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COMPUTERISED BOOK PROCUREMENT SYSTEM :-  
SYSTEMS ANALYSIS

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# COMPUTERISED BOOK PROCUREMENT SYSTEM - SYSTEMS ANALYSIS

By

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## ABSTRACT

A detailed systems analysis has been carried out for the computerized book procurement system to process the requests for the new books in the Library of Physical Research Laboratory. The system monitors the status of processing of each individual request received by the library and subsequently assists the library staff in taking appropriate actions immediately. The mechanization of certain standard procedures and the prompt actions taken by the system would help considerably in minimising the procurement period. The system also helps in accessioning and cataloguing the book after it has been procured. Thus for every request the processing ends only when the book is on the shelf ready for being issued. The system has split the total procurement procedure into number of well-defined stages. The transition from one stage to the other stage is described as a transaction. The system has been thus designed as a transaction - processing system and would be best implemented on a computer system supporting the on-line, interactive processing, which PRL is in process of getting in near future. It must be stressed that the system when implemented in this fashion would serve not only the library staff but also the library users who have put the requests for new books for they can have direct access to the system from their terminals.

### Keywords:

1. Computerisation of book procurement procedures.
2. Library automation.
3. Systems analysis.

## I. INTRODUCTION

Acquiring new books is a continuous activity for any growing library and the staff members are constantly engaged in carrying out the procedures to procure the same. Most of these books are obtained on the direct recommendation of the library users. Some books are recommended by the user only after browsing through them when sent for approval by the book-sellers. Occasionally library may get some books gratis. It may be noted that in the case when the books sent for approval are recommended by the user, it is known which book-seller would supply the same. However, in general, processing the request for a new book would start with floating the query to find a supplier and end when it is available to the user on the shelf in the library. Besides procuring books for its own use, library may entertain the requests for procuring books from the user for their personal use. As total procuring time per request, on an average, would span many months; at any given instant of time one finds various requests received by the library at different stages of processing. If the rate of receiving requests is reasonably high, the system would become quite unwieldy. As a result it would be rather impossible to keep track of the status of the individual request and take the appropriate action immediately. Consequently an additional delay over the normal processing time would be invariably introduced. In this note we describe the computerised system of procuring the books developed for PRL Library, which would

order. This period would be decided on the basis of the fact if the book is available in the country or it is being imported. In case the book agent fails to supply the book within this period, maximum two reminders would be sent at appropriate intervals. If the book is not delivered even after two reminders, the decision to cancel the order may be taken. The books are then reordered from other book-agents who might have responded to the same query letter. However if the foreign supplier or the publisher responds to the order stating his inability to supply the books, one is almost sure that the book is not available in the regular market. In such case, before giving up, it may be necessary to try some antique book shops. Finally if the book could not be procured, the person who has put the request may be informed accordingly.

Once the book is received in the library, it is properly accessioned and catalogued before being issued to the user. In other words the book is given accession number, classification number, key-words etc. and all the details of the book and its procurement are entered in the accession ledger. Various catalogue cards are then prepared by the computer so that it can be located easily by the library user. Finally an intimation is sent to the person who has requested the book. Before the cataloguing is done it is necessary to find what is the actual price paid for a particular book. Though the bills sent by the supplier may show the printed price against each book, the total discount offered, the handling charges and postage are generally calculated on the basis of the total bill value.

It is, therefore, necessary to distribute them proportionately among all the books in the bill to arrive at the effective price of each book.

If one carefully studies the procedure given above, one learns that the total processing time can be broadly split into the following four parts :-

- i) The time margin given to book-agents to respond to query letters and to supply the books.
- ii) The time required to prepare various documents.
- iii) The time required to record the information at various places.
- iv) The time required to refer to various documents for taking further action.

While there is hardly any scope to reduce the period in part one, parts two, three and four can be substantially reduced if one can mechanize the procedure and monitor the overall system through computer. Such a computerised system can not only process the requests in minimum possible period but also it would be able to handle large number of requests efficiently. An additional advantage of the computerized system would be to obtain various statistical and informative reports giving comprehensive picture of the overall activity.

The proposed computerised system would consist of two important files viz(i) the book request file(ii) the book agent file. Complete processing of the request has been suitably divided in number of stages to be described in the

section 2. Processing the request would imply going from first stage to the final stage after traversing through various intermediate stages. If we term going from one stage to another stage as one transaction, then the request processing is nothing but series of transaction processing. In other words the system of request processing would be a package of subroutines for processing various transactions involved in it. Each transaction is characterized by the input, the processing and the output. Figure one gives the picture of general transaction processing as envisaged in the system. It may be noted that the transaction processing may take the input from maximum four different sources viz. (1) the book request file (2) the book agent file (3) the typical transaction input (4) the output of the bill processing system. The output consists of the updated versions of the two files and their duplicate copies as a precautionary measure. It also consists of printed transaction output and relevant reports generated at that stage of transaction. The system can also generate reports overlooking various transactions. In section 2 we describe the general outline of the system along with the details of the book request file and the book agent file. We have divided the total processing in three logical sub-systems for easy implementation of the system. In sections 3, 4 and 5 we describe the sub-systems I, II and III respectively. In section 6 we give the general considerations for implementing the system.

