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The Development and Implementation of a Central Hospital Transportaion System

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THE DEVELOPMENT AND IMPLEMENTATION OF A CENTRAL HOSPITAL TRANSPORTATION SYSTEM

by

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THESIS ABSTRACT

The problem involved in the thesis is the design, development and implementation of a hospital central transportation system. The system as developed must meet the following requirements:

1) It must be centrally located and transport paper, products and patients within the hospital.
2) It must be able to meet the scheduling and routing requirements of the hospital departments.
3) It must be an improvement on the present system both economically and functionally.

The major disciplines followed for the solution to the problem are systems analysis and operations research. A computer program is developed which is capable of considering the various limitations of time, location and sequence of operation; in developing the shortest and most effective transportation route. The patient handling needs are determined and met through the use of such statistical techniques as distribution theory, F-tests and T-tests.

The results of the research is a new department created at the Memorial Hospital of Pawtucket, Rhode Island, capable of satisfying the transport demands of the hospital. The computer program is flexible enough to have wide application in any hospital or any industrial situation with similar circumstances.

ACKNOWLEDGMENT

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INTRODUCTION

The application of industrial principles and techniques to those situations which are not completely analogous to production systems, but which nevertheless require the use of efficient and economical means in order to function to their optimum peak, has opened an affluent realm to the Industrial Engineer.

The economic situation that exists at a hospital is one which is quite the reverse of that of industry. Instead of being positively motivated towards profits, the hospital instead is established in a framework of cost reduction. Few if any hospitals show a profit, but rather attempt to achieve a minimum operating cost.

In particular, within the last four years, hospitals have been a prime consumer of industrial engineering services. Hospital systems have developed from the Alms House and have been plagued to the present decade by untrained and many cases inexperienced doctor-administrators, whose primary function was the care of patients and secondary, administrating effectively to the physical problems of the hospital itself.

An important factor to be considered, however, is that hospitals provide a service which often means life

or death to the consumer. The industrial concern on the other hand deals with an inert object whose product quality is usually less critical. Arbitrary decisions are more easily made and the result of a poor decision is measured in terms of money. Hospital staffs have as their major goal the attempt to save or prolong all human life with less regard for costs. Should hospitals make decisions to cut back on spending impairing the services they provide? No, all departments and systems within a hospital should make a concentrated effort to use effectively and efficiently physical and monetary resource available to them, thus reducing or holding the line on operating costs while maintaining or advancing the present quality standards.

Good hospital care and efficient and economical hospital procedures go hand in hand; rising costs, and new medical methods and equipment have emphasized this fact.

It is in this sense that the Memorial Hospital of Pawtucket has financed a joint project with the University of Rhode Island, the purpose being the improvement of systems and procedures at the hospital.

OBJECTIVE

The proposed research is the design, development and implementation of a central transportation system for the Memorial Hospital of Pawtucket.

A central transportation system is a centrally located department, the function of which is to provide the means of transport for anything that requires movement from one department or unit to another. Basically, such a department will have a department head, whose primary function and responsibility will be the proper and smooth running of the transportation system; a dispatcher, who will receive and log all in-coming calls and assign such orders to the messengers as is necessary to fulfill the transporting demands of the various departments and units.

The central transportation system shall be required to provide all intra and inter-hospital transportation. Not only shall the primary purpose of this project be the design and development of such a system, but also the smooth implementation that is so important for the study to be a success. This will require on the spot changes as well as anticipation of future problems.

It is also the purpose herein to evaluate the system as to its capabilities of handling the present hospital

demands as well as any future demands resulting from change or innovation.

The final phase is a financial judgement on the effectiveness of the system and the importance of its role in the hospital framework.

I. PROBLEM DEFINED

Initially, there existed no type of central transportation system at the Memorial Hospital of Pawtucket. Transport services were provided internally by the departments. Usually there was no particular person whose function was to transport articles from his or her own department to others. This was true within the business and administration departments. The person who was least busy or was traveling in the proper direction made the delivery.

Of course, there were exceptions, a green aide provided transportation service to the nursing units and closely related departments. She made three trips daily; one in the morning, one in the late morning and early afternoon, and one in the late afternoon. These three rounds handled a large portion of the transportation, but was quite limited. Time sheets, pay checks, medical information and lab reports were given close attention and were delivered promptly and regularly.

With such departments as Central Supply, Laundry, Addressograph, and Equipment Room, delivery is an integral part of their function. In some of these cases, a certain knowledge or skill is necessary in order to effectively transport. The Central Supply and Laundry Transporters must be familiar with nursing unit inventories. The

Equipment Room attendant must accompany his equipment in order that it may be set up properly, being the only one available with this knowledge. Thus, it is necessary in these departments that they maintain some form of control over the delivery of their product.

The transporting of patients is done by orderlies, green aides, volunteers and nurses. Orderlies are not assigned a particular floor, but are dispatched from a central area in the nursing administration department. The services of the "floaters" may be obtained by phoning nursing administration. Permanent orderlies are assigned to the operating room and the accident room.

Patient transporting will be discussed later in more detail. This will, however, serve as a very brief picture of the transporting network presently in operation.

From the previous discussion, it is obvious that the transporting needs of the hospital can be broken down to three general categories: patients, products, and papers. Included in the categories are:

1) patients-persons either dead or alive moving to or from the nursing units or other servicing departments.
2) products-articles such as laundry, central supply items, storeroom supplies, drugs, lab specimens, and large volumes or bulk amounts of paper.

3) papers - include intra-hospital communications, mail, medical and lab reports and any other administrative, nursing or service department business papers.

The transporting needs of the hospital are divided in this manner for a most obvious reason. Each of the categories and the articles included in them require different types of transporting.

Examination of survey data indicated that much of the paper transporting was done daily by the same departments or units and at approximately the same time of the day. This was particularly true of the nursing units. They all had the same material to be transported at the same time to the same place.

Some of the problems attributed to the lack of a formal hospital wide paper delivery system were:

1) loss of secretarial time within the administrative and business departments.
2) ineffective scheduling of computer time within data processing.
3) articles desired by departments being held up in the storeroom due to slow delivery of purchase invoices.
4) medical information and lab reports slow in reaching the nursing units.

The development of a daily pick-up and delivery route

seemed to be a tentative solution. This in itself presents problems:

1) path of routes.
2) frequency of pick-up and deliveries.
3) order of the various departments in the delivery route.
4) time necessary to complete the route.
5) the handling of emergency deliveries.
6) the equipment necessary to handle the volume of papers.
7) determining which articles will be handled on the route and which will not.
8) determining the staffing requirements such that the route may be run efficiently.

The delivery of products presented a problem which could at least partially be handled by a route. Many of the small items, particularly from the nursing units, could quite easily be handled by a delivery route. Laundry and central supply items would be difficult to handle with a delivery route. Drugs, addressograph material, central supply items returning from the nursing units and others could possibly be scheduled to be done at certain times of the day. Some specific problems that are commonly encountered are:

1) delay of regular duties to perform product transporting.

2) need for more help throughout the hospital to handle all the necessary product transporting.

Some of the more general problems to be considered before a central transportation system can handle product movement are:

1) determining which are transport tasks and which are department tasks.
2) determining whether enough transporting is done to warrant the specialization of two separate jobs.
3) determing how many people are needed to handle the transporting of products for the hospital.

The transporting of patients is a third entirely different phase of the hospital transportation problem. Patients usually do not move at any regularly scheduled times. The demand on patient transportation is quite random. This type of transporting could probably be most easily handled by a dispatcher. Some of the specific problems of patient moving are:

1) lack of immediately available help, resulting in the patient waiting.
2) irregularity of patient delivery makes the scheduling of the X-Ray, E.E.G., and E.K.G. activities very difficult.
3) nurses are often required to move patients resulting in a decrease of available nursing time.

4) patient discomfort due to long delays.

The use of a dispatcher and messengers as possible solutions present such problems as:

1) determining the special needs of the operating room and the accident room.
2) determining the volume of patient transporting that is done in the hospital.
3) determining the number of messengers necessary to handle the volume of work without any patient waiting.
4) determining what transporting equipment is needed, what is available, and where it is to be stored.

The Memorial Hospital of Pawtucket is approximately a three hundred bed installation. It is by no means a new hospital, having been established at the turn of the twentieth century. It's early design and construction thus leaves something to be desired, although a modern building program is well underway. Presently, much of the hospital consists of one or two-story structures connected by tunnels or passageways. There are eight major sections of the hospital. Richardson, Administration, Out-patient building, and MacColl all have two floors. Read, Sayles North, and Sayles South have a single floor. Wood building is the newest and most modern section of the hospital; it has six floors. The hospital is served by four banks of elevators, of which three are single

elevators and the fourth a set of three. Figure 1. shows the floor plan of the hospital and the location of the elevator banks and the stairwells. All the elevators are of the self-service type. At each floor there are call buttons. If an elevator is called, it will come immediately if it is not in use or if it is in use and is moving toward the floor calling it. Otherwise there is a delay until it is not being used.

In addition to elevators, swinging doors and ramps are quite numerous throughout the hospital. In particular they are both commonly encountered when going from one building to another.

The Wood building is equipped with a pneumatic tube system. The nursing units on the sixth, fifth, fourth and second floors have terminals. There is also a terminal in the dietary department. This system can carry only small paper communications between these departments. It is, therefore limited and is not used extensively.

The discussion of the above facilities is presented because of the possible effect on any transporting system.

II. REQUIREMENTS OF A COMPUTER PROGRAM

The use of a computer program to develop a delivery route must have as its major goal the optimization of any such system, optimization in the sense that all primary demands on the system by the various hospital departments and units must be successfully met.

The demands on the system can be broken down into two general categories: those of the servicing department and those of the department to be served. The servicing department has the following requirements. The route must be one which covers the least possible distance and in turn takes the shortest time to attend all of the departments requiring service. The route must be easy to operate in that the physical demands upon the employees and equipment not be excessive. One of the most important criteria to be met is that the system be flexible. It must have the quality of easy adaptation to meet the changing physical set of the hospital, or the changing demands of the departments being served.

The departments being served have the following route demands. The system must be able to meet the time requirements. Meeting the time requirements means that the pick-up of material, as well as the delivery to other departments, must be made at the proper time. Also, the

various departments must be visited in the correct sequence. In many cases there are priorities to be met. In order for one department to carry on it's work, papers and memos from other departments must first be received. Thus, in many situations there are various critical subsequences that must be followed closely.

The successful operation of the computer program depends on the data available. Precision and thoroughness of data determine how well the results fit the actual situation.

Time, of course, plays an important role in meeting the requirement that pick-up and delivery be made at the proper time. In order to allow for the maximum flexibility in choosing the various departments to build into the system, it was at first necessary to calculate the amount of time needed to travel from one department to another. This system being new, it was impossible to obtain any indication of the actual delivery times by direct observation. It became necessary to simulate these times as best as possible. The simulation was broken in three parts: First, the pushing of a hand cart through the hospital corridors. Second, the time spent riding the elevators to the different hospital floors. Third, the time spent at the various stops picking-up and delivering the materials.

The times for the hand cart movement were obtained

by moving through the hospital at different times of the day, through doors, up and down ramps, and along corridors measuring the distance traveled and time taken. An average distance covered per minute was calculated.

The elevator situation was quite different. Within the hospital are four banks of elevators as shown in Figure 1. The elevators move at different speeds and handle various amounts of traffic at different times of the day. It was thus necessary to obtain an average elevator time for each bank. This was obtained by riding the elevators to various floors at different times of the day. The times were noted and the average was calculated. No consideration was given to the distance that the elevator traveled. The observations indicated there was little difference due to this factor; the amount of traffic played a dominant role.

The amount of time spent at each stop was a difficult figure to estimate. Such factors as the amount of material at a particular stop, who the messenger is, and whether or not the material is ready to be picked up, all play a role. Much of the time was spent sorting the material and placing it in its proper slot on the hand cart. A similar activity of having people sort and put in order a number of lettered cards results in an average time which could be associated with the activity of the messenger at each stop. Consultation with persons familiar with the situa-

tion agreed that the figures calculated were applicable and an overall allowance of a minute at each stop was adequate.

Even with these times available, associating a time with the distance between two points or departments is not easy. The number of route choices increases rapidly as the distance between source and destination increases. It is necessary that all the possible routes be considered. The quickest or the shortest route may not meet the demands of the department served.

All the distances between departments can now be calculated in terms of time. The corridor distance in feet was taken from a floor plan and multiplied by the average time necessary to cover one foot. The elevators used were listed and their average times were added to the above figure. Finally, the stopping allowance for each department was added. These times were calculated for every possible permutation of two using all of the departments to be included in the route. With this information it is possible to calculate the time at any point during the route or the total elapsed time.

The next piece of information is that concerning the time requirements of each department. These times are limitations or restrictions on the system. Interviews with each department head resulted in a list of times when a pick-up was needed. In all cases it was desired that the pick-up be made exactly on time or a little late, but

never earlier than the requested time. In all likelihood the material to be picked up would not be ready early but more probably a little late. Thus a fifteen to thirty minute time allowance was made on the late side of the established pick-up times.

Through the interviews it was possible to obtain a list of the departments that must be visited before a particular department is visited. The departments that must be visited first are referred to as priority departments.

In order to facilitate the listing of the departments and units, each department has a number assigned to it. This number is used in all the data tabulation operations. Thus far enough information is available to satisfy the requirements of the departments being served.

In many cases it is desirable to service all those departments or units having the same functions at the same time, or as reasonably close as possible. With this in mind, an additional bit of information was needed. Each department is assigned a similarity number. Two departments with the same similarity number are exactly the same and, therefore, have the same function. An attempt is made to serve these departments consecutively because the demands of these departments are exactly alike and satisfying the demands of one will satisfy the demands of the other departments with the same similarity number. Given the situation that exists at the Memorial Hospital of Pawtucket, this applies only to the nursing

units.

Another block of information that is necessary is that of the group numbers. The various nursing units and departments of the hospital are lumped together to form groups. Each group is assigned a group number. The size and number of the groups was determined by past experience and the location of the particular departments. There are seventeen groups varying in size from two to five departments. The departments are quite close to one another and a stop at one warrants a stop at the other departments in the group. The theory behind the group numbers is that once a messenger is in a group area an attempt should be made to stop at the remaining departments, thus developing the shortest route in both distance and time.

