Fitting out Witham

Marconi-built plant makes valuable contribution to production

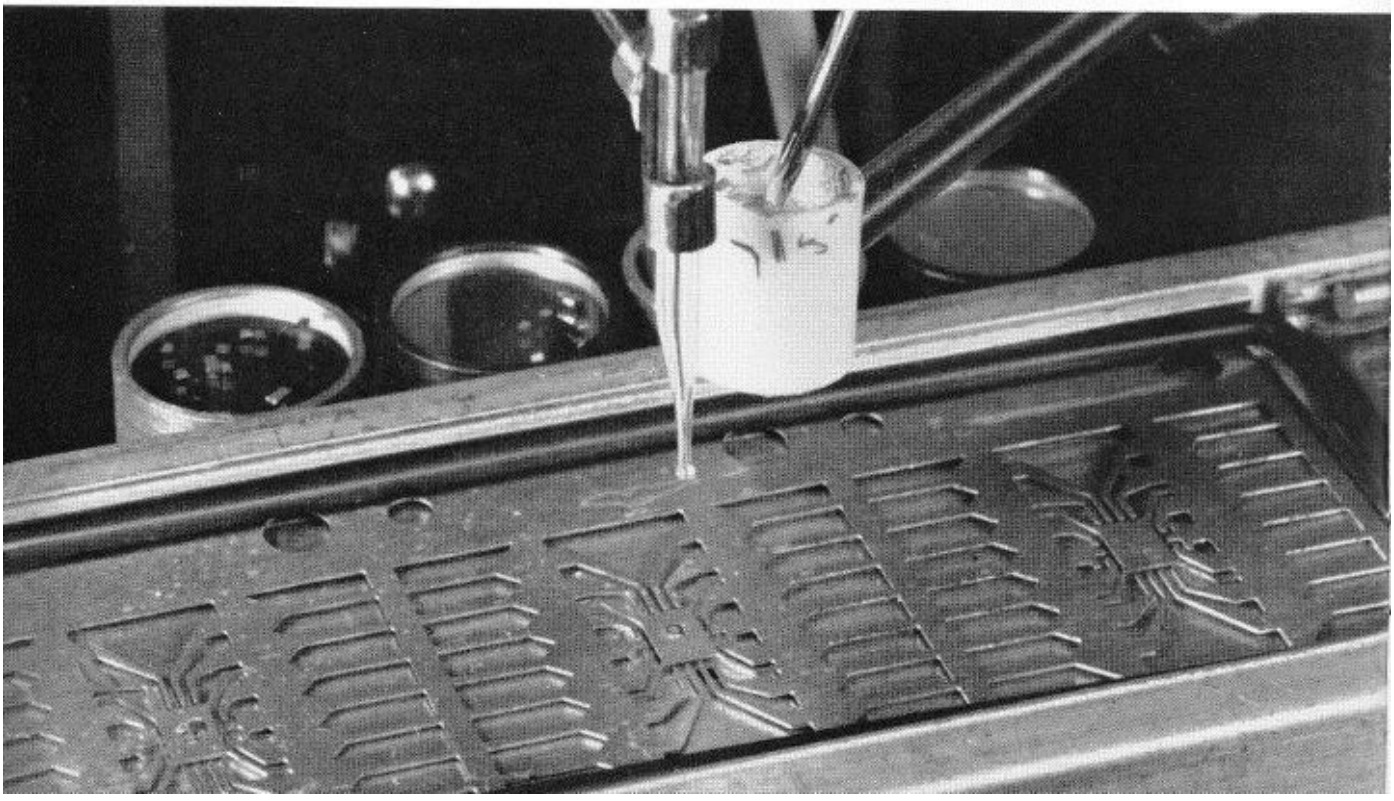
THE NEW FACTORY at Witham will be opening very soon. It is now in the fitting out stage, and in fitting out, the selection and installation of machines with which to produce our microelectronic circuits is one of the most important and expensive features.

