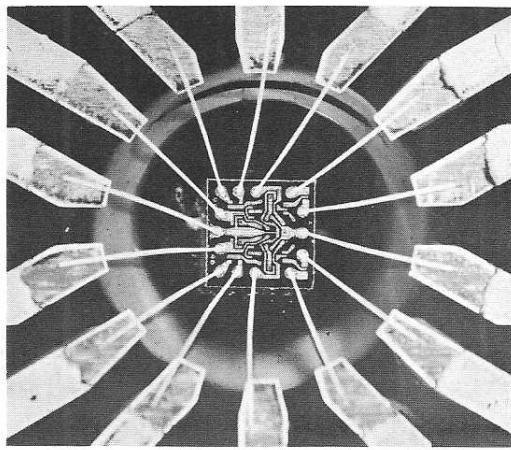
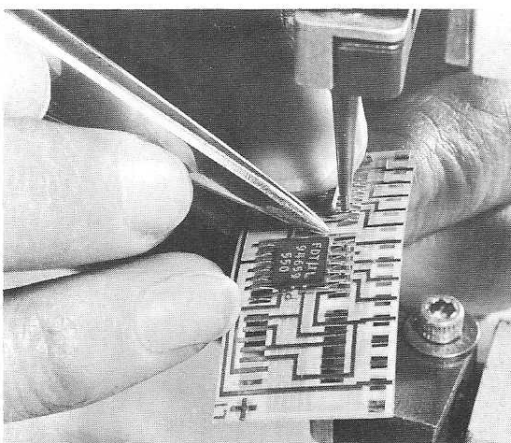


# Assembly technique of the 920M microminiature computer proves feasibility of quantity production methods

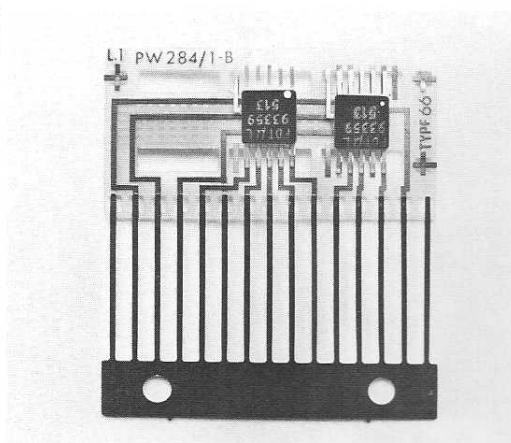
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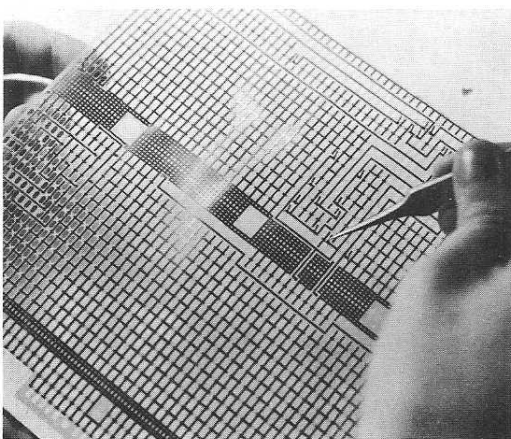
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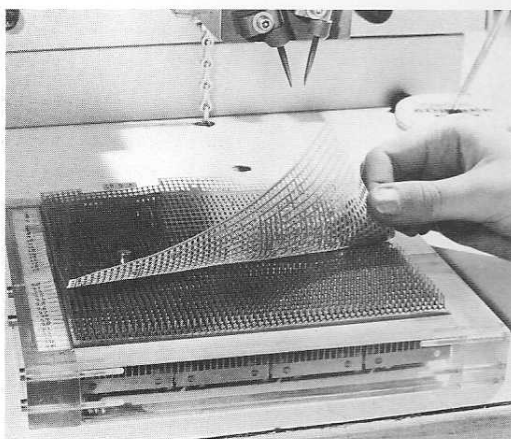
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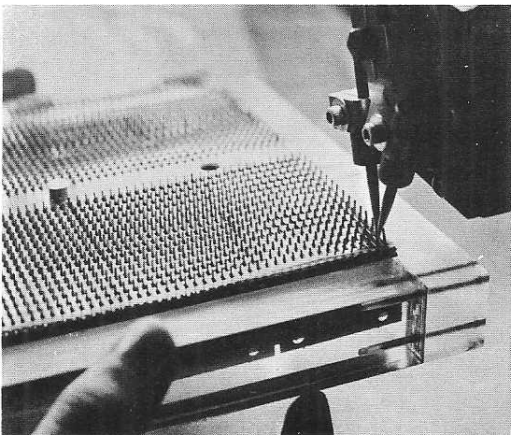
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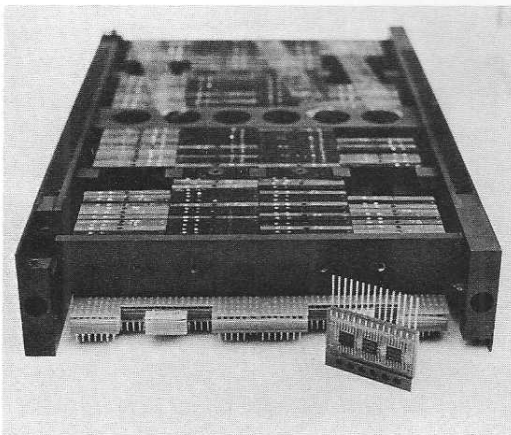
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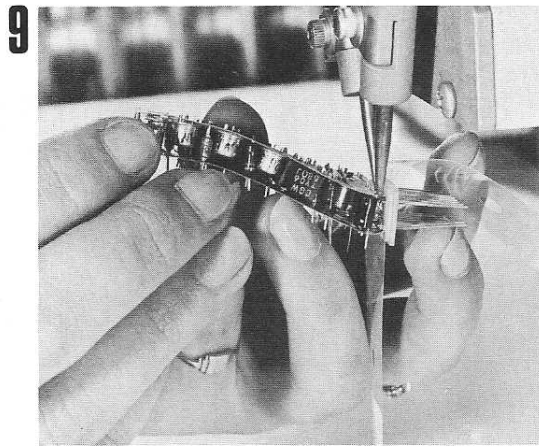
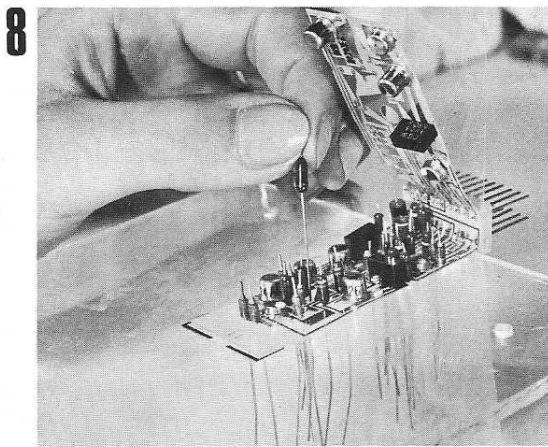
7