Also, included in the data banks is a preference listing. Each group is taken individually and the best group to go to from the group being considered, is listed, then the second best and so on all the way down to the least desirable group to go to. The basis for this choice is again the proximity of the groups to one another.

III. DEVELOPMENT OF THE COMPUTER PROGRAM

The program developed is one which meets the demands of the departments being served as a primary goal, and those of the serving department as a secondary goal.

There are eight parts to the program, one main program and seven sub-routines. The basis of the program is the development of arrays of departments and then choosing from the arrays the proper sequence of departments. Not all the departments are put in the arrays being considered.

There are first two large categories that the various departments are divided into, those with a time requirement and those with no time requirement. A running time check is maintained by the sub-routine TIMECAL. The first test the program performs is determing if there are any departments that are to be put in the system at this time or a time that has already elapsed. If there are departments to be put in at this time, they are grouped together and referred to as hour departments. These hour departments are further divided. If there are any departments with the same similarity number, these hour departments are separated and grouped together. Thus, it is possible to have two groups of hour departments, those with the same similarity number and those with different similarity numbers. All of the priority

departments of the hour departments and the priorities of the priority departments are grouped together. This function is accomplished by the sub-routine PRIOR. The priorities are then listed under their respective hour departments, forming an array. Only one array is worked with at a time. Sub-routine ORDER is then brought in and puts the hour departments which are also priority departments in the proper order in which they are to be considered and eliminates any which are repeated in the array. ORDER sets these hour departments into sub-arrays, or sub-sub-arrays as the case may be. The purpose of this step is that certain hour departments must be put in the system before other hour departments because the initial hour departments are priority departments.

The preference listings are used to determine the positions of the departments. The starting point department's group number is listed and that group's preference listing is followed. This function is performed by the HOUR sub-routine.

The same process is repeated for the group of hour departments with the same similarity number.

It is quite possible that there are no particular departments to be put in the system at the time when the time check is made. In this case, an array is developed with the departments which have no time restriction. Their priorities are listed and an array

IV. RESULTS OF THE COMPUTER PROGRAM

Application of the program resulted in the delivery system as shown in Tables 1 through 4. This particular route is one that meets the morning demands of the Memorial Hospital of Pawtucket. The data used was that pertaining exclusively to the morning hours. The system, at least on the surface, seemed to meet the demands of the hospital. However, as was expected there were a considerable number of implementation problems. There were three very pressing and crucial questions that required attention:

1) How many times a day should this route be run and how radically will the runs differ from one another?
2) What shall be handled by this route?
3) How many people are necessary for the operation of the route and what will be the departmental organization?

The number of times the pick-up and delivery routes were to be run was a question that could be answered by the people who were to be served by the system. As a result interviews were held with the department heads. It was obvious that a morning route would be required

and would be the most complicated and heavily used. This route should start at the earliest possible time in the morning. It would be the most difficult to run, because all departments in the hospital need at least one stop in the morning and many of them have priority departments or time requirements. It was also felt that a run be made as close to the closing time of as many departments as possible. This run would be able to handle all the end of the day out-going mail and memos requiring attention the following day at the various departments. The morning delivery would not be able to handle these deliveries. Many of the larger departments required a run in the middle of the day. This was necessary for those departments whose function required an almost constant flow of material to and from other departments.

The initial run through of the program indicated a running time of approximately two hours. Thus, the total route running time for an entire day would be close to six hours. The department head interviews suggested that the major hours of operation should be between eight o'clock in the morning to five o'clock in the afternoon, a time span of nine hours. Ideally, the first route should begin at eight o'clock in the morning and end at ten o'clock. The second route should begin at eleven o'clock, end the first part at twelve noon, start the second half at one o'clock in the after-

noon and finish at two o'clock. The third route should begin at three o'clock and end at five o'clock. The break in the second route is for lunch. Tables 5 through 8 give the actual routes and their starting times. The first route starts fifteen minutes later than planned, because it is necessary for the messenger to prepare for the day's activities. The last route ends fifteen minutes early to provide some necessary close-down time. As a result the starting and ending times of the routes are juggled accordingly, but yet coincide quite well with the theoretical situation.

Tables 5 through 8 also indicate the changes necessary to accommodate the various departments. Even the original morning route is not exactly as ordered by the program. However, the changes in the morning route are not extensive because the route meets the major demands of the departments being served. The changes instead are ones made by the serving department to facilitate easier handling for the messengers. These few changes in no way reduce the effectiveness of the route and do not interfere with the demands of the other departments. The other two routes at first glance may seem quite different. A closer examination reveals, however, that the basic system remains and that blocks or groups of departments are shifted in position. These shifts were made to satisfy the needs of a few main departments, whose operation required it. The

changes were easily made because the last two routes are not critical, that is, there are many departments indifferent as to when they are visited. In many cases the single or possibly the double delivery is all that is required by a certain department.

The pick-up and delivery route itself handles only papers and small products. This is due to the fact that the means of transporting is a small hand cart. This hand cart has slots for each particular department and a small area underneath for articles. The volume and bulk of the materials handled is quite limited. In spite of this, the route was found to be able to handle the transporting needs of the administrative departments and most of the service departments. Such areas as pharmacy, central supply and the nursing units found the route to be lacking, the reason being that these departments sent very large volumes of bulk articles to other parts of the hospital. These other problems will be discussed under other duties and functions which should be performed by the Central Transportation department.

Emergency or stat deliveries, although not handled by the delivery route, did require attention by the Central Transportation department. Also, included within this grouping were items to be delivered before the scheduled delivery system would normally function. In order to handle these situations, a dispatcher is required

who, upon receiving a phone call requesting messenger service, would dispatch a messenger to personally deliver the item. It was necessary to encourage the departments to have their items ready for delivery and not to depend on the individual messenger service. This problem was partially solved by careful examination of the dispatch records, noting the frequency and type of delivery for a particular department, and informing the head of that department of any abuse.

Another problem confronting the Central Transportation department was that of staffing and departmental organization. The success of this project depended a great deal on the person or persons handling deliveries. A certain amount of knowledge and familiarity with the hospital layout and operation was necessary. Fortunately, a girl was available who had been performing a similar function but on a much smaller scale. A department head was hired to coordinate the activities of Central Transportation and at least temporarily serve as dispatcher. Two more girls were hired to fill the positions.

The equipment needed for initial operation was limited. A home area with office facilities, a waiting area for the messengers, and various types of hand carts were among the most important. The first days of operation pointed out the need for training. The physical drain on one individual was excessive. This plus the coverage needed for sick days and vacations required that there be at least one

other and perhaps two people familiar with the routes. This was put underway immediately.

As the project moved along, many small problems were encountered. In order to fully use the system it became necessary that some type of time-table be developed. Many of the departments were not aware as to when or how long it would take to deliver the item they were sending, or even when the messenger would be at their department for a pick-up. The result was an increased use of the dispatch service and material not arriving at its destination on time. A schedule was published listing the order of departments and the expected time of arrival. Although sometimes the scheduled arrival time was not met exactly, a routine was soon developed and the departments easily fell into it. It was also necessary to accustom the senders as to what articles the system could handle. It was important that this be approached in as objective and positive manner as possible. Discontent with the system at this point could mean rejection and failure.

In order to provide the eight o'clock to five o'clock coverage, messengers had to remain late. Rather than put this in as overtime, two of the messengers' hours were changed. Two came in at eight-thirty and left at five, while one messenger came in at eight and left at four-thirty.

Another problem was that of IN-OUT boxes. Many, if

not most, of the people in any department were unaware of the transportation service. Thus, instead of using the service, people continued to deliver their own materials. When a messenger arrived at a department, no one was familiar as to what was to be sent or even where it was. The IN-OUT boxes provided an easy pick-up and delivery point and also encouraged the use of the system by the departmental employees.

Initially it was quite common for material to be delivered to the wrong department or not at all. In most cases it was the lack of properly identifying the destination of the material being sent. In order to avoid any arbitrary decision by the messenger, as to the destination of any item, all material being sent had to be clearly labeled as to where it was being sent. If many small items were involved, they could be put in an envelope and labeled. Even with this, it was still a problem with departmental people dropping a form, invoice, or notice in the IN-OUT box and expecting it to make it to its proper destination. The Central Transportation department also ran into the problem of lost material. In most cases it was the department receiving the material who called. A call to the sender resulted in a strong assertion that the material had been sent. A further check usually showed that the article never made the IN-OUT box.

These incidents signaled the need for some type of check, necessary to avoid lost material. A registered delivery idea was put into practice. It was used in the handling of medical records. These records were patient histories and required close attention. The transporting of drugs also required the use of the registered delivery. This was used to avoid the loss or theft of drugs while they are in transit. The registered delivery system consists of a slip of paper listing the article being sent. The sender signs and dates the slip. The receiver upon delivery of the material, checks the slip against the shipment and then signs acknowledging the delivery. If any material is lost, it can be pinned down to a time either before or after the delivery and not during. The slip is shown in Figure 2.

There were a few problems that could be classified as arrangement trouble. With slight shifting or elimination a comprehensive system could be worked out. A few of these problems need to be detailed in order that the difficulty of programming all the possibilities into the computer program be pointed out.

After a short time of operation, it was found that some departments required only two or possibly only one delivery a day. Determining which departments these

were was simple, but re-arranging was the challenging part.

The pick-up of the mail made it necessary that a large amount of sorting and filing be done by the messenger. The result was a considerable loss of time, possibly fifteen minutes or more, delaying the route. A similar situation existed in the lab, where a large number of lab reports were sent out. The combination of these two could, and often did, throw the system fifteen to thirty minutes off schedule. The lab problem was partially solved by having the lab people do a pre-sorting; the mail problem is still present.

One of the most difficult problems was also found in the lab. The lab ran tests on specimens all day long until four o'clock in the afternoon. After this hour no lab report would be completed for a specimen sent in. The lab required delivery of all lab reports at eleven o'clock in the morning and four o'clock in the afternoon. The nursing units on the other hand, wanted the route to come to them before four in order that their late specimens would be in on time for lab reports to be completed on them before four. This required a major revision in the late afternoon route. To solve the problem, the nursing units were visited just before four and right after the lab stop had been made. This double coverage was able to satisfy the demands of both areas.

V. PROJECTED FUNCTIONS

Once the operation had proven successful, an immediate thought was to branch out and attempt to take over functions which were closely allied with transportation. Included in this group, were those activities of transporting which were originally thought to be too closely bound to the function of certain departments throughout the hospital to be successfully separated. The expansion possibilities are:

1) Metering and sorting of all incoming and outgoing mail.
2) Delivery of ice to various nursing units.
3) Moving of film projectors.
4) Pick-up and delivery of the pharmacy drug baskets.
5) Delivery and return of sterile supplies and equipment to the nursing units.
6) Photocopying and addressograph department.
7) The take over of the outside delivery truck service.

One of the most natural take overs, was the mail. The Central Transportation department handles all the mail to and from the departments both incoming and outgoing. Rather than have all outgoing mail to be metered sent to

the switchboard, it could be brought back to the Central Transportation department metered there and then sent out all at once at the end of the day. As far as delivering incoming mail, it would certainly be easier and save time if it was brought to Central Transportation and sorted and filed on the cart before the route began, rather than stopping at Mr. Dietz's office and losing time on the route by sorting there.

The delivery of ice to the nursing units and the moving of film projectors are two odd jobs that have fallen to the Housekeeping department. The reason was that there was no other department particularly setup to handle this function. Both of these could quite easily be handled by the Central Transportation department. The demand for projector moving is random and very limited. Ice delivery, however, is done twice a day: once in the morning and once in the afternoon and requires approximately an hour and one-half each time.

The outside delivery system should obviously be handled by the Central Transportation department. This consists of one man and a panel truck who is available to the various departments when the need arises for an errand to be run outside of the hospital.

The Pharmacy department runs a small delivery route of its own. It consists of going around to all the nursing units and picking up baskets in which drug orders are

placed. The baskets are brought back to the pharmacy, the orders are made up and the baskets are filled. The baskets are then brought around on a cart and returned to the nursing units. This activity takes place between nine forty-five and ten forty-five in the morning. The need for someone to handle this has put a strain on the available working time in the pharmacy. This delivery function could easily be taken over by Central Transportation.

A similar function is performed by the nursing units. Each unit is assigned a certain amount of sterile supplies and equipment each day which must be either returned that day or replenished. At approximately two o'clock in the afternoon each day, every nursing unit returns its used sterile equipment and restocks its supplies on the return trip. Again it seems that the Central Transportation department could provide this service provided the personnel were available.

A final area that could be added to the Central Transportation department is that of the Addressograph department. A large amount of the time spent by the two people in this department is in the delivery of the work done by them for other departments. As it is now, the messenger brings the forms and paper work to this department and delivers the finished product if it is needed in a hurry. The messengers are also called on

sometimes to do photocopying. Many departments request that when material is sent down, that it be returned right away thus charging the Central Transportation department with the responsibility to see that it is completed and returned right away. If this responsibility is to be taken by Central Transportation, it seems only right that it have some control over the performance of the address-ograph duties.

VI. PATIENT HANDLING PROBLEM DEFINED

The problem of transporting patients is one which is quite different from the development of a pick-up and delivery route. The most obvious difference is that the system is now handling humans rather than inert objects. It becomes essential to meet a balance between patient comfort and convenience and the requirements of the patient servicing department involved. Also, very little routine or scheduled patient transporting takes place.

This section will be concerned with determining the optimum number of messengers necessary to provide the amount of manpower to transport a patient from point of origin, which shall be the department or unit requesting a messenger, to the point of destination, which shall be the department or unit receiving the patient. This shall be referred to as one-patient move.

The assumptions and limitations of this system are imposed in order to establish a framework which will in turn give a starting point. Let it be understood that said assumptions and limitations are by no means binding, but only temporarily simplify a situation which is most complicated. Once the basic system has been established, the easing of limitations and generalizing the situation

will allow for a system which will be quite flexible and serviceable.

The following assumptions and limitations shall be imposed:

1) The messenger will be used only to supply the manpower to move the patient from point of origin to point of destination.
2) The patient will be ready to be transported when the messenger arrives, and, once the point of destination is reached, will be free to perform further duties as shall be assigned by the C.T.S. dispatcher.
3) Only one messenger is required on all transporting cases.
4) All transporting equipment shall remain at the point of origin and if necessary must be returned.
5) For patient comfort and convenience, all requests for messengers will be handled immediately; enough messengers will be on hand to fulfill this requirement.
6) Only week day service will be considered; the week ends will have an understandably reduced load. The system will be able to be expanded quite easily to handle the week end requirements.

