The SPIRFLAME®

is a patented, powerful microflame generator with an electronically stabilized, adjustable heat output. The microflames are made from the self-generated 2 : 1 mixed hydrogen - oxygen. The multiple-cell electrolyser uses an ample supply of 110 . . 220 vac energy to decompose water.

The SPIRFLAME® microflame generator is used for precision . .

- *soft soldering*
- *silver soldering*
- *brazing*
- *welding*
- *annealing*
- *hardening*
- *spot heating*
- *polishing*
- *flaming of plastic surfaces before print, and . . . .*

Contents of
The SPIRFLAME® brochure

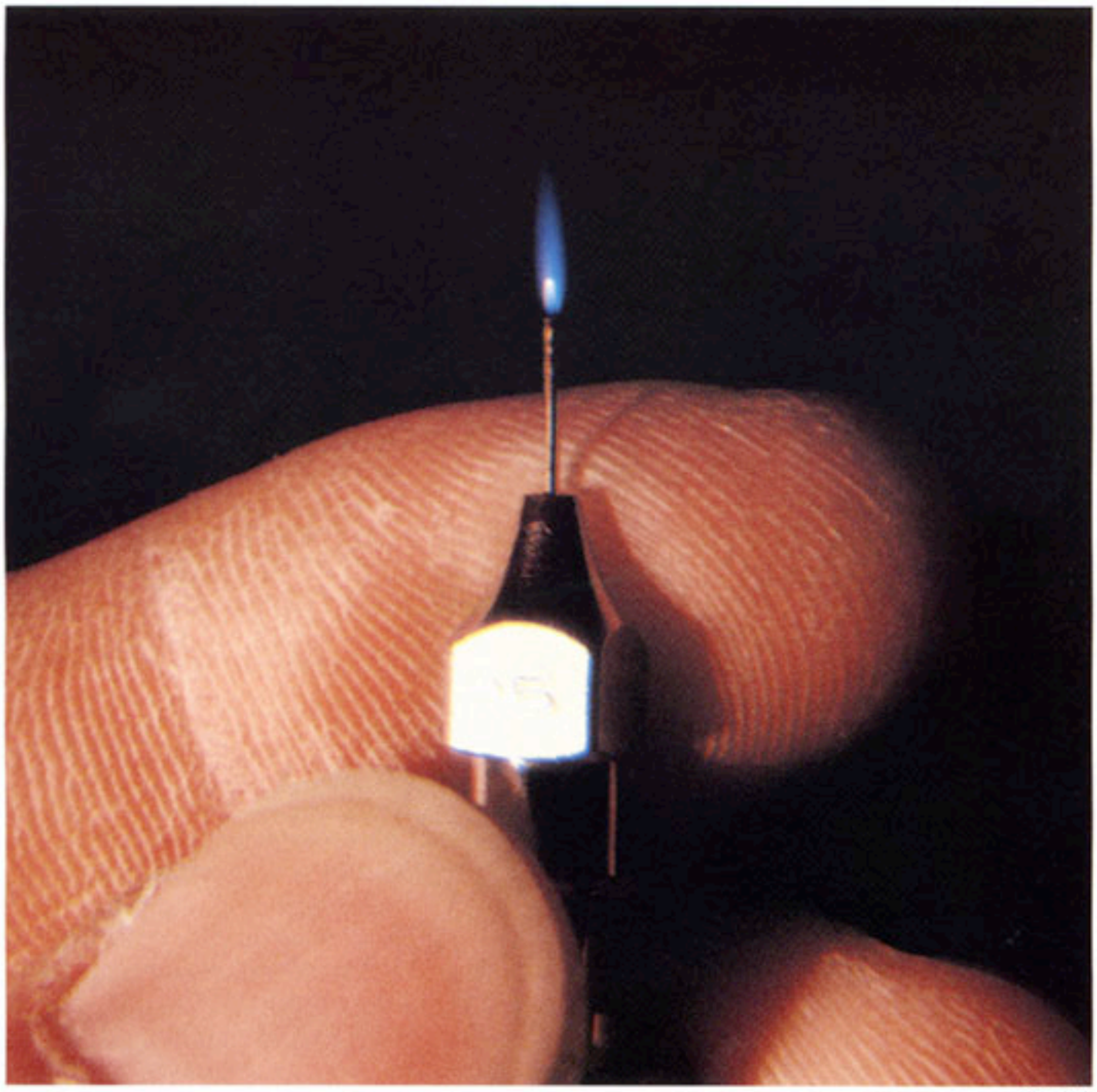

fig.1A

The handling of the microflames can be either manually or by automated handling systems and robots. The requested microflame size and power is electronically selected or programmable.

SPIRIG

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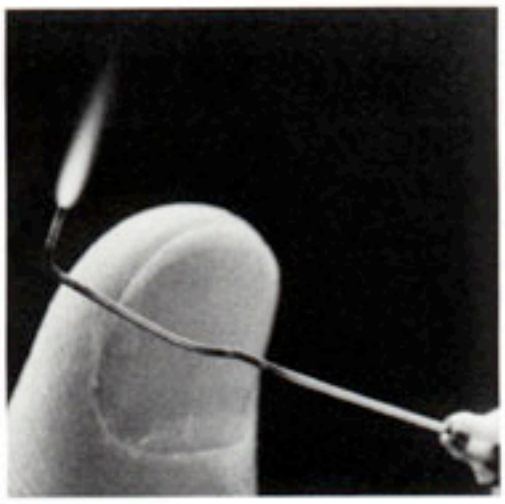


fig.2A. The tip can be bent to adjust the flame direction. The tip does not heat-up in use.

fig.2B. Torch handle includes a disposable flash-back arrester and a magnetic attachment. Various tip sizes (orifice) are available and easily changed.

fig.2C. New SPIRFLAME® model 505HP is a very compact design to fit easily into assembly lines.

The SPIRFLAME® is available in various models.

The SPIRFLAME® models 105HP, 205HP and 505HP cover the maximum gas production rates of 100 litres gas per hour up to 500 litres gas per hour. Models with a higher gas rate capacity are available on request.

The SPIRFLAME® is delivered as a ready-to-use package complete for a one torch station installation. There are no hidden additional costs.

Additional torches are simply added by manifolding the gas hose with plastic T-connectors. The number of additional torches is limited by the maximum gas rate of the specific SPIRFLAME® model and the flame sizes (total gas rate needed) requested by the various torches and the max. gas pressure needed.

The SPIRFLAME® automatically adapts to the changing and varying gas consumption of multiple torches.

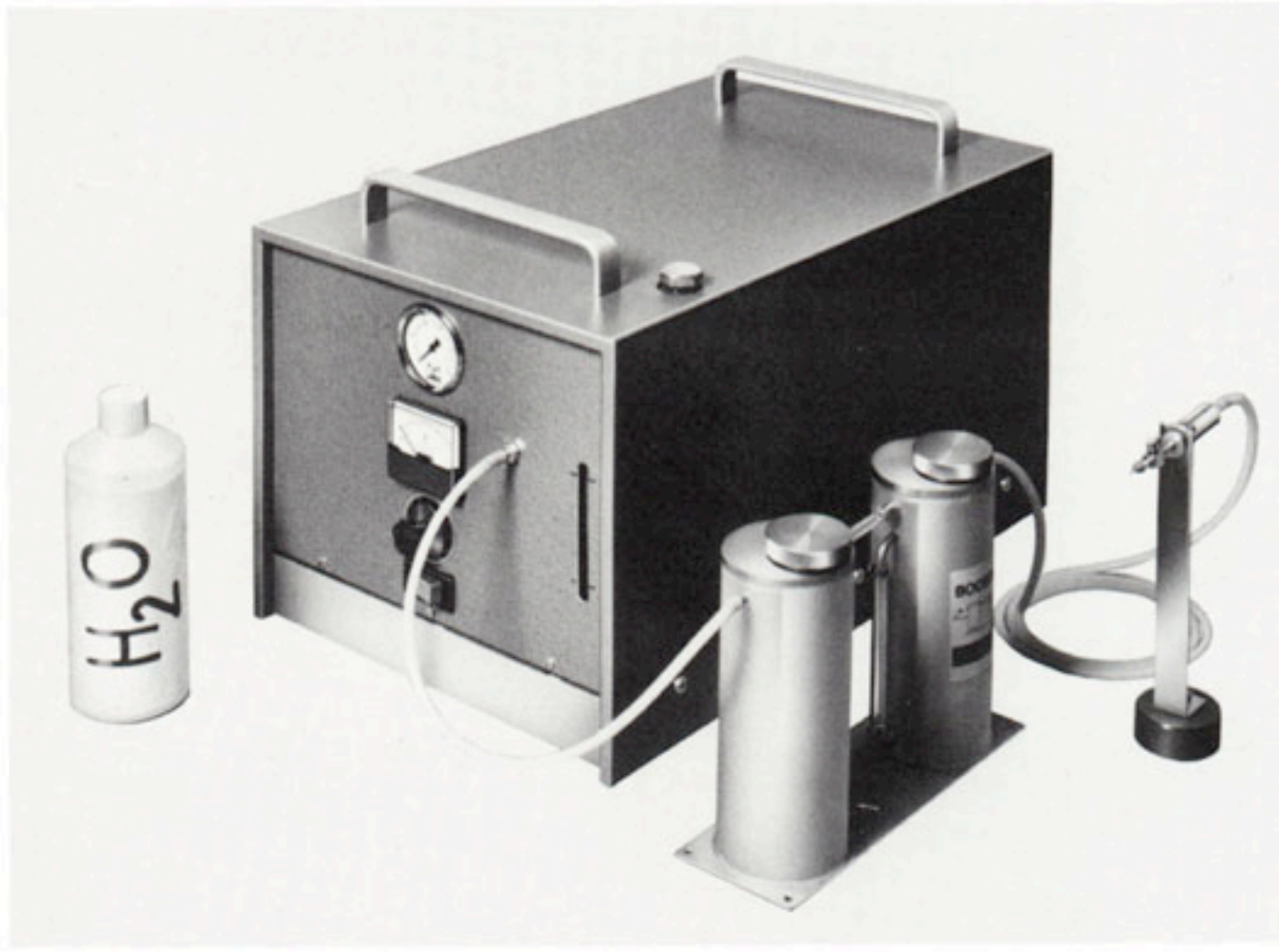


fig.2D. SPIRFLAME® model 105HP & model 205HP have the same compact housing. The BOOSTER (two steel bottles) with methanol additive lowers the flame temperature from 3300 °C (pure oxy-hydrogen) to 2600 °C. Other additives available.

Standard N1:	*Automatic cut-off of gas production in case the water level in tank system falls to the MIN level.*
Option N2:	*Two float level switches can signal LOW and HIGH water level conditions to an external remote control.*
Option D1 & G1:	*Pressure switches detect MIN and MAX gas pressures.*
Option VK-10N:	*MIN fluid (methanol) level sensor in the BOOSTER.*

SPIRFLAME® models:	***105HP***	***205HP***	***505HP***	
Maximum permanent gas rate	*100*	*200*	*500*	*litres / hour*
Operating gas pressures	*40 - 150*	*40 - 150*	*40 - 150*	*mBar*
	0,4 - 1,5	*0,4 - 1,5*	*0,4 - 1,5*	*psi*
AC supply voltage (specify with order)	*220 (115,240)*	*220 (115,240)*	*220 (240)*	*volt*
Energy consumption at max. gas rate	*450*	*700*	*2000*	*watt (VA)*
Water consumption on full gas rate	*50*	*100*	*250*	*gramm / hour*
Methanol consumption on full gas rate	*5*	*10*	*25*	*gramm / hour*
Number of electrolysis cells	*11*	*22*	*50*	*piece*
Dimension of unit	*550 x 350 x 370*	*550 x 350 x 370*	*550 x 350 x 800*	*mm*
Weight (gross / net)	*45 / 61*	*52 / 70*	*140 / 100*	*kg*

fig.3A. Automated microflame soft soldering on printed circuit boards is an established application.

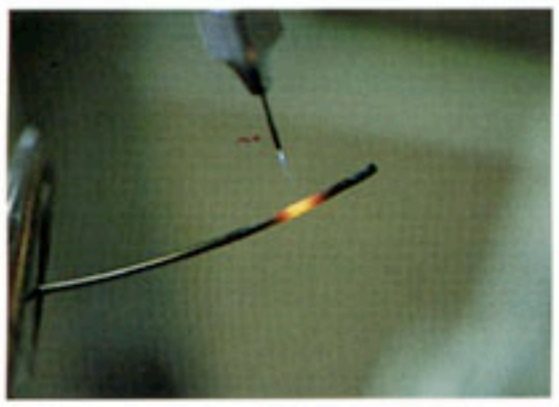


fig.3B. The <spirflame> has a restricted pinpointed heat zone with considerable heat energy.

<spirflame>
is a
SPIRFLAME®
generated flame .

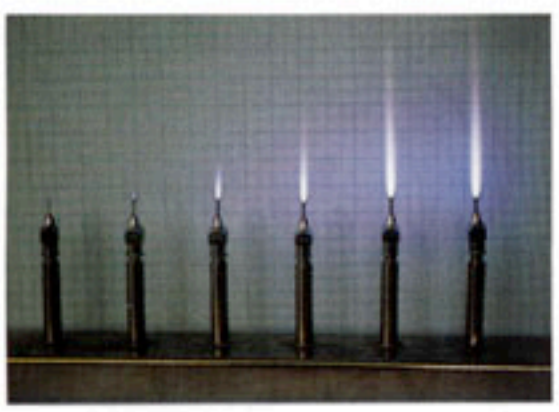


fig.3C. Tip diameter defines the basic flame size.

The **SPIRFLAME®** *function:*

SPIRFLAME® breaks down water (H2O) in its basic elements 2 parts hydrogen (H) and 1 part oxygen (O).

There is no storage of pressurized gas. Operating gas pressures are between a minimum of 50 mBar and up to a maximum of 150 mBar.

SPIRFLAME® automatically mixes the hydrogen and oxygen to the optimal combustion ratio of 2 : 1 without any moving mechanical parts.

Even the smallest flames burn very stable on the tip . A perfect flame stability is most important for automated applications.

SPIRFLAME® automatically adjusts the gas production rate without operator interference to the proper intensity to maintain the gas pressure on the electronically pre-selected level, regardless of gas consumption (be it one or multiple torch users), variations of line voltage, warm-up of system and even aging of the system. This within the limits of the specific models.

