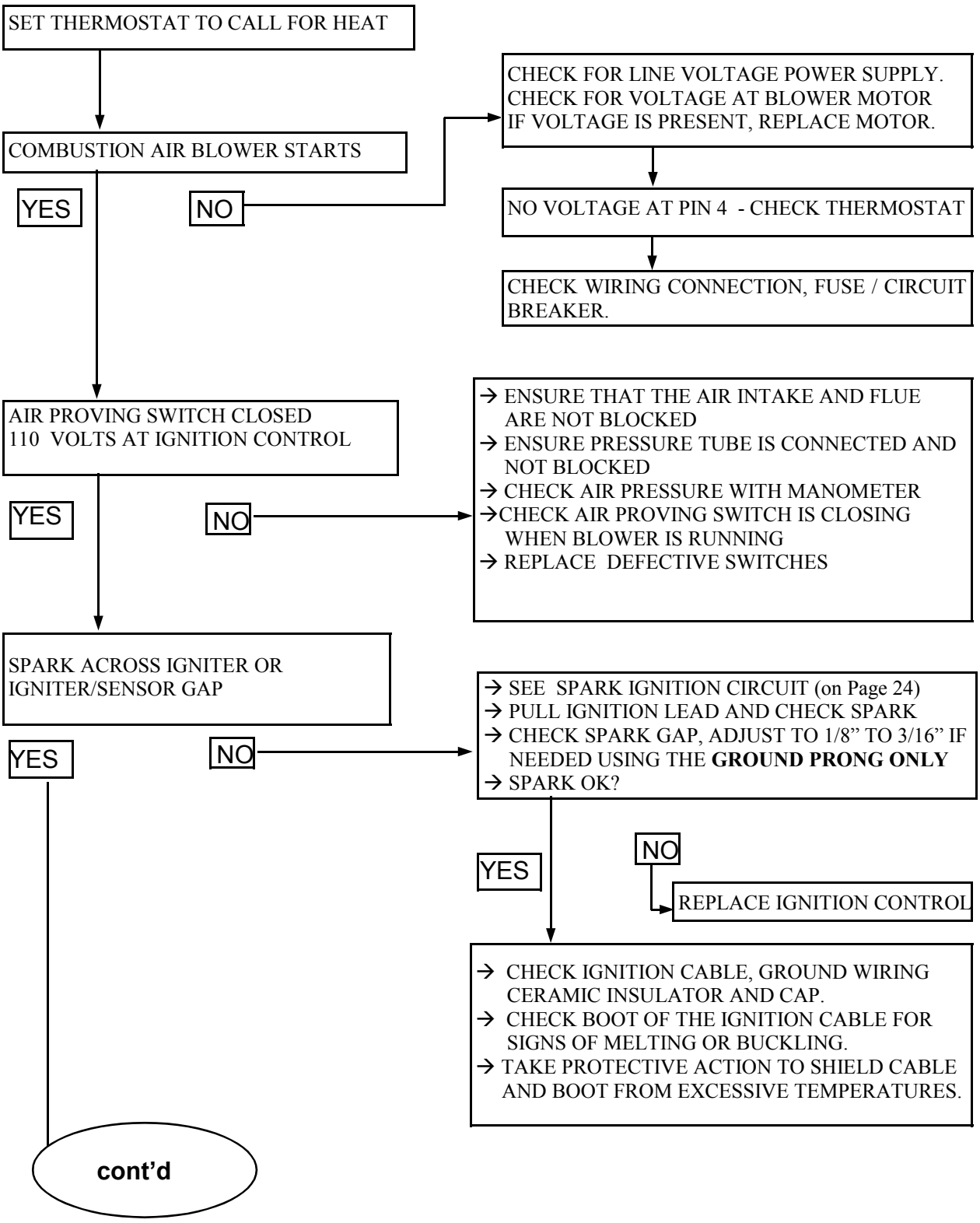
THE SCHWANK TUBE HEATER BURNER IS COMPLETELY FACTORY ASSEMBLED AND TESTED. ANY ALTERATION VOIDS THE CSA CERTIFICATION AND MANUFACTURERS WARRANTY. FOR ADDITIONAL INFORMATION, CONTACT YOUR LOCAL DISTRIBUTOR OR SCHWANK LTD.

