This revised screed is now the "basis of discussions" with Keen.   M.R.

BABY JUMBO

As a result of machine research a year ago we decided that, in order to run menus weaker than the present Jumbos could take, two machines were necessary: -
(i) A Mammoth - with off-chain sensing by means of relays, and making the 25-1 assumption always on the main chain and sometimes on the subsidiary chain.
(ii) A Baby Jumbo - with simultaneous machine gunning of straights on two inputs; to run menus for which the 25-1 assumption - even on the main chain - was a risk.
Since then there have been two important developments: -
(i) A Mammoth with off-chain sensing by relays is wanted for Naval jobs. Several are going to be made, and we hall have part use of them.
(ii) The permutations of a wheel-order in the course of a day (on both Army and Air Force keys) has presented a quite new problem in the matter of cilli menus.
So we now want a Baby Jumbo - more or less as originally conceived - but with the addition of a permuted wheel order device.

Purpose of the machine
(i) To run full range jobs when the 25-1 assumption on the subsidiary chain is a risk, and to make use of a double scanner which allows us to machine gun simultaneously on two chains.
(ii) To run short range jobs, allowing for any density of stops (three or four straights in one position etc.), right down to the sort of menu we normally run by hand on a few ringstellung positions.
(iii) To run jobs with different permutations of a wheel order.

Specification of the Machine.
(i) One bank machine with 24 enigmas.
We need a fairly large number of enigmas for Banbury jobs of the type: -
A_____?_____B_____?_____C
                P_____?_____Q

(ii) Three-wheel pattern, but with the universal drive on each wheel of each enigma.
This is primarily in order to run different permutations of a wheel order, but it could also be used in other ways, e.g. for hoppities, or for special ranges of positions.
(iii) German ringstellung and wiring on all wheels, i.e. a completely German machine.
                    (Wiring Chart supplied)
(iv) Set of wheels 1 to 5 only: 6, 7, 8 not required.
(v) Ringstellung cut-out on each wheel.
(vi) Setting of the machine to any given position by a switch or a hand control.
(vii) Running through a given small range of positions chosen more or less arbitrarily.

To illustrate (v), (vi) and (vii) let us take examples.
Example 1:   Suppose the "first messages" giving an indication of ringstellung are: -
EPX, FOV, DQY
we should then probably try the "block" of ringstellung positions,
        L.H. wheel   C, D, ...G
Middle   "   N, O, ...R

R.H.   "   U, V, ...Z

This is a set of 5 x 5 x 6 = 150 positions, and would be done by the ordinary ringstellung cut-out. However, it would obviously be a help if there could be some means of carrying the middle wheel quickly over the 21 unwanted positions. The slow wheel, of course, would be adjusted by the ordinary carry mechanism.

Example 2:   Suppose the "first messages" are,
            EPX, DOW,   EPW
Here all three indicators are "in step" on the left hand and middle wheels, and the first two indicators are "completely in step". In this case we should probably confine ourselves to the 6 positions,
            CNV, DOW, EPW
                CNW, DOX, EPX
This set of positions would probably be most easily tried by setting up each one in turn by the hand control.

Example 3:   Suppose now the "first messages" are,
            EPR, DOV, DOY
            DPS, DPX, COR
These indicators group well on the first two letters, but the last letters are rather widely separated. Our ringstellung range would in this case be
      COQ DPQ DOQ EPQ
      COR DPR DOR EPR
       *   *   *   *
       *   *   *   *
      COZ DPZ DOZ EPZ
Is it possible to try a selected range of positions like this, in turn, be means of suitable plugging?
(viii) Stecker knock-out by plugging on the diagonal board.
Note: Both ringstellung cut-out and stecker knock-out will probably be used quite often. Therefore we should like the plugging up of these jobs to be as simple and quick as possible.
(ix) Umkehrwalz connections taken out to a plugboard - to facilitate a simple change of umkehrwalz.
(x) (Double Input
(Double Scanner
(Machine Gun
When using the double scanner we want each straight on the main chain to be held uncancelled while each of the subsidiary chain straights is tested in conjunction with it by the machine gun. We shall only want printing of stecker when there is no contradiction at all.