7) Temporarily, messenger service shall be available from the hours of 8 A.M. to 5 P.M., holidays and weekends exempted.

8) Both male and female messengers who are relatively young and strong will be required to staff the system.

There are three types of situations where a messenger is required.

1) A patient in a wheelchair, transported between units or departments.

2) A patient on a stretcher requiring transporting between units or departments.

3) A patient who is admitted and is able to walk but must be accompanied to his room.

In situations 1 and 2 the patient involved must usually be transported twice. However, there are situations where only one move is required:

1) Body to morgue, either from a nursing unit or D.O.A.

2) Patient to be discharged.

3) Patient admitted requiring a wheelchair.

4) Transfer of patients from one unit to another.

5) Patient admitted requiring immediate service and then to unit.

The preceeding exceptions represent a small fraction of the transporting, and will, therefore, be considered

the exception rather than the rule.

Situation 3 are those cases which are entirely one way.

In the light of this discussion, the data concerning the number of patients admitted and discharged, which include deaths in units, will be considered as one-way trips. All other data from the departments on number of patients served will be considered double trips.

The most important factor to be considered in developing the patient transport system is the source of demand. The source of demand will not only indicate the amount of transporting needed, but the time required for a move and the type of transporting situation to be expected.

The sources of patient transporting at the Pawtucket Memorial Hospital vary and are spread over a wide area. Naturally, those departments considered were those of the highest volume and those presenting a situation where a centrally located messenger is both feasible and recommended.

Surveying the entire hospital, the following departments were considered and either accepted fully, partially, or not at all for various reasons which shall be discussed. The listed departments were chosen because they have a function directly involving the patient:

A) X-Ray
B) E.E.G.
C) E.K.G.
D) O.R.
E) ACD. Rm.
F) Admitting
G) Physical Therapy
H) All Nursing Units
I) Isotope Lab.

VII. REQUIREMENTS OF PATIENT HANDLING

Of the nine previously mentioned E. E. G., E. K. G., and the Isotope Lab. were eliminated immediately. E. K. G. deals with the patient directly in his room and handles only outside patients in its own department area. E. E. G. handles house patients in its department area at an average of about two patients per day. Deletion was deemed justified because of the difficulty in obtaining data and the insignificant amount of activity involved. The Isotope Lab. handles even fewer patients than E. E. G. and was also eliminated.

The circumstances surrounding the accident room and the operating room indicate the need for a transporting service, but the very activities of these departments make it extremely difficult for them to actively use any but their own transporting services.

Any Operating Room messenger must, due to the sterile conditions necessary in the O. R. wear the proper cap, mask, and tunic while handling any patient, as well as have some knowledge of O. R. procedures. These restrictions thus make it very difficult to have an O. R. orderly externally located within the Central Transportation department.

The patients requiring transporting from the accident room are those to be admitted to the hospital or those requiring emergency service at the various hospital departments. The very expedience necessary in transporting any of these emergency cases eliminates the use of a central messenger. Instead, accident room orderlies handle the emergency transporting. Only a patient admitted through the accident room will be considered.

The pertinent data to be used were obtained from the X-Ray department, Physical Therapy department, and the Admitting department. These figures show the number of house patients serviced at the X-Ray and Physical Therapy departments. The data was available on a daily basis and each patient represents a double trip. The Admitting department figures show the total number of patients admitted and discharged daily, including deaths in the hospital. Each patient in this case represents a single trip.

No data was collected from the various nursing units. Any figures from the units would be a duplication of the data collected from the servicing departments. All the patient moves considered, will require the use of a stretcher or a wheel chair, the only exception being those patients who are admitted and are able to make it to their respective rooms under their own power.

VIII. THEORY APPLICATION AND RESULTS

The theory used in determining the optimum number of messengers conforms very well to the conditions, assumptions, and limitations of the situation. The theory of distribution and laws of probability will allow the determination with a given level of confidence of how many patient moves may be expected for a given hour interval, and this in turn, how many messengers will be needed for that hour interval.

The first step is to form a frequency distribution of the number of single patient moves throughout the hospital for a given hour interval. These frequency distributions were calculated by polling the various departments concerned, that is, those discussed previously. The departments figures for each hour can then be pooled and form a certain frequency distribution. It then becomes necessary to determine what types of distribution each hour interval is. Once this has been ascertained, it is of very little difficulty to assign a certain probability and then determine the maximum number of patient moves that is associated with the given probability level. With a calculated time per move, the number of messengers needed for each hour interval can be figured.

The exact data for the frequency distribution were not available. Instead, each department concerned had a breakdown of the number of patients moved on a daily basis. The distribution on the other hand required a breakdown concerning the number of patients moved per hour.

The conclusion was reached that it could be assumed, without departing greatly from reality, that the number of patients moved by each particular department was evenly distributed over the period of operation. Indeed, a previous study indicated this assumption to be valid. Figure 3 shows the results of this two-week study. All departments and units within the hospital were asked to log everything that was moved to or from their department by people within their own department. Everything moved was broken down into three general categories: papers, products, and patients. The papers category contained any communications, reports, requisitions, or slips that were to be sent or picked up. The products group consisted of any lab specimens, laundry, medications, etc., that were handled. The patient classification naturally included only patients or bodies picked up or moved. As can be seen, the table indicates a quite consistent number of patient moves over the hours of operation.

Tables 9 thru 13 list the data from the particular departments. A breakdown of departments of the number of patients handled in X-Ray on each day for the month of

October is shown in Table 14. Tables 9 and 10 tabulate the results in the X-Ray department for the months of November, December, January and February, respectively. The in-patient column is the one of concern. These figures are multiplied by 2 and divided by 6, in order to arrive at an average hourly figure. Each in-house patient served in X-Ray must be moved twice, from the unit to X-Ray and back again. Thus, each patient served is considered two-patient moves. The 6 is used as a denominator because clearly the majority of the X-Ray transporting is done between the hours of 9 A.M. and 3 P.M., or six hours, as is shown in Figure 13.

Table 13 indicates the number of in-patients served on the given days by the Physical Therapy department. These, as was the case in the X-Ray department, represent double patient moves, from the unit to physical therapy and back again. To establish the average number of patient moves per hour for physical therapy, the number of patients served is multiplied by 2 and divided by 3. The 3 is used as a denominator because the bulk of the servicing takes place between 9 A.M. and 12 P.M., as is indicated by Figure 3.

Tables 11 and 12 list the admitting and discharge figures, including deaths, for the months of October through February inclusive. Unlike the previous figures, each patient served is considered as only one patient move, either from the unit to admitting, or from the admitting

area to the unit. No direct information was available to determine the major hours of discharge and admitting. These figures are mixed with those of other departments in the nursing unit figures on patient moves. Consultation with the admitting office, and the various nursing units indicated that both the discharge and admitting of patients, other than emergency cases, were fairly evenly distributed over the hours of 9 A.M. and 12 A.M. for discharge and 1 P.M. and 3 P.M. for admitting.

As previously stated in the assumptions and limitations, the transporting service shall be initially restricted to week days between the hours of 8 A.M. and 5 P.M. As a result, the frequency distribution shall also be confined to hour intervals within this span of time. For the hour intervals of 8 A.M. - 9 A.M., 3 P.M. - 4 P.M., and 4 P.M. - 5 P.M., very few patient moves were recorded. This, however, does not completely exempt any available service at this time, and indeed there will obviously be some patient transporting at this time. However, the small amount done during these slack periods, should be easily handled by one man. These slack intervals should be expected due to the fact that their time periods are at the beginning and end of the day's activities. The 9 A.M. - 10 A.M., 10 A.M. - 11 A.M., and 11 A.M. - 12 A.M. hour intervals all are made up of entries from the figures of X-Ray, Discharge, and Physical Therapy. The 12 A.M. - 1 P.M. hour interval contains observations from X-Ray only, while the 1 P.M. - 2 P.M.

and 2 P.M. - 3 P.M. frequency distribution contains readings from the X-Ray and Admitting department.

The frequency distribution charts were constructed by totaling the patient moves of the particular departments in the desired hour interval. The result of this tabulation were three distinct distributions. The 9 A.M. - 10 A. M., 10 A.M. - 11 A.M., and 11 A.M. - 12 A.M. hour intervals are exactly the same and thus have the same frequency distribution. This is shown in Figure 4. The hour interval 12 A.M. - 1 P.M. frequency distribution is shown in Figure 5. The hour intervals of 1 P.M. - 2 P.M. and 2 P.M. - 3 P.M., are exactly alike and they too have the same frequency distribution, which is shown in Figure 6. The distributions thus give the total number of patient moves for a particular hour interval over the week days of a five-month period, holidays exempted.

Observation of the frequency distributions of 9 A.M. - 12 A.M., and 12 P.M. - 1 P.M., respectively, discloses the possibility of a normal distribution, while the 1 P.M. - 3 P.M. distribution shows a distinct inclination towards a Poisson distribution.

A Chi-Square goodness-of-fit test was used to determine how closely each sample distribution fit the hypothesized population distribution. Tables 15, 16 and 17, and Figure 7 are the preliminary calculations of the sample standard deviation of each respective frequency distribution, which are necessary for the Chi-Square test.

The Chi-square total is associated with the probability of arriving at a value of this size due to chance causes only. Various probabilities are expected for different degrees of freedom. The higher the probability, the better is the fit of the sample distribution to the hypothesized distribution. The Chi-square calculations for the 9 A.M. - 10 A.M., 10 A.M. - 11 A.M., and 11 A.M. - 12 A.M. distributions are shown in Table 18 and Figure 8.

The Chi-square total is 4.5644, with 8 degrees of freedom. This value falls between the 80 and 90 percent levels. The assumption of a normal distribution for this sample is concluded to be a valid one.

Table 21 is a comparison of the Chi-square values with that of the expected Chi-square values at the 5 percent significance level, for the three distributions.

The first column shows no significant difference between a normal distribution and the 9 A.M. - 10 A.M., 10 A.M. - 11 A.M., and 11 A.M. - 12 P.M. distribution.

Table 19 and Figure 8 show the Chi-square value for the 12 P.M. - 1 P.M. distribution to be 3.4705. The probability associated with this total and 5 degrees of freedom is between the 70 and 50 percent levels.

Although this may not be as good a fit as desired, the comparison of this value with that of the expected value at the 5 percent significance level and with 5 degrees of freedom, shows no significant deviation from the normal distribution.

Table 20 and Figure 8 show the Chi-square test figures on the 1 P.M. - 2 P.M., and 2 P.M. - 3 P.M. distribution. The calculated value is 5.784 and is associated with a probability between 90 and 80 percent for 10 degrees of freedom. Again, the Chi-square value at the 5 per cent significance level with 10 degrees of freedom is well above the calculated value, further strengthening our conclusion of a Poisson distribution for this sample.

With the aid of these test results it is now possible to make the following conclusions.

1. 9 A.M. - 12 P.M. (inclusive) distribution is a sample from a normal population.
2. 12 P.M. - 1 P.M. distribution is a sample from a normal population.
3. 1 P.M. - 3 P.M. (inclusive) distribution is a sample from a Poisson distribution.

The problem of determining the average time necessary for a single patient move, has three basic difficulties:

1. Data collected from the various nursing units were quite insufficient.
2. The limited number of entries made reflected readings which included the time to help a patient on to or off a stretcher or wheel chair, and possible loitering on the job.
3. It is almost impossible to come up with a single representative time for a patient move anywhere in the hospital.

Observations of the actual patient moving would normally give a good predictor value; however, the restrictions and limitations originally assumed differ greatly enough from the actual situation to warrant the discarding of this idea.

The normal times previously calculated serve as a sound basis. The times themselves proved to be quite accurate and representative of the situation existing under the desired restrictions and limitations.

Instead of using a single time value for the entire hospital, three different values are calculated, an X-Ray time, a Physical Therapy time, and an Admitting-Discharge time. The fact that the distance from the various nursing units to the three service areas is so varied made it impossible to obtain one representative time for the whole hospital for all patient moves.

Another possible problem was a distribution of patient move times from the various nursing units to the particular service area involved. This would make it impossible to assign one single time to a particular service area, that was representative of the time to move a patient to this service area from the nursing units. This is opposed to the assumption of an even distribution.

A T-test was used to test the hypothesis that the assumption of an even distribution was a valid one. A distribution of actual times was calculated for X-Ray,

Physical Therapy, Discharge, and Admitting.

The distributions are the number of patient moves between the servicing areas and the departments served. These are single, one-way trips only.

The samples were taken over a period of three to four weeks, excluding weekends. Tables 22 and 23 show the results for X-Ray and Physical Therapy, respectively. The straight average time is the figure arrived at by assuming equal trips to and from all departments, or an even distribution. The weighted average time is arrived at by taking into account the frequency of trips to and from each floor, or assuming some type of a distribution.

The assumption of an even distribution is shown to be valid due to the fact of no significant difference between the straight average and the weighted average.

The possibility of a distribution of patient moving times is disregarded. The admissions and discharge observations, on the other hand, indicate a significant difference between the straight average and weighted average times as shown in Tables 24 and 25.

The assumption of an even distribution is not valid and the result is a distribution of patient move times.

A pooled T-test was run to determine if there existed any significant difference between the admitting and discharge weighted average times. Figure 9 shows the results to be insignificant. It is thus possible to

arrive at a pooled average figure, also shown in Figure 9. In spite of the fact that the straight average and weighted average for both Admitting and Discharge prove to be significant, the average pooled time will be used for two reasons:

1. The pooled figure was obtained by using the actual data from both Admitting and Discharge.
2. In spite of the fact that the time calculations are carried out to four decimal places the significant difference will not actually affect the calculations because of the quite large margin of error allowed.

We now have the times necessary to calculate the number of people to satisfy the patient moving demands of the hospital.

A weighting factor is again necessary to take into consideration the effect of the contributing service departments within a given hour interval.

Table 26 shows the weights assigned and the average times calculated for each hour interval. The daily observations of all three departments for the month of January, excluding holidays and weekends, were used as the weighting factor. The 9 A.M. - 12 P.M. intervals contain all three departments and the times are weighted accordingly. The 12 P.M. - 1 P.M. interval contains only X-Ray, and the 1 P.M. - 3 P.M. intervals contain

the X-Ray and Admitting departments.