Each 10’ section of the SEBU Series Heater is hung by 4 chains, supporting 2 brackets, 2 tubes and one reflector. The heater may be hung at an angle up to 45 providing the Burner Tube is in the lower position and the flue end in the upper position.

19. CA SERIES WIRING DIAGRAM 12OV THERMOSTAT



20. TROUBLESHOOTING GUIDE - 120v THERMOSTAT



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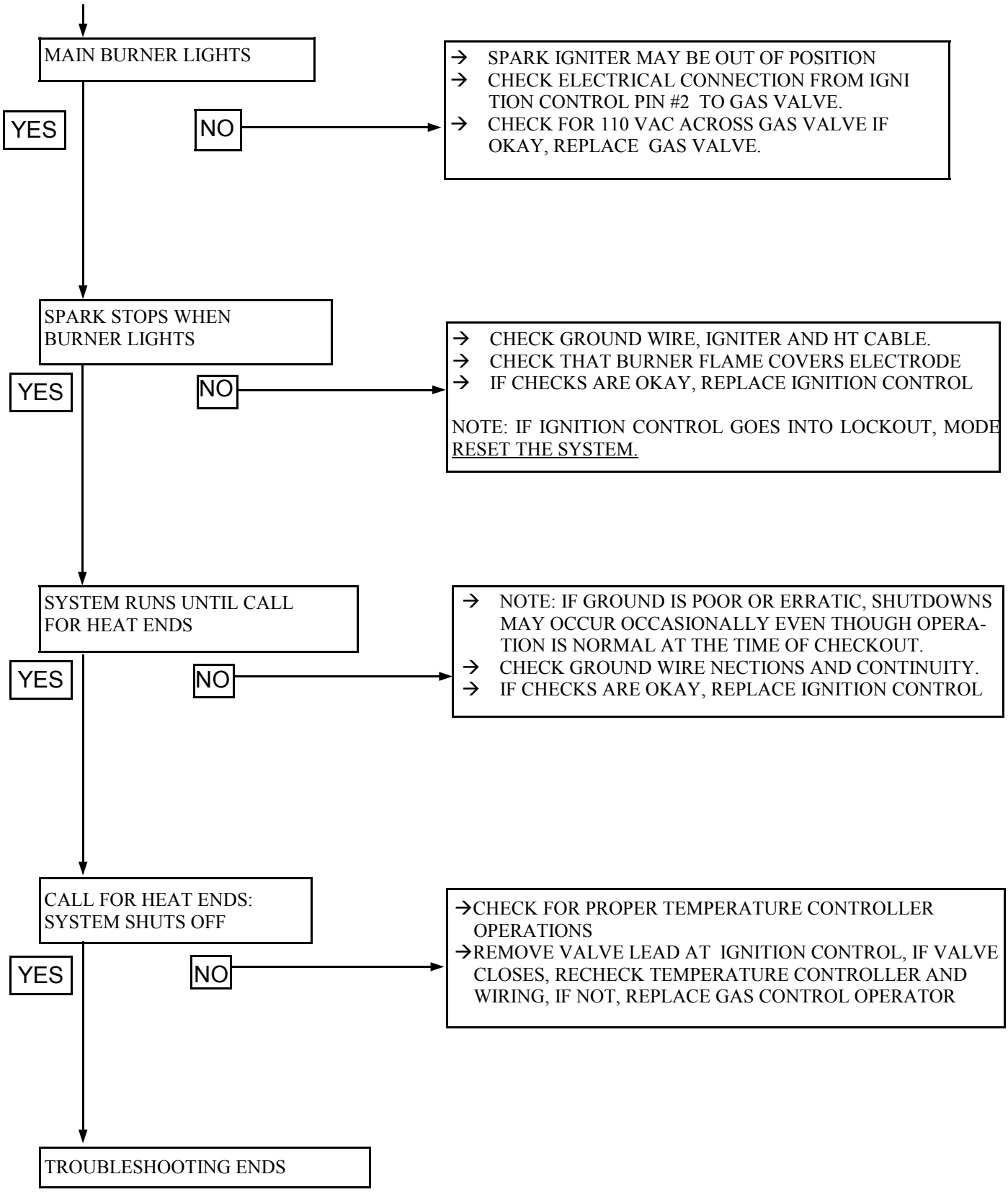


21. SPARK IGNITION CIRCUIT

The step-up transformer in the ignition control provides spark ignition at 30,000 volts (open circuit). To check the spark ignition circuit, proceed as follows.

