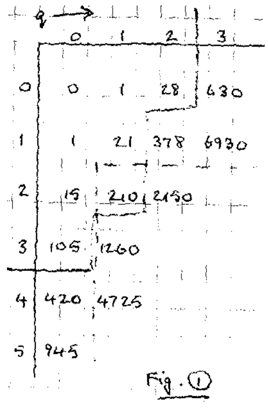
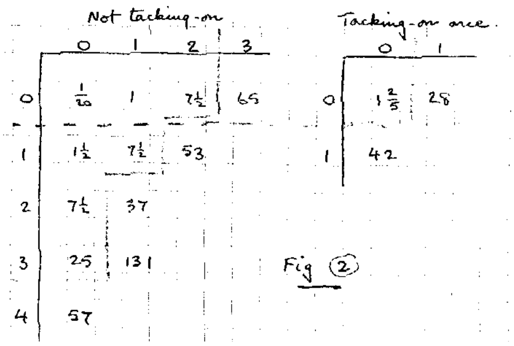
REPORT ON "INTELLIGENT SELECTION" BY THE JUNIOR SUB-COMMITTEE OF MECHANIZATION

Clarke's figures for the factors of merit of different types of story on open chains show that the mere stipulation of so many self-steckers or confirmations is not the best way of selecting stories; in fact this sort of test for a story is formed to let through many which are actually less likely to be right than some of those rejected. The most refined method of selection possible is the drawing of a line on Clarke's factor-of-merit table and the rejection of all stories below it; if one makes out the table in a rectangular form this line appears as a zigzag across the rectangle. For example, Fig. 1 is the factor-of-merit table for an open(11) chain - p standing for the number of self-steckers in a story and q for the number of confirmations; the pencil line across it cuts off 90% of the stories at a risk of 16%. The dotted line shows the effect of 'two self-steckers and a confirmation', - the only way of running the menu as things stand- the risk being 36%.



On menus with subsidiary chains tacking-on has to be taken into consideration, and the factor-of-merit table must then be made to show the relative merits of stories of each type which do and do not tack on. Instead of merely taking all the stories which tack on and leaving the others, it is often better to leave out the very worst of the tacking-on stories and to take instead the best of the stories which do not tack on. A further refinement would be to prefer those stories which tack on twice or more to those which only tack on once. Fig. 2 shows the factor-of-merit tables (for) a 10 with subsidiary 4; the line cuts of two-thirds of the stories at a risk of 4%. The dotted line is the 'one self-stecker' line, and makes the menu runnable at a risk of 7%.



A simple mechanical method of 'drawing the line' would clearly be an advantage over the ordinary diagonal selection and confirmation control. There are three possible stages at which this selection could take place: (i) instantaneously as the bombe runs, by differential relays, (ii) on a pause or a stop, by non-differential relays, (iii) while the stecker are being recorded, by some counting device attached to the typewriter or punch. Baby Jumbo is obviously the machine to house a gadget of this sort, partly because it makes more use of story selection than Mammoth, and partly because whatever the gadget is it will have a lot of plugs and special relays and connections - and Mammoth has quite enough to go wrong as it is. Having decided on Baby Jumbo, it is then clear that the selection must be instantaneous, in order to keep the stops under control. The figures on the next page give some idea of how Baby Jumbo's performance would be improved by this.

[Figures have also been worked out to show what Mammoth could do with intelligent selection; there is only a noticeable improvement in time of running over Baby Jumbo if the selection is instantaneous, which would involve a number of differential relays in addition to the 351 ordinary ones, and an army of plugs and connections.]

Mechanism

Suppose Baby Jumbo is going to run an open 11, and wants to select the stories by 'drawing the line' as it is drawn in Fig. 1 Then each of the 11 self-stecker points of the diagonal board is connected to a coil which actuates one of a series of 5-point relays, and each of the 55 confirmation points is associated in the same way with one of a series of 4-point relays (see fig 3). For a stop we want to ensure that if a straight has no confirmation it must have at least 4 self-steckers, and

_______________1_____________________3___________________

_______________2_____________________1___________________.

This can be simply done by joining X_0 (no confirmation) to Y_4 - so that if a straight has no confirmation it still has four steps to go up - joining X_1 (1 confirmation) to Y_3, and X_2 to Y_1. Then connect the top points of all the relays, and the thing is done; if the AB circuit is closed the story has passed the test and the machine stops.

Now consider how Baby Jumbo would run a 10 with subsidiary 4. For dealing with tacking-on a third set of relays is necessary, 3-point ones; each of the 'tacking-on' points of the diagonal board is associated with one of them, and the self-stecker and confirmation points are fixed up as before. This time what we have to ensure for a stop is that

If a straight does not tack on, and has no confirmation, it must have 4 self-steckers

____________________________1____________________2____________________

____________________________2____________________1____________________

__________tacks on once_____no.____________________1____________________

To do this these connections have to be made: P_0Q_3, P_1Q_1, X_0Y_4, X_1Y_2, X_2Y_1 and the top points of all the relays as before.