Discussions with the hospital administration and people in the field indicated that a 90 per cent confidence interval would be the optimum level to work with. That is, it is desired that the system be able to handle all demands on the service 90 per cent of the time, without any delay at all.

Table 27 indicates the number of trips or fewer that can be expected 90 per cent of the time for all of the hour intervals concerned. The product of trips and average time is the amount of transporting time needed to be done within that particular hour interval. This total time divided by the number of minutes in an hour is the number of people necessary to fulfill the patient transporting needs.

IX. ECONOMIC ANALYSIS OF THE DELIVERY SYSTEM

The success of an operation is at least partially measured by an economic analysis. It was not primarily economics that initiated this project at the Memorial Hospital of Pawtucket. It was instead the inconvenience and loss of time by the hospital departments that precipitated this study. It was felt at the time that the transporting was done by many individuals in many departments, and, by drawing these individuals together and consolidating their activities, a smooth hospital operation would result.

With this in mind, one of the first stipulations placed upon the project was that it would generate no new expense. That is, job functions would be rearranged in such a manner that people would be free to work strictly as messengers in the Central Transportation department.

The first step was to determine those departments which do a considerable amount of transporting. A survey was made of the entire hospital. Each department or unit was asked to log all trips where something required transportation. This activity was carried out for two weeks. The data recorded on each trip consisted of the person's position or job, what was transported,

where it was transported to, the time the person left and and the time he or she returned.

Studying the information, gave an idea of the amount of transporting done, which particular positions did most of it, what was transported by the departments, and the amount of time spent transporting. It was obvious that a great deal of transporting, between three and four hours a day, was done by the nursing units. The people who performed most of these transporting duties were the green-aides. The figures for each unit or department are shown in Tables 28 and 29. These are averages over the logging period and each is a daily average figure.

Most of the logging was carried out in the eight o'clock to five o'clock time period. Thus in many cases the efforts of some departments were very poor. It can safely be concluded that many of these figures are on the low side.

The green-aides and the orderlies became the first immediate source of manpower for the Central Transportation department. The administrative and service departments did have transporting time. It would be difficult to consolidate the efforts of these departments and then draw manpower away from them. However, through the use of the Central Transporting department, a considerable amount of working time was made available.

Naturally, a numerical figure was desired on the amount of savings picked up by the new system. An average hourly cost for each department was calculated. Each of the hourly wage rates for the jobs involved were obtained. Each department log was gone over and the number of trips by each type of particular job was noted. This total number of trips for each type of job was multiplied by the wage rate for that job. A total was taken and an average hourly wage rate was calculated for each department. The average hourly wage rate was in turn multiplied by the average number of hours spent in daily transporting. The final product was an average daily transporting cost for each particular department. These figures are shown in Tables 28 and 29. The grand total of transporting cost was $150.20 per day. However, the inadequacy of the logging warranted a further study. Careful consideration of the departments involved and the volume of transporting done by these units suggest a possible daily transporting cost of approximately $160 to $170 per day.

Either of these figures, of course, are possible theoretical savings. In many cases, the people involved in the transporting could not be consolidated, thus giving no immediate savings. However, it should be quite possible to recognize an increase in work performed by these people, increased efficiency, and less lost time. The result is indirect savings which would be difficult to calculate.

Assuming an average hourly wage rate of the messenger to be $1.70 per hour, Table 30 shows that as many as eleven people could be hired at this hourly rate at no additional cost. Again, these savings will not be immediately obvious. Where it is possible to eliminate job positions; it is necessary that it be done over a long period of time through voluntary terminations and retirement.

APPENDIX

TABLE-1

THE [redacted] STATION IS 17

START TIME IS 8.15000 FINAL TIME IS 8.52121
ORDER OF DEPTS. FOR THIS PERIOD
15 21 32 34 35 36 40 41 38 39 3 9

START TIME IS 8.52121 FINAL TIME IS 8.53653
ORDER OF DEPTS. FOR THIS PERIOD
8

START TIME IS 8.53653 FINAL TIME IS 8.55316
ORDER OF DEPTS. FOR THIS PERIOD
44

START TIME IS 8.55316 FINAL TIME IS 8.57576
ORDER OF DEPTS. FOR THIS PERIOD
47

START TIME IS 8.57576 FINAL TIME IS 8.58706
ORDER OF DEPTS. FOR THIS PERIOD
48

START TIME IS 8.58706 FINAL TIME IS 9.01175
ORDER OF DEPTS. FOR THIS PERIOD
6

START TIME IS 9.01175 FINAL TIME IS 9.12948
ORDER OF DEPTS. FOR THIS PERIOD
17 22 18 20 31

START TIME IS 9.12948 FINAL TIME IS 9.14774
ORDER OF DEPTS. FOR THIS PERIOD
30

START TIME IS 9.14774 FINAL TIME IS 9.16698
ORDER OF DEPTS. FOR THIS PERIOD

TABLE-2

24

START TIME IS 9.16698 FINAL TIME IS 9.18557
ORDER OF DEPTS. FOR THIS PERIOD

START TIME IS 9.18557 FINAL TIME IS 9.20219
ORDER OF DEPTS. FOR THIS PERIOD
27

START TIME IS 9.20219 FINAL TIME IS 9.22062
ORDER OF DEPTS. FOR THIS PERIOD

START TIME IS 9.22062 FINAL TIME IS 9.24737
ORDER OF DEPTS. FOR THIS PERIOD
29

START TIME IS 9.24737 FINAL TIME IS 9.27243
ORDER OF DEPTS. FOR THIS PERIOD
42

START TIME IS 9.27243 FINAL TIME IS 9.29013
ORDER OF DEPTS. FOR THIS PERIOD
27

START TIME IS 9.29013 FINAL TIME IS 9.31839
ORDER OF DEPTS. FOR THIS PERIOD
16

START TIME IS 9.31839 FINAL TIME IS 9.33697
ORDER OF DEPTS. FOR THIS PERIOD
19

START TIME IS 9.33697 FINAL TIME IS 9.36783

TABLE-3

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ORDER OF DEPTS. FOR THIS PERIOD
 25

START TIME IS   9.36783          FINAL TIME IS   9.39114
ORDER OF DEPTS. FOR THIS PERIOD

START TIME IS   9.39114          FINAL TIME IS   9.40745
ORDER OF DEPTS. FOR THIS PERIOD
 37

START TIME IS   9.40745          FINAL TIME IS   9.43804
ORDER OF DEPTS. FOR THIS PERIOD

START TIME IS   9.43804          FINAL TIME IS   9.46860
ORDER OF DEPTS. FOR THIS PERIOD
  1

START TIME IS   9.46860          FINAL TIME IS   9.49110
ORDER OF DEPTS. FOR THIS PERIOD
  2

START TIME IS   9.49110          FINAL TIME IS   9.51238
ORDER OF DEPTS. FOR THIS PERIOD
  4

START TIME IS   9.51238          FINAL TIME IS   9.52714
ORDER OF DEPTS. FOR THIS PERIOD
 45

START TIME IS   9.52714          FINAL TIME IS   9.54560
ORDER OF DEPTS. FOR THIS PERIOD
  1
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TABLE-4

```
ST    TIME IS   9.54560          FINAL TIME IS   9.58394
ORDER OF DEPTS. FOR THIS PERIOD
 9


START TIME IS   9.58394          FINAL TIME IS  10.01948
    OF DEPTS. FOR THIS PERIOD
10


START TIME IS  10.01948          FINAL TIME IS  10.03644
ORDER OF DEPTS. FOR THIS PERIOD
11


START TIME IS  10.03644          FINAL TIME IS  10.05274
ORDER OF DEPTS. FOR THIS PERIOD
12


    TIME IS  10.05274            FINAL TIME IS  10.06888
ORDER OF DEPTS. FOR THIS PERIOD
13


START TIME IS  10.06888          FINAL TIME IS  10.08453
ORDER OF DEPTS. FOR THIS PERIOD
14


START TIME IS  10.08453          FINAL TIME IS  10.10177
ORDER OF DEPTS. FOR THIS PERIOD
43


STOP    00000
END OF JOB.
```

TABLE - 5

CENTRAL TRANSPORTATION OPERATION:

This is a revised schedule of the Central Transportation delivery route that is run three times a day, from the hours of 8:00 A.M. to 5:00 P.M., Monday through Friday, excepting holidays. It supersedes all other schedules.

The schedule indicates when the messenger will be at the designated departments. It is requested that you check the arrival time for your department and, whenever possible, use the routine delivery service. If special messenger service is required, call Central Transportation and a messenger will be placed at your disposal.

In order to expedite the delivery of any papers or small articles they should be clearly marked as to their destination. Also, please have an IN-OUT box available at the point of delivery in your department.

As Central Transportation expands their facilities, you will be advised as to how they may better serve you.

The extension for Central Transportation is 237.

Thank you.

2/26/68

TABLE - 6

CENTRAL TRANSPORTATION SCHEDULE FEBRUARY 26, 1968

First pick up and delivery - - - 8:15 A.M.

Dept.		Estimated Arrival Time	Dept.		Estimated Arrival Time
45	Mr. Fawcett	8:15	19	Accounting Ofc.	9:36
17	Nursing Office	8:19	16	Mr. Hurley	9:38
15	I.C.U.	8:21	28	Mr. Gustavson	9:40
21	Accident Room	8:23	42	Switchboard	9:42
25	X-ray	8:25	*29	Mr. Dietz	9:45
32	Wood 2	8:28	26	Personnel	9:47
34	Wood 4	8:32	27	Medicare	9:49
35	Wood 5	8:35	33	E.K.G.	9:51
36	Wood 6	8:39	37	Volunteer Office	9:52
41	Sayles North	8:43	46	MissMcGinn-Payroll	9:55
40	Read Building	8:45	1	Physiotherapy	9:58
38	R I	8:47	2	Housekeeping	10:00
39	R II	8:49	44	Laundry	10:03
3	Out-Patient Dept.	8:53	48	Equipment Rm.	10:05
6	Pharmacy	8:57	47	Nursing Educ.	10:09
9	Central Supply	8:59	5	Dietary Office	10:13
8	Maintenance	9:01			
30	Operating Room	9:03			
31	Lab & Bl. Bank	9:05			
24	Medical Staff Sec.	9:07			
17	Nursing Office	9:09			
22	Admitting Office	9:12			
18	Billing Office	9:14			
20	Credit Office	9:16			
23	Information Desk	9:18			
4	Medical Records	9:21			
7	Addressograph	9:23			
10	Storeroom	9:26			
11	Purchasing	9:27			
43	Photography	9:29			
12	Health Office	9:31			
13	I.B.M.	9:32			
14	E.E.G.	9:34			

* A.M. stop only if delivery is to be made.

TABLE - 7

Second Pick-up and Delivery - 11:00 A.M.

Dept.		Estimated Arrival Time
45	Mr. Fawcett	11:00
23	Information Desk	11:05
31	Lab & Bl. Bank	11:10
17	Nursing Office	11:20
15	I.C.U.	11:23
21	Accident Room	11:25
25	X-ray	11:28
32	Wood 2	11:31
34	Wood 4	11:34
35	Wood 5	11:36
36	Wood 6	11:41
41	Sayles North	11:45
40	Read Building	11:46
38	R I	11:47
39	R II	11:50
3	Out-Patient	11:55
6	Pharmacy	11:57
9	Central Supply	12:00
8	Maintenance	12:02 P.M.
30	Operating Room	12:04
31	Lab and Bl. Bank	12:08

Under present operation route service will be interrupted for personnel lunch break but special messenger service will be available.

24	Medical Staff Sec.	1:10
17	Nursing Office	1:12
22	Admitting Office	1:14
18	Billing Office	1:16
20	Credit Office	1:17
4	Medical Records	1:20
7	Addressograph	1:22
10	Storeroom	1:24
11	Purchasing Office	1:25
43	Photography	1:26
12	Health Office	1:26
13	I.B.M.	1:27
14	E.E.G.	1:27
19	Accounting Office	1:30
16	Mr. Hurley	1:31
29	Mr. Dietz	1:34
28	Mr. Gustavson	1:36
42	Switchboard	1:37
26	Personnel	1:38
27	Medicare	1:39
37	Volunteer Office	1:41
33	E.K.G.	1:43
1	Physiotherapy	1:48
2	Housekeeping	1:51
44	Laundry	1:54
5	Dietary Office	1:56

TABLE - 8

Third Pick-Up and Delivery -- 2:30 P.M.