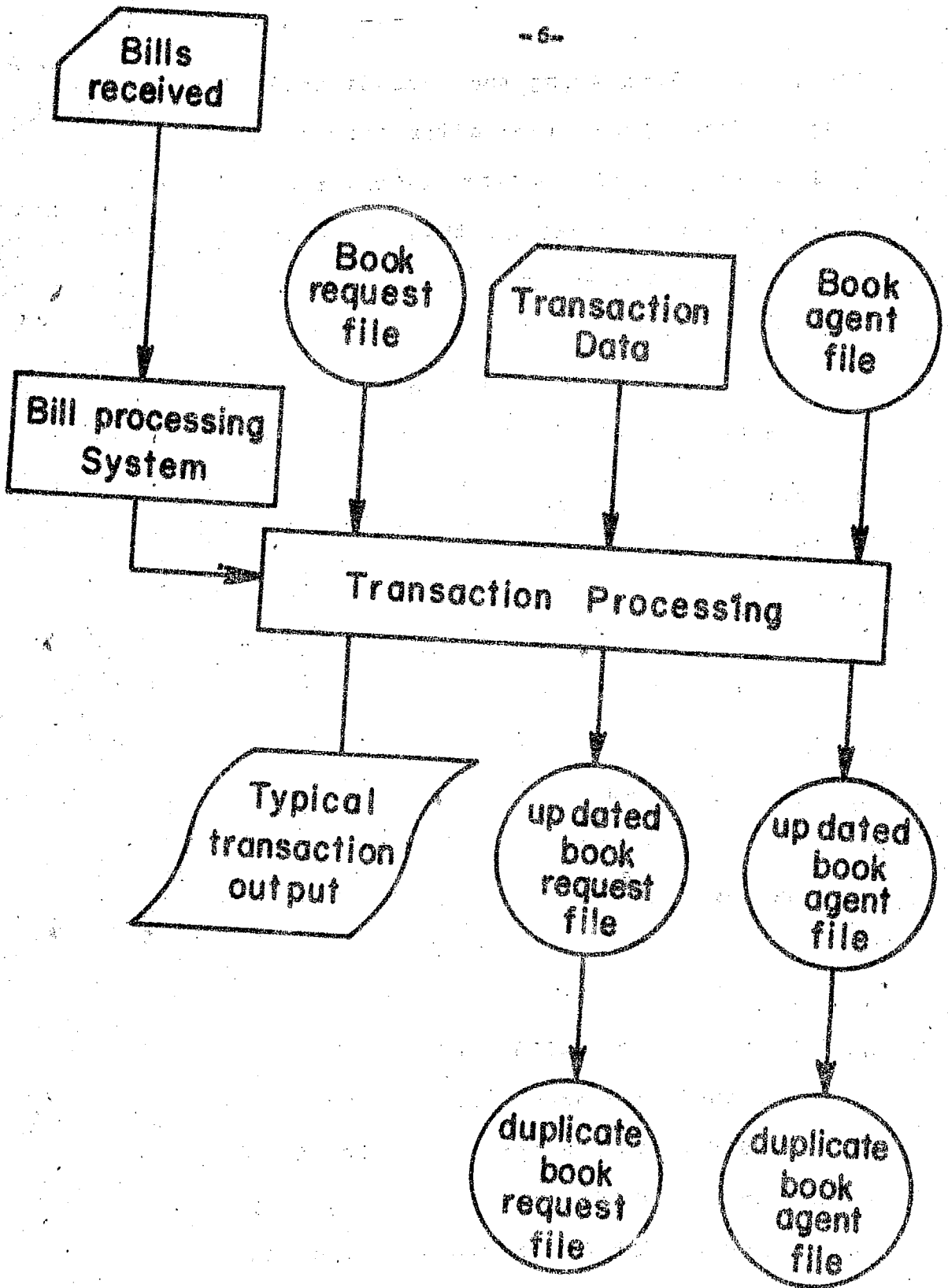


Fig. 1 GENERAL TRANSACTION PROCESSING INVOLVED IN THE SYSTEM OF BOOK-REQUEST PROCESSING



## II. THE COMPUTERISED BOOK PROCUREMENT SYSTEM

In this section we give the details of the system analysis of the computerised book procurement system, hereafter referred to as BPS, as developed for the PRL library. As stated in section I, the BPS is essentially reduced to series of transaction processing, where the transaction has been defined as a transition from one stage to any other allowed stage. Figure 2 shows the different stages involved in the BPS. The manner in which these stages are connected reflects the procedure practised in the library. Other important components of the BPS are two files. The book request file contains the details of the request submitted by the user along with the information associated with various stages it has passed through. The book agent file contains the names and addresses of the book agents along with other statistical information to be used to assess the performance of the agents. Before we describe these files in detail, we describe the various stages displayed in figure 2.

Stage 1 : Two types of requests are assigned to this stage as soon as they are entered in the book request file. The first type is the one when the book is directly recommended by the user. The second type is the one when the book sent for approval by the book agent has been recommended by the user.

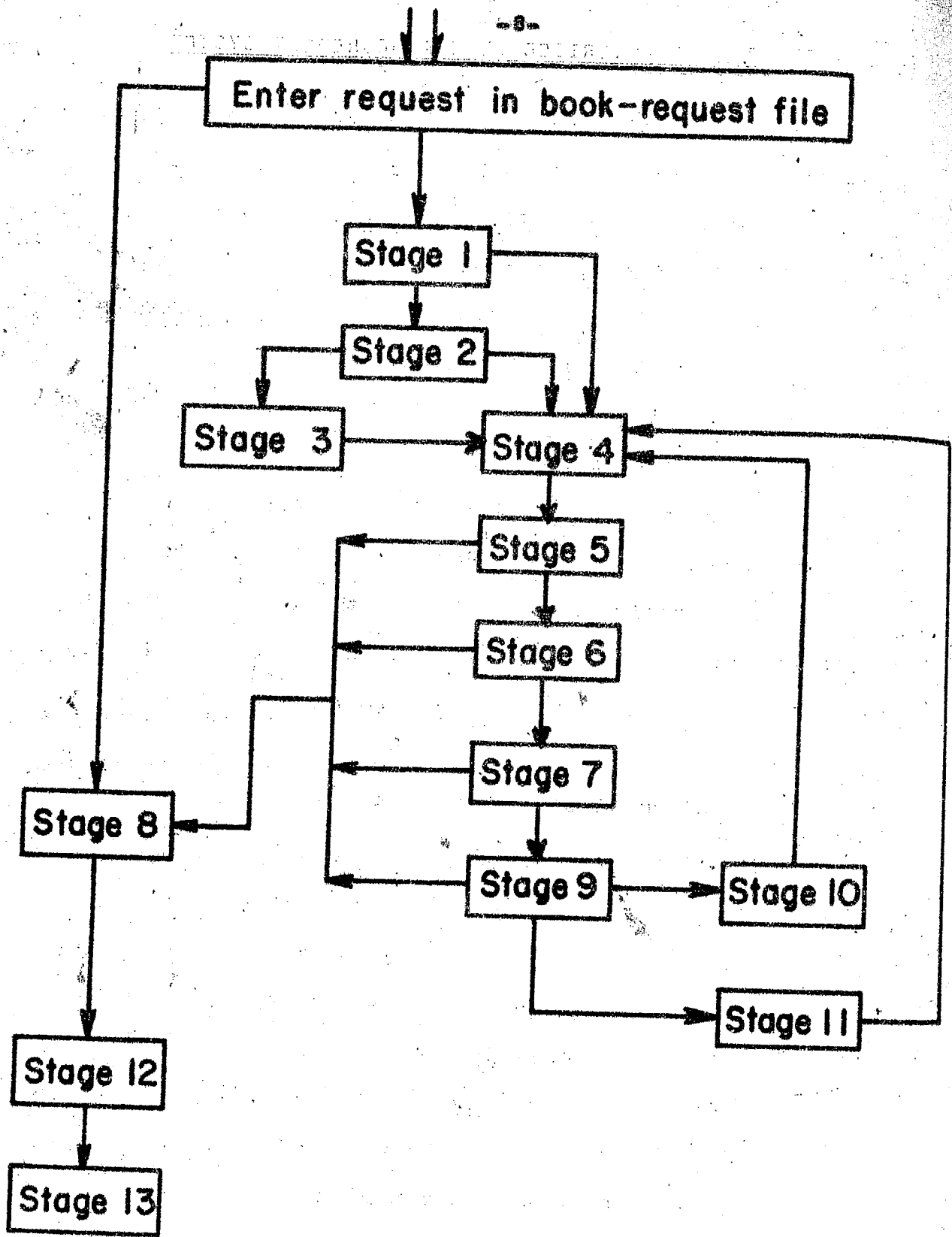


Fig. 2 VARIOUS STAGES DEFINED IN THE BPS SYSTEM

- Stage 2: The request in stage 1 belonging to first type can enter the stage 2 when the query letter for the same would be prepared by the system.
- Stage 3: The request in stage 2 enters the stage 3 when the response to its query letter has not been received in the stipulated period of two weeks.
- Stage 4: The request in stages 1, 2 and 3 enters the stage 4 when the supplier of the book is known to the system. The requests in stages 10 and 11 may also enter this stage when the same book is to be reordered.
- Stage 5: The request in stage 4 enters the stage 5 when the order for the same has been prepared by the system.
- Stage 6: The request in stage 5 enters the stage 6 when the book has not been supplied in the stipulated period and the first reminder has been prepared by the system.
- Stage 7: The request in stage 6 enters the stage 7 when the second reminder letter has been prepared by the system.
- Stage 8: The request enters the stage 8 when the book is physically received by the library.
- Stage 9: A request in stage 7 enters this stage when the book has not been received by the library even after sending the second reminder.