The **SPIRFLAME®** *advantages:*

The SPIRFLAME® multiple electrolysis cell generator presents an hitherto unknown stable, easily adjustable and fully thermally stabilized, dependable and highly reliable precision heat-source. The SPIRFLAME® is used for:

single - or multiple flame torch installations,

100% duty, 24 hours a day and 7 days a week industrial manufacturing applications,

critical laboratory applications, or just as the ideal microflame torch for the dental laboratory or for the goldsmith in need of a very precise heat source to work on fine and delicate gold, platinum or stainless steel (dental wire) parts.

The perfect mixed and heat stabilized micro-flame has, in contrast to any other man-generated flame, almost no side heat radiation.

The ***<spirflame>*** *has, despite its small pinpoint size, a high energy concentration and allows therefore a rapid heat transfer minimizing heat conduction into nearby heat sensitive parts.*

The efficient heat-transfer of the <spirflame> is ideal for soft soldering because at given mechanical parameters: <spirflame> size (tip size and gas pressure), thermal mass of the parts and heat conductivity of the parts:

. . .the heat transfer of the <spirflame> does not depend on a good mechanical contact nor on the surface conditions of the parts to be soldered.

. . .the temperature of the object exposed to the flame depends at given mechanical random conditions only on the duration of the flame contact with the object.

This is the "secret" of the many successful automated microflame soft soldering applications found in rapidly increasing numbers all over the world.

The automotive electronic market is a leader in <spirflame> soldering applications as it avoids cold solder joints 100% .

The flame temperature is constant but can be modified (lowered) by additives (alcohols) mixed in the BOOSTER to the gas flow to the torch. Methanol or Isopropanol are basic additive fluids for the BOOSTER.

The flame energy depends on the volume of gas combusted per second.

The **SPIRFLAME®** *soft- soldering applications.*

fig.4A. Custom designed "flame handling - solder wire feeder". The relative geometric position of flame and solder wire feed pencil are adjustable. The flame has an almost non-existent side heat radiation and does not heat the nearby solder wire.

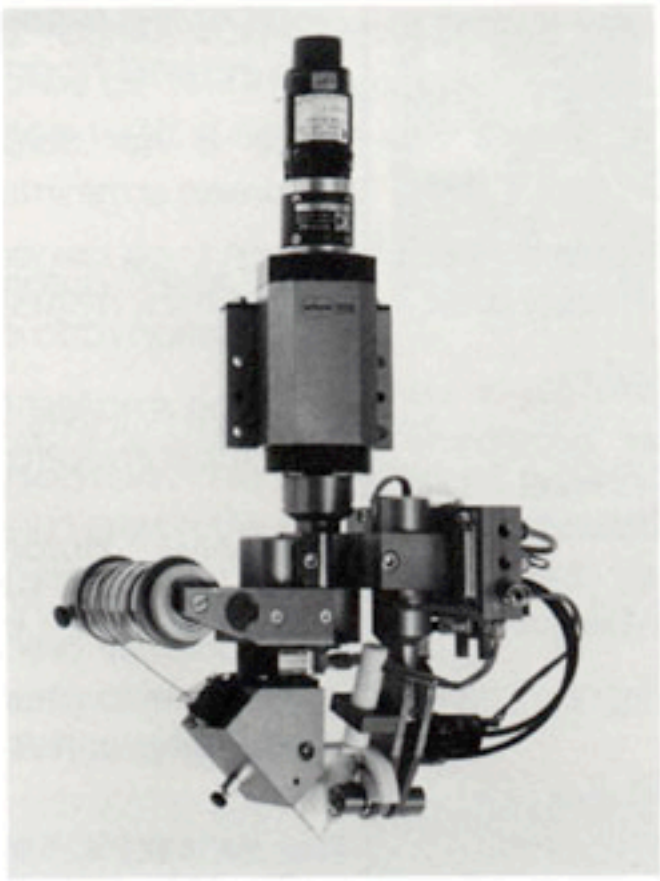


fig.4B. Custom designed "flame handling - solder wire feeder". The flame and solder wire feed directions are adjustable under computer control in all three coordinates.

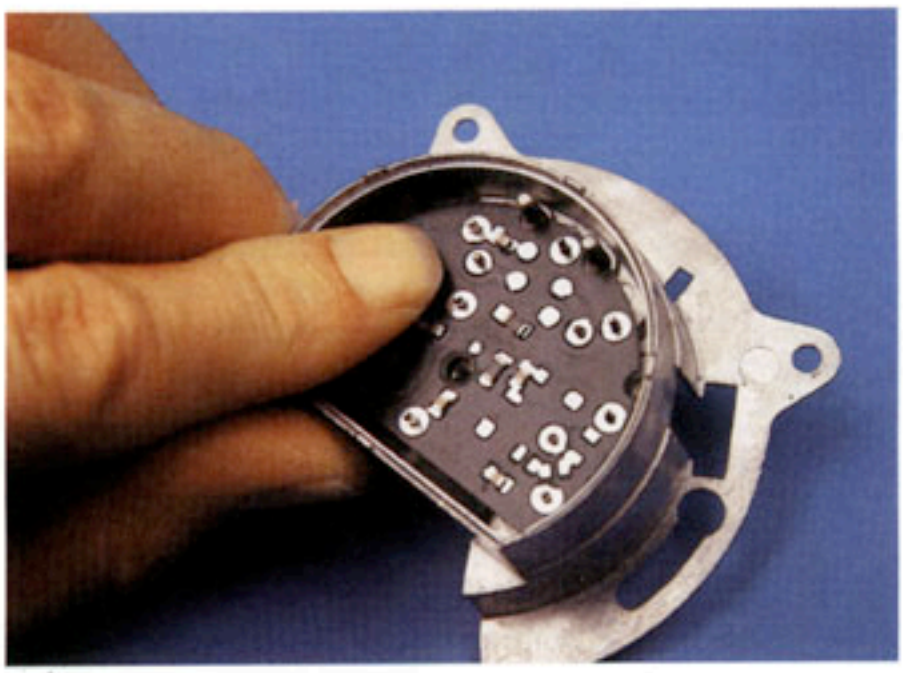


fig.4C. Ten pins are soldered on this high-frequency antenna amplifier to the various pc-board pads.

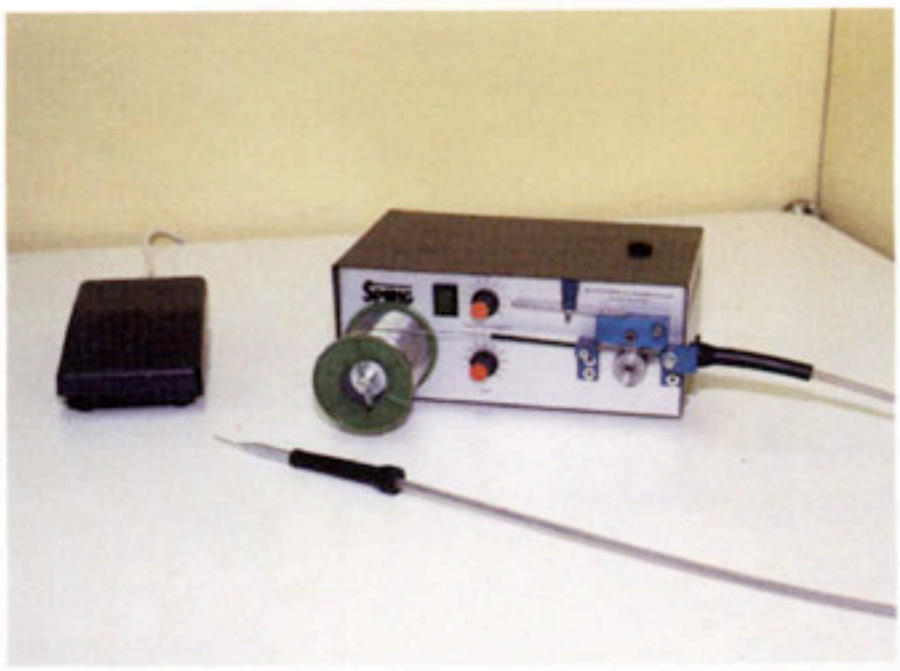


fig.4D. The **Solder Wire Feeder Model LD-200SS** *mounts on a remote place. The solder wire feeds through a flexible hose guide to the desired position. The LD-200SS can therefore be easily installed into existing soldering systems. The solder wire feed speed and the feed duration is adjustable.* ***Special documentation on request****. See also page 5.*

fig.4E. A 2 mm thick copper-bronze alloy sheet is quickly soldered together from several pieces with a minimum amount of heat influx to the assembly.

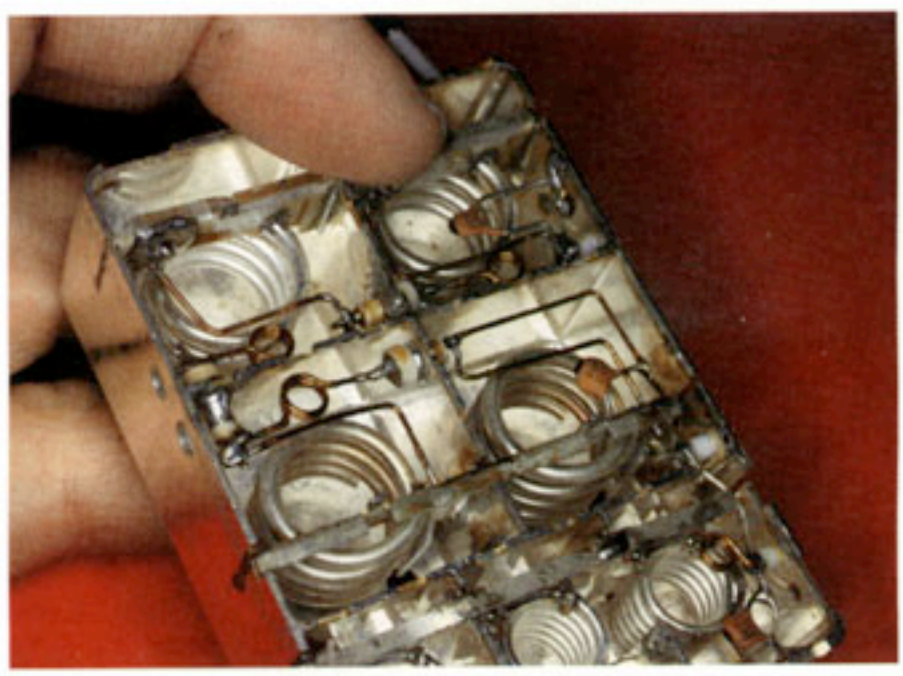


fig.4F. High frequency amplifier modules use silver plated copper housing, coils and feed-through capacitors. Joining by microflame-soft-soldering is a very quick and very reliable procedure. The heating zone is restricted and will not again soften existing nearby soldered joints.

The A B C of successful SPIRFLAME® microflame - soft soldering.

A. *The flame is always directed towards the most massive (heat consuming) object of the parts to be soft soldered.*

B. *The solder wire feed operation is released only when the temperature of the heated part(s) reaches the melting temperature of solder.*

C. *The flame is usually retracted before the solder wire is fed to the object. This ensures that the solder wire is molten by the heat stored in the object and not by direct flame heat radiation.*
This sequence avoids 100% cold solder joints.

Eventually an overlap time span is left to flame heating and wire dispensing operation to compensate for the heat loss of small sized parts due to heat absorbed from the solder wire itself.

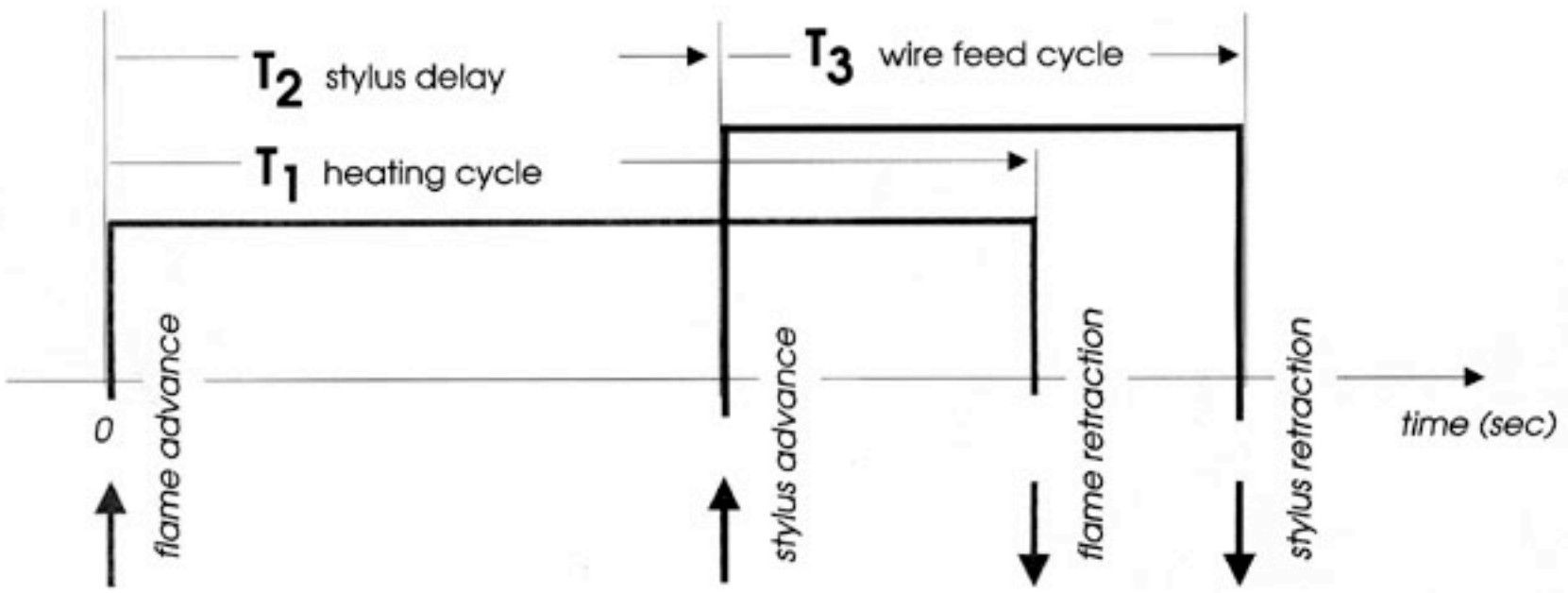


fig.5A.