Dept.		Estimated Arrival Time	Dept.		Estimated Arrival Time
45	Mr. Fawcett	2:30	3	Out-Patient	3:33
4	Medical Records	2:32	4	Medical Records	3:35
7	Addressograph	2:34	6	Pharmacy	3:37
10	Storeroom	2:35	9	Central Supply	3:39
11	Purchasing	2:37	8	Maintenance	3:40
43	Photography	2:37	47	Nursing Education	3:43
12	Health Office	2:37	30	Operating Room	3:47
13	I.B.M.	2:38	31	Lab & Bl. Bank	3:49
14	E.E.G.	2:38	24	Medical Staff Sec.	3:55
19	Accounting	2:41	29	Mr. Dietz	4:00
16	Mr. Hurley	2:43	22	Admitting Office	4:05
23	Information Desk	2:44	20	Credit Office	4:08
24	Medical Staff Sec.	2:48	18	Billing Office	4:10
28	Mr. Gustavson	2:50	17	Nursing Office	4:13
42	Switchboard	2:51	15	I.C.U.	4:17
26	Personnel	2:52	21	Accident Room	4:19
27	Medicare	2:53	32	Wood 2	4:25
37	Volunteer Office	2:54	34	Wood 4	4:28
33	E.K.G.	2:55	35	Wood 5	4:32
1	Physiotherapy	2:58	36	Wood 6	4:34
2	Housekeeping	3:01	41	Sayles North	4:37
5	Dietary Office	3:04	40	Read Building	4:38
17	Nursing Office	3:06	38	R I	4:39
15	I.C.U.	3:08	39	R II	4:41
21	Accident Room	3:10	23	Information Desk	4:44
25	X-ray	3:11	42	Switchboard	4:45
32	Wood 2	3:14			
34	Wood 4	3:16			
35	Wood 5	3:19			
36	Wood 6	3:21			
41	Sayles North	3:23			
40	Read Building	3:25			
38	R I	3:26			
39	R II	3:27			

TABLE - 9

NUMBER OF PATIENTS SERVED IN X-RAY

DATE	NOVEMBER-1967			DECEMBER-1967		
	IN PAT.	OUT PAT.	TOTAL	IN PAT.	OUT PAT.	TOTAL
1	34	53	87	22	54	76
2	26	61	87	28	42	70
3	29	86	115	12	23	35
4	17	58	75	41	68	109
5	12	26	38	28	65	93
6	30	79	109	38	57	95
7	24	56	80	23	49	72
8	29	51	80	30	62	92
9	25	55	80	25	24	34
10	31	65	96	10	24	34
11	19	37	56	37	62	99
12	9	55	64	32	60	92
13	37	60	97	31	63	94
14	20	66	86	26	54	80
15	19	70	89	28	52	80
16	29	75	104	17	43	60
17	24	64	88	10	37	47
18	24	47	71	42	67	109
19	8	31	39	32	67	99
20	41	65	106	30	49	79
21	32	61	93	28	60	88
22	25	72	97	31	50	81
23	9	33	42	30	51	81
24	46	71	117	12	28	40
25	20	60	80	11	27	38
26	3	33	36	37	62	99
27	39	52	91	32	66	98
28	21	58	79	30	70	100
29	32	67	99	37	57	96
30	23	47	70	32	74	106
31				13	48	61
TOTAL	737	1714	2451	835	1636	2471

IN PAT.-in house patients
OUT PAT.-out private patients

TABLE - 10

NUMBER OF PATIENTS SERVED IN X-RAY

DATE	JANUARY-1968			FEBRUARY-1968		
	IN PAT.	OUT PAT.	TOTAL	IN PAT.	OUT PAT.	TOTAL
1	10	43	53	28	84	112
2	42	62	104	28	90	118
3	39	65	104	25	69	94
4	40	75	115	10	38	48
5	37	77	114	45	73	118
6	29	62	91	42	89	131
7	8	25	33	29	81	110
8	46	57	103	29	76	105
9	27	73	102	33	98	131
10	21	90	111	34	80	114
11	34	73	107	15	27	42
12	31	73	104	58	77	135
13	25	61	86	40	98	138
14	11	32	43	34	60	94
15	45	72	117	37	85	122
16	28	57	85	34	72	106
17	25	68	93	28	55	83
18	28	73	101	9	59	68
19	29	61	90	58	90	148
20	23	55	78	34	95	129
21	6	26	32	31	94	125
22	52	68	120	22	41	63
23	27	81	108	38	103	141
24	31	55	86	23	71	94
25	32	65	97	9	33	42
26	37	75	112	58	66	124
27	22	55	77	39	80	119
28	11	33	44	36	73	109
29	43	60	103	33	76	109
30	40	54	94			
31	31	63	94			
TOTAL	912	1889	2801	939	2133	3072

IN PAT.-in house patients
OUT PAT.-out private patients

TABLE - 11

NUMBER OF PATIENTS ADMITTED AND DISCHARGED

DATE	OCT-67		NOV-67		DEC-67		JAN-68		FEB-68	
	ad	ds	ad	ds	ad	ds	ad	ds	ad	ds
1	20	25	15	29	23	19	18	23	30	17
2	41	33	24	20	23	32	44	26	28	31
3	28	29	29	27	26	23	26	22	27	26
4	26	16	29	22	31	24	26	22	25	21
5	33	28	35	32	35	26	24	24	32	14
6	25	39	24	20	37	27	20	35	42	26
7	21	27	32	26	24	24	25	19	21	27
8	23	27	25	26	27	37	32	21	24	24
9	23	15	31	32	28	28	31	31	18	31
10	23	19	32	33	31	34	24	29	28	28
11	22	31	22	32	34	24	28	27	34	29
12	25	26	19	24	27	20	18	33	22	20
13	20	14	32	20	23	38	28	36	26	29
14	13	21	28	28	25	30	23	20	28	26
15	16	25	28	30	20	26	36	22	27	28
16	30	24	38	29	26	23	43	32	23	37
17	34	28	25	33	27	19	20	40	20	37
18	23	30	21	26	32	18	31	22	27	29
19	51	23	21	24	36	30	32	43	25	23
20	10	23	29	20	19	36	25	31	40	29
21	26	36	39	34	26	24	15	25	19	20
22	24	26	26	47	19	39	32	29	27	15
23	28	27	20	20	20	38	36	28	25	25
24	36	25	30	20	12	31	25	30	34	40
25	37	31	13	32	20	12	27	31	25	33
26	35	25	29	19	49	12	22	25	29	19
27	16	25	29	18	33	18	16	35	38	22
28	25	32	35	28	40	22	20	24	28	32
29	19	12	30	30	26	24	25	22	31	33
30	28	35	21	27	25	32	31	25		
31	33	18			23	35	18	25		
	814	795	817	803	844	832	823	858	814	773

TABLE - 12

NUMBER OF PATIENTS DISCHARGED AND ADMITTED

DATE	R1		R2		RB		SN		W6		W5		CW		MT		IC	
	ad	ds	ad	ds	ad	ds	ad	ds	ad	ds	ad	ds	ad	ds	ad	ds	ad	ds
4-21	0	1	3	4	2	3	4	5	5	6	1	3	5	3	3	12	3	0
4-22	2	2	2	1	0	0	4	1	5	3	3	4	10	9	6	7	1	0
4-23	2	1	4	4	1	2	1	0	1	2	2	1	10	7	9	8	0	0
4-24	0	1	1	0	2	4	1	3	2	2	5	6	2	6	6	4	1	0
4-25	2	3	1	2	4	4	2	1	6	6	3	5	10	11	12	5	1	0
4-26	1	2	4	3	4	2	3	6	2	2	3	4	11	9	10	11	0	0
4-27	1	1	0	1	1	2	3	2	7	8	2	6	1	8	9	7	0	1
4-28	0	0	0	1	4	5	0	2	6	3	2	1	7	8	5	3	0	0
4-29	2	2	1	1	4	3	5	2	3	3	3	2	2	2	11	6	0	0
4-30	2	0	3	1	1	0	4	2	4	3	2	1	11	5	10	18	0	0
5-1	1	2	1	2	1	1	1	2	2	1	2	2	4	9	4	5	0	0
5-2	1	3	2	3	1	3	2	2	4	4	3	3	5	5	14	3	1	0
5-3	0	0	1	1	1	1	1	3	3	6	3	3	11	12	8	5	1	0
5-4	0	0	3	4	0	2	0	2	2	4	1	5	5	11	6	13	1	0
5-5	0	1	4	2	3	1	1	1	3	3	3	1	8	4	4	10	2	0
5-6	4	4	0	0	0	1	1	1	3	4	2	2	7	2	8	7	1	0
5-7	2	2	2	4	2	4	1	5	3	4	0	2	9	5	9	7	0	1
5-8	4	3	1	0	0	0	0	0	2	2	4	3	5	9	11	3	2	1
5-9	0	1	2	3	2	4	4	5	1	3	2	2	8	4	9	6	1	0
TOTAL	24	29	35	37	33	42	38	45	64	69	46	56	131	129	154	141	15	3

* ad-admitted ds-discharged

TABLE - 13

NUMBER OF PATIENTS SERVED BY PHYSICAL THERAPY

DATE	OCT-67	NOV-67	DEC-67	JAN-68	FEB-68
1		16	18		10
2	23	17		6	10
3	27	18		8	
4	25		15	9	
5	22		14	5	8
6	21	18	8		9
7		16	10		11
8		16	8	8	8
9	21	17		11	7
10	15	16		12	
11	17		14	13	
12			13	14	5
13	18	16	13		7
14		16	15		6
15		18	15	14	8
16	14	18		18	8
17	13	20		15	
18	12		14	11	
19	10		18	12	7
20	11	19	16		9
21		18	16		8
22		17	16	14	
23	15			10	7
24	14	17		9	
25	15			9	
26	14		12	8	13
27	19	15	10		13
28		18	10		12
29		18	10	7	12
30	13	17		5	
31	16			9	
TOTAL	355	361	266	227	180

TABLE - 14

NUMBER OF PATIENTS SERVED IN X-RAY OCTOBER 1967

DATE	AR	PP	RB	R1	R2	SN	W6	W5	CW	MT	DR	NR	IC	HC	OP	OR	TOTAL
1	31	1	1		1		1	2					1				38
2	33	30	2	8	5	2	5	5	2	1	1	2	1	1	2		99
3	37	24	3	4	3	2	2	1	2		1	1	1	3	5	3	90
4	30	22	1	1	4	1	4	7	1				1	2	4		78
5	31	22	1	3	1	2	2	3	2	1	1			1	1		71
6	42	28	2	5	2	2	3	3	3	1		2	1	3	2		99
7	33	14	1	2	1	1	6	3				1	1	1			64
8	28		1														29
9	34	31	3	6	2	5	7	3	3			2			2		98
10	33	27	4	3	1	1	6	3	3			2	2	4	4	1	94
11	38	20	2	2	2	4	5	4	1	1			1	1	4	1	86
12	34	6	3	2		2	2	1									50
13	36	27	3	4	2	3	3	7	3				4	2	4	1	99
14	26	21	1	1	1	3	2	1					2				58
15	35	4	1	1	1		2	1									45
16	48	33	1	6	4	1	5	4	1			3	2		2		110
17	19	9	2	1											1		32
18	26	15	3	4		1	3	3	2					5	1	1	64
19	29	28	3	2	2	2	4	5	1	1			3	9	8		97
20	31	19	2	3	2		3	3	4	1			1	5	3		79
21	43	17		3	3	1	5	3	1				1				77
22	41	2	1	1			2	1	2				3				53
23	51	32	1	4	2	4	3	6	1	1		1	3		3		114
24	46	20		2	5	2	5	5		1			2	4	7		99
25	57	17	3	1	6	1	2	2	2			1			8		93
26	29	22	6	3	3	3	7	5	2	2			1	5	7		95
27	41	21	4	2	4		4	6	2			1	2	9	1		97
28	31	22	1	2	1	2		1	5			1	3				69
29	46			1		1		3		1			2				54
30	32	25	2	3	6	5	6	2	1	4		2		3	2		93
31	40	21	6	1	2	5	5	5	3		1		2	6	7		104
TOTAL	1104	580	64	81	66	56	104	98	47	15	4	19	40	64	78	7	2428

KEY:

AR-accident room
PP-private patients
RB-read building
R1-richardson first floor
R2-richardson second floor
SN-sayles north
W6-wood sixth floor
W5- wood fifth floor
CW-children's ward
MT-maternity
OR-operating room
NR-nursing
IC-intensive care unit
HC-health clinic
OP-out patient department
DR-delivery room

TABLE - 15

CALCULATION OF STANDARD DEVIATION FOR 9-10, 10-11 and 11-12 HOUR INTERVALS

CLASS INTERVAL	FREQ. A	CODE B	AxB	B(AxB)	AxINT.	CLASS INTERVAL
22	1	-7	-7	49	22	22
23	4	-6	-24	144	92	23
24	6	-5	-30	150	144	24
25	8	-4	-32	128	200	25
26	9	-3	-27	81	234	26
27	10	-2	-20	40	270	27
28	12	-1	-12	12	336	28
29	12	0	0	0	348	29
30	6	1	6	6	180	30
31	10	2	20	40	310	31
32	10	3	30	90	320	32
33	6	4	24	96	198	33
34	4	5	20	100	136	34
35	1	6	6	36	35	35
36	1	7	7	49	36	36
37	1	8	8	64	37	37
38	2	9	18	162	76	38
TOTAL	103		13	1247	2974	

TABLE - 16

CALCULATION OF STANDARD DEVIATION FOR 12-1 HOUR INTERVAL

CLASS INTERVAL	FREQ. A	CODE B	AxB	B(AxB)	AxINT.	CLASS INTERVAL
6	2	-4	-8	32	12	6
7	4	-3	-12	36	28	7
8	8	-2	-16	32	64	8
9	12	-1	-12	12	108	9
10	23	0	0	0	230	10
11	16	1	16	16	176	11
12	12	2	24	48	144	12
13	10	3	30	90	130	13
14	7	4	28	112	198	14
15	5	5	25	125	75	15
TOTAL	99		75	503	1065	

TABLE - 17

CALCULATION OF STANDARD DEVIATION FOR
1-2 and 2-3 HOUR INTERVALS

CLASS INTERVAL	FREQ. A	CODE B	AxB	B(AxB)	AxINT.	CLASS INTERVAL
15	1	-11	-11	121	15	15
16	0	-10	0	0	0	16
17	0	-9	0	0	0	17
18	3	-8	-24	192	54	18
19	6	-7	-42	294	114	19
20	10	-6	-60	360	200	20
21	6	-5	-30	150	126	21
22	6	-4	-24	96	132	22
23	9	-3	-27	81	207	23
24	8	-2	-16	32	192	24
25	6	-1	-6	6	150	25
26	12	0	0	0	312	26
27	5	1	5	5	135	27
28	4	2	8	16	112	28
29	6	3	18	54	174	29
30	4	4	16	64	120	30
31	6	5	30	150	186	31
32	2	6	12	72	64	32
33	4	7	28	196	132	33
34	1	8	8	64	34	34
35	1	9	9	81	35	35
36	2	10	20	200	72	36
37	1	11	11	121	37	37
38	0	12	0	0	0	38
39	1	13	13	169	39	39
TOTAL	104		-82	2524	2642	

TABLE - 18

χ^2 SQUARE TEST FOR THE 9-10, 10-11, and 11-12 HOUR INTERVALS

CLASS INT.	FREQ. OBS.	CUML. PROB. B	EXACT PROB. A	THEO. FREQ. NxA	NxA LUMP.	OBS. LUMP. C	$\frac{[(NxA)-C]^2}{NxA}$
22	1	.0322	.0322	3.30			
23	4	.0606	.0288	2.96	10.90	11	.0010
24	6	.1056	.0450	4.64			
25	8	.1711	.0655	6.75	6.75	8	.2310
26	9	.2578	.0876	8.94	8.94	9	.0004
27	10	.3632	.1054	10.85	10.85	10	.0690
28	12	.4801	.1169	12.05	12.05	12	.0002
29	12	.5987	.1176	12.10	12.10	12	.0008
30	6	.7088	.1101	11.41	11.41	6	2.5500
31	10	.8023	.0935	9.64	9.64	10	.0135
32	10	.8749	.0726	7.47	7.47	10	.8600
33	6	.9265	.0516	5.31	5.31	6	.0885
34	4	.9599	.0334	3.44			
35	1	.9798	.0199	2.05			
36	1	.9906	.0108	1.11	7.56	9	.7500
37	1	.9960	.0054	.55			
38	2	1.0000	.0040	.41			
TOTAL							4.5644