Stage 10: It is a stage when the order placed for the requested book has been cancelled.

Stage 11: It is a stage when the system has been informed by the supplier that the requested book is not available in the regular market.

Stage 12: The request in stage 8 enters this stage when all the details of the book such as accession number, classification numbers, keywords, price etc. have been supplied to the system and the book is ready to be issued.

Stage 13: The request enters this stage when it is to be deleted from the book request file.

These stages are so formed that each one of them can give the clear indication of what processing has been done and where it stands at present. Another consideration in designing these stages would be to give certain amount of flexibility to the user. The major decisions such as cancelling the order, placing a new order etc. have to be taken by the user depending on the situations prevailing at that time. To be specific when the request reaches the stages 3, 9, 10 or 11, the system cannot help the request any more until the action is taken by the user of the system. In short the basic and the most important tasks of the system would be to keep track of the request, show its status clearly and unambiguously to the user and help him to carry out certain procedures automatically wherever possible. It may be noted that the

stage 8 indicates only the arrival of the book in the library. The same cannot be issued to the users unless the request reaches stage 12. The complete path traversed by the request from stage 1 to stage 13 (as shown in figure 2) has been divided in three logical sub-systems. The details of the transactions covered by these subsystems would be described in sections 3, 4 and 5.

Having analysed the procedure of book request processing, we now describe the details of the two important files on which the BPS has been founded.

1. The book-agent file: The records of this file primarily include the names and addresses of those Indian book agents to whom the query letter would be sent regularly. They would be referred to as the permanent member of the file and would be given the status code 'P'. Every member would be assigned an unique book agent code consisting of numeric and alphabetic parts. The numeric part is generated from the first three numerals of the PIN code indicating the city of the book agent and alphabetic part is formed using maximum four letters to identify his name. Along with this information the BPS also stores some more statistics generated during the course of its running in each record of the file. The statistics help the user find the following information periodically.

- a) Number of query letters sent to the book-agent
- b) Number of orders placed to him
- c) Number of books supplied by him

- d) Number of reminder letters sent to him
- e) Number of orders cancelled

These numbers can clearly be used to assess the performance of the book agent during some specified period.

Besides the permanent book agents, the file may have records containing the names and addresses of few other Indian book agents, the foreign book agents and the publishers to whom the orders for the books have been placed. Unlike the permanent members, all of these suppliers would be given the status code to be blank. As a result they can be easily identified and no query letter would be sent to them. While all these extra suppliers would be given the unique book agent codes, the numeric part of the codes for the foreign book agents would be 000 uniformly for all of them to distinguish them clearly from Indian suppliers. Thus it may be noted that the file contains the information for all those who can supply the books. It must be remembered that unless the entry of the supplier has been made in this file, the book order cannot be prepared by the system.

The header record of the file stores the general information. For example it contains the number of book agent records stored in the file, their record size, the name of the file, the last date of its update and other recording details. If the duplicate file has been prepared simultaneously as a fail-soft strategy, one can as well, keep the details of the same in this record.

Sometime the file may contain the lists of publishers who offer discount only if the books are ordered directly from them. If ordered through book agents, these publications are more costly. The status code for these publishers would be 'R'.

2. The book request file :

Every record in the file corresponds to one request containing only one book. Every request is uniquely identified by the date and number assigned to it by the library staff. It contains the details of the book such as its title, names of its authors and publishers, publication year, edition number, the price, the number of copies required etc. It also includes the details of the person who has requested it such as the name of the person, the section to which he belongs etc. There are three types of requests based on their mode of processing. The request of type 'R' is the one when the book is directly recommended by the user. In this case the supplier of the book is not known to the system. A request of type 'A' would be one when the book has been approved on being sent by the publisher to the library or user. In this case the supplier of the book is known to the system. A request of type 'G' would be one when the book has been given gratis to the library. There is another classification of the requests to separate personal ones with official ones. The request of type 'O' is the request of the book for the use of the library and one of type 'P' for personal use. In each record of the file

the latest stage of the request is stored in a fixed position. It also stores all the relevant information associated with each stage. For example for every stage it stores the date on which the request has changed its status. If there is more information generated at a particular stage, the same would be recorded in the file. For example when the system prepares query letter, order letter or reminder, its reference number, date etc. generated by the system would be recorded in the record of each request for future reference. After receiving the books if any information would be provided to the system for processing, it would be first recorded in the file. To be specific, the accession number, classification number and other details of the book provided by the user would be stored in the corresponding record. In other word any relevant information regarding the request that is provided to the system or generated by the system during processing would be retained in the record.

The header record of the file contains the general information regarding the file as well as statistical information generated during processing. For example it may contain the number of book request records available in the file, its record size, the name of the file, the date of its last update and other recording details as well as some useful details of its copy generated simultaneously. It also stores some statistical information such as the number of query letters prepared by the system, the number of orders



prepared, the number of books received etc. It may contain a number denoting the total number of books in the library to generate the accession number automatically. In fact one may include any piece of information which would, in a way, help the system generate the new information, thereby increasing its efficacy.

### III. THE TRANSACTIONS OF THE BPS IN SUBSYSTEM I

Before discussing the details of transaction processing incorporated in subsystem I, we assume that the book request file and the book agent file have been already generated. This is imperative because no request can be processed unless it is first entered in the book request file. In fact the subsystem I starts with entering the request in the book request file and ends when the system comes to know who would supply the book. Figure 3 displays various transactions and stages involved in the subsystem I. As stated in previous section, each transaction is characterised by the input it asks for, the processing involved and the output it gives. We describe below the details of the transactions in the subsystem I in terms of its input, processing and output.

Transaction 1: This transaction takes place when the book request submitted by the user is entered in the book request file. However before doing so it has been verified that the requested book is not available in the library. This can be done by searching the data bank of the books available in the library. In case the title of the book and its author's name have not been properly quoted in the book request this check may fail. But even for manual checking the various lists generated using the data bank of the books come very handy and make the checking tasks much simpler. The input for this transaction would be the book