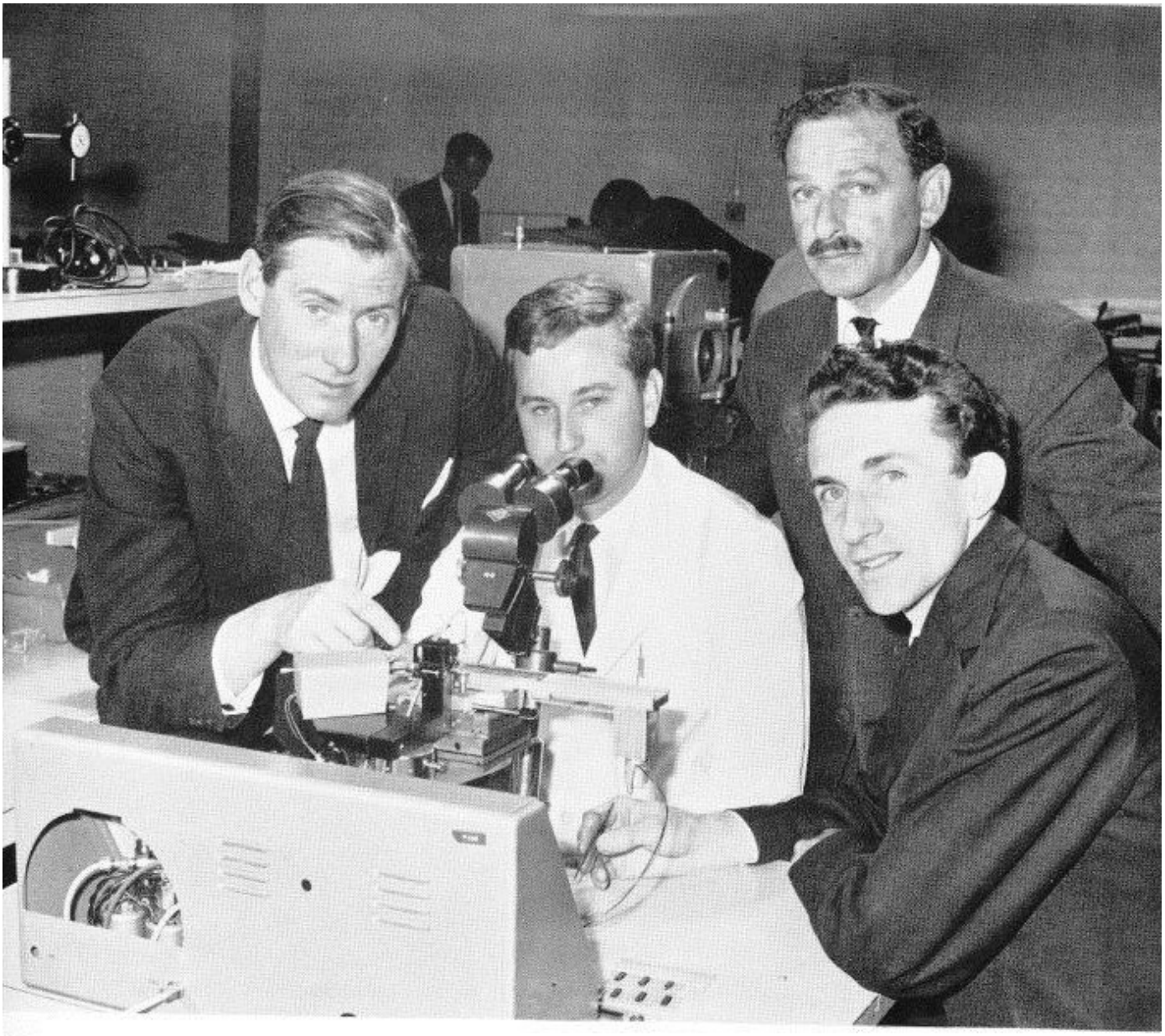
It will be news to many people that most of the intricate machines now being used for assembling microcircuits at Witham were designed by Microelectronics Division's own Engineering Group, and the prototypes were built by them. Production was sub-contracted to Company workshops where standardized components were used and altogether thirty-six have been built.

These machines have proved to be efficient in operation and economical to build. Producing them ourselves in quantity was preferable to laying out capital on importing plant from the U.S.A. Super American equipment demands expensive maintenance and will not lend itself to modification when new techniques come into operation. So efficient, in fact, have our own designs proved that machines of this type are now being built under licence by S.L.E.E., London, and are being sold for production work to the British electronics industry.