Solder Wire Feeder LD-200SS

*A reasonable low cost but versatile **solder wire feeder** is the new model LD-200SS (see fig. 4D). The wire dispenser stylus is connected via a hollow, flexible tube to the actual stationary wire feed mechanism installed at a remote place. The solder wire dispenser stylus can be mounted conveniently located within the (eventually already existing) soldering system.*

The dispenser stylus is rapidly driven from its home position by pneumatic or electromechanical means to its dispensing position and than dispensing starts. At the end of the wire feed cycle the stylus is moved quickly back to its home position. This creates a well defined solder wire end. The wire is actually pulled out from the still molten solder deposit on the object.

1. ***The solder wire speed is adjusted properly to allow the advancing solder wire to melt off as it moves towards the heated object.***

2. ***The solder wire feed duration is adjusted properly to deposit the requested amount of solder metal on the object.***

NEW ! ***low cost***

Solder Wire - Flame Handling System LA-1000

This unit now offers a complete entry level set-up to immediately start experimenting with even complex soft soldering tasks. See fig. 7F & 16A.

The Solder wire feed stylus and the flame torch can be positioned independent for optimal access to the parts to be soldered.

All timings needed can be easily set and changed in 1/10 second intervals on thumbweel operated digital timers.

Engineering departments can prepare optimal timings by experimenting on its own laboratory set-up. Those timings can than be transferred to the actual production equipments without "loss" of information (precision).

A FREE documentation is available for the

Solder Wire Feeder LD-200SS
and the
Solder Wire - Flame Handling System LA-1000.

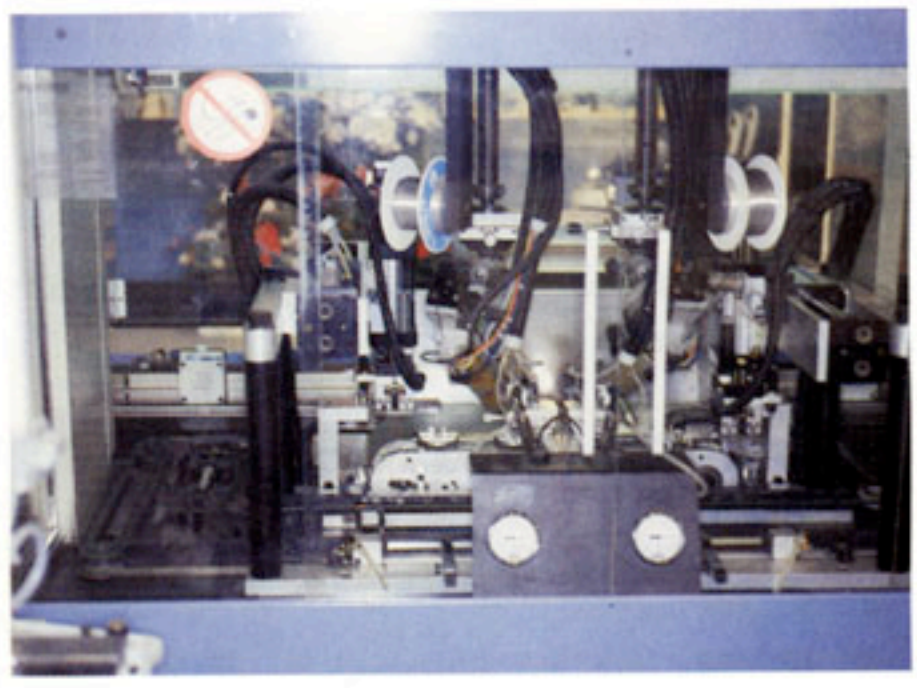


fig.6A / 6B. Assembly of magnetic circuit breakers is made on a fully automated production line. The insulation of the magnet wire is solderable. Both joints are soldered simultaneously with two flames. Each flame is supplied from a separate SPIRFLAME® to allow maximal flexibility in computer programme controlled flame adjustments.

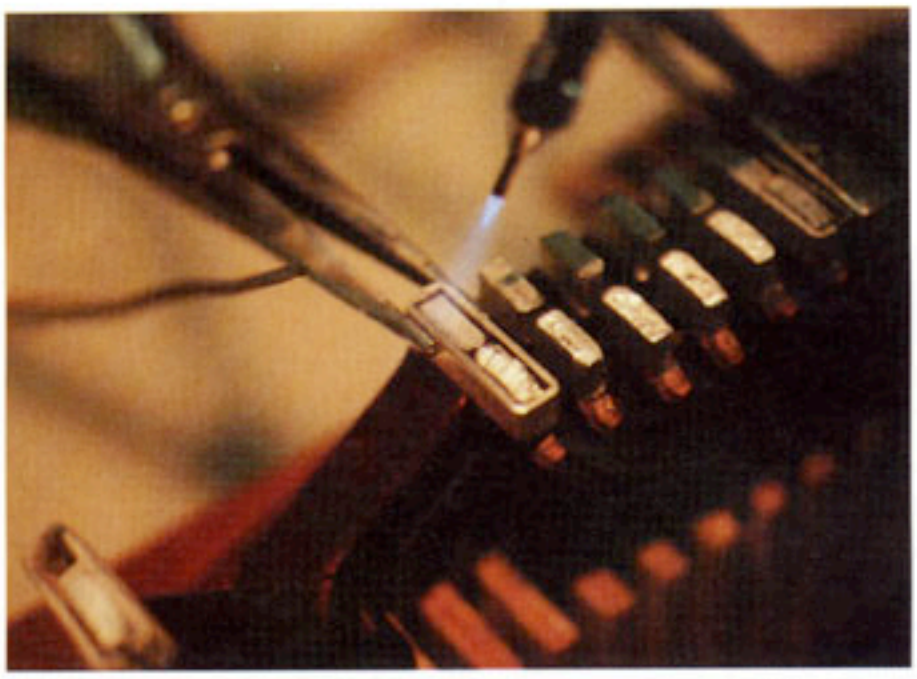


fig.6C. The concentrated heat output allows soldering of massive magnet wire profiles without burning nearby insulation parts.

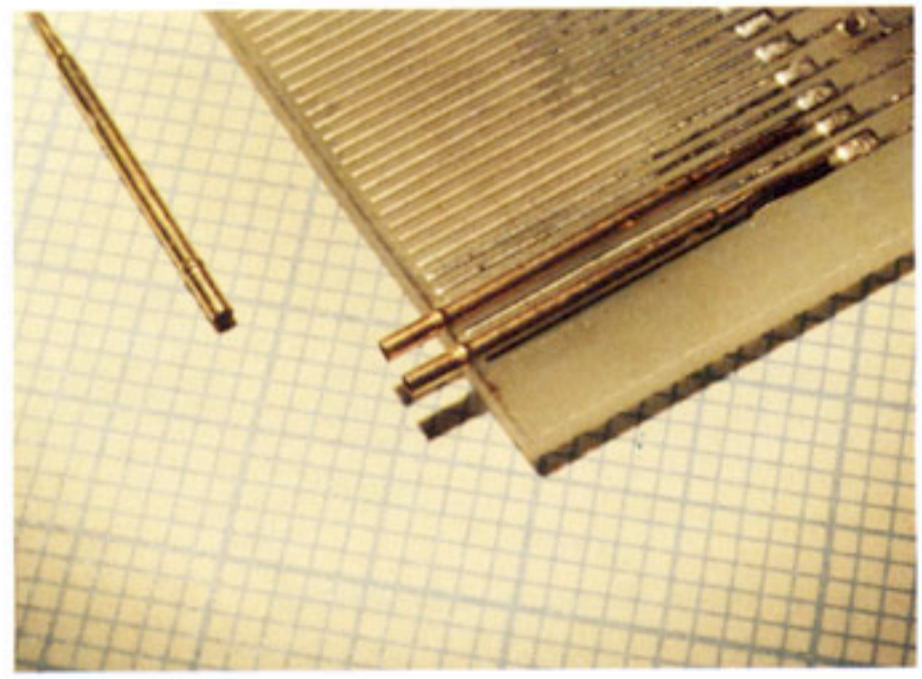


fig.6D. Thin copper pins with diameters around 1 mm are soldered to the printed circuit board connector pads. Important for the application is the minimal wetting of the pins with solder. Capillary forces of the molten solder align the pins parallel to the solder pads.

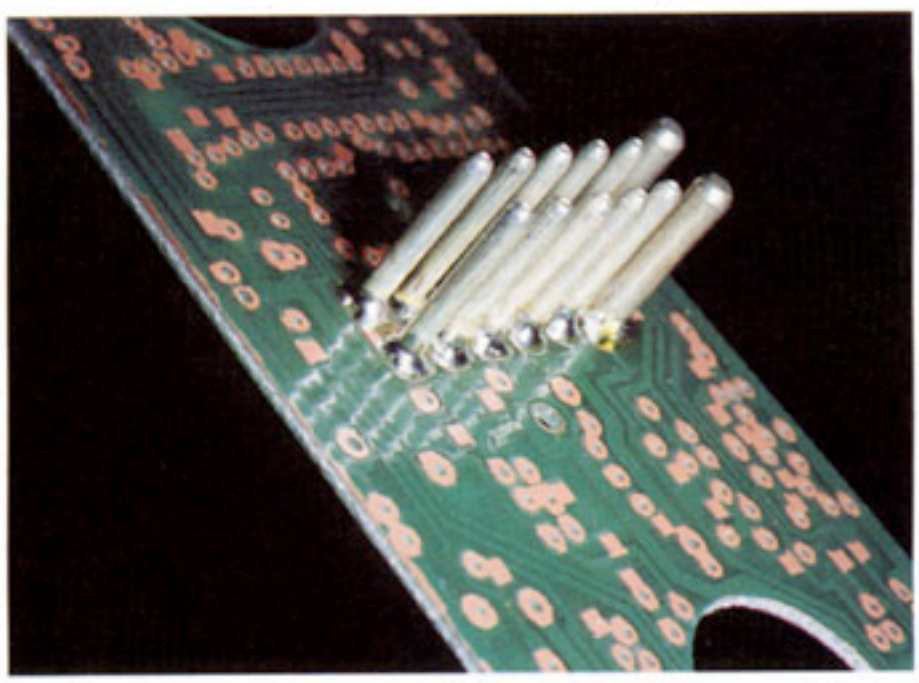


fig.6E. Heavy silver alloy coated connector pins solder directly to this printed circuit board used in automotive electronic systems. The ordinary wave soldering process does not deliver enough heat for a good joint. SPIRFLAME® eliminates cold solder joints completely.

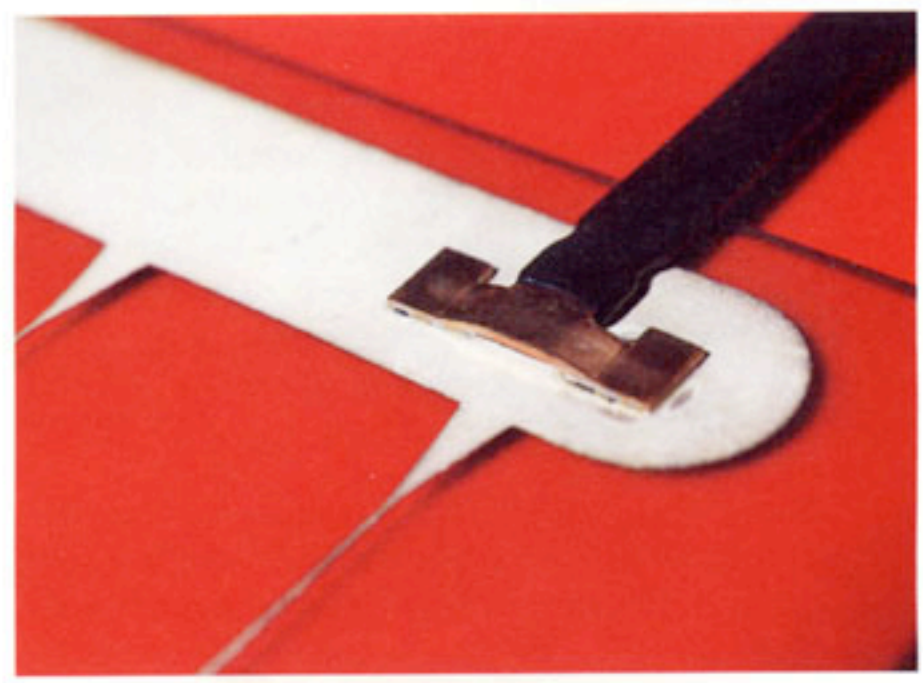


fig.6F. The windscreen electric heating terminal contact is soldered directly to the solder pre-coated connection pad on the glass pane.
Quality variations common to standard electric resistance heating (resistance, surface conditions like oxidation) are avoided.

More of the **SPIRFLAME®** *soft-soldering applications.*

fig.7A. View on the fully automated assembly line. On the left is an old SPIRFLAME® model 500HP matching in its grey colour the custom coloured assembly line set-up. See also fig. 6A / 6B / 8A.

fig.7B. Each of the two SPIRFLAME® units serves one individually adjustable flame in a soft-soldering line for a heater coil installed into a ladies hair dryer. Two simultaneously made joints receive the solder wire from two ***SPIRIG Solder Wire Feeders LD-200SS.***
Presence of the two flames is verified by two infra-red radiation detectors.