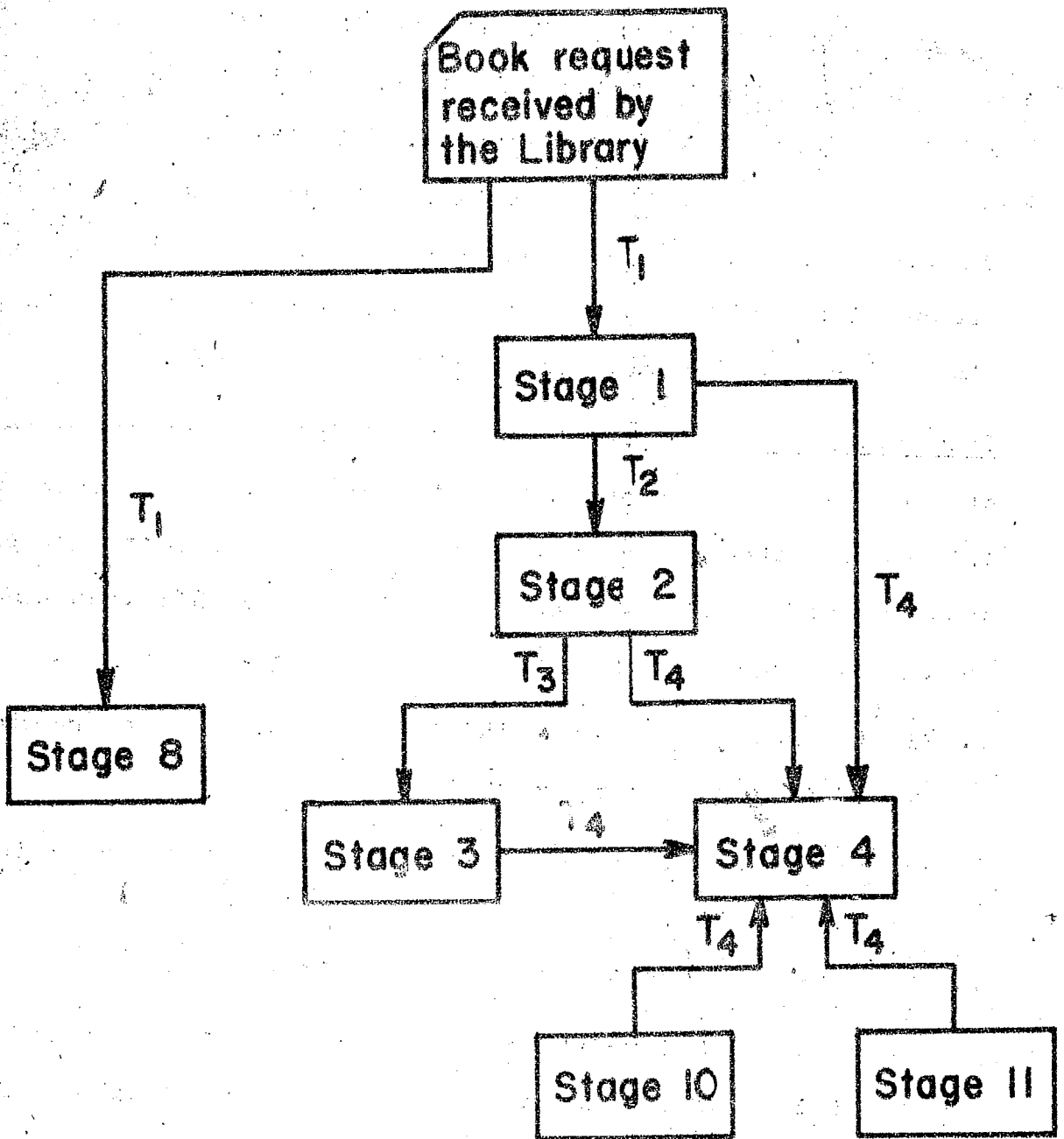


Fig. 3 VARIOUS TRANSACTIONS AND STAGES COVERED BY THE SUBSYSTEM I

request file, data for the book request to be entered and date of entering. When the request of type 'R' or 'A' is entered, it would be recorded in the file with a stage number one. When the request is of type 'G', it would be directly assigned a stage number 8. This is because the gratis book is immediately available in the library skipping all the usual book procurement procedures. The output of the transaction would be the list of book requests entered in the file along with the date and their stage numbers.

Transaction 2 : This transaction takes place when the request of type 'R' in stage one enters the stage 2. The purpose of this transaction would be to prepare the query letter to be sent to permanent book agents. The input for this transaction would come from the following three sources:

1. All the requests of type 'R' in stage one and the header record in the book request file.
2. The names and addresses of the permanent book agents in the book agent file.
3. The date on which the query letter is to be sent.

The processing involves preparing the query letter following the specific proforma and containing a list of the book titles, their authors and publishers, publication years etc. along with the request number and date against each of them. The reference number of the letter is generated using the fixed alphabetic string and the number to be obtained from the header record. In request records the stage number is changed to 2 and the

reference number of the query letter is included along with the date. The header record is also updated suitably. Further the permanent book agent records have also been updated in the book agent file. The output would be as many copies of the query letter as the permanent book agents in the file plus two extra for the library record. The names and addresses of the permanent book agents may also be printed at this stage. It would also be advisable to get the list of requests which are changed to stage 2 for the ready reference. Thus as a result of processing this transaction, we essentially get the request to be at stage 2 by preparing query letter for the same. The book agent is expected to respond to query letter by quoting the price, the period of delivery and other terms within two weeks.

Transaction 3 : This transaction takes place when the request in stage 2 goes to stage 3. As seen in transaction 2, the requests in stage 2 await the response to the query letter within the stipulated period of 15 days from the date of despatch. This transaction keeps watch on the arrival of the response. If the response is not received within the stipulated period for some requests, this transaction immediately warns the user of the system by giving the list of those requests. The input to this transaction would be the request in stage 2 and the processing date. The processing would check if the time-interval between the processing date and date of the query letter exceeds 15 days. If so, the

request would be changed to stage 3 along with the processing date recorded in it. If not, the request would be ignored and the next request would be taken for checking. The output of the transaction would be the list of requests for which the response to query letter has not been received in the specified period.

The stage 3 is a critical stage in the sense that once it is reached, the system is helpless and the decision regarding the same has to be taken by the user. As per the procedure in PRL library, it is decided that no query letter or reminder to query letter would be sent again for these requests and the order may be placed directly to foreign book agents or to publishers.

Transaction 4 : This transaction takes place when the user of the system receives the favourable response to the query letter or when he comes to know, by some means, the name of the supplier. The transaction essentially stores the book agent code of the supplier in the request record. When this transaction takes place, the request may be in the stage 1, 2, 3, 10 or 11. The requests in stage 1 would be of type 'A' only. If the request is in stage 10, it means the user wants to place an order to a new supplier after cancelling the previous order. If the request is in stage 11, it means the user is trying a new supplier as the previous one could not supply the book. The requests would be in stage 2 and 3 if the user receives the response to the query letter.

Therefore the input to the transaction would be all the requests in stages 2,3,10 and 11 and all the requests of type 'A' in stage 1. It also consists of the request number and the date, the book agent code of its supplier, the price in original currency, the delivery period to be offered, the first and second extension of period to be offered and the date of processing. The transaction processing would verify that the book agent code of the supplier is available in the book agent file. Every supplier's entry should be first made in the book agent file. Thus if the book agent code is available in the book agent file, the processing would keep the same in the request record along with other input information after changing the request to stage 4. The input consists of list of requests which are changed to stage 4 along with other relevant details. After this transaction the system knows the name of the supplier to whom the order would be placed.

Thus in subsystem I the system knows the supplier. In subsystem II described in section IV, the system would prepare the book order and take the required follow-up actions whenever necessary till the book is received by the library.

