UNITROL

INSTABRAZE

a major breakthrough in brazing

Now with INSTABRAZE you can effectively, economically and quickly braze similar or dissimilar metals without a torch or oven

INSTABRAZE

Microcomputer System controls brazing parameters 2 ways:

1. OBSERVING DYNAMIC TEMPERATURES - With the INSTABRAZE System using brazing paste or brazing pre-forms, you can braze join electrical components, small mechanical tabs or clips, hydraulic or mechanical tubing to fittings, thermocouple terminations, etc.
2. DETERMINING LIQUESCENT STATE - of ribbon filler metal, ideal for heavier electrical components mechanical support brackets and joining dissimilar metals.

INSTABRAZE IS-

- Fast-as little as ¼ second per joint
- Clean-minimum flux and heat needed
- Economical-consumes no gas
- Simple-no complex operator training
- Gives quality results-electronic control assures inspection of every joint during the process
- Easily lends itself to automation

If you don't have any equipment, Unitrol can provide complete engineering of the entire package for manual , semi-auto or fully - automatic brazing.

Call or write for specific information on how INSTABRAZE can more efficiently handle your joining project needs.

UNITROL

T. J. SNOW CO., INC.
1-800-NOW-SNOW
http://www.tjsnow.com

T.J. Snow is an Authorized Unitrol Distributor.

T. J. SNOW CO., INC.
1-800-NOW-SNOW
http://www.tjsnow.com

T.J. Snow is an Authorized Unitrol Distributor.

Unitrol Instabraze

Product Overview

Unitrol's Instabraze System is the marriage between Closed Loop Microcomputer technology and Resistance Brazing (also known as "Electrobrazing").

Resistance Brazing is the most efficient method of bringing ferrous or nonferrous metals up to brazing temperatures. The electrical current is passed directly through the parent metals. This heats only the area necessary resulting in minimal heat damage to the rest of the assembly.

Some Typical Applications

* Tube to Tube
* Tube to Bracket
* Tube to Fitting
* Flange to Tube
* Carbide Saw Blade Inserts
* Solidification of Braided Cable Ends
* Relay and Circuit Breaker Contacts
* Armature Brazing and Heat Staking
* Transformer Lead Brazing

Instabraze Adds True Control to Resistance Brazing.

The major drawback in the past of Resistance Brazing has been that, to ensure joint strength during production runs, the amount of current had to be set significantly above that which was needed, and the heat conducting time was set longer than required. This reduced production rates and overheated the components being joined.

Unitrol has developed a Microcomputer Control that reacts to the temperature of the parts being brazed. This **closed loop** control has allowed users to reduce the time per part by 50% or more over non-controlled resistance brazing and 90% or more over non-resistance bracing methods (ie. flame, induction, etc.). Most importantly, brazed parts produced with the INSTABRAZE process are consistant in joint strength and physical atributes.

Instabraze Retrofits To Existing Equipment.

For companies that already have a Resistance Brazing system, this Unitrol SOLUTION system replaces the existing welding control in less than one day's installation time. Allow a few hours to become familiar with the accuracy and repeatability of this closed loop digital control, and the next step is **Controlled Quality Production.**

Unitrol Will Design Or Assist With New Applications.

Unitrol Electronics can provide Engineering Services as well as complete tooling to supply the most economical means of Resistance Brazing your products. Providing "turnkey" brazing systems is our specialty. Please contact us with drawings, samples, or just questions.

Unitrol's Instabraze is available in two different processes: **Temperature Feedback** and **Ribbon Break.** Both have been developed to provide a closed loop feedback systems for production Resistance Brazing.

Unitrol Instabraze

Technical Description

Temperature Feedback Method, Page One

Temperature feedback incorporates a remotely located fiber-optic pyrometer to dynamically sense temperature of the parts being joined during the heating cycle . It can be used with any form of filler metal (ribbon, paste, preform, pre-deposit). Typical joint time is 1/4 second to 6 seconds depending on part mass.

Joining Of A Typical Part

Figure A shows the INSTABRAZE process being used on a tube to nut application. This is an **indirect** heating sequence. Current, E, passes from one side of the nut to the other through two molybdenum faced electrodes.

