The utilisation of graphic display units as the main form of computer input

By B. J. Gladwin*

This paper is based on two IBM 360 Systems which have been installed in Kays, a large Mail Order Company based in Worcester and Leeds. Kays have a large problem of providing the computer with basic input data, in that 200,000 line items have to be processed daily, of which 7% contain errors of one form or another. This problem is made more severe in that Kays' product range is changed every six months, making basic file coding very difficult. The general solution and also the method of approach is then described using 2260 Graphic Display Units in the conversational mode of operation. The paper is concluded by general comments as to the current status of the project and the proposed extensions.

(Received November 1968, revised January 1969)

The input problem

One of the most expensive and time consuming parts of any computer organisation is the daily preparation of basic data and subsequently the reading of this data into the computer system. Key punch and key verify operators are becoming more costly to employ and more difficult to engage. Furthermore, the computer department of many companies have daily deadlines, which have very tight schedules. More often than not the most time consuming part of this critical schedule is the editing and subsequent preparation (i.e. key punching and verifying) of the daily data—the most common form being order entry data. The failure to meet this schedule can mean hundreds and maybe thousands of employees in the warehousing or shipping departments being made idle.

This problem can be no more acute than at Kay and Co. Limited which is one of the companies forming the mail order group within the G.U.S. organisation. As most people are probably aware, a mail order company is one that sells its goods entirely through agents who are responsible for making sales to their own customers and who are paid commission on the sales made. The goods are selected from large catalogues, that are changed about twice a year. The goods are then mailed directly either to the agent or the customer concerned.

At the Worcester section of Kay & Co. Limited 100,000 daily line items have to be processed through their order-entry routines. Similar volumes apply to the Leeds section of Kays.

This problem is made more severe due to the fact that about 7% of these line-item orders are in error because the agent has made one of the following mistakes:

(a) Stated his or her agency number incorrectly.

(b) Ordered the wrong catalogue item—e.g. stated wrong catalogue number but correct catalogue description.

(c) Chosen the wrong option—e.g. size or colour.

(d) Ordered the wrong quantity—e.g. 12 of items sold in dozens, instead of 1.

(e) Stated the wrong price—e.g. catalogue price change.

* D.P. Manager, Kay & Company Limited, Worcester

It is the policy of Kays to provide the best possible service to all their agents and part of this policy involves sending the item which the agent 'thought' he or she ordered wherever possible. Finally the problem of order entry is further complicated in that once every six months a brand new catalogue is issued to all Kay agents and less than 50% of all items are carried forward from one catalogue to another. Of those carried forward many may have a different selection of options or a different price. Kays' catalogue contains approximately 8,000 catalogue items which between them have 25,000 unique options. To create codes for 25,000 options once every six months is obviously a sizeable problem which needs to be avoided if possible.

The solution at Kay and Co. Limited

The cost and time element of data preparation, coupled with the vast amount of punched cards involved, unfortunately made a conventional punched-card approach unacceptable. Kay and Co. Limited felt so strongly about this particular aspect of their data processing requirements that their terms of reference, given to all computer manufacturers, which were called in to do a survey, stated that a conventional punched-

Fig. 1. A section of the data-preparation office
card approach to their Order Entry Routines would not be acceptable.

Many approaches were considered and the approach finally chosen was to use two IBM 360 Disk/Tape Systems, one in each of Kays’ main operating centres. Each system would have $64 \times 2260$ Display Units to act as the input system.

Fig. 2. IBM 2260 Display Unit showing signal ‘WAITING FOR WORK!’

The 2260 display units are being used to enter the majority of Order Entry Data into the computer system —Orders, Returns, Goods Receipts, etc. The majority of other forms of input data, may well be prepared for the computer by a 1287 Optical Reader.

In a short paper, the whole system cannot be described; this paper deals with the most interesting aspect, i.e. the use of 2260 display units for order entry. Even this aspect is very involved so only the major features of the input system will be described.

The approach to the solution

The procedure by which a Kays’ operator will enter a request via a 2260 terminal is described below.

Initialisation

Input into the computer via the 2260 Graphic Display

Fig. 3. Answer back with batch numbering on initiation

Terminals is carried out continuously throughout the day. About each hour, the input is cut off and is released for processing —this hour’s work forms an input batch. At the beginning of each input batch every terminal operator has to inform the Computer as to the type of work that she is about to key in. Every operator could theoretically be keying in a different form of input and can change the form of input during the batch.

In the example shown below the operator, having read the signal (Fig. 2) ‘Waiting for Work!’, has advised the computer that she is about to key in ‘Live Requests’ and the computer has confirmed this back to her (Fig. 3). The computer has also allocated a number to her batch, viz. 1234. ‘Live Requests’ is displayed as opposed to ‘Trainee Requests’ which is Kays method of on-line training of operators (reference last section of the paper).

Fig. 4. Computer reply to first message

Step 1

(a) The operator reads a new request from her pile of forms, each form containing all of the items requested by one agent. She keys in the agent number followed by the item number, quantity and price of the first item. This completes her first ‘message’.

(b) The computer checks the agent number for validity and displays a message if invalid. Otherwise it stores the number.

(c) It then obtains from its memory the record for the item whose number is keyed, and checks the keyed price for correspondence with the true price, and the keyed quantity for any possible ambiguity. Any error found is displayed.

(d) It then displays on the screen the full description of the item with its available options coded. The appearance of this display will be similar to this example, and will appear within a fraction of a second.