1 Shut off gas supply to the gas control
2 Disconnect the ignition cable at the ignition control stud terminal to isolate the circuit from the spark igniter or igniter/sensor
3 Prepare a short jumper lead, using heavily insulated wire such as ignition cable

CAUTION

In the next step, DO NOT allow fingers to touch either the stripped end of the jumper or the stud terminal. This is a very high voltage circuit and electrical shock can result.

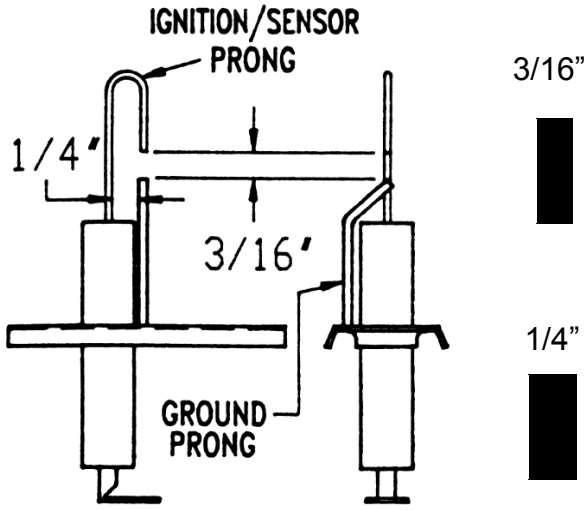
1 Perform this test immediately upon energizing the system before the ignition control goes into safety lockout and interrupts the spark circuit. Touch one end of the jumper firmly to the ignition control GND terminal. (DO NOT remove the existing ground lead.) Slowly move the other end of the jumper wire toward the stud terminal on the ignition control to establish a spark.
2 Pull the wire away from the stud and note the length of gap at which spark discontinues.
3 A spark length of 1/8 in. (3mm) or more indicates satisfactory voltage output. If no arc can be established, or the maximum spark is less than 1/8 in. (3mm), and power to the ignition control input terminals was proved, replace the ignition control.

SPARK IGNITER SET UP

Please use the following diagram for checking the Igniter gap.
If the gap is incorrect all adjustments should be made with the **GROUND PRONG/PIN ONLY!**

DO NOT BEND THE IGNITER PRONG!!!!

The black bars located at the lower right corner can be used as a guide for adjustment.



SP-MSEB-BX-10A
SEB Manual
RD: JUNE 2004
RL: 10
KH

22. START-UP SHEET

COMMISSIONING REPORT
AS PER I&O MANUAL AND LOCAL CODES

CONTRACTOR NAME: .....DATE.....

ADDRESS:.....

.....

CITY:.....

PHONE:.....

CELL: .....

JOB SITE.....CITY.....

HEATER MODEL NUMBER:.....

HEATER SERIAL NUMBER: .....

THIS EQUIPMENT HAS BEEN FACTORY FIRED AND TESTED BEFORE DELIVERY, NEVERTHELESS IT IS NOT A PLUG IN APPLIANCE..IT DOES REQUIRE COMMISSIONING AND FIELD ADJUSTMENTS

TO ENSURE THAT SITE CONDITIONS ARE COMPATIBLE WITH THIS HEATER, AND TO ALLEVIATE NUISANCE CALL BACKS FOR THE CONTRACTOR, THE FOLLOWING START-UP NEEDS TO BE COMPLETED BY THE LICENSED GAS INSTALLER.

A CONTRACTOR IS CALLING FOR TECHNICAL SUPPORT, MUST PROVIDE THE FOLLOWING INFORMATION FROM HIS COMPLETED COMMISSIONING REPORT ON NEXT PAGE