#### IV. THE TRANSACTIONS OF THE BPS IN SUBSYSTEM II

In subsystem II, the system prepares the order letter and monitors the other follow-up procedures to ensure the prompt action. Figure 4 shows different stages and transaction involved in subsystem II. It may be seen that the subsystem II starts with requests in stage 4 and ends either in stage 8 when the book is received in the library or in stage 11 when it is not available in the market. To be more explicit, besides preparing the order letter, the subsystem helps the user in carrying out the necessary follow-up actions such as sending reminder letters, recording the responses of the suppliers etc. It is expected that the book agent should supply the book within the stipulated period which may or may not be mentioned in the order letter. This stipulated period would obviously vary depending on the country of the supplier. In the BPS the user is expected to give this period as an input data in transaction 4 to the system. Based on this period the system would be able to prepare reminder letters whenever necessary. In general two reminders would be sent at an interval/<sup>the duration of</sup> which is also the part of the input in transaction 4. Normally, however, once the order has been placed, the user gets different types of responses to the order letters from the suppliers. The system records these responses in a suitable form and acts accordingly. For example the typical response of the supplier that the book is yet to be published would mean that the order would not be



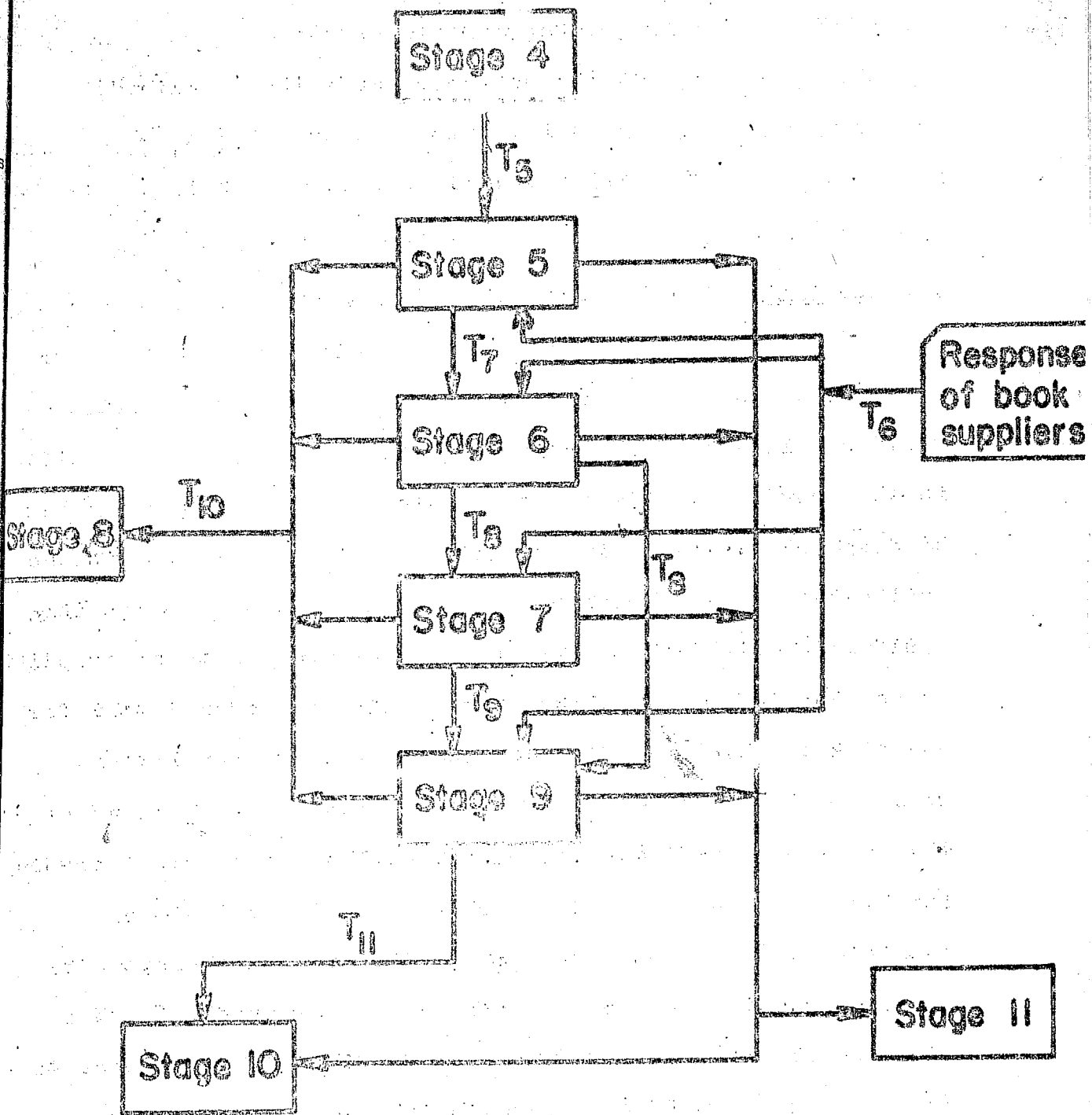


Fig. 4 VARIUS STAGES AND TRANSACTIONS IN THE SUBSYSTEM II

executed in the stipulated period. In such a case the order may have to be kept pending and the system may have to be advised so. In fact the system records the supplier's responses by changing suitably the status of the order stored in what is called Order Status Word (OSW). We discuss below the transactions in the subsystem II.

Transaction 5 : This transaction takes place when the request goes from stage 4 to stage 5 by preparing the order letter to be sent to the supplier. The input for the transaction would be all the requests in stage 4, the suppliers' details in the book agent file and the date on which the order would be despatched. The delivery period would be estimated in the system based on the country of the supplier. The processing would mainly involve collecting all the requests to be supplied by one book agent and thus prepare only one order letter for one book agent. The reference number of the order letter would be generated by the system using the header record of the book request file. Subsequently all the requests included in the order letters would be changed to stage 5 after retaining the reference numbers of the order letters, their dates, etc. in the corresponding request records. Further for each record an Order Status Word (OSW) would be generated, which would be blank in the beginning. The output would be the order letter in triplicate following the specific proforma along with the list of the names and postal addresses of the suppliers. There would also be a list of requests

which have been changed to stage 5 along with other necessary details. The suppliers' records in the book agent file would also be suitably updated simultaneously.

For the book published by certain publishers, the book agents would not give any discount and in addition would charge extra amount as handling charges. It would therefore be preferable to procure these books directly from the publishers. In case the orders for these publications are placed to the book agent, the system would prepare the order without these publications contained in it and the separate orders addressed to publishers would be prepared for them automatically. This is possible as the list of these publishers has been maintained in the book agent file.

Transaction 6 : After the order has been placed, the user expects to get different types of responses from the suppliers. Depending on the type of response, we defines the OSW for the request. Below are given some typical responders and the corresponding OSW.

	<u>Response</u>	<u>OSW</u>
1.	No response	bb
2.	Confirmation of the order/order registered.	CONF
3.	More particulars required	MPR
4.	The book is out of print/out of stock	OP
5.	The book is yet to be published/new edition due	NPUB

- |    |                                      |      |
|----|--------------------------------------|------|
| 6. | The book has been already despatched | DESP |
| 7. | The order is cancelled               | CAN  |
| 8. | Publisher not responded - reordering | REOR |

This transaction is meant for recording the OSW for each request. When the supplier may respond, the request may be in stage 5, 6, 7 or 9. The input to this transaction would be the request number and date, its OSW and the date of processing. The transaction would keep the OSW in the corresponding request record in the file. When the OSW would be 'OP', the system would change the request to stage 11 with the processing date recorded in it. At this point the system may have to generate a report informing the person who has requested the book about the non-availability of the book. The stage 11 in the system requires immediate action on the part of the user. He may try to reorder the book or close the chapter by deleting the requests from the file. The output would be the list of requests with initial stage numbers, their OSWs and their new stage numbers along with the date of processing. The aim of this transaction would be simply to record the OSW to facilitate future action. When the OSW is 'CAN', the system would take the request directly to stage 10 without preparing the formal cancellation letter. It may be thus noted that this transaction can take the request in stages 5, 6, 7, 9 directly to stages 10 and 11.