Plans for the move to the new plant have been going ahead. Expansion means more new machines, and although some special types have been bought in, Microelectronics Engineering Group have produced prototypes of new ones now being built.

This Group is thinking ahead. On their drawing boards are designs for machines to handle new techniques and new processes: new plant must always be designed in line with the development of new circuits by Research.



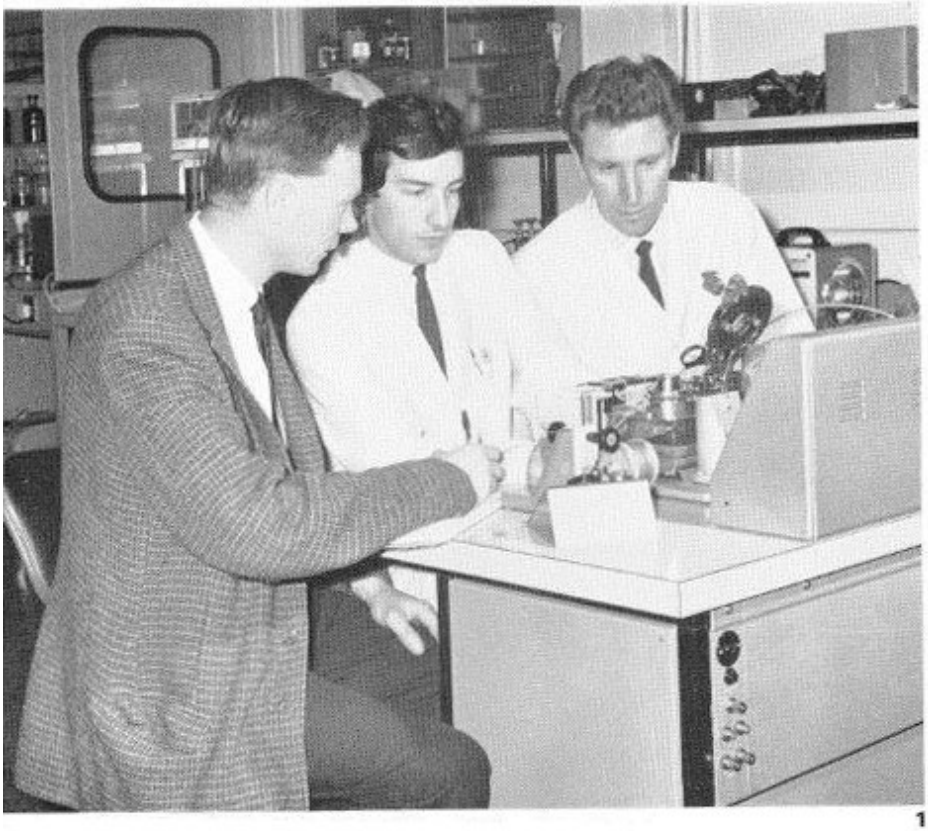


These pictures tell their own story of Micro-electronics Division's Engineering Group and of their achievements

Above: This machine is the prototype of a new set-up for handling and mounting integrated circuits in lead-frames of the dual in-line type, and a number of these machines are being built for future production in the new factory. Working on the silver epoxy mounter are Chris Doubleday, Senior Mechanical Engineer, right foreground, and his assistant Alan Wiltshire, centre. Between them is Albert Magnus, Manager, Engineering Group, Witham, and on the left is his Section Chief, Aubrey Crick.

Left: A close-up of dual in-line lead-frames on the assembly machine to which Aubrey Crick is pointing. This is a section of a run of four lead-frames with chips mounted and alloyed in position on the two left-hand ones. The quartz capillary which transfers chips by vacuum to the lead-frames is in the ready position above. Behind it on its bar support is the cup containing silver epoxy which is applied to the spot on the frame to which the chip will be attached by the pen seen in the cup. The arm works automatically within a sequence of movements and this saves assembly time. When the chips are attached and wired the assemblies are encapsulated in resin, the frames are separated, and the lead ends are bent at right angles ready for assembly on printed boards.

The design speciality of these circuits is that they are compact, that they can be assembled in numbers close together with economy of space, and that they are useful for printed board work.