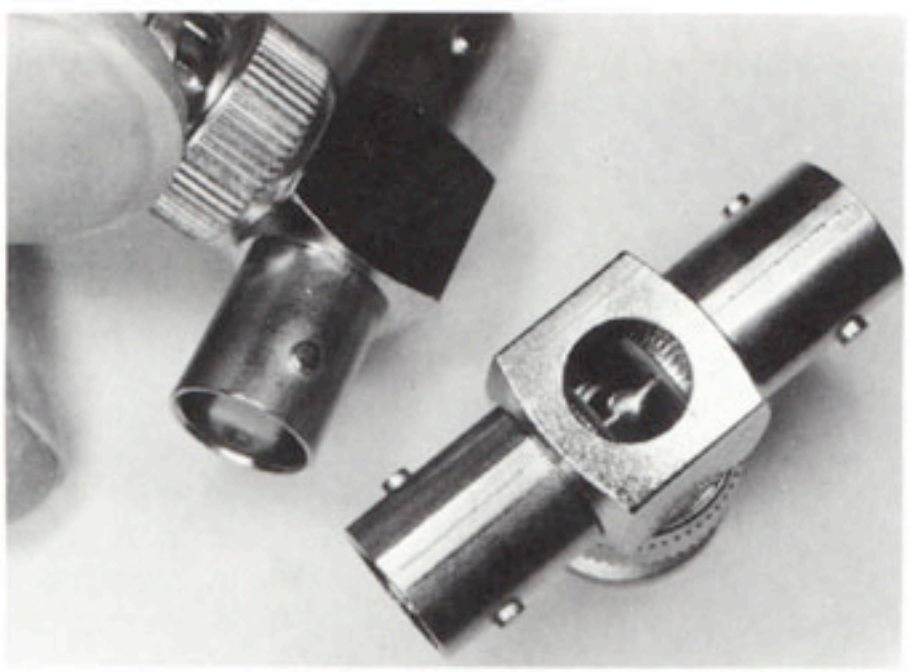


fig.7C. Microwave coaxial T - connectors have three central pins to be soldered together in the "depth" of the connector cavity. The electric soldering iron allows only access for a thin diameter tip. The slow heat transfer to the pins also heats up the entire connector with heat sensitive insulation.
SPIRFLAME® is the ideal solution for this solder task.

fig. 7D. Coaxial terminating plugs have the load resistor pins soldered to the grounded end plate. Only SPIRFLAME® delivers the needed powerful heat output for a quick, localized soft soldering of the pins to the massive metal end plates.

SPIRFLAME® is the ideal solution for this solder task.

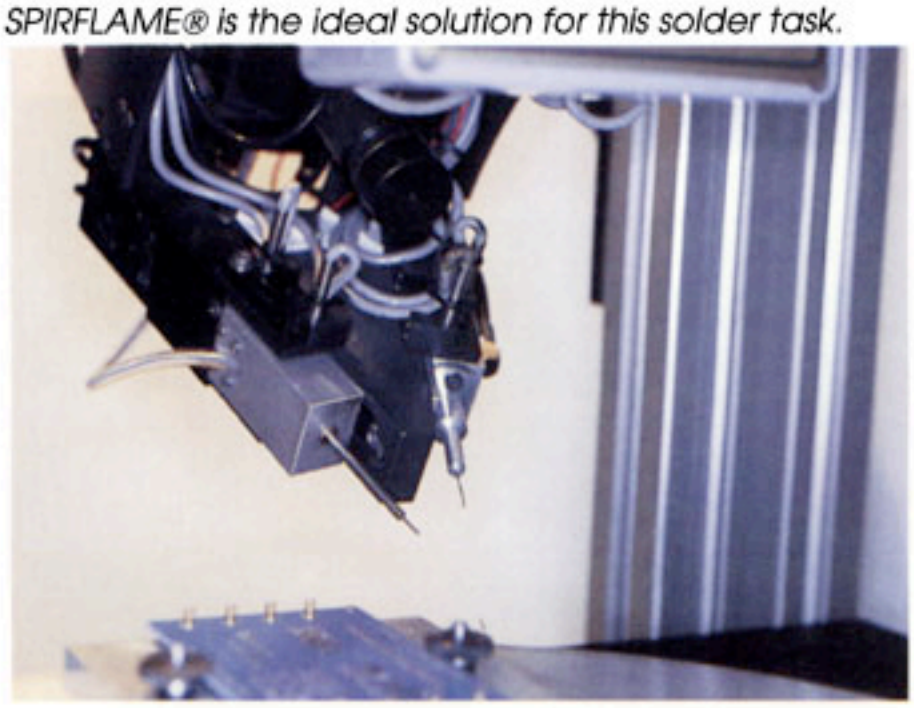


fig.7E. A close-up view on a very compact
Solder Wire Feeder - Flame Application Head
designed for use on a 3 - dimensional linear- or on a robotic systems. Head can move in 3 directions and turn itself in an angle of 240° to reach an optimal position for microflame soldering.

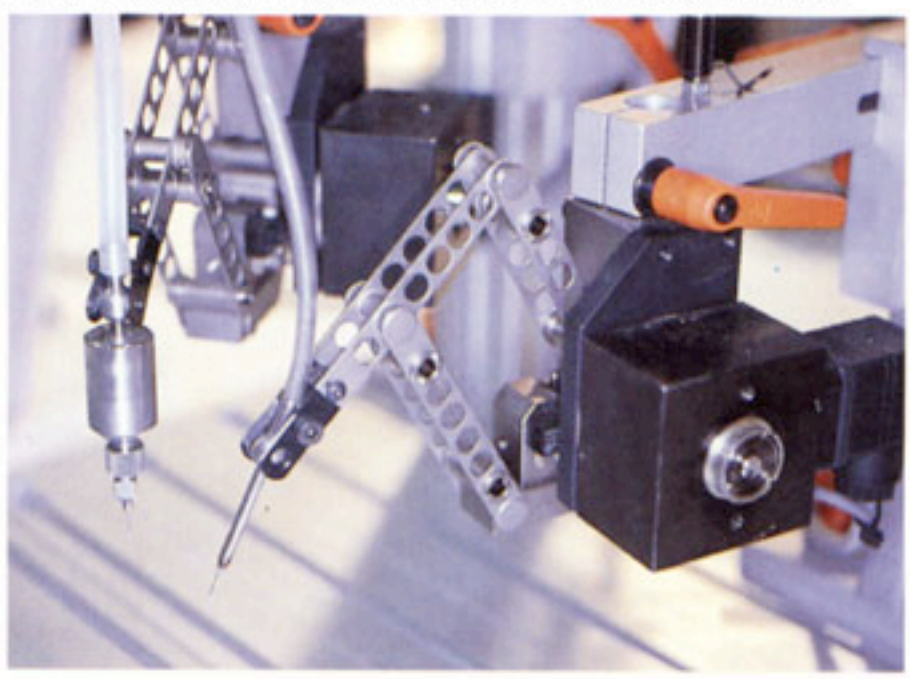


fig.7F A close-up view of the
Solder Wire - Flame Handling System LA-1000
Electromagnetic driven actuator arms with the independent movable torch and solder wire dispenser stylus. Each actuator arm can be positioned in 5 directions and there be mechanically locked.

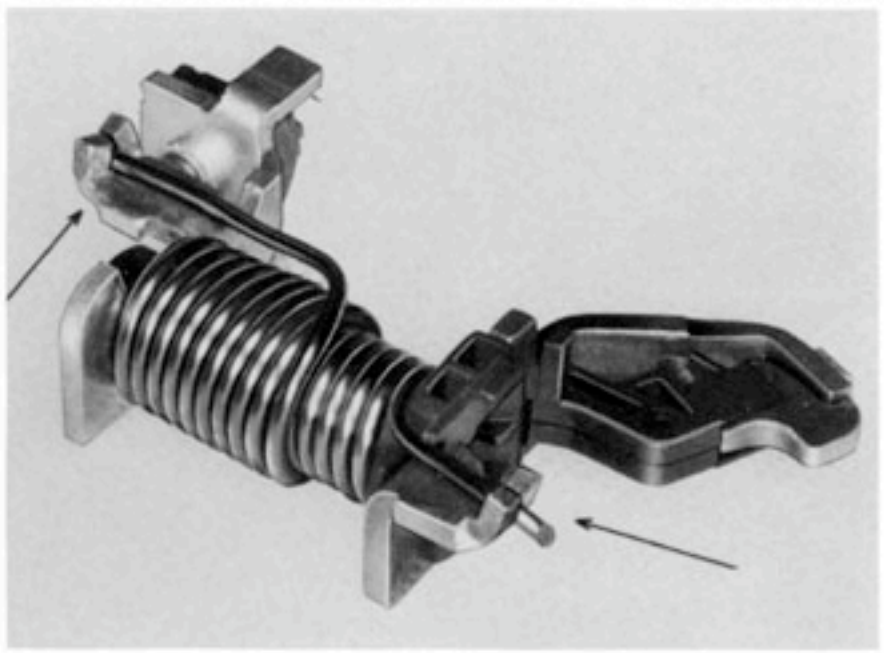


fig.8A. This is the magnet circuit breaker part assembled on the production line (see fig 6A / 6B / 7A). The two joints indicated by a flash are automatically soft soldered. The joints are massive copper parts and wire. It needs the high <spirflame> energy input to solder these joints within approximately 1 second.

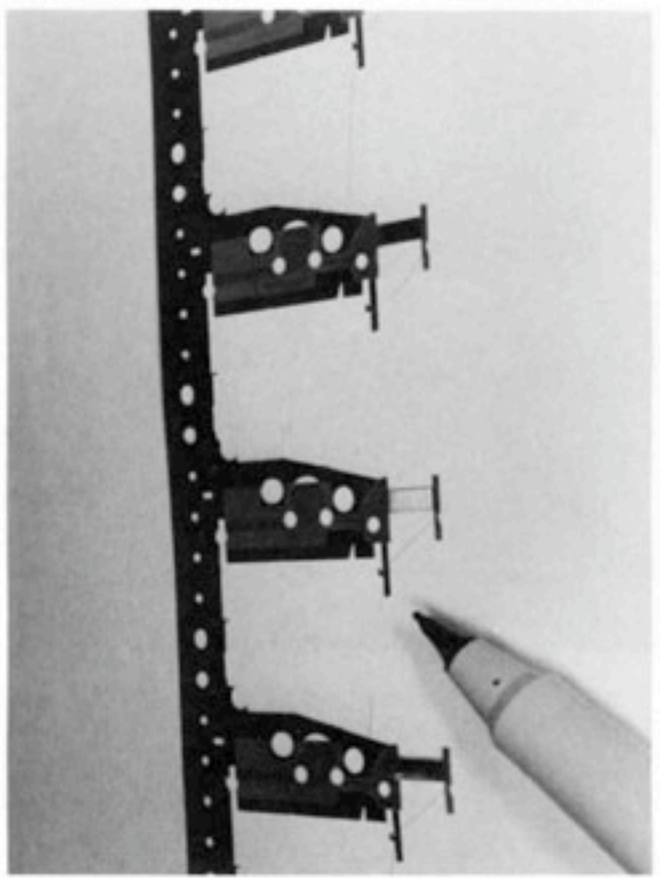


fig.8B. An extremely fine solderable magnet wire must be soldered to the terminals. The wire is so thin, that the capillary forces of the molten solder between iron tip and wire did break this extremely thin wire. Only <spirflame> could solve this problem.

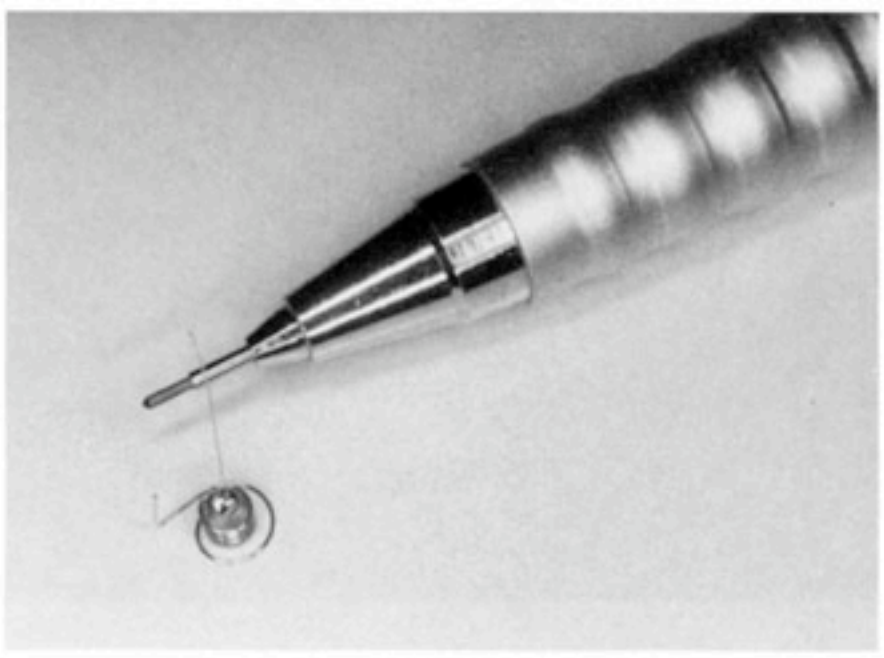


fig.8D. A very small spring is soldered to a terminal.

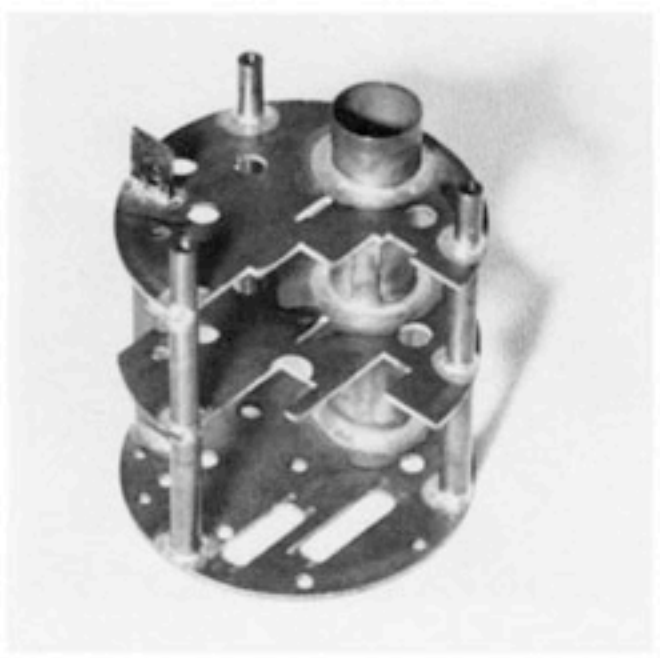


Fig.8C. A high frequency measurement probe is composed of three p.c. boards fixed with three vertical copper screw spacer bolts and one circular copper waveguide. Soldering with an iron did not work. Use of the <spirflame> allowed quick heating of the massive copper parts and those copper parts than operating as the solder "tips".