Transaction 7 : This transaction prepares the first reminder letter if the book has not been supplied within the stipulated delivery period. The input to this transaction would be all the requests in stage 5 with OSW to be 'bb' or 'CONF', the date on which the transaction has been processed and the details of the suppliers from the book agent file. The processing would obtain the difference between the processing date and the order letter date and would compare the same with the delivery period. If the difference exceeds the delivery period, the system prepares the first reminder letter listing all the books to be supplied by the book agent. Otherwise the system ignores the request and goes to next request. Simultaneously the system would change the request in stage 5 to stage 6 with the date of processing (which is also the date on which the reminder would be sent) recorded in it. The output would consist of two copies of the reminder letters along with the names and postal addresses of the book agents listed separately. It would also include the separate list of requests which are changed to stage 6. To assess the performance of the book agent at the end of the year, the number of reminders sent to individual book agent would be recorded in the book agent file.

Transaction 8: The transaction prepares the second reminder letter if it is due. Incidentally the second reminder would be sent only to foreign book suppliers. The input would be the requests in stage 6 with OSW to be 'bb' or 'CONF' the date of processing and the details of the suppliers from the book

agent file. After noting the date of the first reminder and the first extension of the period offered from each request record, the system decides if the second reminder is due. If so, it prepares the second reminder and changes the requests in stage 6 to stage 7 simultaneously after recording the date of processing in each of them. The output would be exactly similar to one in transaction 7 except that now the system gives the list of requests which are changed to stage 7. The records in the book agent file are updated suitably. In the case of Indian book supplier, second reminder would not be sent and hence the following action should be taken. Instead of preparing the reminder letter, the request stage would be changed from 6 to 9 directly and same would be recorded in the file along with the processing date. The output would be the list of requests which are changed to 9.

Transaction 9 : If the book is not received by the library even after the second reminder, the system gives the appropriate message to the user through this transaction so as to enable him to take the extraordinary action immediately. The input would be all the requests in stage 7 with OSW to be 'bb' or 'CONF', the date of processing and the suppliers details from the book agent file. Noting the date of the second reminder and the second extension of period given, the system decides if the warning is due on the processing date. If so, it gives the message to that effect so that action can be taken immediately. Simultaneously

the system changes the request in stage 7 to stage 9 and records the date of processing it. The output would be the appropriate message stressing the urgency of the action and the separate list of requests which are changed from stage 7 to stage 9.

Transaction 10 : This transaction takes place when the user informs the system about the arrival of the book in the library. The input would include the requests in stage 5, 6, 7 and 9, the number and the date of the request corresponding to the book received, the date of arrival and the number of copies received. The processing would record the event by changing the request to stage 8 and recording the date of arrival. It would then generate the accession number for the first copy and keep the same in the request record along with the number of copies received. At this stage the system also prepares a letter intimating the person who has requested the book about its arrival in the library. The output would be the intimation letter along with the separate list of requests which are changed to 8. The header record of the request file would also be updated by modifying the total number of books received and the number of books supplied.

Transaction 11 :

As stated in transaction 9, when the request reaches stage 9, the user is expected to take some action. This transaction takes place when he decides to cancel the order. The input would be the number and date of the request in stage 9 to be cancelled and the date of processing of the

transaction. The transaction takes the request to stage 10 by changing its OSW to 'CAN' and keeping the date of processing in its record. It may at this stage, prepare a formal letter of cancellation. The output would also be the separate list of requests which are changed to 10. The stage 10 is also a stage where the system is helpless and the user is urged to take the action immediately. The number indicating the total number of cancellation of orders against the book agent in the file is duly updated in this transaction.

Thus in the subsystem II, the request reaches stage 8 when the supplier responds positively and the book is delivered to the library, stage 10 when the supplier does not respond at all and the order has to be cancelled and stage 11 when the supplier responds negatively and the book is not available in the regular market.



V. THE TRANSACTIONS OF THE BPS IN SUBSYSTEM III

The subsystem III starts with the arrival of the book in the library and ends when the book is properly catalogued, classified and recorded before being issued to library users. Finally the details of the books thus procured would be transferred from the book request file to the already existing data bank containing the information of all the books in the library. This data bank is useful in generating various reports related to these books. Figure V shows the stages and transactions covered in the subsystem III. We discuss below these transactions :

Transaction 12 : This transaction brings the request in stage 12 by furnishing only the cataloguing details of the books received to the system. The transaction data may include the following information:

- i) The exact details of the book such as the title, the names of the authors and publishers, the publication year, the edition number, the number of copies received etc. Though these details already exist in the record, this is the time when one can verify the correctness of these details and modify them if necessary.
- ii) Though the accession number may be assigned automatically by the system, the book has to be given the classification numbers, keywords etc. to catalogue it properly. In addition the book has been given various