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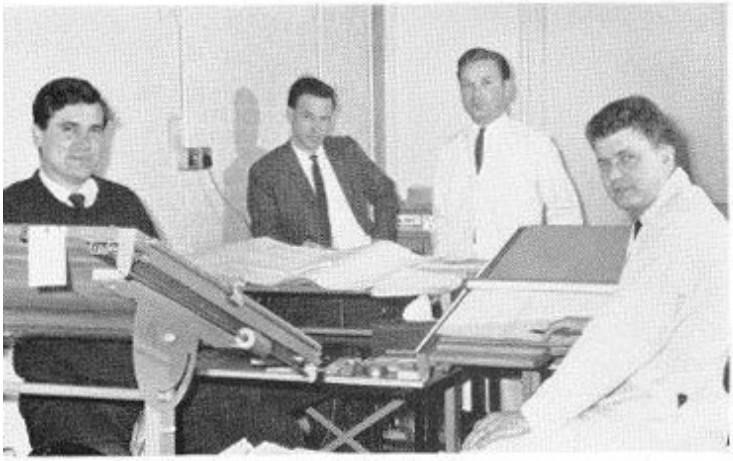

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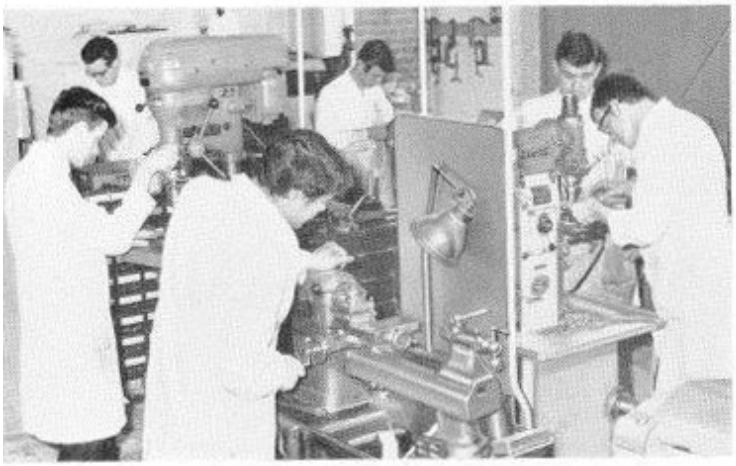

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Right: In the July issue of the magazine we gave details of the mounting of chips for Myriad circuits. Here, on the heat column of a new assembly machine, built at Witham, is a Micronor circuit for computers. In the dispensing trays on the left are chips ready for assembly. There are two circuits on each of these, and one chip is not as wide as the diameter of an ordinary pin head.

The bottom of the dispensing tray is a mirror, which enables the operator to see if the chip is seated correctly on the underside of the collet of the vacuum pick-up tube. Its position must be exactly right, and there is a pyramidal recess in the collet to ensure this. The chip is transferred by means of the vacuum tube to the header where it is alloyed in position by the combination of the silicon of the chip and the gold on the mounting forming a eutectic. The header can be seen on the heat column where it is blanketed in forming gas at a temperature of 465° C.

1. Another Witham development: the prototype of a new mask alignment system. This is basically a contact printer for reproducing circuit patterns on a slice of silicon—about 400 of them to the square inch, with 5 thou lanes or gaps between the rows for parting off the chips or dice. There is more in this that meets the eye, for the construction of a micro-circuit demands that separate areas

corresponding to pattern contours of the circuit are processed in depth, in the silicon. The treatment varies for different areas and chips may be processed as many as eight times in the furnaces before completion. Therefore the re-imposition of the pattern on a slice of silicon in the printing machine requires an accuracy of register correct to one micron, which is a thousanth of a millimeter.

The Witham engineers have achieved this by devising a 'Hovercraft' bearing, an air-cushioned, hemispherical bearing for the table which holds the silicon slice during the impositioning process. The silicon, when offered up to the underside of the mask will therefore take up its position in perfect parallelism with the mask. The table is locked by vacuum, and both slice and mask are held rock steady within the minute field of focus of the operator's binocular microscope while he carries out the alignment.