The 920M microminiature computer has been designed for quantity production and for extreme ease of servicing. It is constructed from about 450 inexpensive throw-away modules and includes a miniature 8,192-word core store, all housed in three hinged segments, two containing logic and the other the store and its circuitry. There are two basic forms of non-reparable throw-away module, one for logic circuitry and the other for store circuitry. Of the 450 modules there are only 38 sub-types so that spares complement is kept to a minimum.

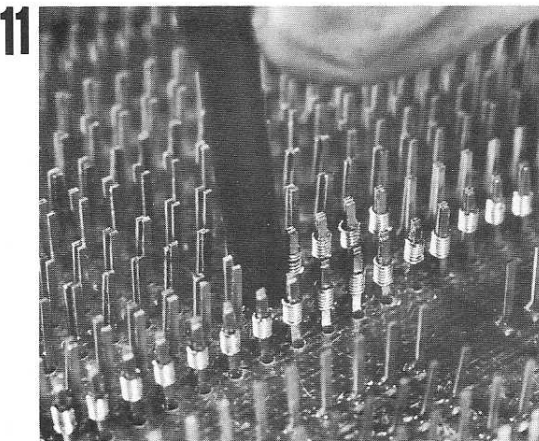
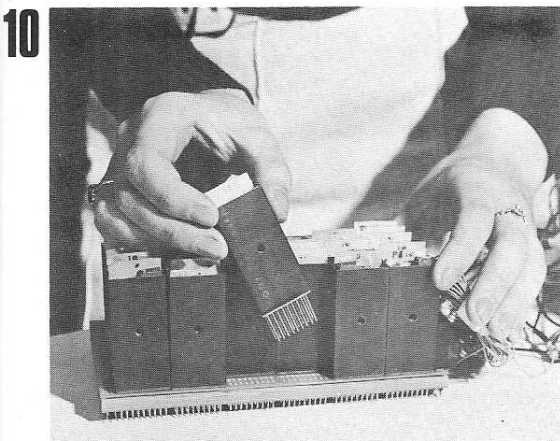
Assembly of a logic module is illustrated in *figures 1, 2 and 3*. A typical integrated circuit chip, smaller than a pin-head, joined to its interconnecting leads before final sealing within its "flat-pack" is shown in *fig. 1*. In *fig. 2* a complete and fully tested flat-pack is being welded to an etched nickel-mylar multi-layer interconnection circuit. *Fig. 3* shows the logic assembly before it is "potted", together with an aluminium heat-sink, to form an easily handled unit unaffected by vibration. The backwiring interconnection system used throughout the 920M is by the etched nickel-mylar multi-layer printed circuitry technique developed by Elliott-Automation. This technique, illustrated in *figures 4, 5, and 6*, is an important factor in the suitability of the 920M for quantity production. *Fig. 4* shows interconnecting tabs being turned up on a typical mylar layer before it is laid on to a back-wiring board stack in *Fig. 5*. *Fig. 6* shows the tabs being resistance welded to the header-pins of a backwiring stack which may hold twenty or so mylar layers.

