Innovative Heat Treatment

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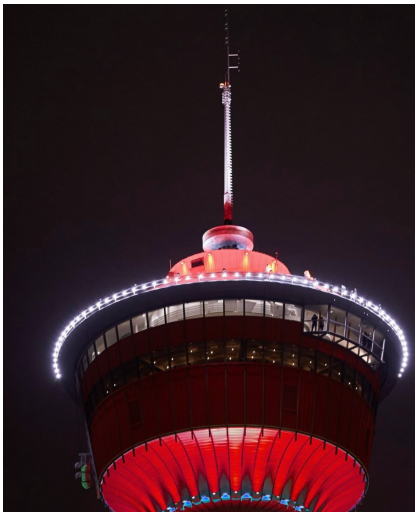
SCU BURNER – OPERATING MANUAL

"The Heat Is On"



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1.0 INTRODUCTION

Surface Combustion Unit (SCU) is an economical and highly efficient infra-red gas radiant heater that provides a radiant heat source for pre-heating metal fabrications. The SCU is available in a range of sizes:

- 1 Burner 300 X 150mm (12” x 6”) Hot face
- 1 Burner 300 X 300mm (12” x12”) Hot face
- 1 Burner 600 X 150mm (24” x 6”) Hot face
- 1 Burner 900 X 150mm (36” x 6”) Hot face

2.0 APPLICATIONS

- Pre heat of rotating circumferential seams on pressure vessels using floor mounted stands.
- Preheat of longitudinal seams on pressure vessels using the ‘series link’ arrangement.
- Preheat of sections of pressure vessels requiring repair.
- Preheat of castings during repair.
- Expansion of metal rims and subsequent shrink fitting.
- Almost any process that requires clean and rapid heat.

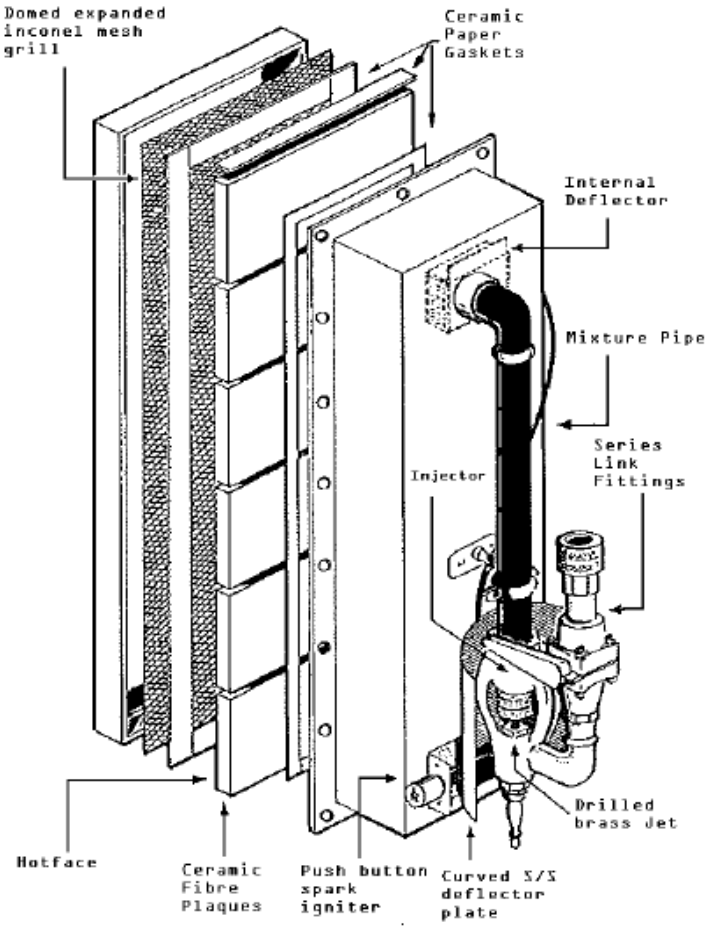
3.0 OVERVIEW

Infra-red energy is transmitted by the hot face of the Surface Combustion Unit (SCU). Liquefied Petroleum gas (LPG) or High pressure natural gas enters the rear of the unit drawing in air, mixing inside the plenum chamber and then burns efficiently on the front face of the perforated ceramic tiles. Complete combustion is achieved without flaming.

Compared with open flame gas burners, the SCU can save one-third or more of the gas input as there is the absence of flame management.