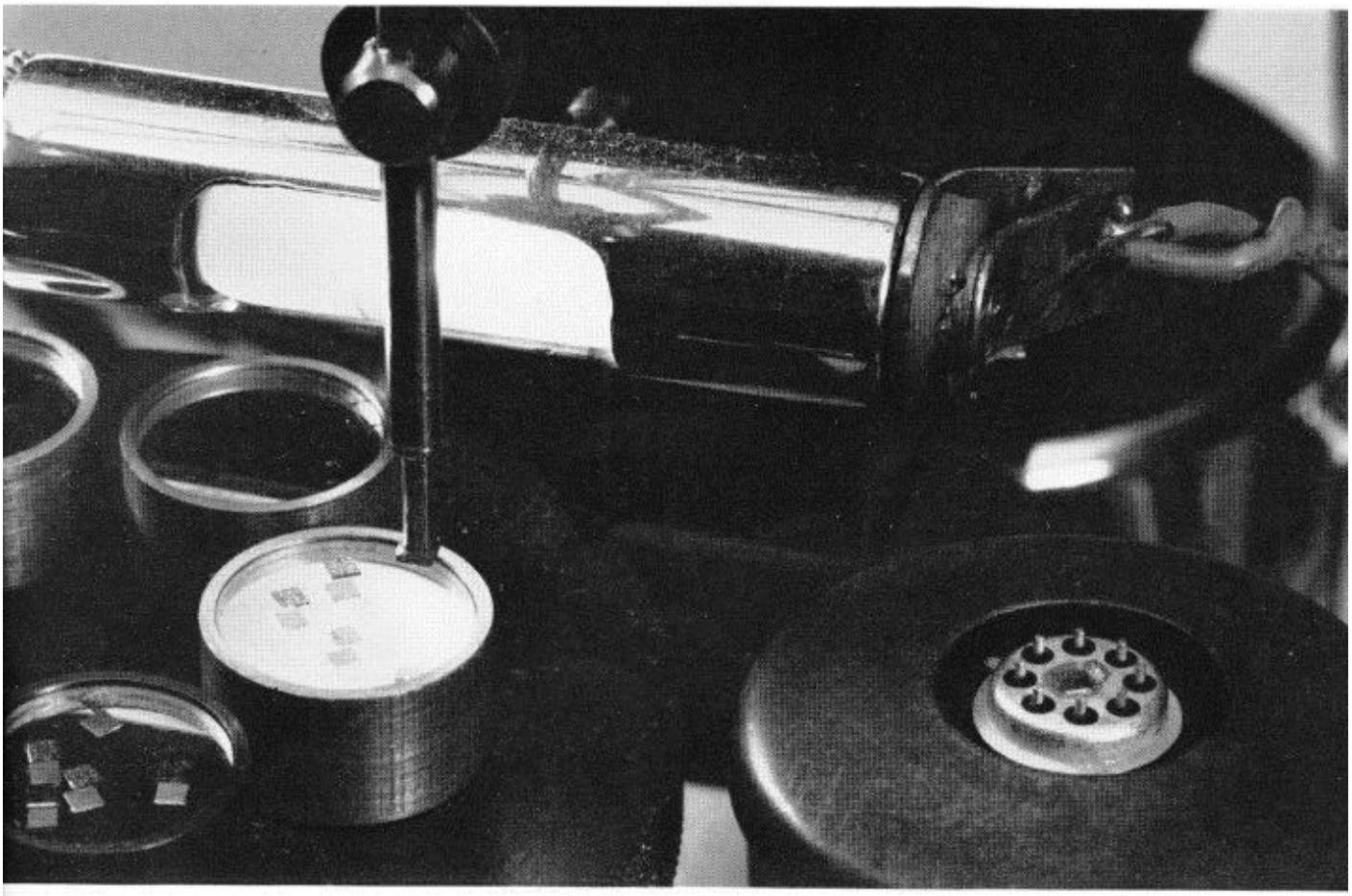
Machines like this one are already in use but new improvements have been made and working on them here are, left to right, Mike Cable, Laboratory Section Leader, John Dowman, his assistant, and Brian Wilson, Production Engineer.