In the example shown the operator had previously keyed in the following information:

<table>
<thead>
<tr>
<th>TYPE OF DATA</th>
<th>KEYED DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agent No.</td>
<td>9013 (Computer expanded)</td>
</tr>
<tr>
<td>Item No.</td>
<td>P1611</td>
</tr>
<tr>
<td>Price</td>
<td>£3.85 11</td>
</tr>
<tr>
<td>Quantity</td>
<td>(Assumed quantity of 1 displayed as 001)</td>
</tr>
</tbody>
</table>
The photograph (Fig. 4) shows the computer reply to this first message. Certain items in our catalogue have only one option, i.e. it is available in only one size and/or colour. The computer reply if such an item is keyed in would show only the words 'NO OPTIONS' in display lines 2–5 inclusive, as with the quilted bedcover (Fig. 5).

![Image of a computer display showing 'T0026 QUILTED BEDCOVER £4.02.06 NO OPTIONS 90000013 1']

**Fig. 5.** Computer reply where no options available

**Step 2**

(a) The operator then looks at the option stated on the request and the display of available options, and notes the code number appearing by the option (in this case a size) named by the agent. If that option does not appear, this indicates that the agent has made a mistake.

(b) The operator keys in the code number of the option selected. This is her second 'message'.

(c) The computer responds by displaying the same picture as before, except that all options other than that selected are caused to disappear.

In the photograph (Fig. 6) we continue the main example shown in Step 1. The terminal operator has decided that the agent requires the girl's boot in Size 1, so has keyed in the option code '7'.

**Step 3**

The operator, whose eyes remain on the screen, checks that the option now displayed above is the one chosen by the agent. This is a final check, on her own work.

![Image of a computer display showing 'P1611 'HIWARM' GIRL'S BOOT £3.05.11 7.SZE 1 90000013 001']

**Fig. 6.** Specification of size of boot ordered

(a) If everything is correct she keys in a code advising the computer that she accepts the data displayed. This is her third 'message'. The code she keys depends whether there are more items to follow for the same agent or not. In the photograph (Fig. 7) she has told the computer that there are more items to follow for agent 9013.

(b) The computer then stores in its memory for later processing the requested item, i.e. catalogue number, option code, quantity, price and agent number.

(c) The operator now repeats the whole procedure for each remaining item on the request form, except that the agent number is neither keyed again nor checked. It is held by the computer until a new request form is to be handled, and stored away with its record of each item requested.

![Image of a computer display showing '90000013 ITEM P1611']

**Fig. 7.** Agent number and last item number held as signal for further items to continue

**Errors**

The procedure for handling errors that the computer recognises on input is very straightforward. The computer displays an error message on the bottom display line (Fig. 8).

The computer then refuses to progress that terminal's work until the operator has acknowledged that (a) an error has taken place and (b) either corrects the error or advises the computer that the specific item must remain pending within the computer until a manual decision has been made. The great advantage of this error recognition approach is that the error is found whilst the source

![Image of a computer display showing 'T0119 NYLON PILLOW CASES £1.03.06 1. BLUE 2. LEMON 3. ROSE 90000013 001 WRONG PRICE']

**Fig. 8.** Error message display—wrong price
This page contains a discussion about the implementation and usage of graphic display terminals at Kays. The text elaborates on the transition from manual to automated systems, highlighting the efficiency gains and the challenges faced during this process. It mentions the importance of maintaining a high number of operators to handle the increased volume of orders, and the ongoing development of training and improvements in the system. The text concludes by noting the necessity of adapting graphics for different input problems and the ongoing efforts to enhance the system's capabilities.

The Computer Journal

Published Quarterly by
The British Computer Society, 23 Dorset Square, LONDON NW1, England.

The Computer Journal is registered at Stationers' Hall, London (certificate No. 24690, June 1966). The contents may not be reproduced, either wholly or in part, without permission.

Subscription price per volume £5. (U.S. $12.00 at $2.40). Single Copies £1 5s. (U.S. $3.00 at $2.40).

All inquiries should be sent to the Secretary at the above address.

EDITORIAL BOARD

P. G. Barnes
D. V. Blake
M. Bridger
R. A. Brooker
E. C. Clear Hill
L. R. Crawley
G. M. Davis
A. S. Douglas
R. G. Dowse
L. Fox
H. W. Gearing
P. Giles
S. Gill
J. A. Goldsmith
E. T. Goodwin
T. F. Goodwin
I. H. Gould
J. G. Grover
P. Hammersley
T. Kilburn
A. McG. Leckey
J. G. W. Lewarne
J. C. P. Miller
M. O. Mutch
R. M. Needham
T. H. O’Beirne
E. S. Page
R. M. Paine
D. Rogers
P. A. Samet
P. A. Spooner
K. H. Trewee
H. P. Voysey
P. H. Walker

F. Yates (Chairman)

Mathematical Proof Reading: Mrs. D. Sargent, Mrs. J. Bourne.

Correspondence Secretary: Mrs. H. Hedge.

Communications: Papers submitted for publication should be sent to P. Hammersley, The University Mathematical Laboratory, Corn Exchange Street, Cambridge. Intending authors should first apply for Notes on the Submission of Papers, as the onus of preparing papers in a form suitable for sending to press lies in the first place with the authors.

Opinions expressed in The Computer Journal are those of the authors and do not necessarily represent the views of The British Computer Society or the organisations by which the authors are employed.