The simplest setup involves one burner connected to a bottle of propane and positioned near the work piece at a distance of 50mm.

An optional Piezo-electric device can be used to ignite the gas-air mixture



on the burner. Other burners may be added to the circuit by means of rapid disconnect couplings. Revolving seams may be temperature controlled using an optical pyrometer and a control unit. Open flame burners are still used in some workshops for pre-heating heavy components. Therefore, environmental protection and energy conservation becomes increasingly relevant.

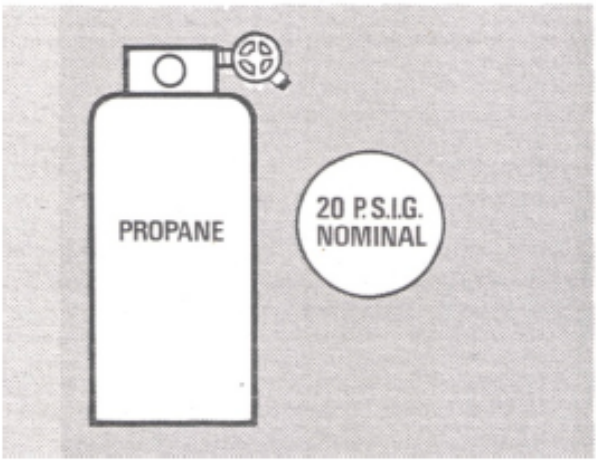
Bottled or piped propane or natural gas enters the rear of the burner by means of a self-sealing, quick release coupling. Combustion air is entrained by gas as it passes through the injector. A deflector in the burner case spreads out the mixture over the full hot face which is made up of rectangular ceramic plaques, each containing hundreds of tiny holes.

As the gas/air mixture emerges on the front plate of the plaques, it is ignited with an electric spark and continues to burn on the plaque surface. The plaques become intensely hot therefore being made from a modern ceramic material will withstand 1000°C (1800°F) on the hot face and yet run cold on the back face where the gas/air mixture enters. A domed, expanded Inconel mesh grill which protects the plaques from mechanical damage also helps to retain combustion loss to the hot face. When positioned 50mm-75mm (2”-3”) away from the work piece to be heated, 50 000 BTU’s (for 600mm x 150mm) of energy will be directed at its surface. Heat transfer is mainly by radiation and the 1000°C (1800°F) radiating surface of the burner permits rapid heating to be achieved.