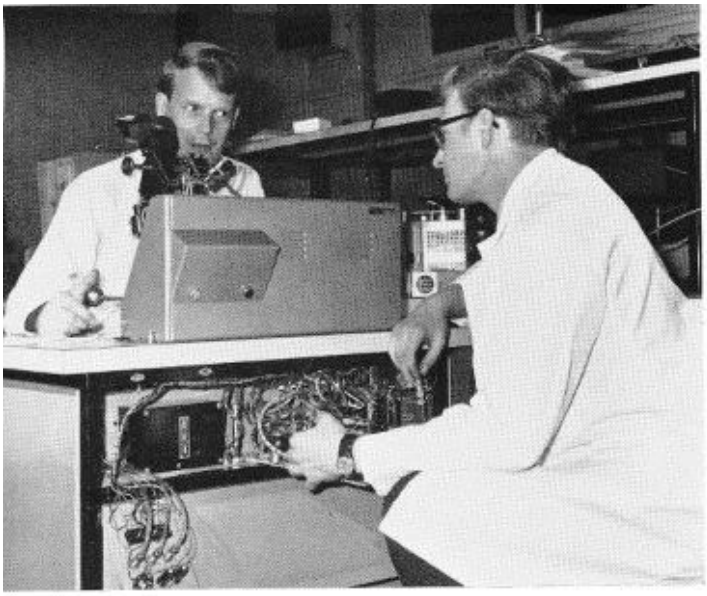
2. More experimental work in progress in Microelectronics Division's engineering laboratory at Witham. This is Vic Hawkswell at work on a new development for a flat pack circuit sealing machine.

3. This type of development requires detailed design office work, and so that the close link is maintained between engineers and designers in Engineering Group the office is integral with the engineering section. In fact the designers work on one side of the main laboratory and the engineers on the other. Many original ideas worked out by the engineers during development have been 'hammered into the system' in the design office.

Here are designers who carry out the drawing for development and production work in Engineering Group at Witham, left to right, John Denney, Jeff Childs, mechanical designer, Barry Lapwood and Dave Coe.

4. Engineering Group's workshop build prototype microcircuit machines from start to finish. Left to right Bill Rose, Andrew Turner, Trevor Morris, Ron Scott, Peter Allen, Workshop Chargehand, and Fred Minton.





Left top: The Microelectronics maintenance team familiarize themselves with new machines in Engineering Group's Laboratories. Here are, Peter Gordon, Chargehand of the team, left, and Dave Clark, adjusting the flame size in a bonding machine. A minute hydrogen flame controls the size of the gold ball by which a wire only one thousandth of an inch thick is bonded to a chip. If you look at the blown-up picture of a chip, or microelectronic circuit on the inside front cover, you will see what a microscopic business it is to bond a wire.

There are five men altogether in the maintenance unit. Three of them work full-time on the production lines at Witham. They are responsible for commissioning new machines, for setting temperatures, and for carrying out all the detailed work necessary to keep such complicated equipment in trim and working at full pace for both day and evening shifts.

Two of the team work full-time in the Microelectronics Division's development laboratories where machines are constantly in operation for research and development of new circuits and new techniques.

Left: The Group needs a secretary to sort out some of the paper work and to keep law and order. Here she is, Mrs. Ida Smith, with Engineering Group's project planner, Vic Byland.

WEMBLEY NEWS

An inspector leaves

FRANK CECIL passed through the gates of Wembley Works as an employee for the last time, at the end of June, after fourteen eventful years.

His engineering career was interrupted for a while, in the late 'thirties, when he branched out as a restaurant proprietor and industrial caterer in south-east London. The introduction of food rationing which accompanied the outbreak of the Second World War ensured his return to his original choice. Frank joined E.M.I. at Wembley in 1953 from an Inspection job with Buck & Hickman, and stayed on with Marconi's as an Assistant Foreman (Inspection) at the time of the Works transfer in 1961. A year later he was promoted to the post of Inspection Controller.

His catering experience was reflected in another form of service—as Mess President in the Supervisors' Dining Room.

To mark his retirement his friends and colleagues gave him a wall clock which A. M. Bennett, Chief Inspector, presented on their behalf.

[*N. Butterworth*] See photo below

Eyes have it

AN INDEFATIGABLE milk-bottle-top collector. That's how Sister Muriel Dick is known throughout the