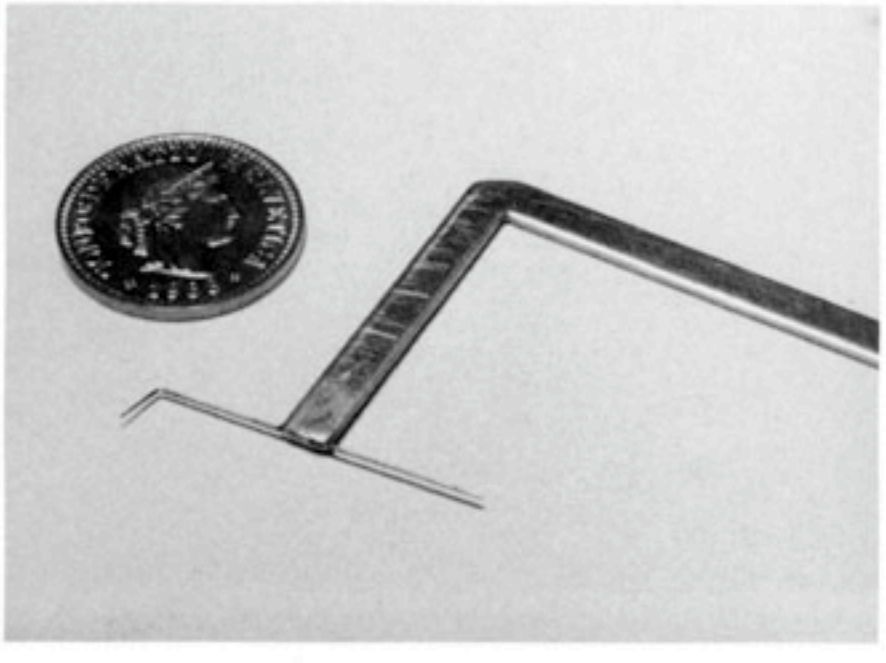


fig.8E. A small tungsten probe tip is silver soldered into the holder. the heat zone had to be limited to not degrade the tungsten tip surface.

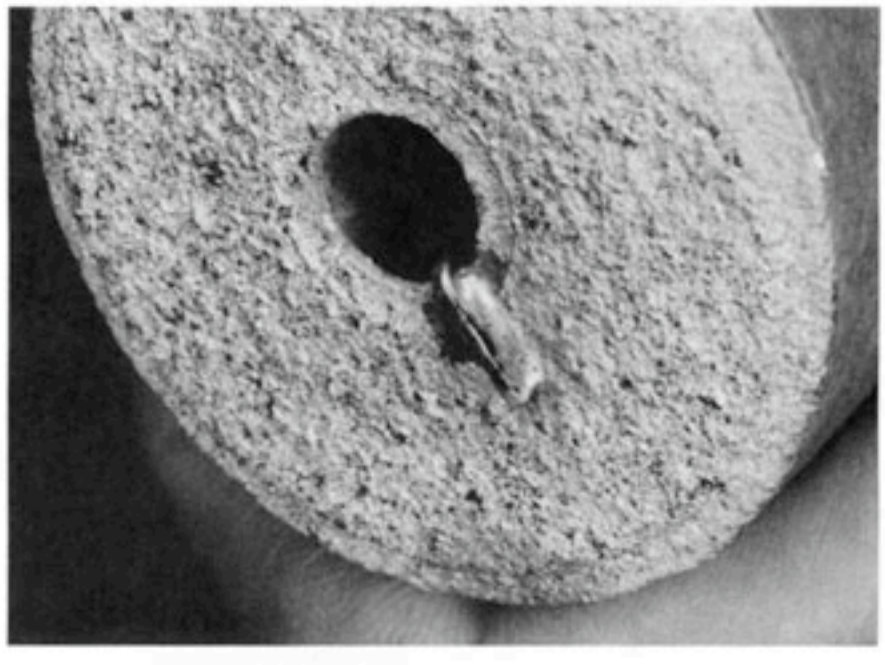


fig.8F. The connecting pins on each side of the solder alloy coated concentric wound capacitor "coil" are soldered in parts of a second to these layers.

The **SPIRFLAME®** *welding of magnet wires without prior removal of the insulation.*

fig.9A. The heat zone of the <spirflame> evaporates high temperature insulations of magnet wires. The twisted magnet wires join smoothly in a ball. The copper surface is deoxidized in the reducing flame. No residues or oxides are trapped in the joint be it during soft-soldering, brazing, silver-soldering or welding.

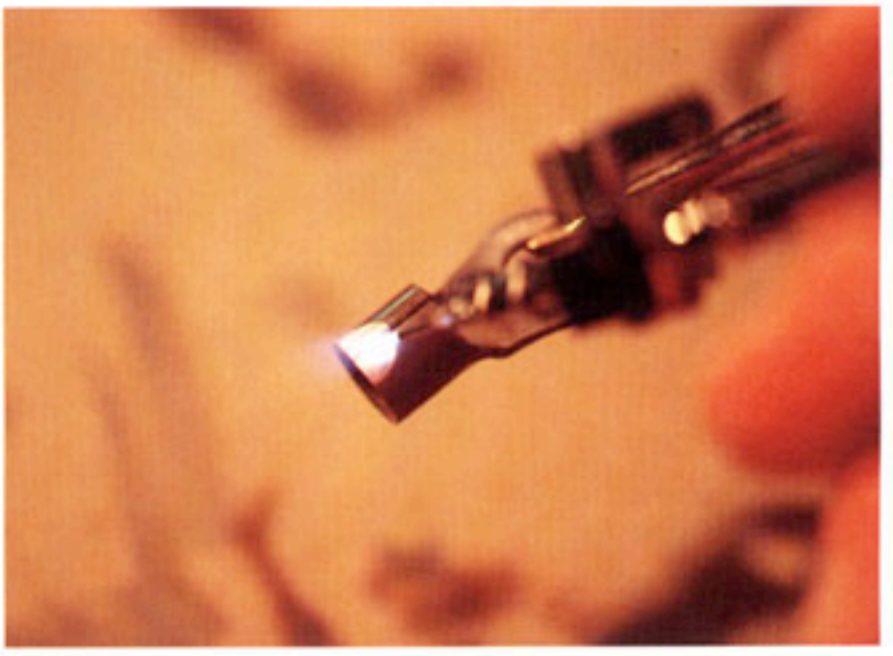


fig.9B. The reducing (de-oxidizing) zone of the flame shows clearly on the heated copper terminal. Closing the gap of such lug type terminals is done rapidly on automated production lines.

The heat energy needed and wasted by ordinary flame heating is drastically reduced.

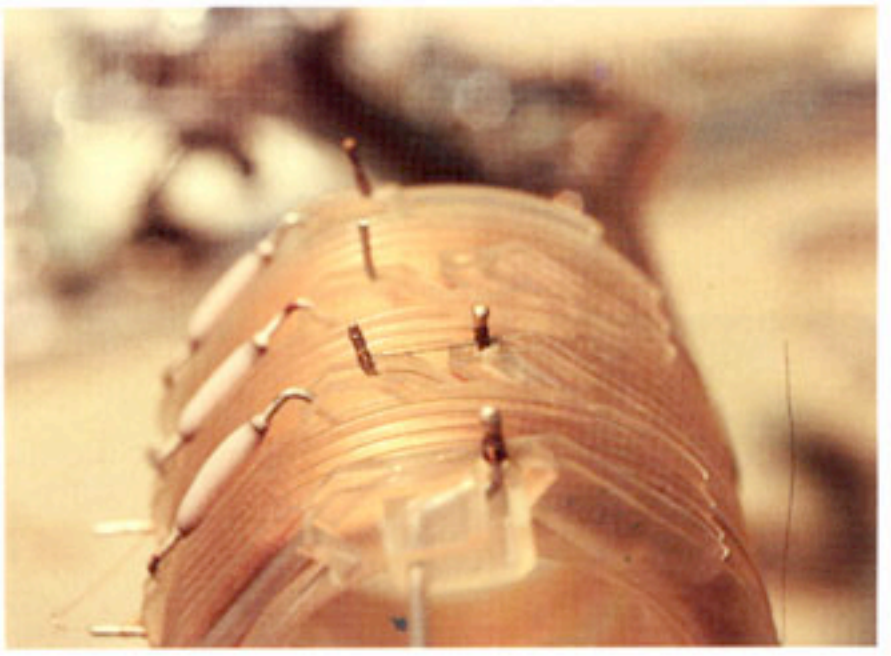


fig.9C. Todays automotive electronic fuel management and antiskid brake systems request highest reliability for components, like coils, responsible for safe and reliable operation of the system. The coil winding ends of the magnet wires are welded with the <spirflame> to the terminal spade. The heat transfer is quick and a minimum of heat energy is induced into the terminal material. The terminal fixed in the plastic mould does not soften by its low temperature the strength of embedding.

Fig.9D. Welding of fine wires to pins on a high voltage coil.

fig.9E. The coil wire ends and capacitor lead ends are welded together in a smooth ball joint.

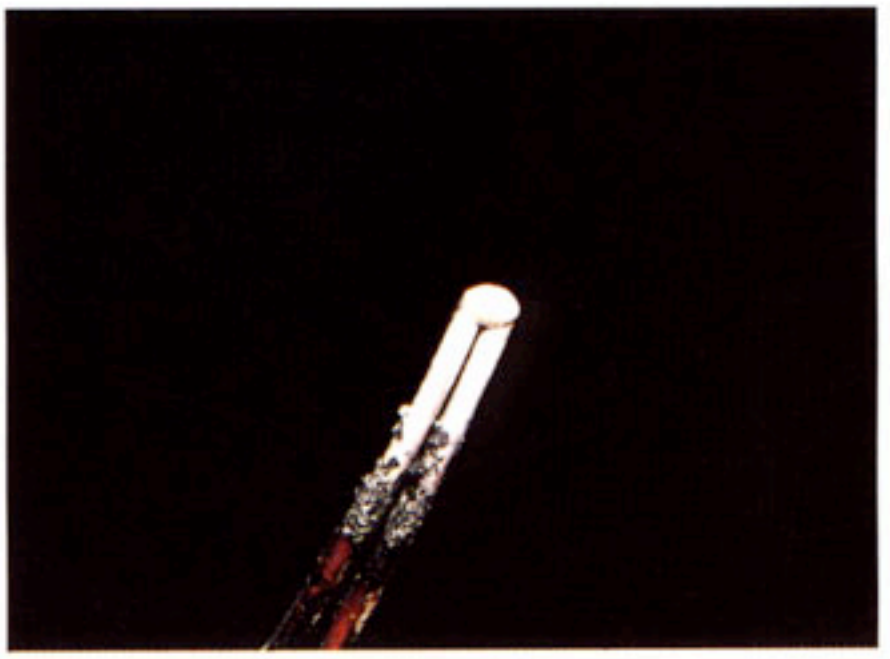


fig.9F. Two magnet wire ends are joined by fusion. The clean, smooth and non-oxidized copper surface indicates a highly reliable weld joint.

The **SPIRFLAME®** *welding of magnet wires in an electric motor manufacturing plant.*

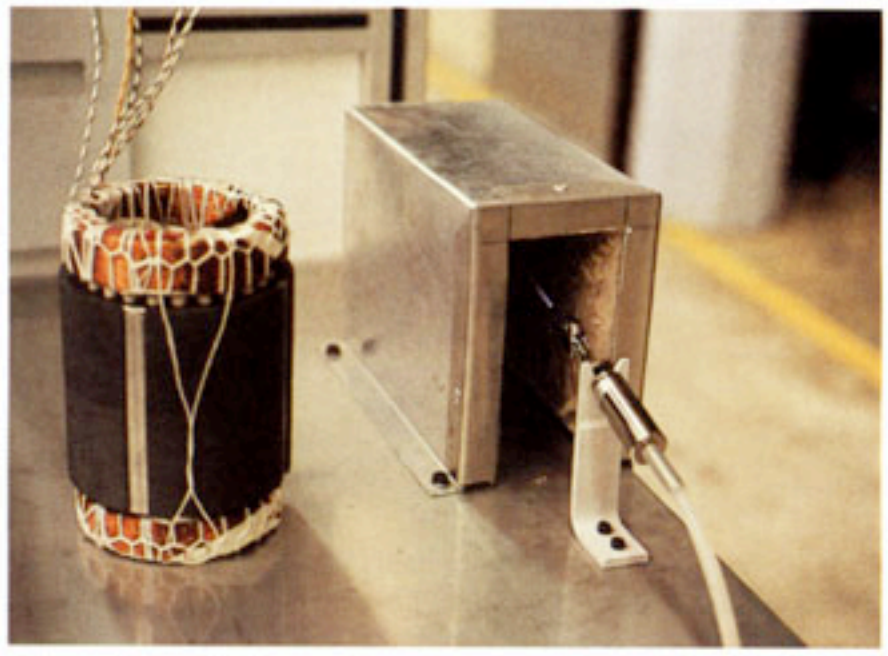


fig.10A. Twenty-one manual operated welding stations are served by 2 banks of each 4 piece model 205HP SPIRFLAME®s conveniently located at both ends of the group of operator stations .