SCU SURFACE COMBUSTABLE UNIT

4.0 INSTALLATION & OPERATION

4.1 Determine gas to be used and Supply pressure available.

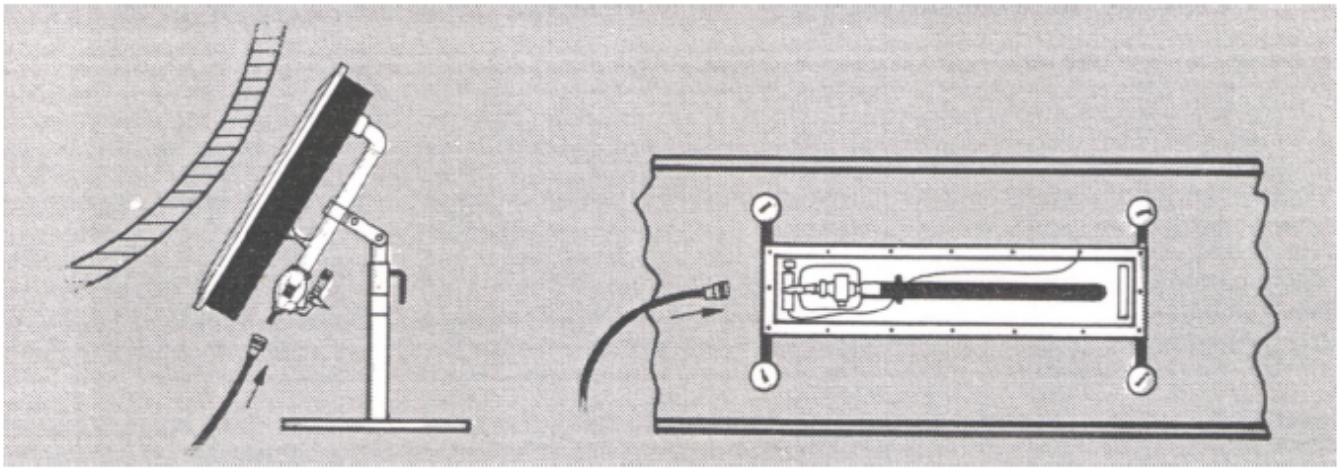


4.2 Check suitability of burners (i.e. jet size) for gas in question.

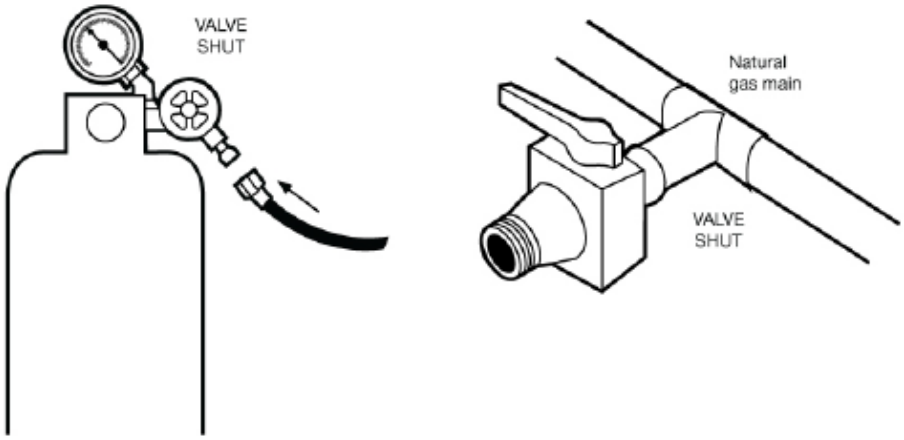
Burner Size	Propane	Natural Gas
305mm x 152mm	0.55mm	0.8mm
305mm x 305mm	0.80mm	1.2mm
610mm x 152mm	0.80mm	1.2mm
915mm x 152mm	1.00mm	1.8mm
1219mm x152mm	1.20mm	-

4.3 Fit (if not already fitted) all ancillary equipment (i.e. series links, magnetic feet, spark igniters, deflector plates, flame failure kits).

4.4 Position burners, as required, using stands or magnetic feet. Close all series link valves.

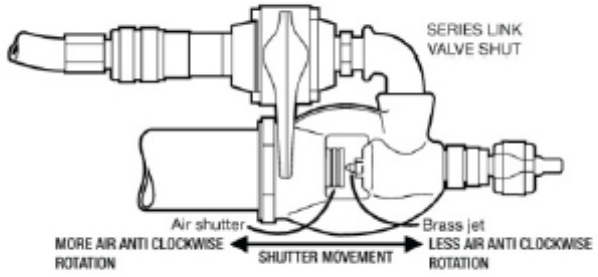


4.5 Connect gas supply hose to an isolated gas supply (i.e. propane bottle/network or natural gas supply).

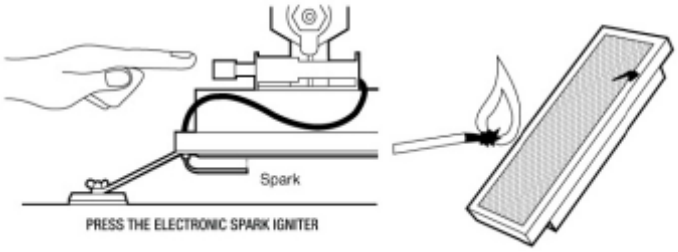


4.6 Connect quick-release coupling to first burner and inter-link others in series, as required, using short link hoses (i.e. up to six in chain).

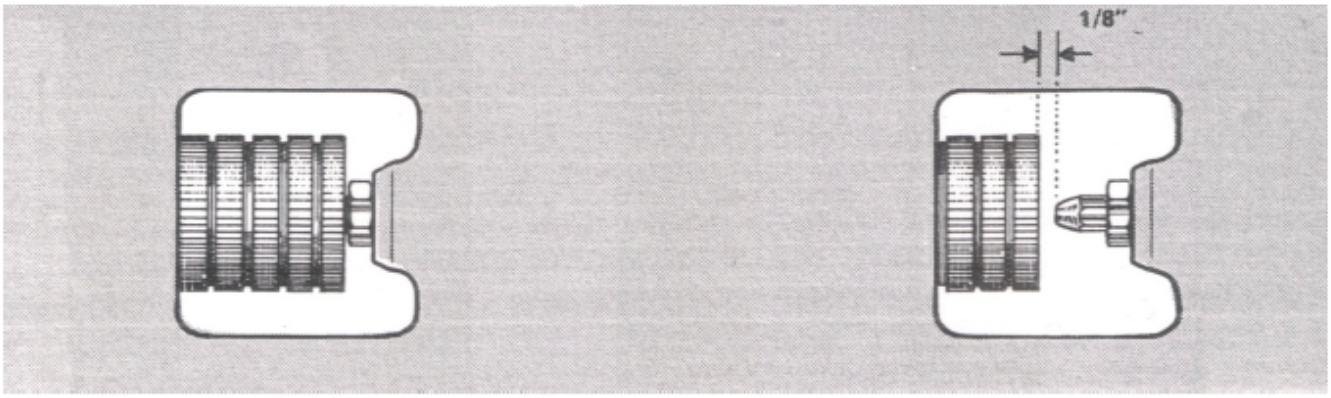
4.7 Fully open air shutter on first burner in series. Check all series link valves are shut.