TABLE - 19

χ SQUARE TEST FOR THE 12-1 HOUR INTERVAL

CLASS INT.	FREQ. OBS.	CUML. PROB. B	EXACT PROB. A	THEO. FREQ. NxA	NxA LUMP.	OBS. LUMP. C	$\frac{[NxA)-C]^2}{NxA}$
6	2	.0233	.0233	2.3	6.47	6	.0340
7	4	.0655	.0422	4.17			
8	8	.1469	.0814	8.05	8.05	8	.0003
9	12	.2810	.1341	13.30	13.30	12	.1270
10	23	.4602	.1792	17.80	17.80	23	1.5100
11	16	.6443	.1841	18.21	18.21	16	.2640
12	12	.8023	.1580	15.60	15.60	12	.8330
13	10	.9049	.1026	10.15	10.15	10	.0022
14	7	.9633	.0584	5.80	9.93	12	.7000
15	5	1.0000	.0367	3.63			
TOTAL							3.4705

TABLE - 20

X SQUARE TEST FOR THE 1-2 and 2-3 HOUR INTERVALS

CLASS INT.	FREQ. OBS.	CUML. PROB. B	EXACT PROB. A	THEO. FREQ. NxA	NxA LUMP.	OBS. LUMP. C	$\frac{(NxA)-C)^2}{NxA}$
15	1	.018	.018	1.87			
16	0	.032	.014	1.46			
17	0	.053	.021	2.18			
18	3	.081	.028	2.92			
19	6	.119	.038	3.95	17.33	20	.410
20	10	.167	.048	4.95			
21	6	.224	.057	5.92	5.92	6	.001
22	6	.291	.067	6.97	6.97	6	.130
23	9	.365	.074	7.70	7.70	9	.220
24	8	.442	.077	8.00	8.00	8	.000
25	6	.521	.079	8.20	8.20	6	.590
26	12	.598	.077	8.00	8.00	12	2.000
27	5	.670	.072	7.50	7.50	5	.834
28	4	.735	.065	6.76	6.76	4	1.130
29	6	.794	.059	6.13	6.13	6	.004
30	4	.843	.049	5.10	5.10	4	.160
31	6	.884	.041	4.26			
32	2	.916	.032	3.30			
33	4	.940	.024	2.50			
34	1	.958	.018	1.87			
35	1	.972	.014	1.46	15.78	18	.305
36	2	.982	.010	1.04			
37	1	.988	.006	.62			
38	0	.992	.004	.42			
39	1	.995	.003	.31			
TOTAL							5.784

TABLE - 21

χ SQUARE SIGNIFICANCE TEST

INTERVAL	9-10, 10-11 and 11-12	12-1	1-2 and 2-3
DEGREES OF FREEDOM	8	5	10
χ SQUARE CALCULATED	3.4705	4.5644	5.7840
χ SQUARE TABLES =.05	11.0705	15.5073	18.3070
CRITICAL REGION	$\chi_c^2 > \chi_T^2$	$\chi_c^2 > \chi_T^2$	$\chi_c^2 > \chi_T^2$
ASSUME	Dist. not normal	Dist. not normal	Dist. not poisson
	$3.4705 < \chi_T^2$	$4.5644 < \chi_T^2$	$5.7840 < \chi_T^2$
CONCLUDE AT 5% LEVEL	Dist. normal	Dist. normal	Dist. poisson

TABLE - 22

X-RAY MOVE TIME

UNIT	ROUND TRIP IN MINUTES	FREQUENCY	FREQxTIME	WA-SA	$(DIF)^2$
R1	6.2286	81	504.5166	.0427	.0018
R2	7.8436	66	517.6776	1.5723	2.4721
RB	5.5764	64	356.8896	.6946	.4825
SN	4.9566	56	277.5696	1.3147	1.7284
WOOD	6.3714	286	1822.2204	.1001	.0100
IC	6.0004	40	240.0160	.2709	.0734
TOTAL	56.0912	593	3718.8898		

$SA=\frac{56.0912}{9}$

$SA=6.2323$

$WA=\frac{3718.8898}{593}$

$WA=6.2713$

$\Sigma(DIF)^2 FREQ=296.7708$

$\sigma^2=\frac{296.7708}{592}$

$\sigma^2=.5013$

HYP.: $SA=WA$
ALT. HYP.: $SA\neq WA$

$\alpha=.01$
CR $T_c > T_\tau$
$T_\tau=2.62$

$T=\frac{\bar{X}_1-\bar{X}_2}{\frac{\sigma}{\sqrt{N}}}$

$T_c=\frac{.0490}{.708}$

$T_c=1.6817$

$T_c < T_\tau$
Accept HYP.
Conclude SA=WA

TABLE - 23

PHYSICAL THERAPY MOVE TIME

UNIT	ROUND TRIP IN MINUTES	FREQUENCY	FREQxTIME	WA-SA	$(DIF)^2$
R1	5.2672	33	173.8176	2.0881	4.3601
R2	5.2672	45	273.0240	2.0881	4.3601
RB	6.0498	34	205.6932	1.3055	1.7043
SN	6.5716	28	184.0048	.7837	.6141
WOOD	10.4116	75	780.8700	3.0563	9.3409
TOTAL	43.9790	215	1581.4096		

$\alpha = .01$
CR $T_c > T_\tau$
$T_\tau = 2.62$

HYP.: SA=WA
ALT. HYP.: SA≠WA

$SA = \frac{43.9790}{6}$

$SA = 7.3298$

$WA = \frac{1581.4096}{215}$

$WA = 7.3553$

$\sum (DIF)^2 FREQ = 1115.7963$

$\sigma^2 = \frac{1115.7963}{214}$

$\sigma^2 = 5.214$

$T_c = \frac{\bar{X}_1 - \bar{X}_2}{\frac{\sigma}{\sqrt{N}}}$

$T_c = \frac{.0255}{.156}$

$T_c = .1442$

$T_c < T_\tau$
Accept HYP.
Conclude SA=WA

TABLE - 24

ADMITTING MOVE TIME

UNIT	ROUND TRIP IN MINUTES	FREQUENCY	FREQxTIME	WA-SA	$(DIF)^2$
R1	7.3538	24	176.4912	.2700	.0738
R2	8.9688	35	313.9080	1.8850	3.3332
RB	6.6688	33	220.0704	.4150	.1724
SN	5.9514	38	226.0832	1.1324	1.2824
W5	7.1132	46	327.2072	.0294	.0009
W6	7.1132	64	455.2448	.0294	.0009
W4	7.1132	131	931.8292	.0294	.0009
W2	7.1132	154	1095.4328	.0294	.0009
IC	5.1360	14	71.9040	1.9468	3.7730
TOTAL	62.5316	539	3818.2408		

$SA=\frac{62.5316}{9}$

$SA=6.9479$

$WA=\frac{3818.2408}{539}$

$WA=7.0839$

$\Sigma(DIF)^2 FREQ=233.9616$

$\sigma^2=\frac{233.9616}{538}$

$\sigma^2=.4340$

HYP.: $SA=WA$ $\quad \alpha=.01$

ALT. HYP.: $SA\neq WA$ $\quad CR=T_c>T_\tau$

$T_\tau=2.62$

$T_c=\frac{\bar{X}_1-\bar{X}_2}{\frac{\sigma}{\sqrt{N}}}$

$T_c=\frac{.136}{.0284}$

$T_c=4.7887$

$T_c>T_\tau$

Don't Accept HYP.
Conclude $SA\neq WA$

TABLE - 25

DISCHARGE MOVE TIME

UNIT	ROUND TRIP IN MINUTES	FREQUENCY	FREQxTIME	WA-SA	$(DIF)^2$
R1	7.3538	29	213.2602	.2428	.0688
R2	8.9688	37	331.8456	1.8578	3.4516
RB	6.6688	42	280.0896	.4422	.1556
SN	5.9514	45	267.8130	1.1596	1.3448
W5	7.1132	56	398.3392	.0022	.0001
W6	7.1132	69	490.8108	.0022	.0001
W4	7.1132	129	914.6028	.0022	.0001
W2	7.1132	182	1294.6024	.0022	.0001
IC	5.1360	3	15.4080	1.9750	3.9008
TOTAL	62.5316	592	4209.7716		

$SA=\frac{62.5316}{9}$

$SA=6.9478$

$WA=\frac{4209.7716}{592}$

$WA=7.1110$

$\Sigma(DIF)^2 FREQ=210.0224$

$\sigma^2=\frac{210.0224}{591}$

$\sigma^2=.3547$

HYP.: $SA=WA$

ALT.HYP.: $SA\neq WA$

$T_c=\frac{\bar{X}_1-\bar{X}_2}{\frac{\sigma}{\sqrt{N}}}$

$T_c=\frac{.1632}{.0243}$

$T_c=6.857$

$\alpha=.01$

CR $T_c > T_T$

$T = 2.62$

$T_c > T_T$

Don't Accept HYP.

Conclude SA=WA

TABLE - 26

AVERAGE TIMES FOR EACH HOUR INTERVAL

9-10, 10-11, and 11-12 hour intervals

DEPT.	NUMBER OF TRIPS	AVG. TIME PER TRIP	TOTAL TIME	AVG. TIME
X-RAY	252	6.2323	1570.5396	
PHY.THY.	149	7.3298	1092.1402	$\frac{4288.1447}{630}$
DISCH.	229	7.0981	1625.4649	
TOTAL	630		4288.1447	6.80 min.

12-1 hour interval

DEPT.	NUMBER OF TRIPS	AVG. TIME PER TRIP	TOTAL TIME	AVG. TIME
X-RAY	252	6.2323	1570.5396	$\frac{1570.5396}{252}$
TOTAL	252		1570.5396	6.23 min.

1-2, and 2-3 hour intervals

DEPT.	NUMBER OF TRIPS	AVG. TIME PER TRIP	TOTAL TIME	AVG. TIME
X-RAY	252	6.2323	1570.5396	$\frac{3880.6373}{569}$
ADMIT.	317	7.0981	2250.0977	
TOTAL	569		3820.6373	6.71 min.

Sample includes the month of January, weekdays only

TABLE -27

MANPOWER REQUIREMENTS

TIME INTERVAL	NUMBER OF TRIPS AT THE 90% SIGF. LEVEL	AVG. TIME PER TRIP	TOTAL TIME	PEOPLE NEEDED
9-10, 10-11 and 11-12	33	6.80	224.40	$\frac{224.40}{60} \approx 4$
12-1	13	6.23	80.99	$\frac{80.99}{60} \approx 2$
1-2 and 2-3	32	6.71	214.72	$\frac{214.72}{60} \approx 4$

TABLE - 28

TRANSPORTATION COST BREAK DOWN

DEPARTMENT OR NURSING UNIT	AVG. DAILY TRANSPORT TIME-HRS.	AVG. HRLY. COST IN DOLLARS	AVG. DAILY TRANSPORT COST
Accident Rm.	1.00	2.31	2.31
Admitting Of.	.45	1.83	.84
Accounting Of.	.61	1.82	1.11
Addressograph	.89	1.74	1.55
Billing Of.	.53	1.74	.93
Central Supply Rm.	.80	1.68	1.35
Credit Of.	.61	1.74	1.07
Dietary	1.80	2.02	3.64
Dietz Of.	1.20	2.36	2.84
E.E.G.	.33	3.91	1.29
E.K.G.	.74	1.82	1.35
Plant Eng. Of.	no data available		
Gustavson Of.	.66	2.26	1.49
Health Of.	.89	3.28	2.92
Housekeeping	2.69	1.70	4.58
Hurley Of.	.66	1.74	1.15
I.B.M.	1.33	2.10	2.80
I.C.U.	2.10	1.68	3.53
Information Desk	1.18	1.82	2.15
Lab.	1.06	1.90	2.02
Laundry	no data available		

TABLE - 29

TRANSPORTATION COST BREAK DOWN

DEPARTMENT OR NURSING UNIT	AVG. DAILY TRANSPORT TIME-HRS.	AVG. HRLY. COST IN DOLLARS	AVG. DAILY TRANSPORT COST
Maintenance	.70	2.99	2.09
Medicare Of.	.60	1.82	1.10
Medical Recd.	3.45	1.77	6.11
Medical Staff Sec.	.40	1.90	.76
Nursing Ser. Deliv.	5.00	1.74	8.70
Nursing Of.	.34	1.90	.65
Operating Rm.	included with nursing service delivery		
Out Patient Dept.	2.03	1.68	3.41
Personnel	.94	1.94	1.82
Pharmacy	4.10	1.91	1.82
Physical Therapy	2.66	1.85	4.92
Purchasing Of.	.83	1.90	1.58
Read	3.41	1.80	6.13
Richardson 1	3.32	1.85	6.14
Richardson 2	3.10	1.82	5.62
Sayles	3.21	1.80	5.77
Store Rm.	1.43	2.11	3.02
Volunteer Of.	.86	2.26	1.94
Wood 2	3.31	1.72	5.70
Wood 4	3.50	2.13	7.46
Wood 5	3.40	2.05	6.97

TABLE - 30

TRANSPORTATION COST BREAK DOWN

DEPARTMENT OR NURSING UNIT	AVG. DAILY TRANSPORT TIME-HRS.	AVG. HRLY. COST IN DOLLARS	AVG. DAILY TRANSPORT COST
Wood 6	3.33	1.91	6.36
X-Ray	5.46	1.83	10.00
Payroll Of.	no data available		
Photography	no data available		
Equipment Rm.	no data available		
Nursing Ed. Of.	no data available		
* Estimate	4.00	1.80	7.20

