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.

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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-

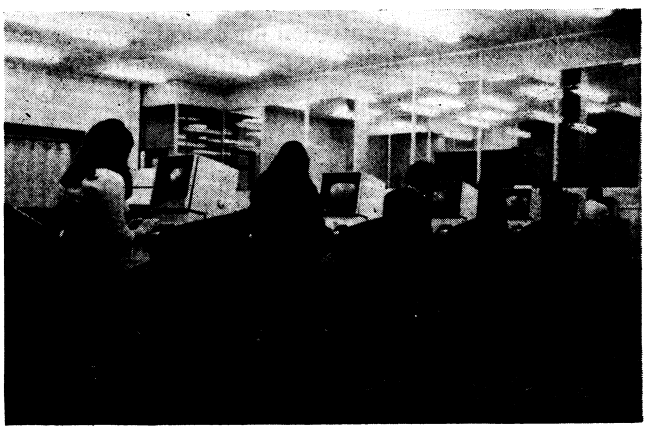

Fig. 1. A section of the data-preparation office

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 × 2260 Display Units to act as the input system.

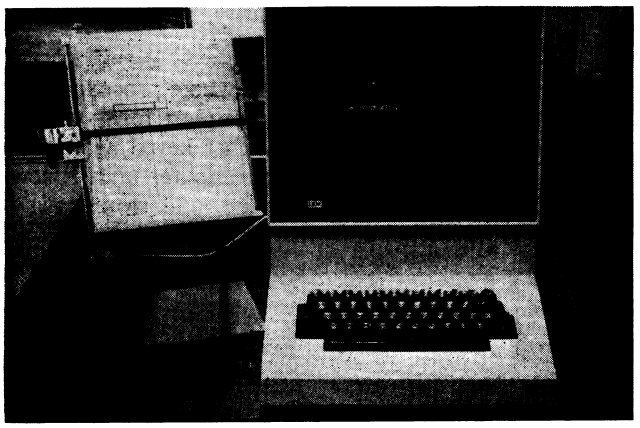

Fig. 2. IBM 2260 Display Unit showing signal 'WAITING FOR WORK!'

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 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. 3. Answer back with batch numbering on initialisation

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:

TYPE OF DATA	KEYED DATA
Agent No.	: 9013 (Computer expanded)
Item No.	: P1611
Price	: £3 5 11
Quantity	: (Assumed quantity of 1 displayed as 001)

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**).

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.

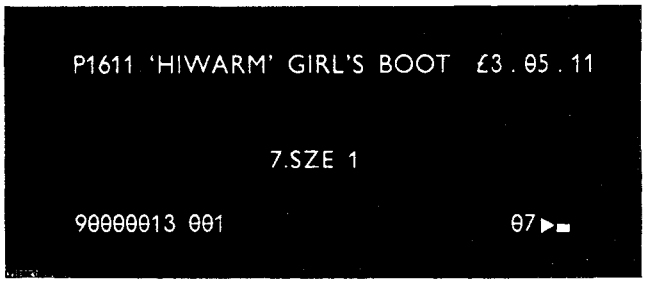

Fig. 6. Specification of size of boot ordered

(*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.

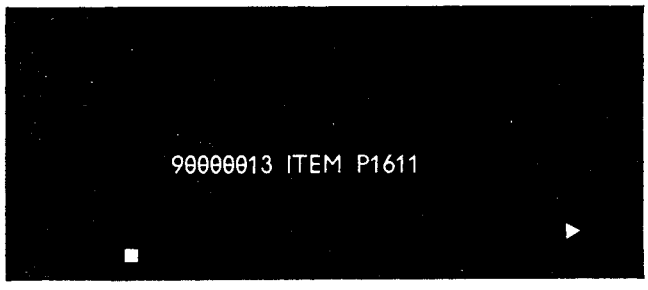

Fig. 7. Agent number and last item number held as signal for further items to continue

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

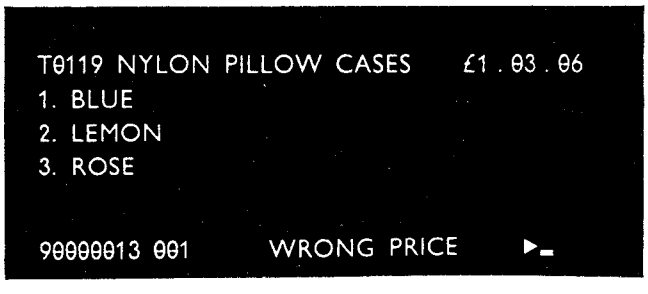

Fig. 8. Error message display—wrong price

document is still to hand. (When the complete order entry procedure is mechanised, the computer departments will receive between 40,000–50,000 orders per day —an immense amount of paper.)

Current status and proposed extensions

Kays commenced live operation on a 360 System Model 30 at Worcester in January 1968, with 7 × 2260 Graphic Display Terminals on line. At the time of preparing this paper (November 1968) Kays have replaced the 360/30 by an IBM 360/40 installed at Worcester which has 32 × 2260 display terminals on line. There has also recently been installed an IBM 360/30 at Leeds with 6 × 2260 display terminals on line. Kays are gradually building up the system at Worcester so that by July 1969 the system will have 64 × 2260 on line. The 360/30 at Leeds is planned to be replaced by a 360/40 in May/June, 1969, and will also gradually be built up to have 64 × 2260 on line.

The speed of input, on which we based all our original terminal requirements, was an item completely input every 13 seconds, i.e. just over 4·5 items per minute. These targets have easily been achieved and the better operators are achieving an input cycle of 8 seconds, i.e. 7·5 items per minute. A similar target was set in that an operator should key in 1600 items per 7½ hour working day. Again this target is easily being achieved and many operators are maintaining input in excess of 2000 items per day.

The operators that we are utilising are, in the main, Kays' employees who were previously carrying out clerical functions that the computer has replaced. These operators have taken to their new type of work exceptionally well. They have been relatively easy to train and their speed has been improved through the means of professional keyboard training. This training has been helped considerably by the on-line training facilities which were built into the Display Input Program and which records the number of correct items keyed in over a specific period of time.

Kays were most likely the first company in the United Kingdom to utilise alpha-numeric graphic terminals as a direct form of computer input. The initial development was hence relatively slow due to the 'pioneering' problem. The decision to utilise graphics has now been well and truly vindicated and there are no regrets whatsoever in this form of approach to the input problem. Future developments in graphics and/or handwriting readers may cause the approach to be modified or changed but it is felt that graphic terminals will always play a large part in computer development at Kays.

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