FAX COMPLETED FORM TO TECHNICAL SERVICES: CANADA - 905-712-8336 USA - 706-554-9390

TO BE COMPLETED BY THE LICENSED INSTALLER
TUBE HEATER COMMISSIONING REPORT

TYPE OF GAS:	NG ☐	LP ☐
DOES BUILDING HAVE A NEGATIVE CONDITION:	YES ☐	NO ☐
IF THIS IS A HIGH ALTITUDE AREA WHAT IS THE ALTITUDE ABOVE SEA LEVEL		Feet
DOES APPLICATION REQUIRE FRESH AIR TO BURNER	YES ☐	NO ☐
IS HEATER EXPOSED TO CHEMICAL OR CORROSIVE ATMOSPHERE:	YES ☐	NO ☐
ARE ACTUAL MINIMUM CLEARANCES AS PER TABLE 3	YES ☐	NO ☐
CAN HEATER BE AFFECTED BY OVERHEAD CRANES / VIBRATION	YES ☐	NO ☐
ARE GAS SUPPLY LINES ADEQUATELY SIZED FOR SYSTEM	YES ☐	NO ☐
GAS LINES AND BRANCHES HAVE BEEN PURGED OF AIR:	YES ☐	NO ☐
THIS HEATER FIRED WITHOUT ANY MALFUNCTION:	YES ☐	NO ☐
INLET GAS SUPPLY PRESSURE WITH HEATER OPERATING :		WC"
GAS VALVE OUTLET (Manifold) PRESSURE WITH HEATER OPERATING:		WC"
WHAT IS THE LINE VOLTAGE READING AT THE HEATER		VOLTS
WHAT IS THE VOLTAGE READING AT THE IGNITION MODULE		VOLTS
WHAT IS THE FLAME SIGNAL STRENGTH IN uA FROM SENSOR:		uA (microamps)
IS HEATER CONTROLLED BY A THERMOSTAT	YES ☐	NO ☐
IS THE THERMOSTAT STRATEGICALY LOCATED	YES ☐	NO ☐
WHAT IS TOTAL LENGTH OF INSTALLED THERMOSTAT WIRE		FEET
WHAT IS THE GAUGE OF THE THERMOSTAT WIRE		GAUGE
WHAT IS THE HEATER TUBE LENGTH (10ft per Tube section)		FEET
WHAT IS THE TOTAL LENGTH OF THE VENT (add 10ft for each bend)		FEET
WHAT LENGTH IS COMBUSTION AIR INTAKE (add 10ft for each bend)		FEET
IF REQUIRED....WHAT IS THE LENGTH OF THE TURBULATOR(S)		FEET
IF INSTALLED....IS TURBULATOR AT FLUE END OF SYSTEM	YES ☐	NO ☐

THIS HEATER MUST HAVE GOOD ELECTRICAL GROUNDING

*** FAX COMPLETED FORM TO TECHNICAL SERVICES: CANADA - 905-712-8336 OR USA - 706-554-9390**

23. OPTIONAL COMPONENTS: FOR SCHWANK SE SERIES TUBE HEATERS

Flue Vent Terminals

4" wall horizontal
6" wall horizontal

JA-0528-XX
JA-0529-XX

Flue Vent Terminals

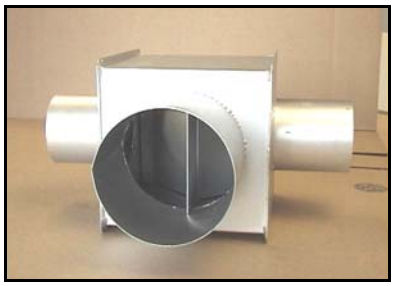
4" roof vertical
6" roof vertical

JA-0530-XX
JA-0531-XX

Torctite Coupler (c/w 2 bolts)

JA-0516-SW

Vent Tee 4" X 4" X 6"
(2 couplers optional)



JA- 0514-XX

90 degree Aluminized Steel Elbow Kit*
(*Kit includes: elbow, coupler, and two end plate hangers)

JS-0508-SM

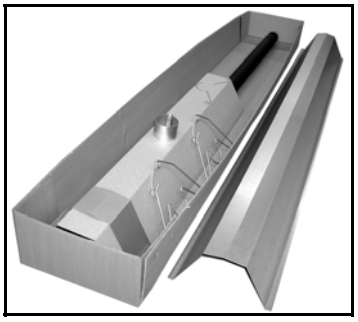
180 degree Aluminized Steel Elbow Kit*
(*Kit includes: elbow, coupler, and two end plate hangers)

JS-0513-SM

Line Voltage Thermo-

JL-0772-XX

10' Tube & Reflector Extension Kit
(1-10' Steel Tube, l-l0'Reflector, 2 Wire Hangers, 1 Coupler.