AVERAGE TOTAL COST $150.20 PER DAY

* Estimate for those departments with no data available

TABLE - 31

MANPOWER POTENTIAL

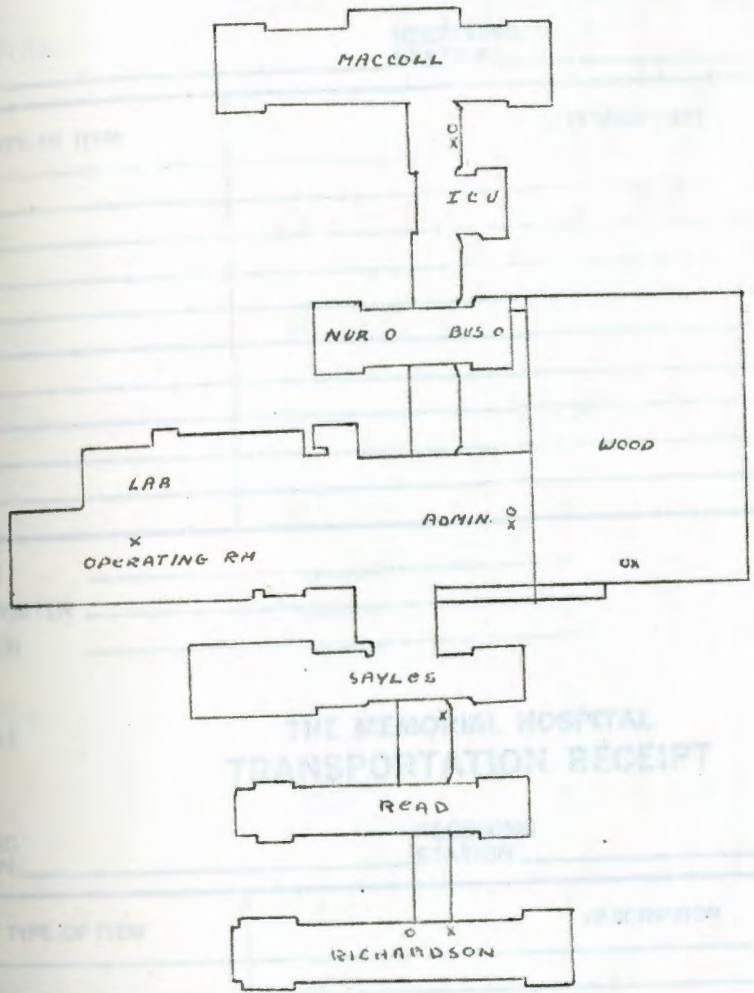
* ESTIMATED TRANSPORTATION SAVINGS	$150.20
** HOURLY WAGE RATE FOR TRANSPORTERS	$ 1.70
NUMBER OF WORKING HOURS THAT CAN BE PAYED	88
NUMBER OF TRANSPORTERS THAT CAN BE HIRED	11

* Minimum estimate

** Rate is $.10 above minimum wage

FIGURE - 1

MEMORIAL HOSPITAL OF PAWTUCKET



SCALE:
$\frac{1}{2}$in.=20ft.
x stairs
o elevator

Figure - 2

Form CTS 1

THE MEMORIAL HOSPITAL
TRANSPORTATION RECEIPT

SENDING STATION:_____ RECEIVING STATION:_____ DATE:_____

TYPE OF ITEM	DESCRIPTION
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

SENDER _____ SIGNATURE

TRANSPORTER _____ SIGNATURE

RECEIVER _____ SIGNATURE

30-261

Form CTS 1

THE MEMORIAL HOSPITAL
TRANSPORTATION RECEIPT

SENDING STATION:_____ RECEIVING STATION:_____ DATE:_____

TYPE OF ITEM	DESCRIPTION
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

SENDER _____ SIGNATURE

TRANSPORTER _____ SIGNATURE

RECEIVER _____ SIGNATURE

30-261

Figure - 3

HOURLY BREAKDOWN OF PATIENTS MOVES FOR ONE WEEK

HOUR INTERVAL	X-RAY	PHYSICAL THERAPY	NURSING UNIT
8-9	6	2	37
9-10	50	32	37
10-11	46	48	80
11-12	42	16	80
12-1	34	0	31
1-2	32	6	36
2-3	44	7	33
3-4	20	3	20
4-5	14	0	20
TOTAL	288	114	374

nursing unit figures represent duplication of other departments.