The sequence is as follows:

1. The nut is placed between two electrodes which are then closed by an air cylinder.

2. A preform ring and flux is placed on the tube end. Note that an alloy/flux paste could also be used in this application.

3. The tube is pushed down into the counterbored hole of the nut.

4. The Unitrol SOLUTION control starts electrical current (E) flowing on a controlled ramp **across** the nut. This heats the nut directly while heating the tube by thermal conduction.

   Note that many parts can be brazed by connecting the electrodes on both parts being joined. This **direct** INSTABRAZE technique causes the electrical current to pass **through** the joint while heating both parts.

5. While parts are being heated, the SOLUTION control continuously monitors and displays surface temperature of a customer selected point at or next to the joint area by the use of a remote non-contact Fiber Optic Lens system. Target size is approximately .040" diameter.

6. As shown in Figure B, the control first PREHEATS the part and then ramps current (UPSLOPE) while continuously checking the temperature. When the keypad selected temperature has been reached, the SOLUTION control steps to the BRAZE portion of the program by dynamically shifting electrical power (phase shifting) to maintain the temperature within a keypad selected NULL band.

7. When the selected number of BRAZE cycles have been completed, the control checks to be sure that the temperature is within the selected range. If it is out of the range, a tone is sounded, and the display will show the problem. On manual load/unload systems, the part can be captured between the electrodes requiring operator action to release.

8. If the part passes the temperature test, the electrodes are opened after a delay time that allows the joint transition to the solidus state. Alternately, the system can wait until temperature drops below a set point before release.

Unitrol Instabraze

Technical Description

Temperature Feedback Method, Page Two

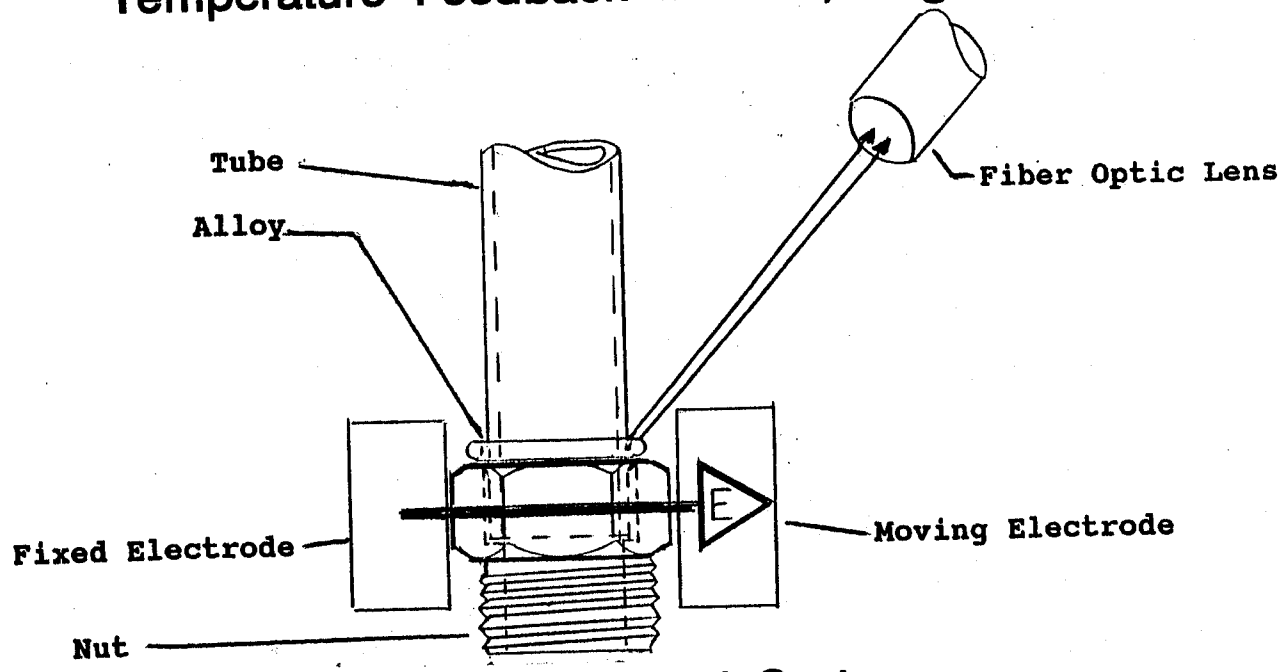
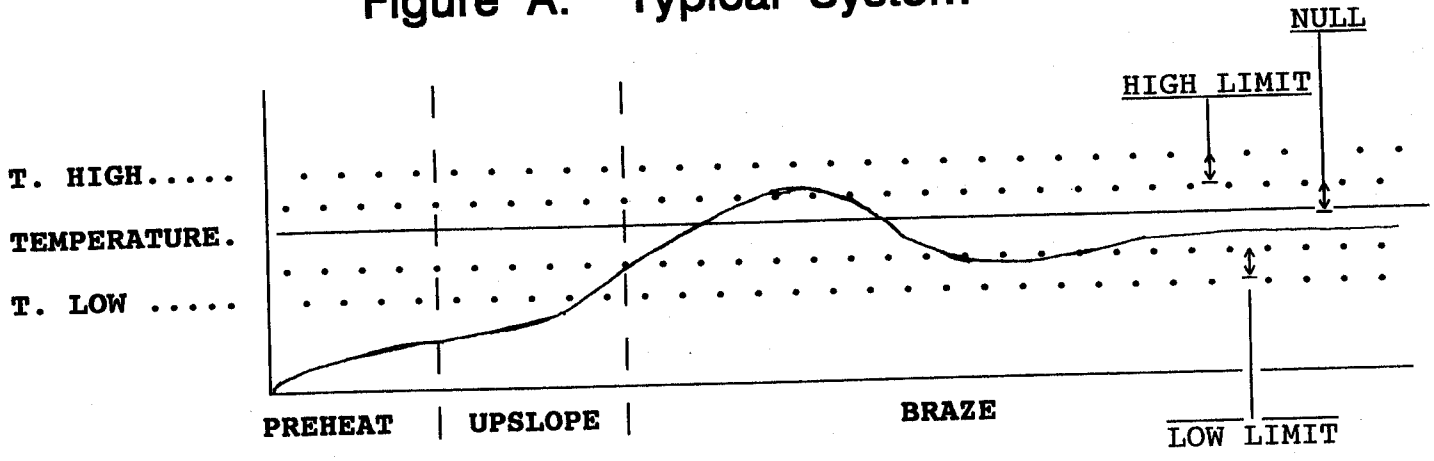