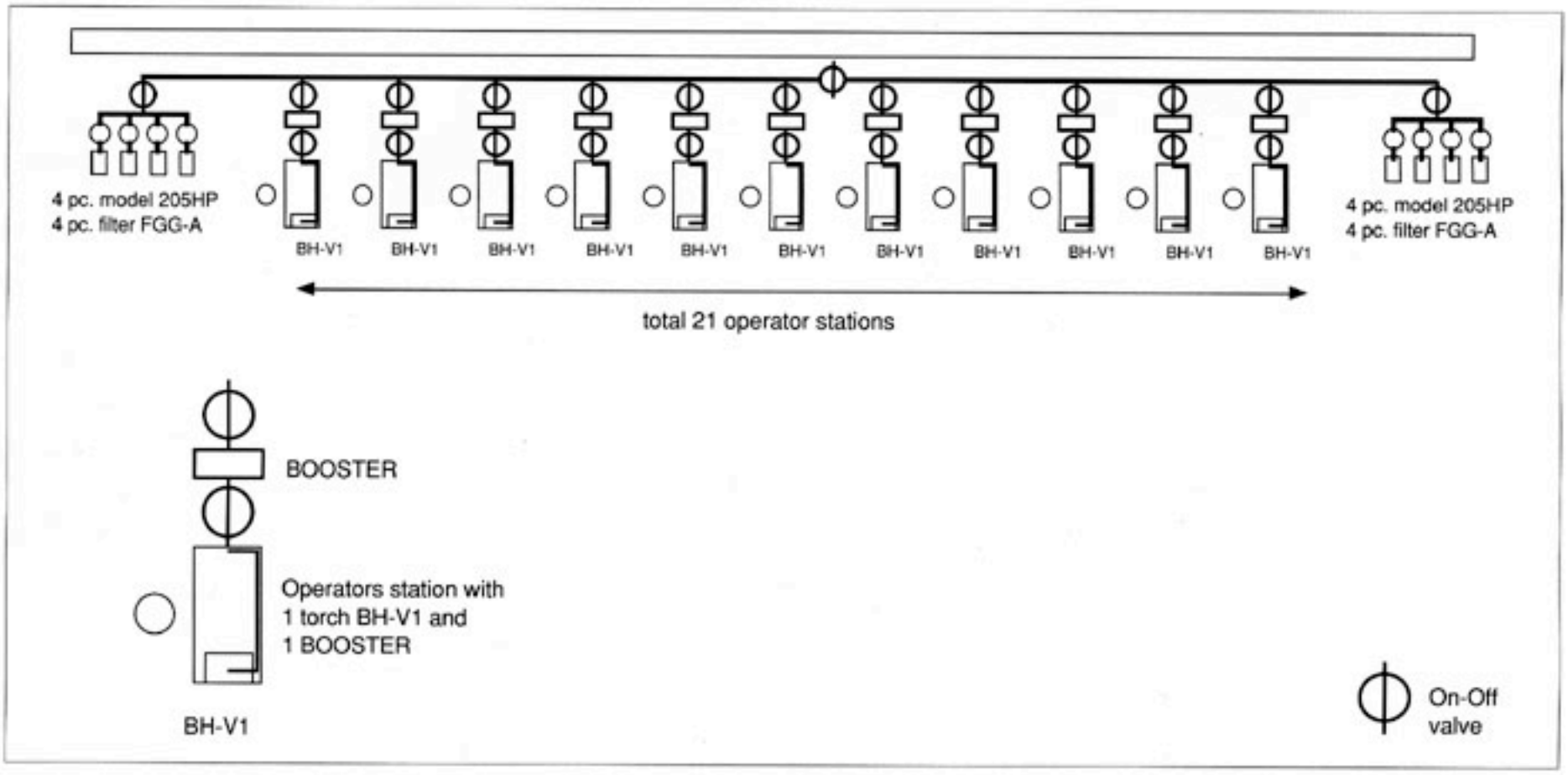


fig.10B. The gas is fed from both sides by a stainless steel pipe along the motor stator conveyor. Each station connects to that gas supply pipe with its own shut-off valve and BOOSTER assembly.

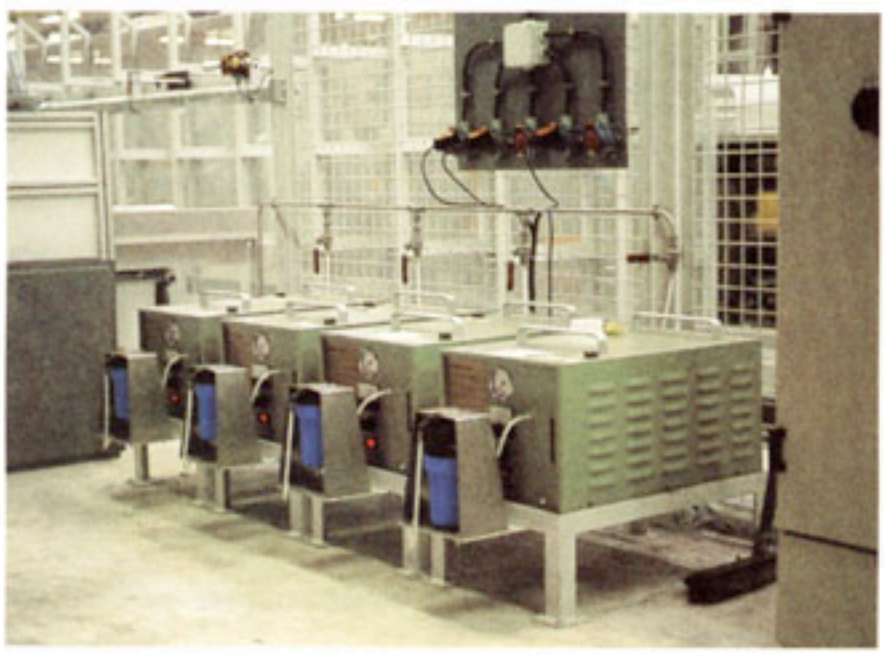


fig.10C. Two banks of each 4 piece model 205HP feed the needed gases into a central stainless steel supply tube system.

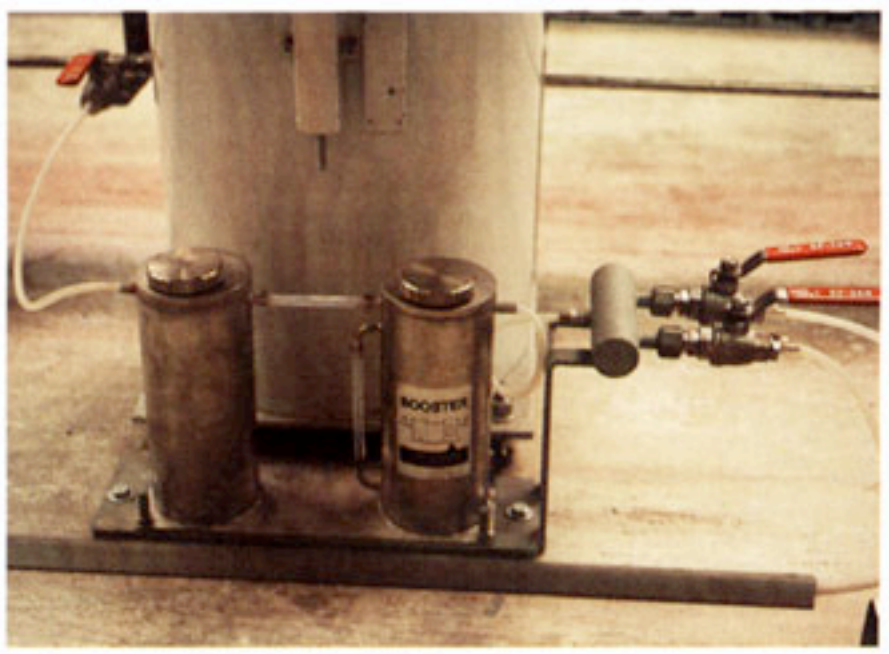


fig.10D. Each BOOSTER serves two torches BH-V1. The BOOSTER or the torches can be isolated from the gas supply for servicing without interfering with the rest of the gas supply system.

The temperature of the <spirflame> can be lowered by additives in the "BOOSTER".

A perfect soft, low temperature flame locally heats a defined area without softening the nearby made solder joints.

fig.11A. Manufacture and repair of brass type music instruments demands a considerable know-how and feeling for handling the thin sheet metals used to form the air volumes. No wonder that the skilled craftsman demands the ultimate in tools to make his work a perfect masterpiece. Craftsmen appraise the stable, dependable and easily adjustable heat output of the SPIRFLAME® flame generating system.

fig.11B / 11C. The low temperature <spirflame> (special additive) does not discolour the polished or lacquer coated metal surfaces during repair of broken instrument parts.

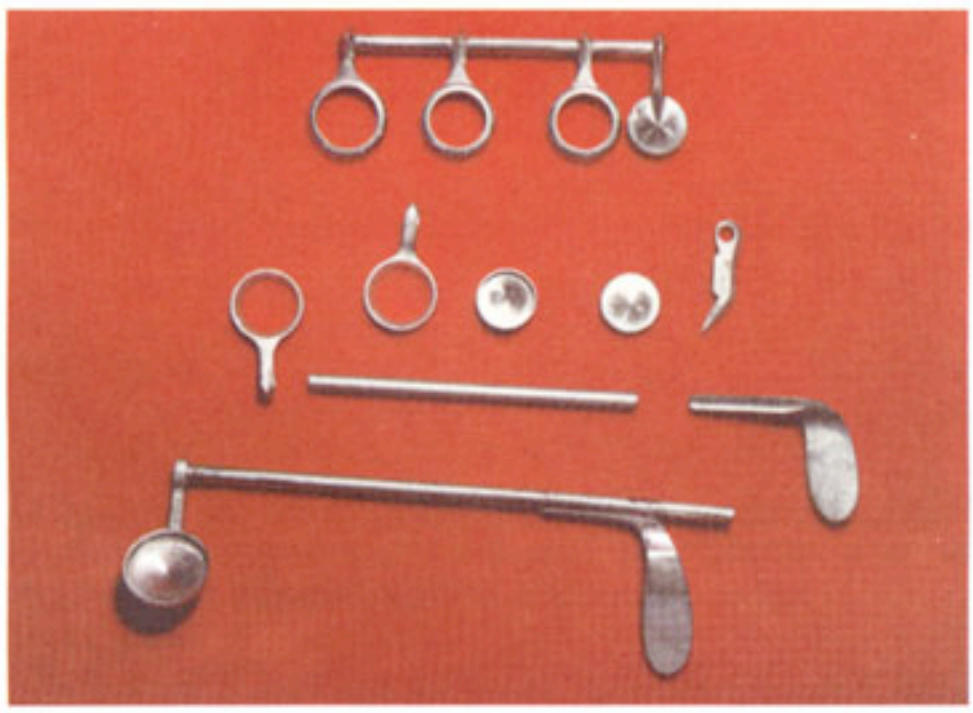


fig.11D. The many small and odd sized music instrument parts are also joined by silver soldering for added mechanical strength and as parts which are later soft soldered to the music instrument body.

The **SPIRFLAME®** *soldering applications in the dental laboratory.*

The dental laboratory technician work is very demanding to produce high quality dental parts with long life expectancy and providing comfort to the user.

fig.12A. The pinpoint sized and very directed <spirflame> allow the user to join and repair broken dental wire structures on the gypsum model holder without destroying the model and with a minimum of heat-shield protection to nearby plastic parts.

fig.12B / 12C / 12D. Various dental parts are repair soldered with gold or other noble metal alloys. A powerful but limited heat zone microflame is needed to prevent overheating surrounding parts.

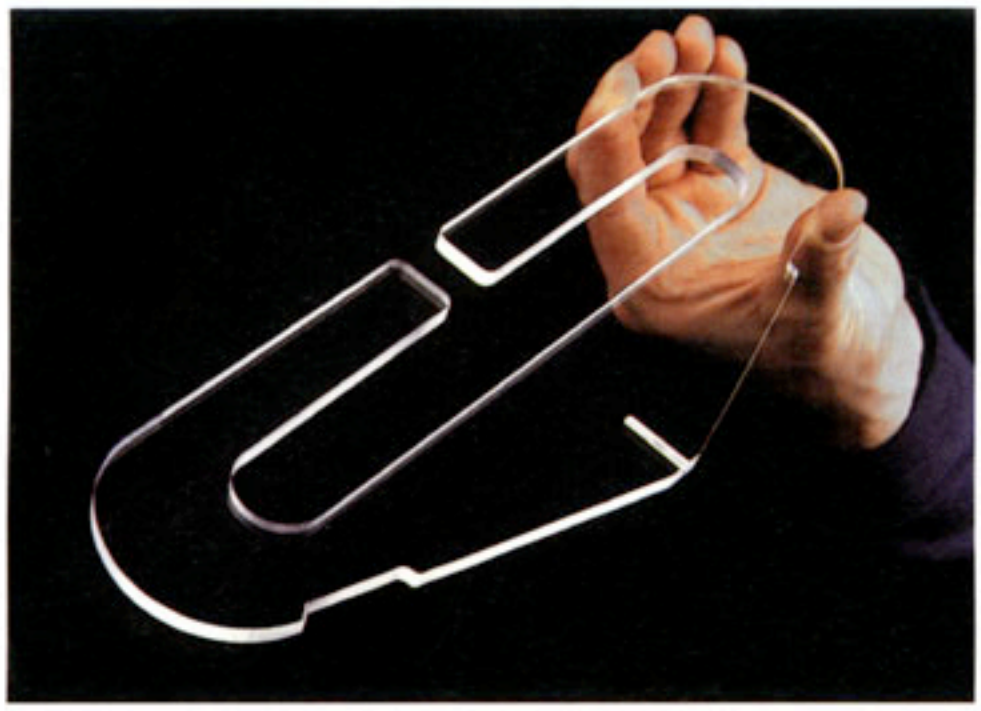


fig.13A. Flame polishing of delicate curved acrylic glass (plexiglas®) surfaces not accessible to mechanical polishing procedures.

fig.13B. Delicate work on laboratory glass parts and assemblies becomes an easier task with a defined flame heat zone.