Generally speaking we shall not want check stops, i.e. straights found but thrown out by the machine gun, printed; but we should like to have several printed, say at the beginning of the run, to ensure that the machine is running correctly. Therefore could this printing of stops be controlled by a switch? Stories should of course always be printed.
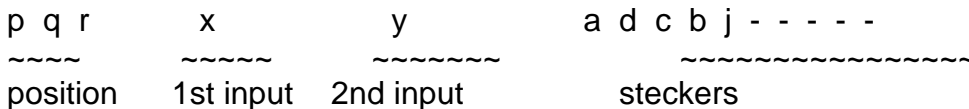
In many cases the 25-1 assumption on the main chain will be safe, so would it be possible to have an alternative 25-1 (cast-iron) input there to save boxing time on the main chain?

Boxing will then be necessary only on the subsidiary chain. However, it is essential to have an ordinary input for weaker menus when the 25-1 assumption no longer holds.

We shall sometimes want to use the second input merely to make sure that there is a straight on the subsidiary chain, and not want to box, test, or print on this input. That is, we shall want to be able to cut off the effect of the second input boxing, testing, and printing if necessary.
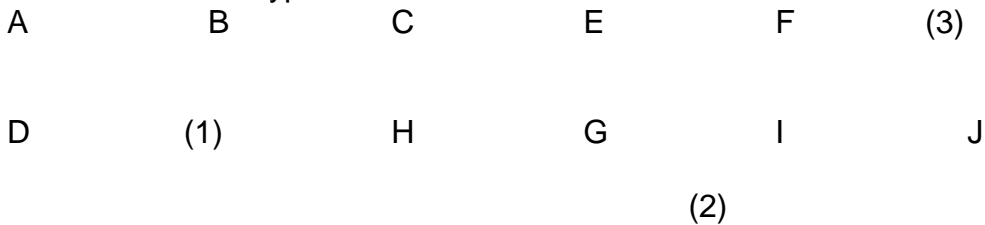(xi) Recording by a typewriter or a Hollerith punch (not a gang punch).
We shall want an extra place for the printing of the significant letter on the second chain. This would be most convenient immediately following the significant letter on the main chain.

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p  q  r      x          y         a  d  c  b  j  -  -  -  -  -
~~~~        ~~~~~      ~~~~~~~     ~~~~~~~~~~~~~~~~~
position    1st input  2nd input       steckers
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(xii) Triple Input
For menus of the type

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A          B          C          E          F          (3)


D          (1)        H          G          I          J
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                                  (2)

it will sometimes be useful to use a third input. The main input would be at B, the subsidiary input at G, and the current entry line Bg. The third input would simply consist of a set of 26 relays attached to I to ensure that there is a straight on the third chain. It would have no scanner or printing, etc., but the machine would only stop when at least one relay of each of the three inputs was "up".

(xiii) Selection of Stories
We were considering using an analyser to give a Factor of Merit for the story. But, as Keen rightly pointed out, why not do the selection on the Bombe itself?
This could best be done at the typing (or punching) stage. It would be necessary to record

either (i)   the number of self-stecker, and the number of confirmations
or (ii)   the number of self-stecker, and the number of off-chain steckers. after the story itself had been printed out. The best stories could then be picked out by hand.

We have before mooted the idea of doing our selection by means of non-energised relays during the course of a run. Relays would be attached to the self-stecker points, the confirmation points, and- for double-input menus- the cross-stecker points of the diagonal board. When a straight appeared some of these relays would go up, and the machine would only stop if the combined "Factor of Merit" was sufficiently high. The complete device would require about 150 relays, many of which need several points. This device, however, is little better than a clumsy form of Mammoth, and its use would not justify its complexity. As a compromise, however, the provision of about 60 simple one-point relays would enable us to make a tacking-on assumption. This would be done as follows: -

Suppose the A, B, C,... are on the main chain, and P,Q,R,... on the subsidiary chain. Attach a differential relay to each of the points A/P, B/P,... A/Q, B/Q... etc, and insist that

the machine will not stop unless at least one of these relays is up. This would often reduce the number of stops substantially.

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The points (i) - (xiii) enumerated above are not, of course, of equal importance. The details will depend largely on Keen. We may roughly say that
(i), (ii), (iii), (iv), (v),(viii), (x), (xi)   are essential in some form.
(vi), (vii), (ix)   are highly desirable.
(xii), (xiii)   are suggested rather tentatively.

O.H.L.
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