TM-1010-SX

Side Reflector Extension -
l0" deep l0ft long Each

JS-0509-XX-P

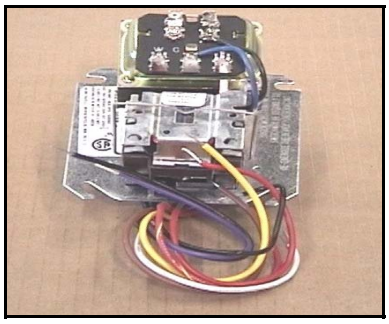
TruTemp Thermostat
(Do Not use in wet or
corrosive environments)

JM-0150-XX

Low Voltage Thermostat
(24 Volts)

JS-0569-XX

Transformer / Relay
(for 1 to 7 heaters per zone)



JM-0303 –KT

Fresh Air Intake Adapter

JS-0532-SE

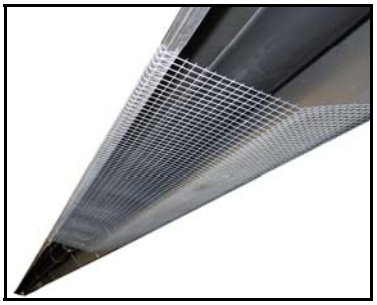
Hanging Chain - (box of 50 ft)

JL-0798-XX

Touch Up Paint - High Temp,
369g aerosol can

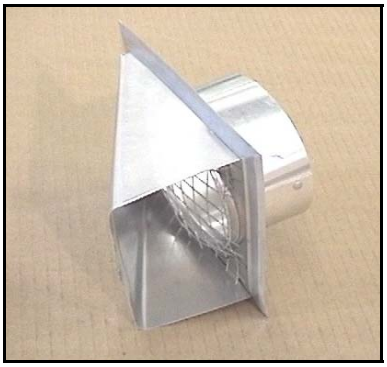
JA-0587-XX

Tube Protection Screen -5 feet long



JA-0780-XX

Fresh Air Intake Cap



JS-0532-VC

24. ORIFICE - ALTITUDE CONVERSION CHART

MODEL NO	STD ORIFICE (DMS)	FOR USE AT ALTITUDES ABOVE (FEET)						
		2000	3000	4000	5000	6000	7000	8000
SEB-60N	JS-0725-DM	JS-0726-DM	JS-0727-DM	JS-0727-DM	JS-0728-DM	JS-0728-DM	JS-0729-DM	JS-0729-DM
SEB-60L	JS-0742-DM	JS-0742-DM	JS-0743-DM	JS-0743-DM	JS-0743-DM	JS-0744-DM	JS-0744-DM	JS-0745-DM
SEB-80N	JS-0718-DM	JS-0719-DM	JS-0719-DM	JS-0720-DM	JS-0721-DM	JS-0722-DM	JS-0723-DM	JS-0724-DM
SEB-80L	JS-0736-DM	JS-0738-DM	JS-0739-DM	JS-0739-DM	JS-0740-DM	JS-0741-DM	JS-0742-DM	JS-0742-DM
SEB-110N	JS-0752-MM	JS-0751-MM	JS-0750-MM	JS-0709-DM	JS-0711-DM	JS-0719-IN	JS-0713-DM	JS-0714-DM
SEB-110L	JS-0731-DM	JS-0732-DM	JS-0732-DM	JS-0732-DM	JS-0733-DM	JS-0734-DM	JS-0735-DM	JS-0736-DM
SEB-130N	JS-0758-MM	JS-0757-MM	JS-0756-MM	JS-0755-MM	JS-0703-DM	JS-0704-DM	JS-0705-DM	JS-0720-IN
SEB-130L	JS-0729-DM	JS-0729-DM	JS-0730-DM	JS-0730-DM	JS-0730-DM	JS-0730-DM	JS-0731-DM	JS-0731-DM
SEB-155N	JS-0725-IN	JS-0764-MM	JS-0763-MM	JS-0762-MM	JS-0761-MM	JS-0760-MM	JS-0759-MM	JS-0758-MM
SEB-155L	JS-0714-IN	JS-0735-MM	JS-0729-DM	JS-0734-MM	JS-0733-MM	JS-0733-MM	JS-0730-DM	JS-0713-IN
SEB-175N	JS-0767-MM	JS-0766-MM	JS-0766-MM	JS-0765-MM	JS-0765-MM	JS-0764-MM	JS-0763-MM	JS-0763-MM
SEB-175L	JS-0721-DM	JS-0723-DM	JS-0723-DM	JS-0724-DM	JS-0725-DM	JS-0726-DM	JS-0727-DM	JS-0728-DM
SEB-200N	JS-0730-IN	JS-0774-MM	JS-0773-MM	JS-0773-MM	JS-0772-MM	JS-0728-IN	JS-0771-MM	JS-0770-MM
SEB-200L	JS-0719-DM	JS-0720-DM	JS-0720-DM	JS-0721-DM	JS-0722-DM	JS-0723-DM	JS-0725-DM	JS-0726-DM