Figure A. Typical System



.rm 7"

Figure B. Temperature Sequence

Available Variations

A. **Temperature Feedback Annealing:** This can be used on single parts or on continuous moving components (tubemill, etc.).

B. **Thermocouple Feedback Annealing:** Control is based on signal from a contact thermocouple on the part surface.

C. **Solidify Stranded Wire:** Hand load manual or automatic continuous process.

D. **Soft or Hard Soldering:** Process uses an optical lens system without the fiber optic cable to read and accurately control temperatures below 1,000^{O}F.

E. **Adhesive Bonding:** Using resistance heat to cure adhesives joining components.

Unitrol Instabraze
Technical Description

Ribbon Break Method, Page One

This method is used when the filler metal is in a continuous ribbon form (strip or coil). A typical braze joint takes between 1/4 second on small parts to as long as 5 seconds on components with greater mass. A typical sequence, with the parts held as shown in Figure A and the electrical sequence as shown in Figure B, is done as follows:

1. One part is placed on the lower electrode.
2. Flux is applied if required with the chosen filler.
3. Filler ribbon (silver solder, etc.) is placed over the part by either hand or automatic means.
4. Second part is placed over the ribbon.
5. Upper electrode clamps parts.
6. Unitrol SOLUTION starts electrical current flowing through parts with a PREHEAT and then UPSLOPE sequence for controlled heating.
7. While parts are heating, slight outward force is placed on the filler ribbon to attempt retraction.
8. The SOLUTION control continuously samples an electrical signal from a wire connected to the filler ribbon.
9. At the point where the filler ribbon melts at the outer edge of the parts, the SOLUTION control automatically advances to the BRAZE sequence. At the end of this sequence, the system goes to a HOLD time that allows the filler to move to the Solidus state.
10. The electrodes are opened, and joined assembly is removed.