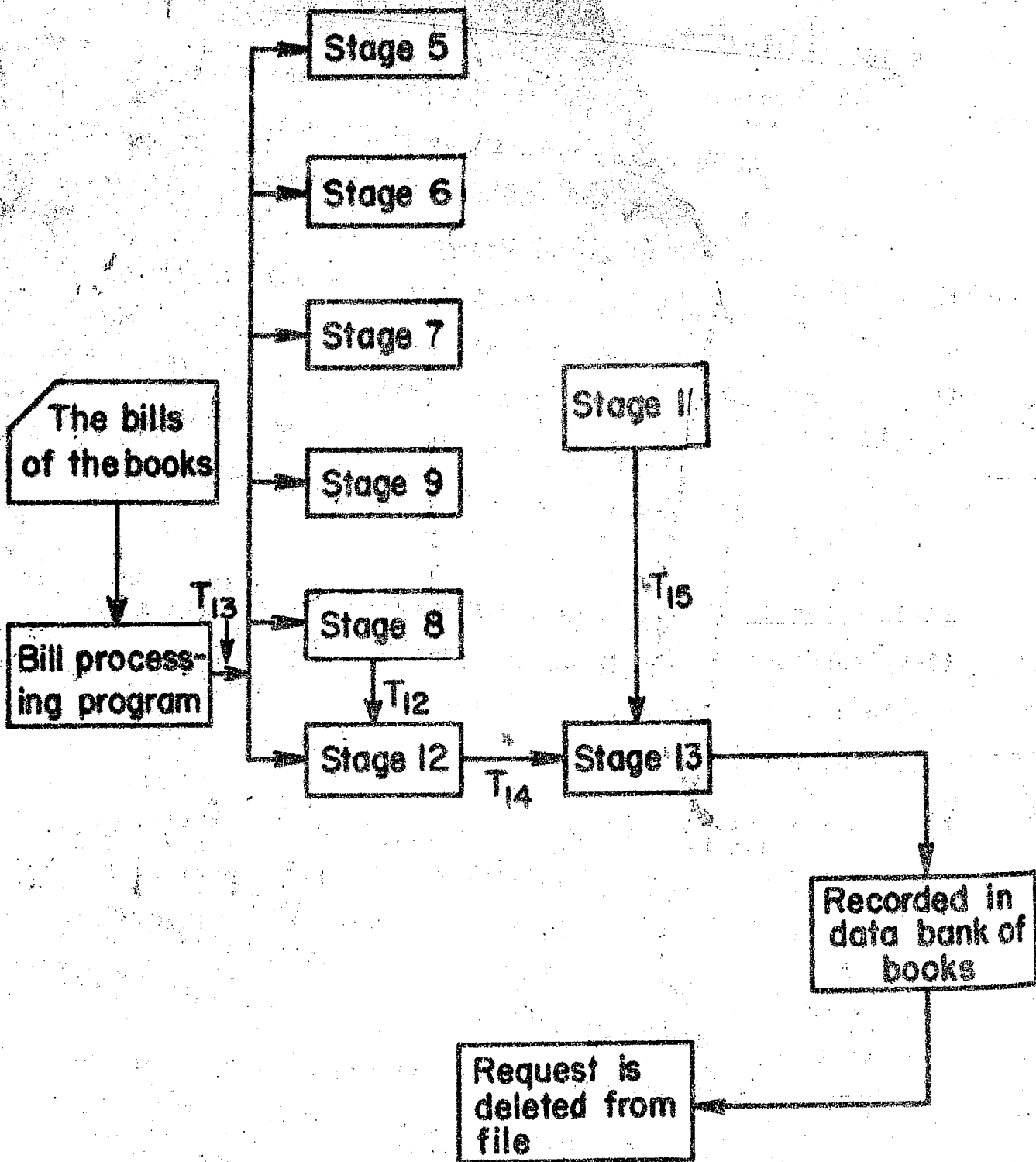


Fig. 5 VARIOUS STAGES AND TRANSACTIONS IN THE SUBSYSTEM III

codes such as author code, the code to indicate if it belongs to a continuing series or it is the proceedings of the conference and other details related to them so as to prepare various cards for different catalogues in the library.

iii) The above information would be given against the request indicated by its number and date along with the processing date as usual. The payment details of the book would be furnished in the transaction 13. This transaction simply puts the above information in the request record and changes it to stage 12 with the date of processing recorded in it. The request is said to have reached the stage 12 fully, provided both the cataloguing as well payment details have been recorded in the corresponding record. We now define an index LEDGER which would indicate the status of the stage 12. The index LEDGER is equal to one, when only the cataloguing details have been fed to the system. It is two, when only payment details are available to the system. When the index LEDGER is equal to 3, both the details have been kept in the record. Thus in this transaction we define the index LEDGER to be 1 or 3 depending on the previous value of the index. The processing would involve preparing various catalogue cards with tracings viz. (1) authorwise (2) titlewise (3) classificationwise (4) series card (5) proceeding card. The cards have been prepared

following the proforma of existing cards in the library. The output would, as usual, consist of list of requests which are changed to 12 along with its index LEDGER and other related details.

Transaction 13 : As stated above, the payment details of the books are furnished to the system in this transaction. These details are available from the bills sent by the supplier. As these bills may be received any time after the order has been placed (some time even before the book has been received), the transaction may deal with requests in stages 5, 6, 7, 8, 9 or 12. To be specific, the bills would contain the printed prices against the books (along with their request numbers and dates) and the miscellaneous amount covering the total discount offered, postage and the handling charges. In general the miscellaneous amount has been calculated on the basis of total bill value. The bill processing programme takes the content of the bills as described above as the input in addition to the bill number and its date. It then finds out the actual price charged for each book by distributing the miscellaneous amount proportionately. The effective price thus obtained would go in the record along with the bill number and its date. The index LEDGER would also be suitably modified. This transaction does not change the stage number of the request. The output would be the list of request along with the effective prices shown against them.

Transaction 14 : This transaction would be used to print the details of the book as required in the accession ledger. It collects all the requests in stage 12 with index LEDGER equal to 3 and then gives the following details for each book to form a computerized accession ledger.

- (1) The number and date of the request and its type (i.e. 'R', 'A' or 'G').
- (2) Name of the person who has put the request and his group.
- (3) Accession number and the date of accession.
- (4) Names of the authors.
- (5) Title of the book.
- (6) Name of the publisher, year of publication and edition number.
- (7) Name of the supplier.
- (8) Order number and date.
- (9) Bill number and date.
- (10) Printed price (currency and amount).
- (11) Actual price paid in rupees.

After giving these details for every book, the transaction changes the request to stage 13 with the date of processing recorded in it. The output would also consist of the list of requests which are changed to 13.

Transaction 15 : This transaction is required to move the request in stage 11 to stage 13 so that it can be finally deleted. As discussed previously, the request reaches

stage 11 only when the book is not available in the regular market. The library, therefore, may try some antique shops before giving up. If the book could not be obtained even from these sources, it is then confirmed that it is not available anywhere. At this stage the user may like to delete the request from the book request file. Thus not all the requests reaching the stage 11 would be deleted. The input to the transaction would be the number and date of the request to be deleted along with the date of processing the transaction. The transaction would change the request stage from 11 to 13 and would record the date of processing simultaneously. The output would consist of the list of requests which are changed to 13.

Transaction 16 : This transaction takes place when the request in the request file is to be deleted. The input to this transaction would be all the requests in stage 13 along with the date of processing. The processing involves two main jobs viz.

- (1) to transfer all the details of the book in the request record with index LEDGER value of 3 to the existing data bank of all the books available in the library.
- (2) to delete the request from the book request file.

These operations would necessitate the updating of the header record of the book request file. The index LEDGER of value 3 ensures that the request has been deleted after successful processing while the same index with value 0 indicates that the request has to be deleted as the book is not available anywhere. As a result the book details are transferred only when the requests are processed successfully. The output would consist of the list of requests which are deleted from the file along with the remarks about their processing.

Thus the subsystem III helps considerably in conventional processing of the book after it has been received in the library.

VI. SOME CONSIDERATIONS OF IMPLEMENTING AND OPERATING THE SYSTEM

In this section we will describe in brief how the system BPS should be implemented and operated so that it would be more effective in serving the user. As discussed in the previous sections, we have designed the system BPS as a transaction-oriented system in which the transactions may occur in any random sequence. Therefore we envisage that the BPS should be implemented on the computer system which supports the interactive mode of processing with many CRT terminals attached to it. Consequently many users would be able to use the system BPS from their own terminals. It may be noted, however, that unlike many transaction-oriented system, the BPS is different in the sense that in the BPS, the transaction is originated only at one place in the library. As a result only the staff members and the library can change the contents of the files or can initiate the processing of the transaction in the BPS. The other users would be able to have only the access to the contents of the record pertaining to their requests. The user would thus know the progress in the processing of his request just by sitting near his terminal without going to the library to get the same information. As for any transaction processing, the response time of the system should not be too large. To ensure this it is necessary that the book request file and the book agent file should



both reside on direct access devices so that by choosing the proper access mechanism the processing time can be reduced substantially. As most of the records have to be accessed randomly, the sequential tape-based files would not be suitable especially if the number of records in each file is very large. However, the tapes may be used as back up files in the system. The details of the exact implementation would necessarily be dependent on the hardware and software facilities available with the computer system on which the BPS would be installed. Fig.6 shows the implementation of BPS as described above.