So all that is necessary to run any menu in this way is a set of 115 differential relays (I think this is enough - 11 self-steckers, 55 confirmations and 49 tacking-on's) easily with the points of the diagonal board, and a couple of devices to enable one to join the end points P,Q,X,Y of the sets of relays however one chooses.

I think 3,4 and 5 respectively are enough points for the relays; in all the cases I have worked out they are, and I can hardly imagine ever wanting to reject stories which tacked on twice, or had 3 confirmations or 4 self-steckers.

The fact that the selection is instantaneous opens it to the same objection that has been raised against instantaneous machine-gunning, namely that in passing a 'reject' position the relays have to flap up and down in the space of a few milli-seconds; but in this case it is not quite so bad, because there would usually be only 1 or 2 relays involved in the flap, and never more than 4. At any rate it is no worse mechanically than ordinary instantaneous diagonal selection and confirmation control and produces considerably better results.

The effect of intelligent selection

Menu	Mammoth Chance	Mammoth Stops	Mammoth Pauses	Mammoth Time	B.J. Chance	B.J. Steckers	B.J. Stops	B.J. Time	Intelligent B.J. Chance	Intelligent B.J. Steckers	Intelligent B.J. Stops	Intelligent B.J. Time
11					0.64	17	80	16 mins.	0.93	25	100	20 mins.
9_1	0.68 [0.7]	23	700	18 mins.	0.7	23	70	15mins.	0.89	18	47	10 mins.
6_2	UNRUNNABLE								0.73	12	17	4 mins.
10 _ 3	0.69 [.78]	14	1800	40 mins.	0.79	15	150	29 mins.	{0.95 {0.9	26 17	270 150	52 mins. 29 mins
10 _ 4	0.93 [.97]	15	650	15 mins.	0.86	10	220	40 mins.	{.98 {1.0	20 21	180 300	33 mins. 57
9 _ 5	0.76 [.82]	3	800	17 mins.	0.82	3	292	54 mins.	0.95	13	215	40 mins.
8 _ 5					0.69	11	400	75 mins.	{0.79 {0.75	27 15	280 250	52 mins 47 mins.
8_1 _ 4	0.68	7	350	8.5 mins.	0.69	7	120	23 mins.	{0.97 {0.98	22 20	150 100	30 mins. 20 mins.
6_1 _ 6	0.72	18	540	14 mins.	0.73	8	140	26 mins.	0.84	22	150	30 mins

]Bracketed figures for Mammoth risk show the advantage of having 24.1.1 on the main chain]

(Bracketed figures for Mammoth risk show the advantage of having 24-1-1 on the main chain.)

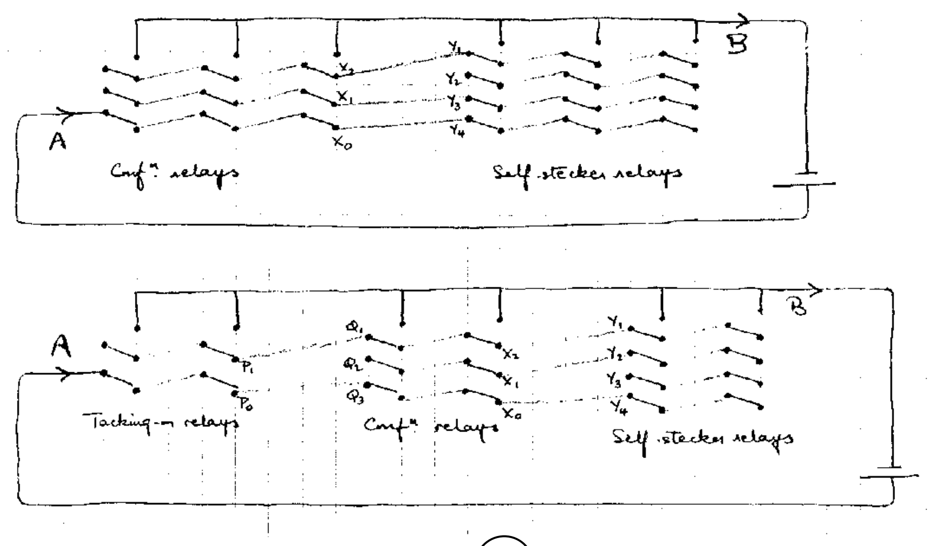


Fig. 3

Later Note

On a menu such as an 8 with subsidiary 5, where one has to reject some of the worst tacking-on stories, better results can be obtained if relays corresponding to self-steckers and confirmations on the five-chain are introduced as well as those for the eight-chain. Of the thirteen letters in an 8 with 5, for example, at least three must be involved in self-steckers or confirmations, and so one can knock out a large proportion of the stops at absolutely no risk. In this way the menu can be run, giving 130 stops and 22 stories (25 minutes) with a chance of .82 - quite an advance on the previous figures.