4.8 Turn on gas supply and light first burner using push button spark igniter. If damaged or missing light on - front face with a match.



4.9 Adjust aeration by closing the air shutter until burner shows signs of starvation, then open up three full turns.



4.10 Turn gas on to second burner using series link valve on first unit.

4.11 Adjust similarly, the second burner. Close air shutter to starvation point. Open air shutter three full turns.

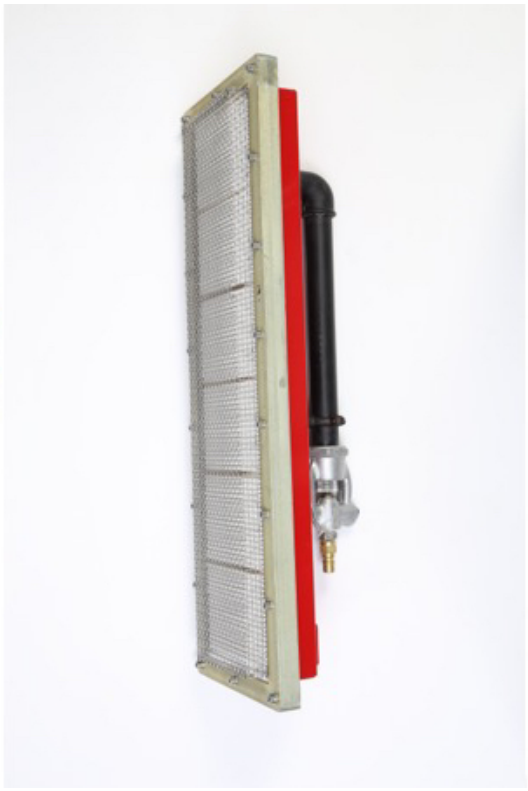
4.12 To shut down the burners, close the relevant valves or common supply isolation valve.