To a user, the BPS system would look like a package of procedures or subroutines. This package would consist of two different sets of procedure. The first set would contain only those procedures which would change the contents of the book request file or the book agent file or both. This set would include the procedures to generate and update the files and to process various transactions defined in sections 3, 4 and 5. Only the staff members of the library will have access to these procedures. The second set contains the procedures which would not change the contents of the files but would present the information in the files as requested by the user. This set includes number of procedures processing different requests. While the staff members of the library can have access to all the procedures in this set, the other users can process only the following requests:

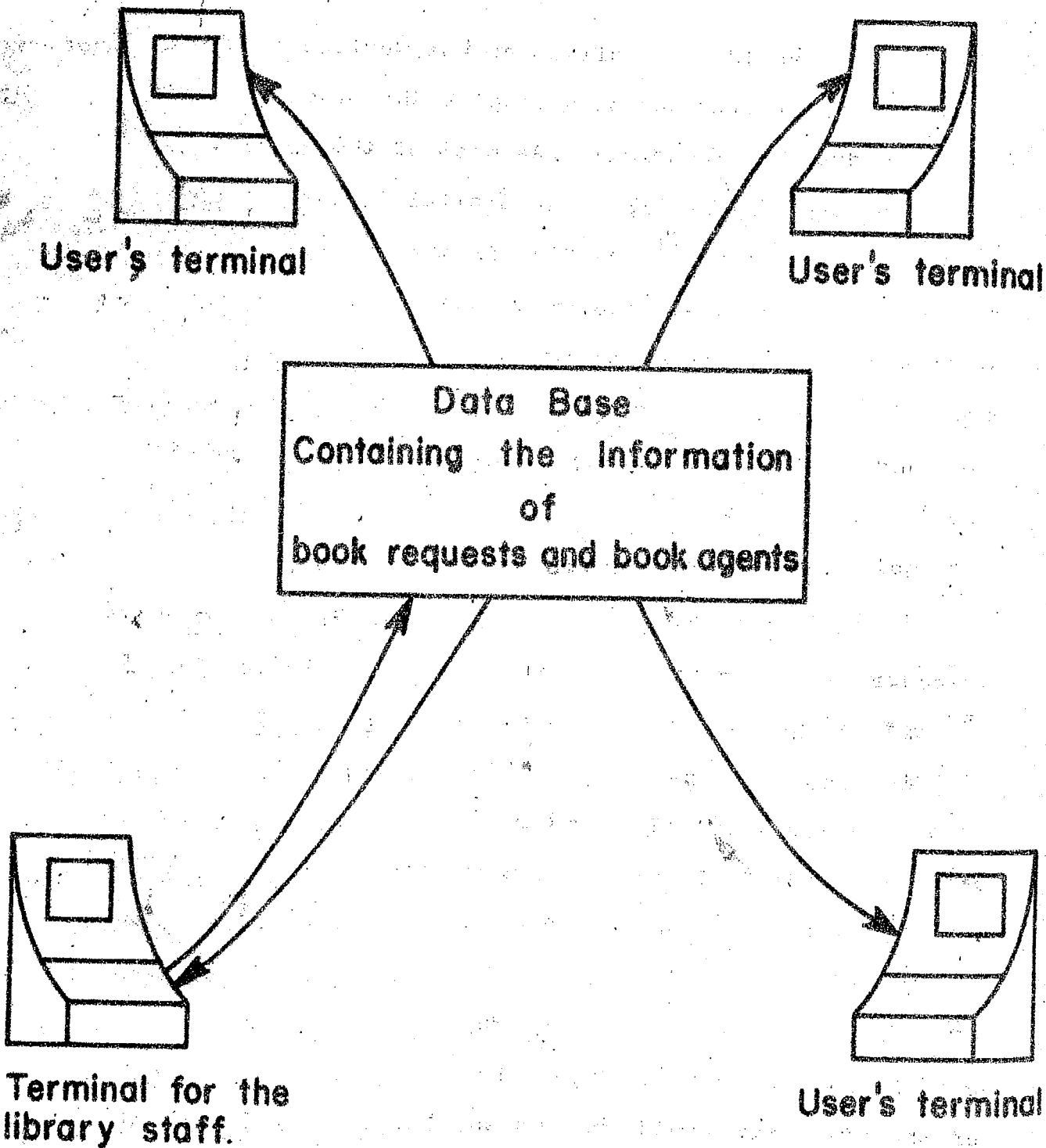


Fig. 6 ON-LINE FLOW OF INFORMATION IN THE BPS AS ENVISAGED IN THE IMPLEMENTATION. IT FLOWS BOTH WAYS FOR THE LIBRARY STAFF (INDICATED BY 2 ARROWS) & IN ONLY ONE WAY FOR OTHER USERS.

- (1) What is the status of a specific request?
- (2) What are the details of the books corresponding to a particular request? The details may contain only the title, the names of the authors and publishers, the publication year, the edition number and the price.
- (3) Which book agent has supplied the book corresponding to a given request?
- (4) What is the query number and date in a given request record?
- (5) What is the order number and date in a given request record?
- (6) Give the stagewise tracing of a given request (upto the latest stage?)

Many more requests may be programmed if it is felt necessary. However it may be mentioned that the system would only allow the simple predictable requests from the users and has not been designed to have free dialogue with the user.

The other requests would give the reports and the general information which would be useful only to the staff members of the library to operate the system on regular basis. Some of these requests are given below:

1. The list of requests in various stages.
2. The list of requests of different types ('R', 'A' or 'G')
3. The list of official and personal requests.
4. The list of new acquisitions in order of their arrival.
5. The subjectwise list of new acquisition and the amount spent.

6. The list of requests for which the orders have to be cancelled.
7. The list of requests for which books are not available.
8. The statistics of a book agent in terms of
  - a) the number of queries sent to him
  - b) the number of orders placed to him
  - c) the number of books supplied by him
  - d) the number of reminders sent to him
9. The citywise list of the permanent book agents. The list of foreign book agents and the publishers.
10. The general statistics of the system in terms of
  - a) the number of queries sent by it during the specified period
  - b) the number of orders prepared by it
  - c) the number of books procured by it
  - d) the number of reminders sent by it

Needless to say that any other specific request can also be included in the above list of reports if necessary.

The day-to-day operation of the system is of great importance in contributing to the efficacy of the system. The data base of the system should be updated promptly by feeding the information and initiating the processing of the crucial transactions without delay. The messages of the system should be acted upon immediately so that the system can proceed ahead. Various reports should be generated at regular interval so as to get the overall picture of the

activity. We give below a few practical tips for smooth running of the system:

- (1) The back-up file should be maintained containing, as far as possible the latest updated versions of the files.
- (2) Every morning it is necessary to obtain the list of requests in the stages 3, 9, 10 and 11 so that the user knows which requests require immediate consideration.
- (3) Every morning it is necessary to process the transactions  $T_3$  (to see that the response to query letter has not been delayed),  $T_7$  (to see that the first reminder goes in time),  $T_8$  (to see that the second reminder goes in time), and  $T_9$  (to inform the user of the order which has been too much delayed). This ensures that the action required to be taken by the user has not been delayed.

As stated previously these are some of the broad considerations of implementing and operating the system. The actual details would depend on environment in which the system would be installed. However the point to be emphasised is that the system would serve the multiple users including library staff who would keep the up-to-date data bank of information regarding the book requests and book agents by initiating various transactions and feeding relevant information.