Schwank infra-red gas heaters ISO 9001:2000 REGISTERED

LIMITED WARRANTY CERTIFICATE

FOR GAS-FIRED INFRA-RED LOW INTENSITY TUBE TYPE HEATERS : SEM, SEB, SER SERIES

The Manufacturer warrants that this product is free from defects in material or workmanship under normal use and service subject to the terms of this document.

TWO YEAR WARRANTY

Subject to the conditions and limitations stated herein, during the term of this limited warranty, we will repair or replace (at our option) any component part of the heater as defined below, which the Manufacturer's examination determines to be defective in workmanship or material for a period of three (3) years from the date of installation, unless otherwise specified below. This warranty applies to the heater's original owner, and subsequent transferees and only if the unit is installed and operated in accordance with the printed instructions accompanying the unit and in compliance with all applicable installation, building codes and good trade practices. Warranty is only applicable to Schwank components, other parts are limited to their own Manufacturers warranty. (1 year)

FIVE YEAR WARRANTY

The Manufacturer warrants the radiating tubes (excluding couplings) for a period of five years**.** (5 years)

TEN YEAR WARRANTY

The Manufacturer warrants the burner sub-assembly comprising of ceramic and immediate metal tubing, for a period of ten years**.** (10 years)

WHAT IS NOT COVERED

This warranty does not cover heating products improperly installed, misused, exposed to or damaged by negligence, accident, corrosive or contaminating atmosphere, water, excessive thermal shock, impact, abrasion, alteration or operation contrary to the owner's manual or if the serial number has been altered, defaced or removed. This warranty shall not apply if the input to the heating product exceeds by more than 2% of the rated input on the rating plate. The Manufacturer shall not be responsible for any expenses, including service, labor, diagnosis, analysis, material or transportation charges incurred during removal or reinstallation of this product, or any of its components or parts. All labor or service charges shall be paid by the owner. The Manufacturer shall not be liable for any default or delay in performance by its warranty caused by any contingency beyond its control, including war, government restrictions, or restraints, strikes, fire, flood, acts of God, or short or reduced supply of raw materials or products.

WARRANTY PROCEDURE

To establish the installation date for any purpose under this Limited Warranty, you must retain the original records that can establish the installation date of your unit. If you do not provide such documents, the start date of the term of this Limited Warranty will be based upon the date of unit manufacture, plus thirty (30) days. Failure to maintain the equipment through regular annual service maintenance by a qualified service technician shall void the warranty.

LIMITATIONS AND EXCLUSIONS

This document contains all warranties made by the Manufacturer and may not be varied, altered or extended by any person. There are no promises, or agreements extending from the Manufacture other than the statements contained herein. THIS WARRANTY IS IN LIEU OF ALL WARRANTIES EXPRESSED OR IMPLIED, TO THE EXTENT AUTHORIZED BY THE LAWS OF THE JURISDICTION, INCLUDING SPECIFICALLY THE WARRANTIES OR MERCHANTIBILITY OF FITNESS FOR A PARTICULAR PURPOSE.

It is understood and agreed that the Manufacturer's obligation hereunder is limited to repairing or replacing parts determined to be defective as stated above. In no event shall the Manufacturer be responsible for any alleged personal injuries or other special, incidental or consequential damages. As to property damages, contract, tort or other claim the Manufacturer's responsibility shall not exceed the purchase priced paid for the product.

All replacement parts will be warranted for the unused portion of the warranty coverage period remaining on the applicable unit.

Some Authorities do not allow certain warranty exclusions or limitations on how long a warranty lasts or the exclusions or limitations of incidental or consequential damages. In such cases, the above limitations or exclusions may not apply to you and are not intended to do so where prohibited by law. This warranty gives you specific legal rights. You may also have other rights which vary by each jurisdiction.

SCHWANK INC. 5285 BRADCO BLVD. MISSISSAUGA, ON, L4W 2A6 Ph: 905-712-4766

SP-DSEX-BX-02A
SE series WARRANTY
MAY, 2004
RL: 2
KH