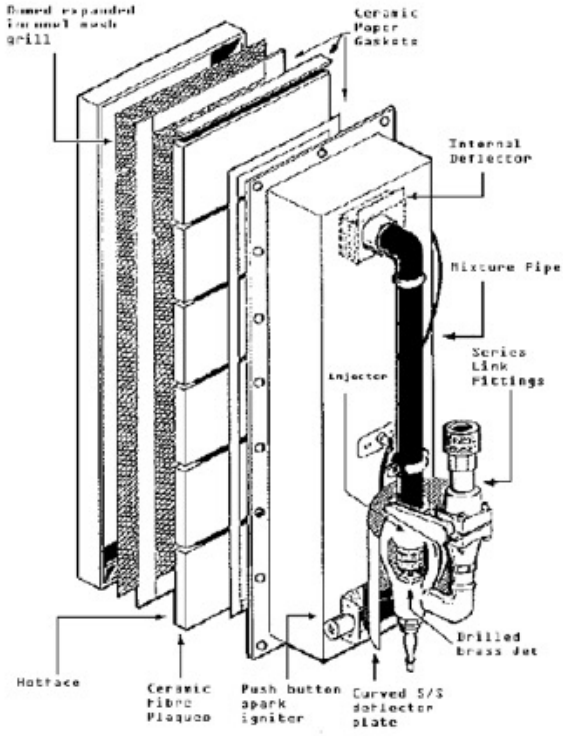
Operation

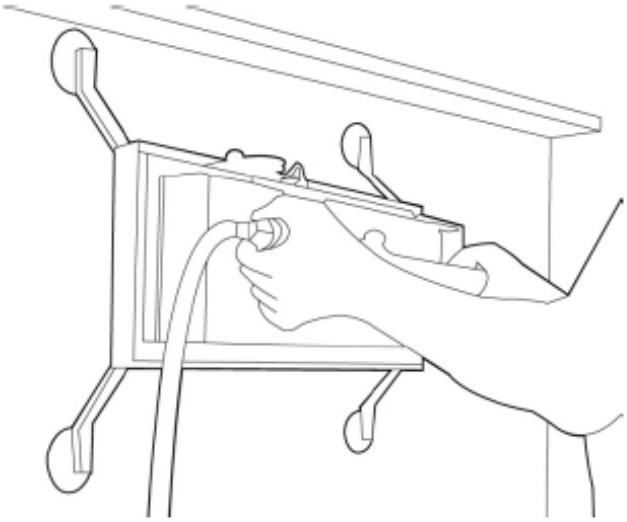
Firing in the downwards plane: It is important to utilise the curved s/s deflector plate when firing an SCU in the inverted (downward) position. This deflects the rising products of combustion away from the entrained air stream into the injector.

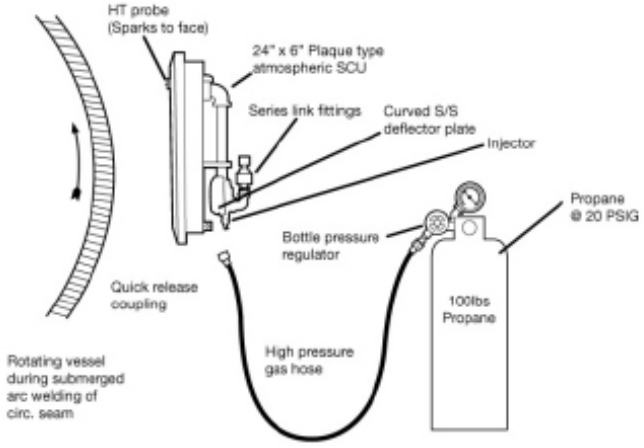
Quick Heat-Up of Hot face: Due to the extremely light weight of the plaques, it takes only a few seconds for the burner to reach the operating temperature. Therefore it is possible to automatically control the heat output using high/low control of the gas supply to the burner. This is a pressure controlled by-pass system which automatically adjusts to the number of burners being supplied.

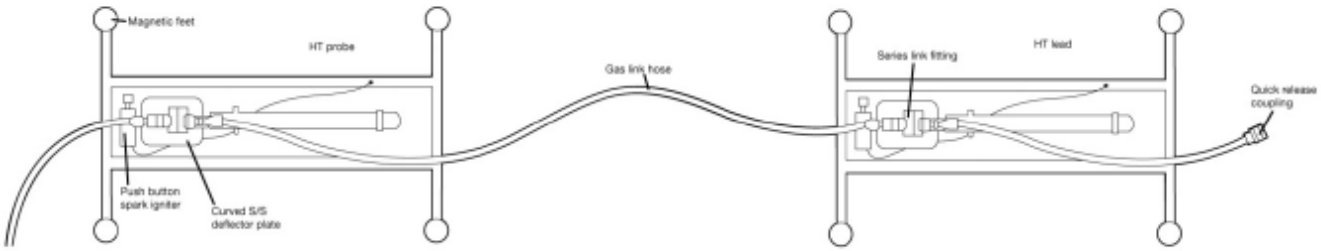
"THE HEAT IS ON"




Ceramic Paper Gaskets
Internal Deflector
Mixture Pipe
Series Link Fittings
Injector
Drilled Brass Jet
Hotface
Ceramic Fibre Plaque
Push button spark igniter
Curved S/S deflector plate




HT probe (Sparks to face)
24" x 6" Plaque type atmospheric SCU
Series link fittings
Curved S/S deflector plate
Injector
Propane @ 20 PSIG
Bottle pressure regulator
Quick release coupling
100lbs Propane
High pressure gas hose
Rotating vessel during submerged arc welding of circ. seam


Magnetic feet
HT probe
Gas link hose
Series link fitting
HT lead
Quick release coupling
Push button spark igniter
Curved S/S deflector plate