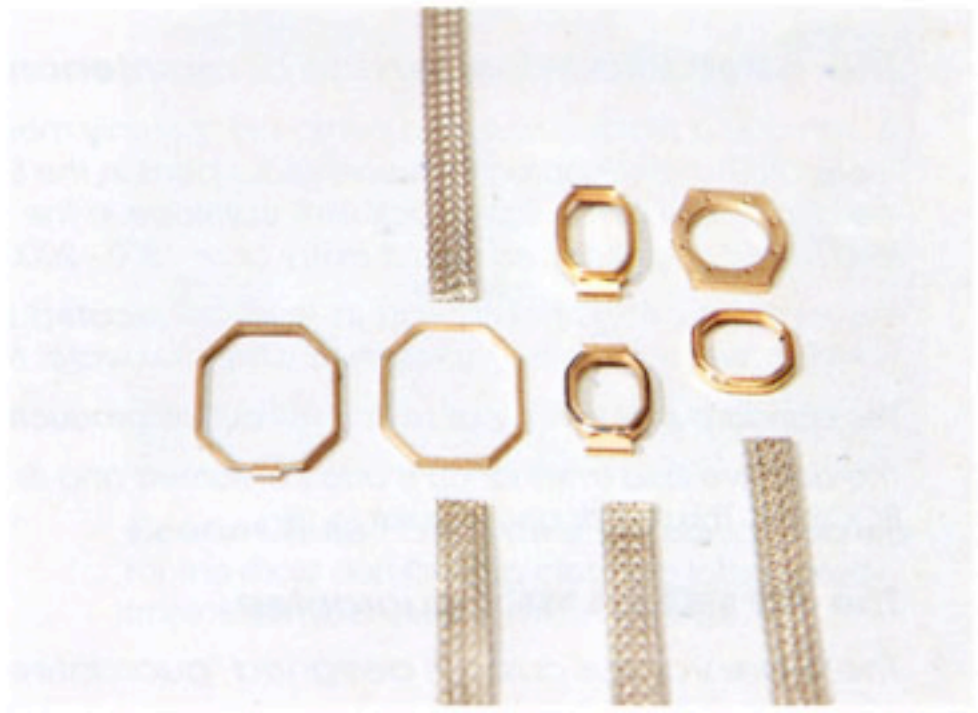
fig.13C / 13D. Manufacture of custom designed down scaled models of locomotives and other carts demands patience and an enormous skilled craftsman to join the many small parts made from thin brass or copper alloy sheet metal.
Soft soldering is the preferred joining method for the parts. The solder metal can be galvanic coated for a perfect finish.The <spirflame> is an excellent tool for a quick and local heat-up of the parts to be soldered without loosening already fixed parts on the same structure melting their solder joint. This eliminates the need for jigs substantially.
What a different look of the unfinished and the finished model!

fig.13E. Almost all Swiss manufacturers of jewelry watches use the <spirflame> to gold solder watchcases to the wrist-straps ("bracelets").

The restricted and well defined heat zone eliminates heat deformations on thin wall design watchcases.

Moulded massive gold watchcases sometimes show pinholes during machining. Such semi-finished parts have been normally remolten. A considerable loss of invested hours of craftsmen work! Such pinholes can be closed by gold soldering deposits and re-machining.

Manufacturers of large glide bearings also repair pinholes in their bearing metal layer with SPIRFLAME® and re-machine the repaired surface. Enormous savings!



Why is the SPIRFLAME® multiple-cell electrolyser far superior to the single-cell electrolysers?

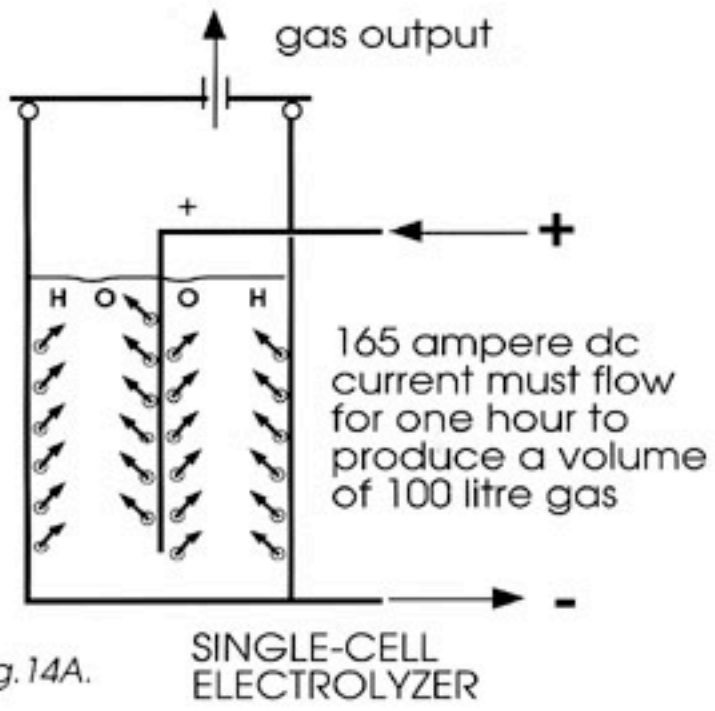


fig. 14A.

Electrolysis follows the basic electro-physical law of Faraday. Regardless of the nature of the electrode size or materials or electrolytic fluids used, the law says:

"To produce 100 litres of a mixture of hydrogen and oxygen a DC current of 165 Ampere must flow for one hour through the electrolytic cell. It will de-compose 54,6 gramm of water".

The needed dc voltage across the cell to force the high165 Amp current through the cell depends entirely on the electrode material, electrolytic fluid composition, temperature and on the geometric size of the cell.The surface area and the distance between the two electrodes defines the electric resistance.

The temperature of the electrolytic fluid influences the resistance. The gas bubbles moving upwards in the fluid between the electrodes also increase the electrical resistance.

Designers have tried to optimize the basic single cell design. But the most negative aspect the basic physics law of single cell designs could not be eliminated. An extra water cooling system to remove the excess heat is the only solution to get a reasonable physical size of such a single-cell generation apparatus.

If the needed electrolysis current can be cut in half or even to one tenth, then the current created heat losses would be reduced by a factor of 4 or even 100! The heat losses increase with the square of the current intensity.

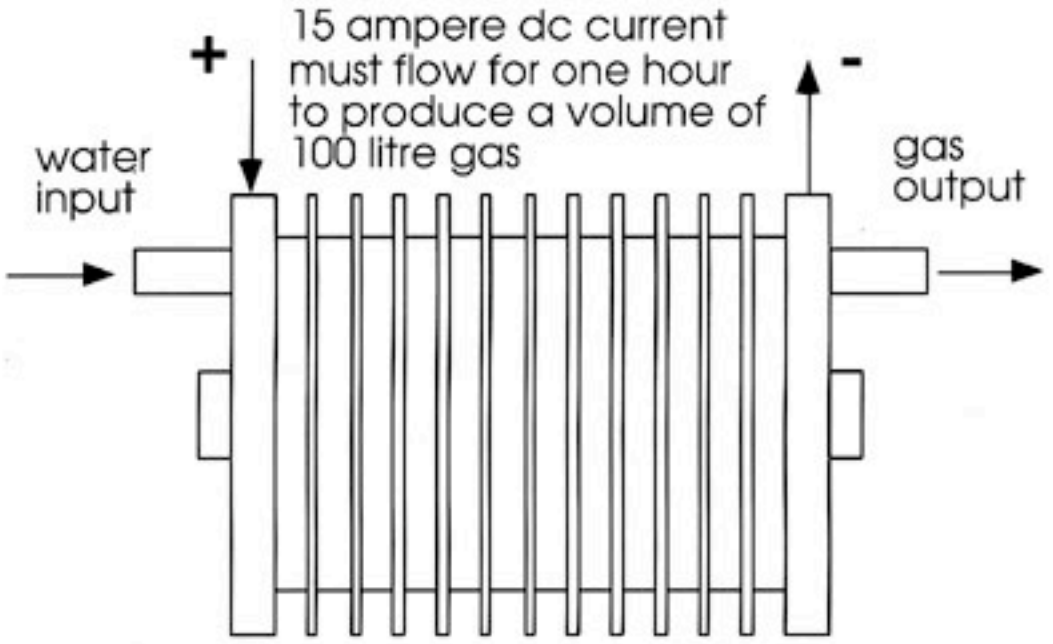


fig. 14B.

The patented multiple electrolysis cell design of Spirig reduces the high electrolysis currents by a factor of ten or more, but multiplies the number of cells in use by that factor.

This sounds logical, but the complexity of such an arrangement, if realized by ordinary cell design (pot + cover with electrodes) would be too complicated and too expensive.

The multiple - cell design is an elegant approach for multiple cell combinations with a minimum of seals and a minimal complexity of the required gas volumes and electric connections to pass the currents from one cell to the next without creating excessive by-pass (stray) currents lost for gas production.

The SPIRFLAME® service or maintenance needs.

A fan and a water circulation pump are the only moving parts in the system. Both have an almost unlimited life. There are no other potential wearing-out parts in the SPIRFLAME®. Maintenance is limited to the regular check of the disposable flame flash-back filter cartridge in the torch handpiece and an external gas filter. The electrolyte fluid must be exchanged about every after 1500 - 2000 operational hours dpending on intensity of generation.

The water is decomposed and its level is indicated by a transparent sight level tube on the front of the SPIRFLAME®. Water is to be replenished when the water fluid level approaches the MIN mark.

The standard MIN level float switch will cut-off production automatically if refill is missed.

The additive fluid (methanol) is also consumed and its level is indicated on the transparent sight level tube on the BOOSTER. This needs also regular re-fill.

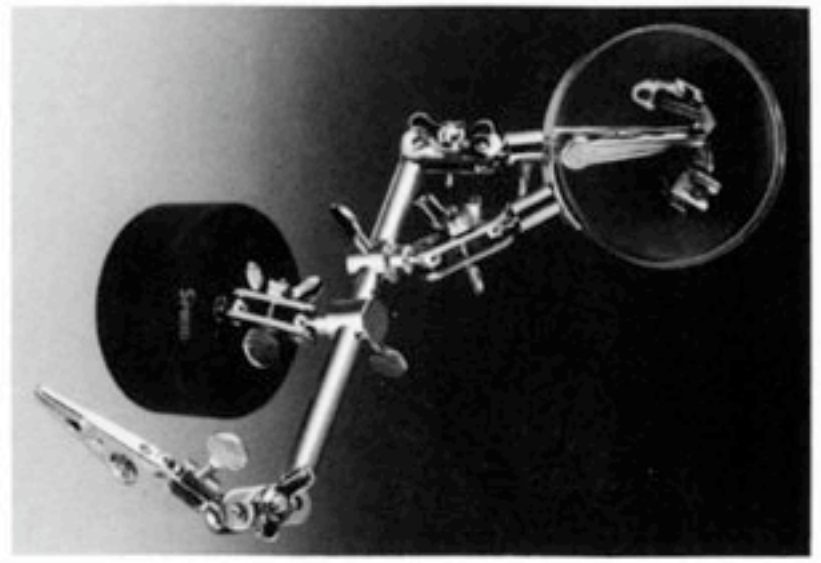
The SPIRFLAME® guarantee.

There are various custom designed "guarantee packages" available to fit any needs.

Comparison	*Patented Multiple-Cell Electrolyser* **SPIRFLAME®**	*Single-cell Electrolyser*
Electric Energy Consumption:	*Low*	*High. For the same gas volume the energy consumption of a single-cell design is about 3-times more than the patented SPIRFLAME®*
Number of Electrolysis Cells	*11, 22, 55 or over 100 cells. This depends on the requested maximal gas rate of the specific SPIRFLAME® model. Each individual cell can produce maximal 10 liter gas per hour.*	*1 "pot" cell*
Electrolysis Current	*15 Amp DC maximal .*	*165 Amp DC to produce 100 liter of gas per hour.*
Electrolysis Voltage	*Each cell between 1.8 to 2.2 V DC; total cell stack dc voltage is number of cells multiplied by single cell dc voltage.*	*Cell needs between 3 to 7 V DC to "squeeze" the very high dc current level through the electrolyte fluid!*
Heat Losses	*Low, because there is only a small maximal 15 ampere dc current.*	*Very high, because of the very high dc current needed.* *A 10-fold increase in dc current means a 10 x 10 = 100-fold increase in heat losses.* *Losses increase to the power of 2 with the current intensity.*
Energy Efficiency	*High, because of low heat losses.*	*Low, because of high heat losses.*
Gas Rate Potential	*500 liter/hour per generator module or higher without need for water cooling*	*Around 70 liter/hour maximal gas rate are a realistic limit for non-continuous operated single-cell generators*
Continuous Operation	*100% duty industrial full power operation was the design target and is met by the patented principle.*	*Permanent operation at full power output causes electrolyte to start boiling, contaminate the gas with caustic pottash aerosols and high water vapour content.*
Operation Temperature of Electrolyte Fluid	*Safe level of + 45 °C as demanded by the German Industry Norm (DIN) 32508 is not exceeded.*	*Will pass without extra artificial water cooling the critical temperature level of 45 °C within approx 30 minutes.*
Quality of Gas	*Clean mixture of hydrogen and oxygen with minimal contaminations removable for automated microflame applications by special disposable gas filters.*	*Corrosive electrolyte aerosols (fog) and humidity present in gas. Can be filtered-off, but consumption of filters costly.*
Flame Flash-Back Filters	*The clean gas does not influence such protective devices, eg stainless steel mesh filters.*	*Pores of filter cartridges tend to soon clog.*
Overpressure Safety Protection	*Various sequenced electronic and electric excess pressure safety guards would shut-off in a worst case condition the ac energy supply to system permanently and would need a manual re-set.*	*Various grades of safety protections also advisable but the sensors might be influenced by the corrosive fogs .*
Other Safety Protections	*The housing base is designed as a fluid sump to trap spills of corrosive fluid in case of a leak.*	*No such leak protection known.*
Materials	*All parts in high quality stainless steel design to avoid any risk of chemical attacks.*	*Stainless steel also used.*

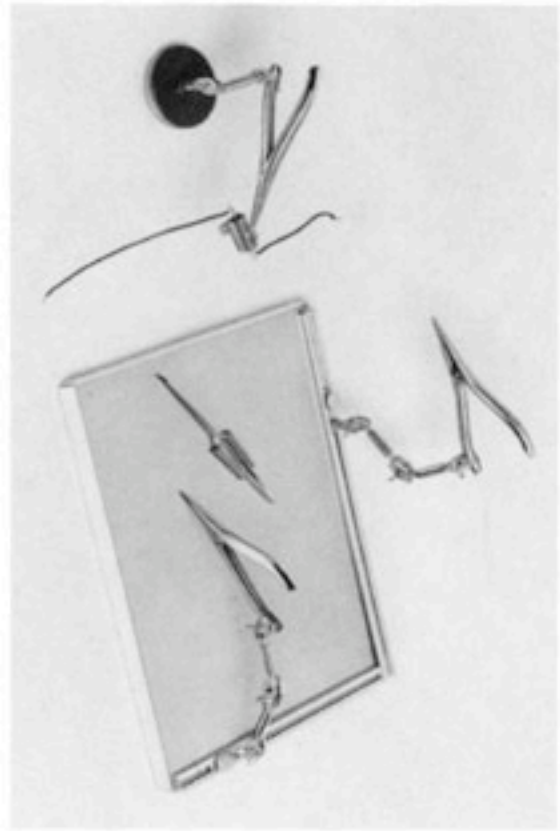
fig. 15A.