Quality Control System

If the ribbon is not present at the beginning of the heating cycle, or if filler ribbon doesn't break within the customer selected maximum time, the SOLUTION will stop the cycle and display the fault condition on the readout. This is especially useful on automatic machines and presents a quality joint every time the system cycles successfully.

T. J. SNOW CO., INC.
1-800-NOW-SNOW
http://www.tjsnow.com

Unitrol Instabraze
Technical Description

Ribbon Break Method, Page Two

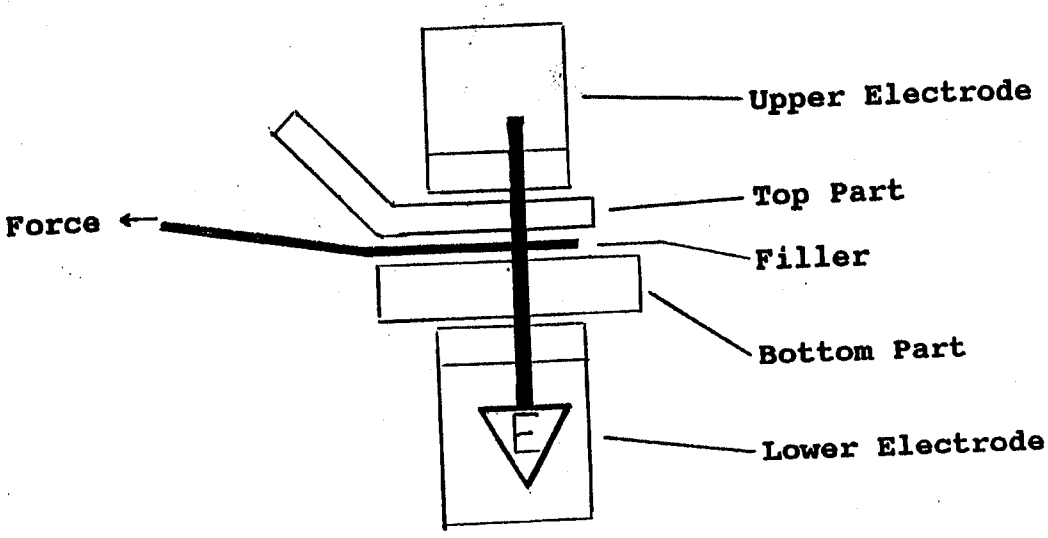


Figure A. Typical Equipment

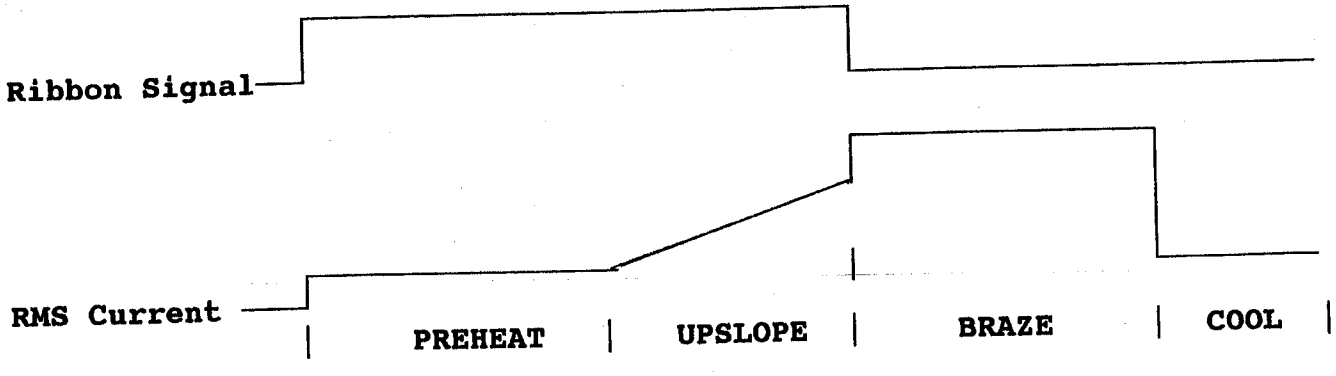


Figure B. Electrical Sequence