5.0 ITEMS & ACCESORIES

ITEM DESCRIPTION
Six plaque packs (replacement face kit) Comprising: Six plaques and ceramic fibre paper gasket material protectively wrapped and packaged,
Twin and four outlet distribution manifolds with or without fitted adjustable pressure regulators,
Tall and short single column adjustable burner pedestal stands and vertical scissor stand
Set of four magnetic feet:305mm x 305mm,6262/22 and 152mm x 152mm,
Burner Clamp; enables to carry the SCU off the support steelwork,
Twin Burner Support Bracket; Doubles the carrying capacity of the pedestal stand,
Angle Bracket; Used with the burner clamp to provide an additional plane for adjustment for SCU,
Set of Series Link fittings; provide a 'feed on' facility from the SCU injector to supply the next burner in the train. (Fitted to Order),
Individual thermo-magnet flame failure kit (Fitted to Order),
Curved S/S deflector plate; essential in inverted firings to deflect combustion products (Fitted to order),
Spark Ignition Kit; Piezo-electric device that enables pushbutton ignition (Fitted to order),
Propane bottle regulator; adjustable pressure regulator,
Propane bottle 'Pig Tail' Hose; high pressure flexible gas hose for interlinking two or more propane bottles. Used in conjunction with the propane bottle 'T' Piece,
Propane bottle 'T' piece; to interlink a number of propane bottles to increase 'draw off' capability
Brass Fuel Jet set of 5; interchangeable brass fuel jet to convert SCU's from one fuel to another (5 per packet),
'O' Clips; for 8mm bore orange fuel gas hose (10 per packet),
Gas Supply to Manifold hose c/w fitted quick release couplings,
Manifold to burner link c/w fitted quick release couplings,

Link Hose Couplings; A set of link hose coupling c/w 'O' clips but no hose,
Female Link Hose Coupling c/w 'O' clip,
Male Link Hose Coupling c/w 'O' clip,
Manifold, quick release inlet coupling c/w
100m Roll Thermocouple Wire

6.0 REPLACING THE PLAQUE FACE OF A BURNER

6.1 Remove all front frame screws.(1)

6.2 Remove frame and domed Inconel grill.(2)

6.3 Strip out old plaques and gaskets.(3)

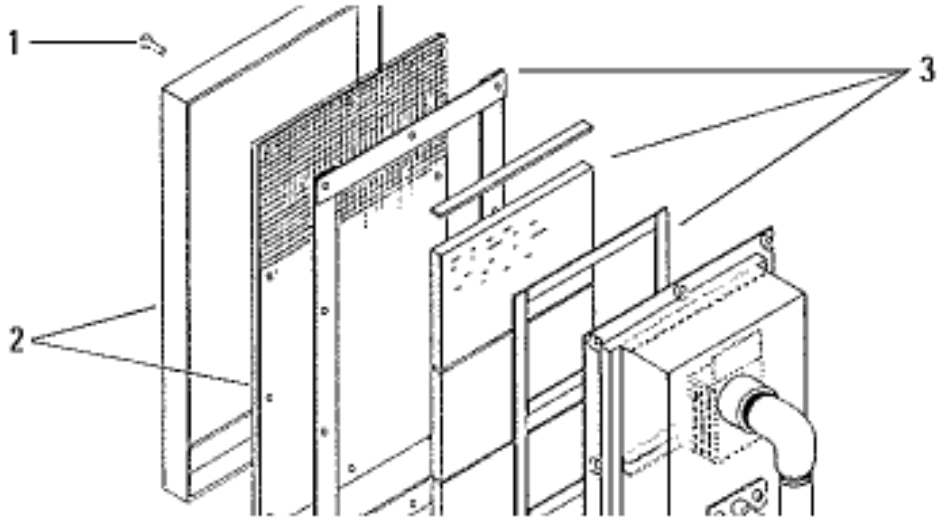
6.4 Cut and re-seat new top gaskets.

6.5 Trim plaques to size leaving a band all around the retaining edges. Space out with ceramic paper strips.

6.6 Cut and re-seat new grill and front frame.

6.7 Replace the Inconel grill and front frame.

6.8 Replace all front frame screws applying a dab of anti-seize compound to each thread.



7.0 SAFTEY

- Use the correct fuel at the supply pressure stated on the rating label. Check using a gauge if necessary.
- Make sure that all quick-release couplings are securely connected, to prevent a leak.
- Allow air to circulate freely around burners.
- Use a curved s/s deflector plate when firing in the inverted (downward) position.
- Do not insulate adjacent to the burner case.
- Do not restrict the escape of the combustion products in any way.
- Do not use confined spaces which would result in air starvation or vitiation.

“THE HEAT IS ON”