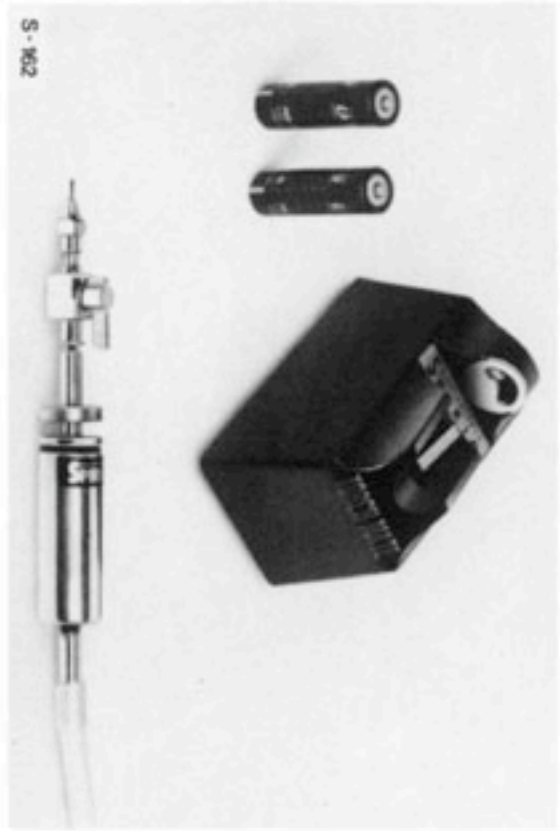
(SF2VGL01)



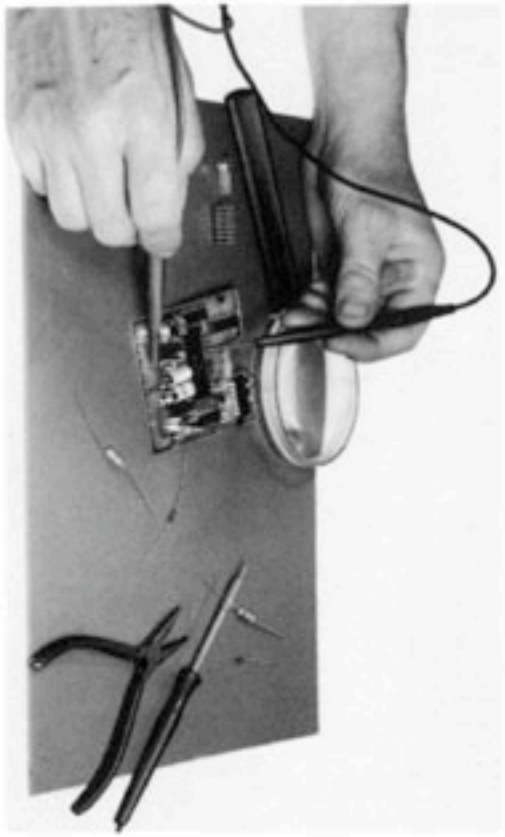
X-HAND® a small parts holding fixture system with various clamps and accessories.

X-PLATE® a holding fixture system for micro-flame soldering, -brazing, -welding. With sliding clamps and a heat resistant (non-asbestos) workplate.





TorchMate® a battery powered microspark generator to easily ignite small or large torches.



StopSlip® an extremely non-skid plastic table top mat. It eliminates the need for cumbersome fixtures or holders during assembly or manipulating of delicate and small parts.

❑ **I have the following potential application for the SPIRFLAME® in mind:**

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

❑ Send me detailed infos on: . . . . . .
❑ Send me detailed infos on the **Solder Wire feeder LD-200SS.**
❑ Send me detailed infos on the **Solder Wire - Flame Handling System LA-1000.**
❑ Send me your **Free Application Notes.** Preferably related to my above potential application.
❑ Put me on your mailing list to get free SPIRFLAME® Application Notes as they become available.

Name: . . . . . .

Company: . . . . . .

Department: . . . . . .

Street / POBox: . . . . . .

Town: . . . . . State: . . ZIP: . .

phone: . . . . . date: . .

telefax: . . . . . .

❑ **I have the following potential application for the SPIRFLAME® in mind:**

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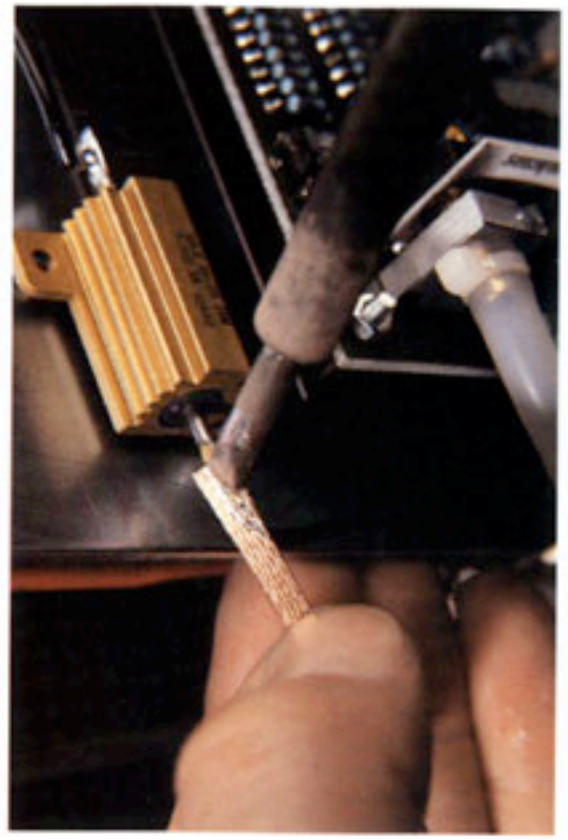
Town: . . . . . State: . . ZIP: . .

phone: . . . . . date: . .

telefax: . . . . . .

CelsiClock® Temperature Indicating Labels record and permanently proof exceeded temperature levels between +40 °C to +260 °C.



3S-Wick® De-soldering Braid (solder removing wick). "Wicking" is an economic and safe NASA approved solder-removal procedure.

EconoClean® High Power Ultrasonic Cleaners for the most demanding cleaning jobs in electronics, semiconductor fabs, hospitals, . . .

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P.O.Box 11 40
CH-8640 **RAPPERSWIL** / Switzerland

(AW2SF00)

APPLICATION NOTES

There is a series of more detailed APPLICATION NOTES available on request. Please specify or describe your eventual application(s). We might be able to provide you with useful general or specific application informations.

You can also use our free of charge laboratory application service tests on your samples.

*Send your parts for easy customs clearence declared as "**Engineering samples without commercial value**", to our address in Switzerland or to one of our authorized sales agents.*

References:

SPIRFLAME®s are used in Europe, USA and Far East by leading industries for now more than 4 years. To name a few users: ROBERT BOSCH AG, SIEMENS AG, PHILIPS NV, TELEMECANIQUE (France), BRITISH AIRCRAFT, ASEA Brown-Boveri, HAI Hellenic Aerospace Industries (Greece), MBB, Daimler Benz AG, Bayer AG, BASF AG. Many well known laboratories of Universities & Research organizations, like the MAX PLANCK and Fraunhofer Institutes, Nestlé, the Finish-, German-, Swiss- Defence Forces, leading precious watch manufacturers like OMEGA, Patek-Philippe, PIAGET, IWC Watch, ROLEX, leading semiconductor manufacturers, like HITACHI, MOTOROLA, SIEMENS, SGS, leading music instrument makers like YAMAHA, and many more companies worldwide. Some companies use more than 25 SPIRFLAME® units per plant and also in various of their plants locations worldwide.

American, European and Japanese semiconductor manufacturing facilities use Spirig made flame-generators, eg. Motorola, Siemens, SGS, HITACHI for pre-mark flaming of IC packages.

Several SPIRFLAME® installations operate in the USA (3-shift 7 days a week) integrated there into European supplied production gear. Systems supplied either by their European parent companies or by independent production system integrators.

Several well known German, French and Swiss designers and suppliers of automatic production assembly lines regularly integrate SPIRFLAME®s into their designs. The number of such OEM customers (VAR retailers) increases.

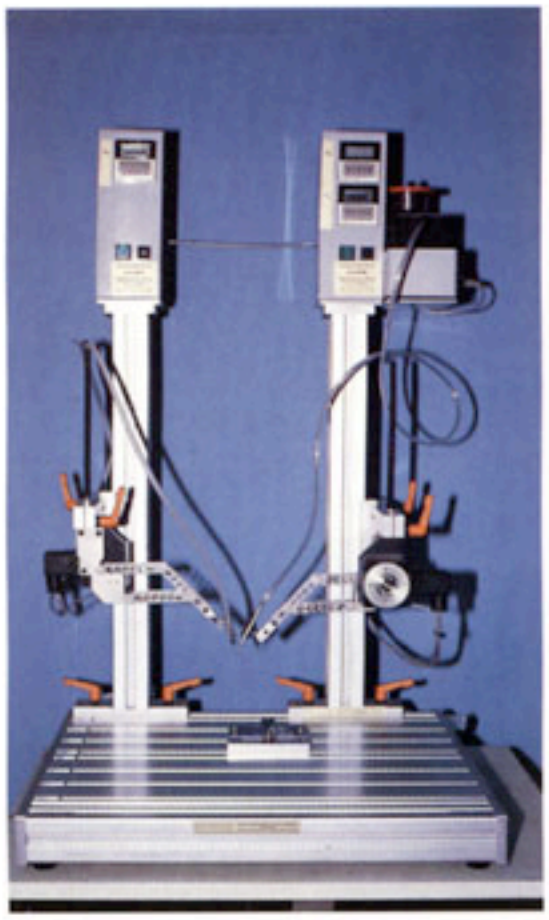

*fig.16A. The **Solder Wire - Flame Handling System LA-1000** is for "spot" soldering. Flame handling unit with "A" timer on left side. Solder wire handling- and feeding unit with "B" & "C" timers on the right side. Solder wire spool on the right of the "B-C" timer head. Special literature on request.*

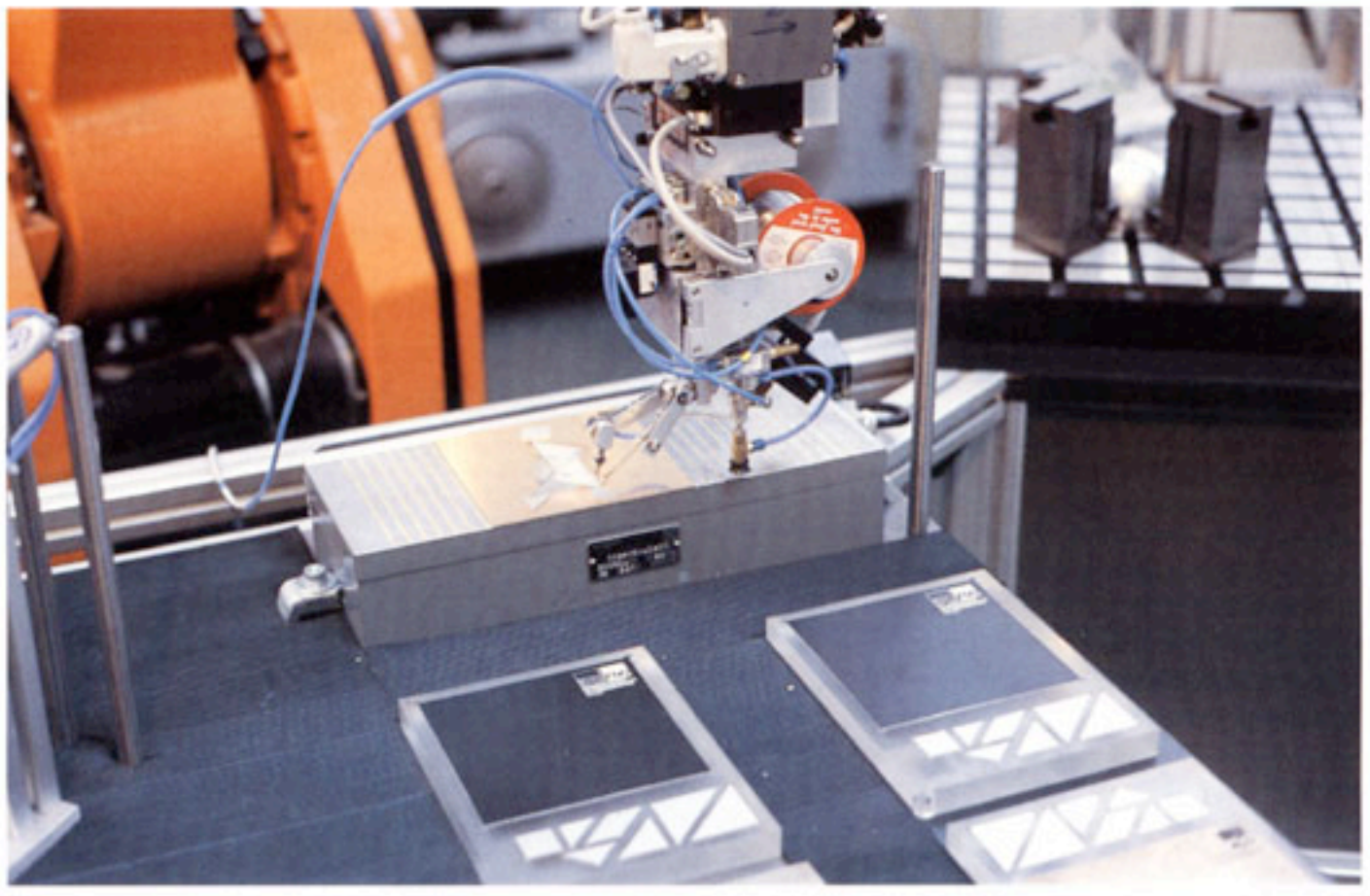

fig.16B. This roboter guided microflame "line soldering" tool is developed for contour soldering. It allows automatic solder joinging along 3-dimensional lines in manufacture of complex high-frequency shielded sheet metal housings. An adaptive control adjusts travel speed of flame versus heat flow.

The manufacturer of the SPIRFLAME® reserves the right to make design and specification changes at any time without prior notice.

All photos made by Ernest Spirig. DTP on MACIIx - RagTime3- Linotype300
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