One of the two logic segments of the 920M computer is shown in *fig. 7* with, in the foreground, a completed logic module which will be plugged into one of the spaces remaining in the backwiring board of the segment.

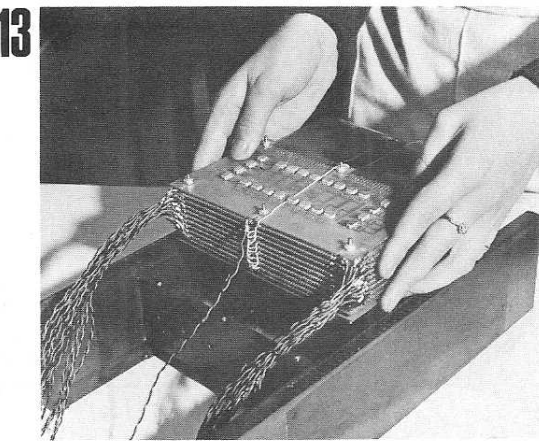
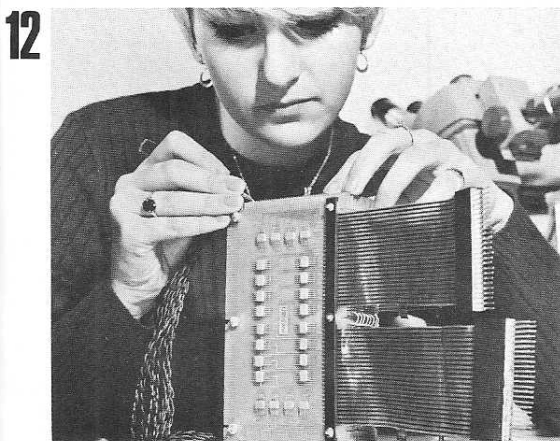


The mylar backwiring layers can be seen protruding beneath the segment.

Assembly of a typical 920M store module is illustrated in *figs. 8 and 9*. A neat, high density packing technique has been devised for the store modules and the illustrations show how the components, all having weldable leads, are sandwiched between an etched-nickel-mylar inter-connection pattern. *Fig. 10* shows a store module in its final encapsulated form being plugged into the backwiring board of a 920M store segment. All the modules, both logic and store types, are wire-wrapped to corresponding backwiring board pins (*fig. 11*) allowing easy removal and replacement during maintenance.



The 920M core store being checked in *fig. 12*, consists of 7 epoxy-glass printed circuit boards bearing an array of cores on each side to give an 18-bit 8,192-word capacity. The drive wires are selected by a diode matrix, the diodes of which are mounted directly on the core stack itself and are visible in *fig. 12*. By mounting the diodes in this way store connection terminals are reduced in number from 450 to 156. *Fig. 13* shows the core stack being placed in the 920M store segment.



Flexible film wire connectors link the three segments of the 920M computer which, when complete, opens out like a book for easy access to all parts (*fig. 14*). When closed up (*fig. 15*) the 920M measures only 12.56" x 7.50" x 7.63". This three-layer configuration in the form of a  $\frac{3}{4}$  ATR package for airborne mounting is ideal for the computer's aerospace applications e.g. the Europa I satellite launcher and advanced military aircraft.



Brief details of the 900 Series' specification and applications are given in the table overleaf