FIGURE - 4

FREQUENCY DISTRIBUTION FOR 9-10, 10-11 and 11-12 HOUR INTERVALS

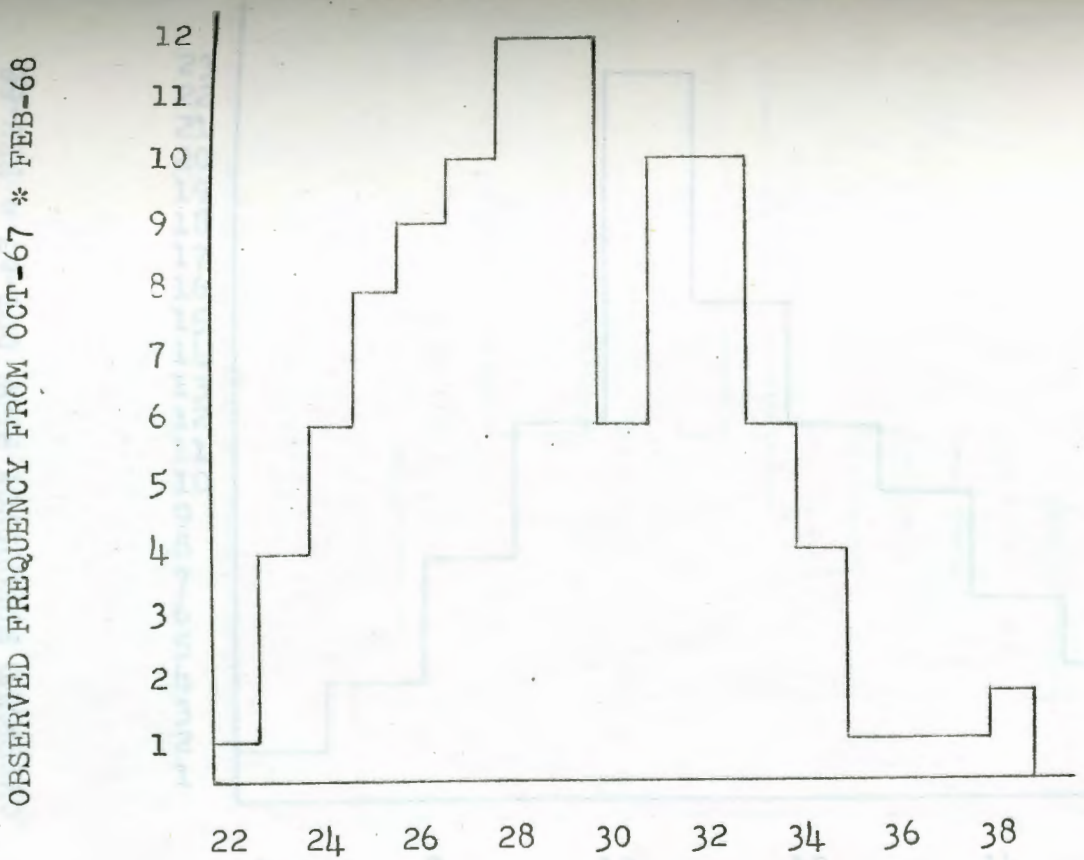


FIGURE - 5

FREQUENCY DISTRIBUTION FOR 12-1 HOUR INTERVAL

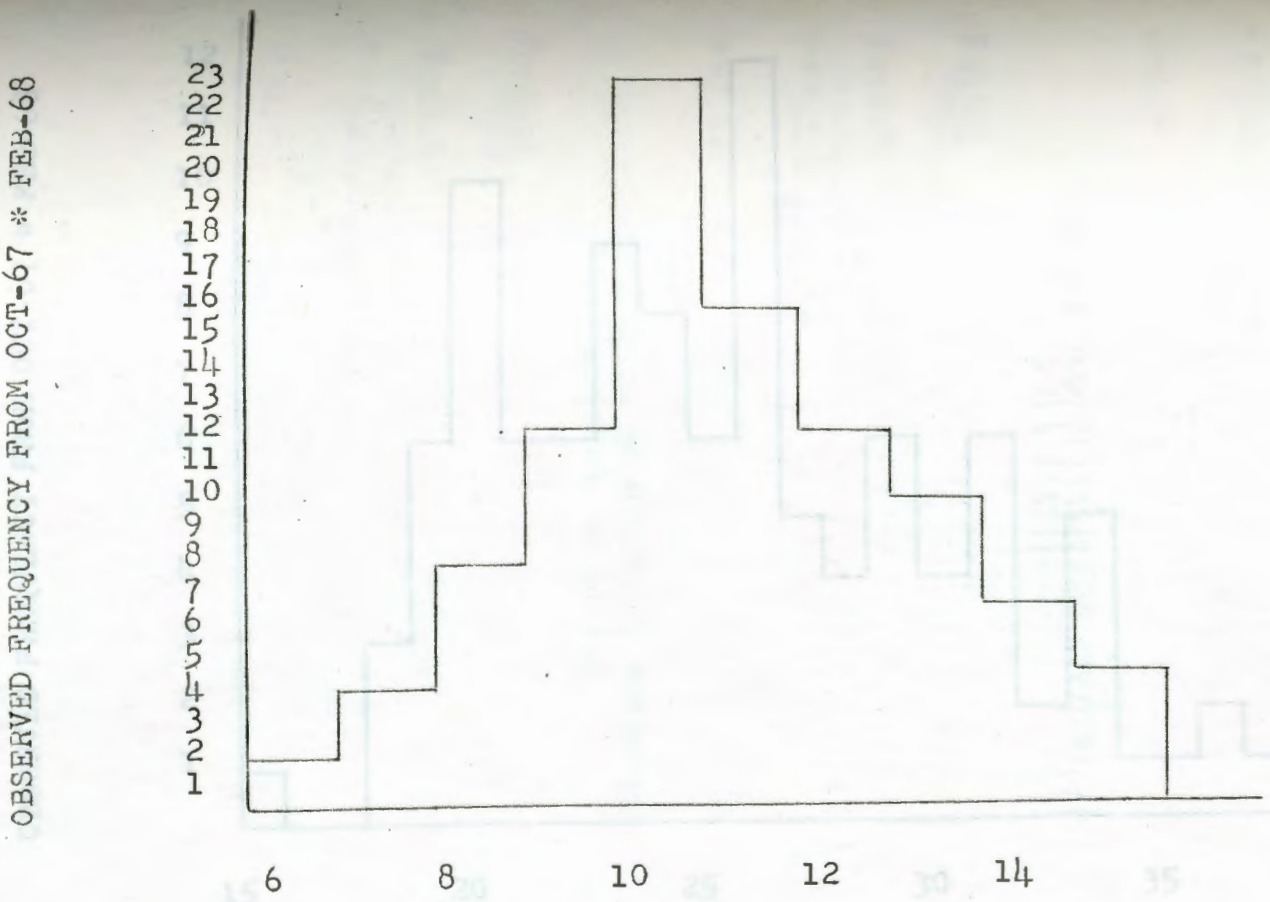


FIGURE - 6

FREQUENCY DISTRIBUTION FOR 1-2 and 2-3 HOUR INTERVALS

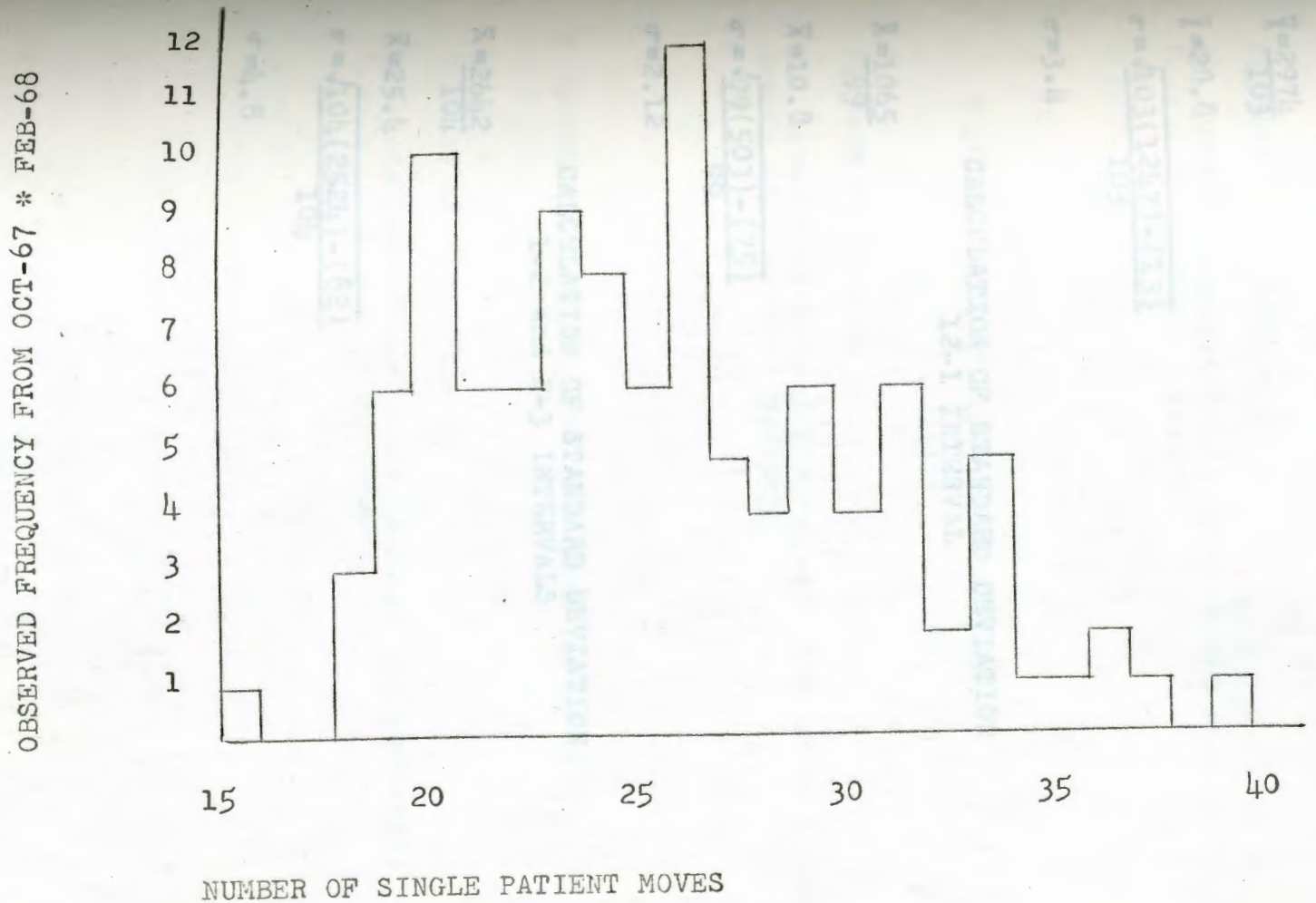


FIGURE - 7

CALCULATION OF STANDARD DEVIATION
9-10, 10-11 and 11-12 INTERVALS

$$\bar{X}=\frac{2974}{103}$$

$$\bar{X}=28.8$$

$$\sigma=\sqrt{\frac{103(1247)-(13)}{103}}$$

$$\sigma=3.4$$

CALCULATION OF STANDARD DEVIATION
12-1 INTERVAL

$$\bar{X}=\frac{1065}{99}$$

$$\bar{X}=10.8$$

$$\sigma=\sqrt{\frac{99(503)-(75)}{99}}$$

$$\sigma=2.12$$

CALCULATION OF STANDARD DEVIATION
1-2 and 2-3 INTERVALS

$$\bar{X}=\frac{2642}{104}$$

$$\bar{X}=25.4$$

$$\sigma=\sqrt{\frac{104(2524)-(82)}{104}}$$

$$\sigma=4.8$$

FIGURE - 8

χ SQUARE TEST ON 9-10, 10-11 and 11-12 HOUR INTERVALS

Degrees of freedom - 8

The total deviation falls between the probability levels of 90 and 80 percent

χ SQUARE TEST ON 12-1 HOUR INTERVAL

Degrees of freedom - 5

The total deviation falls between the probability levels of 70 and 50 percent

χ SQUARE TEST ON 1-2 and 2-3 HOUR INTERVALS

Degrees of freedom - 10

The total deviation falls between the probability levels of 90 and 80 percent

FIGURE - 9

F-TEST BETWEEN DISCHARGE - ADMITTING

HYP.: $\sigma_1^2 = \sigma_2^2$

ALT. HYP.: $\sigma_1^2 \neq \sigma_2^2$

$F_c = \frac{.3547}{.4340}$

$F_c \approx .83$

$\sigma_1^2 = .3547$

$\sigma_2^2 = .4340$

$n_1 = 592$

$n_2 = 593$

$\alpha = .01$

CRITICAL REGION

$F_{591,\ 538,\ .99} < F_c < F_{591,\ 538,\ .01}$

$.82 < F_c < 1.22$

Conclude: $\sigma_1^2 = \sigma_2^2$

T-TEST BETWEEN DISCHARGE - ADMITTING

HYP.: $\bar{X}_1 = \bar{X}_2$

ALT. HYP.: $\bar{X}_1 \neq \bar{X}_2$

$T_c = \frac{7.0839 - 7.1110}{\sqrt{\frac{.3547 + .4340}{1129}}}$

$T_c \approx 1$

$T_T = 2.6$

$n_1 = 592$

$n_2 = 539$

$\alpha = .01$

CRITICAL REGION

$T_c < T_T$

Conclude: $\bar{X}_1 = \bar{X}_2$

AVERAGE POOLED TIME = $\frac{8028.0124}{1131}$

= 7.0981

COMPUTER PROGRAM

```
/JOB GO,NOMAP,TIME=10
/ETC NAME=MAIN,LIST,NOREF
BPS FORTRAN D COMPILER
      C     MAIN PROGRAM
      C     VALUES READ AS INPUT
S.0001      COMMON DDIS(48,48),IGRPR(19,18),ITRES(48),LPRN(48,15),NGRP(48),
           1NPRD(48),NSIM(48),TMRES(48)
      C     ARRAY VALUES COMPUTED BY PROGRAM
S.0002      COMMON IRST(15),ISYS(48),JARRY(35,30),JHRPR(50),KTOTAL(35),
           1LHRPR(50),NHRPR(50)
      C     SINGLE CELL VALUES COMPUTED BY PROGRAM
S.0003      COMMON IDDR,IHR,ISA,ISTART,LGROUP,LSMIN,LSMTY,LSTAT,TIME,TIMEP
S.0004      COMMON ICOUNT,IOP,NGPS
S.0005      DIMENSION LNAR(35),LYAR(15)
S.0006      CALL INPUT
S.0007      WRITE(IOP,102)
S.0008  102 FORMAT(1H1)
S.0009      WRITE(IOP,460) LSTAT
S.0010  460 FORMAT(1X,24HTHE STARTING STATION IS I3//)
      C     INITIALIZATION
S.0011      ITRS=0
S.0012      DO 5 I=1,48
S.0013    5 ISYS(I)=0
S.0014      ISYS(LSTAT)=1
S.0015      NDPTS=48
S.0016   10 ISTART=0
S.0017      NN=0
S.0018      NDONE=0
S.0019      IDDR=0
S.0020      IC1=0
S.0021      IB1=0
      C     TOTAL NO. OF DEPTS. NEEDED AT THIS TIME
S.0022      ICOUNT=0
      C     TOTAL NO. OF DEPTS. WITH SAME SIMILARITY NO.
S.0023      LSMTY=0
      C     TOTAL NO. OF DEPTS. WITH DIFFERENT SIMILARITY NO.
S.0024      LSMTN=0
      C     DETERMINE NO. OF DEPTS. NEEDED
S.0025      DO 100 I=1,NDPTS
      C     FIRST TEST PAST TIME TO SEE IF ALREADY DONE
S.0026   29 IF(TIMEP-TMRES(I)) 30,100,100
      C     NOW TEST PRESENT TIME
S.0027   30 IF(TIME-TMRES(I)) 100,40,40
      C     STEP UP TOTAL NO. COUNTER
S.0028   40 ICOUNT=ICOUNT+1
S.0029      ISYS(I)=0
      C     SEE IF THERE IS A SIMILAR NO. IN THE SIMILARITY ARRAY
S.0030      IF(NSIM(I)) 85,85,44
S.0031   44 IF(LSMTY) 60,60,45
S.0032   45 DO 55 J=1,LSMTY
S.0033      ISUB=LYAR(J)
S.0034      IF(NSIM(I)-NSIM(ISUB)) 55,50,55
      C     THERE IS A SIMILAR NO.
S.0035   50 LSMTY =LSMTY+1
S.0036      LYAR(LSMTY)=I
S.0037      GO TO 100
S.0038   55 CONTINUE
      C     TEST FOR A SIMILAR NO. IN THE SO FAR NON-SIMILAR ARRAY
S.0039   60 IF(LSMTN) 85,85,65
S.0040   65 DO 80 J=1,LSMTN
S.0041      JA=J
S.0042      ISUB=LNAR(J)
```

```
S.0043          IF(NSIM(I)-NSIM(ISUB)) 80,70,80
                C     A SIMILARITY NO. IS FOUND, REDUCE NON-SIMILARITY COUNTER AND
                C     MOVE UP THE NON-SIMILAR ARRAY
                C     INCREASE THE SIMILARITY COUNTER AND ARRAY BY TWO
S.0044       70 LSMTY=LSMTY+2
S.0045          LSMTN=LSMTN-1
S.0046          LYAR(LSMTY-1)=ISUB
S.0047          LYAR(LSMTY)=I
S.0048          IF(LSMTN) 100,100,72
S.0049       72 DO 75 K=JA,LSMTN
S.0050       75 LNAR(K)=LNAR(K+1)
S.0051          GO TO 100
S.0052       80 CONTINUE
                C     ADD TO NON-SIMILARITY ARRAY
S.0053       85 LSMTN=LSMTN+1
S.0054          LNAR(LSMTN)=I
S.0055      100 CONTINUE
S.0056          TIMEP=TIME
S.0057          IF(ICOUNT) 110,110,200
S.0058      110 DO 150 I=1,NOPTS
                C     DETERMINE DEPTS. WITH NO TIME RESTRICTIONS
S.0059          IF(ITRES(I)) 150,125,150
                C     DETERMINE IF ALREADY IN SYSTEM
S.0060      125 IF(ISYS(I)) 150,130,150
S.0061      130 ICOUNT=ICOUNT+1
S.0062          LNAR(ICOUNT)=I
S.0063      150 CONTINUE
S.0064          IF(ICOUNT) 500,500,160
S.0065      160 CALL PRIOR(1,ICOUNT,LNAR,LYAR)
S.0066          ITRY=0
S.0067      161 CALL SELECT(1,ICOUNT,1,ILST,IVAL)
S.0068          IF(IVAL) 164,164,162
S.0069      162 ISB=LNAR(IVAL)
S.0070          ISA=NGRP(ISB)
S.0071          LGROUP=IGRPR(ISA,1)
S.0072          CALL OUTPUT(1)
S.0073          GO TO 10
S.0074      164 ITRY=ITRY+1
S.0075          IF(ITRY-NGPS) 165,165,450
S.0076      165 LGROUP=IGRPR(ISA,ITRY)
S.0077          GO TO 161
S.0078      200 IF(LSMTY) 220,220,205
S.0079      205 NVE=LSMTY
S.0080          CALL PRIOR(1,NVE,LYAR,LNAR)
S.0081          IF(LSMTN) 250,250,210
S.0082      210 L1=LSMTY+1
S.0083          GO TO 225
S.0084      220 L1=1
S.0085      225 NVE=LSMTN
S.0086          CALL PRIOR(L1,LSMTN,LNAR,LYAR)
                C     TEST TO SEE IF ANY PRIORITY DEPTS. ARE ALSO HOUR DEPTS.
S.0087      250 IF(IHR-1) 256,257,255
                C     PUT PRIORITY HOUR ARRAY IN PROPER SEQUENCE
S.0088      255 CALL ORDER
S.0089          NDONE=IHR
S.0090      257 CALL PHOUR(MSIM,LYAR)
                C       TEST TO SEE IF SIMILARITY COMPLETED
S.0091      256 IF(MSIM) 258,258,280
S.0092      258 IF(LSMTY) 284,284,260
S.0093      260 IA1=1
S.0094          IA2=LSMTY
S.0095          ILST=0
```

```
S.0096        262 CALL SELECT(IA1,IA2,-1,ILST,IVAL)
S.0097            IF(IVAL) 275,275,265
S.0098        265 ILST=1
S.0099            IB1=IB1+1
S.0100            MSIM=1
S.0101            ISB=LYAR(IVAL)
S.0102            ITRY=1
S.0103            ISA=NGRP(ISB)
S.0104            LGROUP=IGRPR(ISA,ITRY)
S.0105            IF(IB1-LSMTY) 262,270,270
S.0106        270 IF(NN) 283,283,310
S.0107        275 IF(MSIM) 280,280,278
S.0108        278 ITRY=ITRY+1
S.0109            LGROUP=IGRPR(ISA,ITRY)
S.0110            IF(ITRY-NGPS) 262,262,450
S.0111        280 IF(NN) 283,283,298
S.0112        283 IF(LSMTN) 305,305,285
S.0113        284 MSIM=1
S.0114        285 IF(IC1+NDONE-LSMTN) 286,305,305
S.0115        286 IA1=LSMTY+1
S.0116            IA2=LSMTN+LSMTY
S.0117            ILOC=1
S.0118        288 CALL SELECT(IA1,IA2,ILOC,ILST,IVAL)
S.0119            IF(IVAL) 298,298,290
S.0120        290 IC1=IC1+1
S.0121            ISB=IVAL-LSMTY
S.0122            ISR=LNAR(ISB)
S.0123            ITRY=1
S.0124            ISA=NGRP(ISR)
S.0125            LGROUP=IGRPR(ISA,ITRY)
S.0126            IF(IC1+NDONE-LSMTN) 292,295,295
S.0127        292 IF(MSIM) 260,260,288
S.0128        295 NN=1
S.0129            IF(MSIM) 260,260,310
S.0130        298 ITRY=ITRY+1
S.0131            LGROUP=IGRPR(ISA,ITRY)
S.0132        300 IF(MSIM) 260,260,285
S.0133        305 NN=1
S.0134            IF(MSIM) 278,278,310
S.0135        310 CALL OUTPUT(0)
S.0136            GO TO 10
S.0137        450 WRITE(IOP,451)
S.0138        451 FORMAT(1X,38HTHERE IS AN ERROR IN SELECTING A GROUP)
S.0139        500 STOP
S.0140            END

FORTRAN DIAGNOSTIC MESSAGES.

GENERAL DIAGNOSTICS
1 PROGRAM 1161 SUGGEST SUBDIVIDING PROGRAM
END OF COMPILATION  MAIN
```

```
/FTC NAME=ORDER,LIST,NOREF
BPS FORTRAN D COMPILER
S.0001          SUBROUTINE ORDER
                C     VALUES READ AS INPUT
S.0002          COMMON DD1S(48,48),IGRPR(19,18),ITRES(48),LPRN(48,15),NGRP(48),
               1NPRD(48),NSIM(48),TMRES(48)
                C     ARRAY VALUES COMPUTED BY PROGRAM
S.0003          COMMON IRST(15),ISYS(48),JARRY(35,30),JHRPR(50),KTOTAL(35),
               1LHRPR(50),NHRPR(50)
                C     SINGLE CELL VALUES COMPUTED BY PROGRAM
S.0004          COMMON IDDR,IHR,ISA,ISTART,LGROUP,LSMTN,LSMTY,LSTAT,TIME,TIMEP
S.0005          COMMON ICOUNT,IOP,NGPS
                C     THIS ROUTINE PUTS THE HOUR DEPTS. WHICH ARE ALSO PRIORITIES IN
                C     ORDER AND ELIMIMATES THOSE WHICH ARE REPEATED
S.0006          IA1=1
S.0007          IA2=IHR-1
S.0008        3 IFLAG=0
S.0009          DO 35 I=IA1,IA2
S.0010          IC=I
S.0011          IVAL=LHRPR(I)
S.0012          I1=I+1
S.0013          DO 30 J=I1,IHR
                C     TEST PRIORITY HOUR AGAINST REGULAR HOUR
S.0014          IF(IVAL-NHRPR(J)) 30,10,30
                C     A PRIORITY TO THE PRIORITY HOUR FOUND
S.0015       10 TEMP1=LHRPR(I)
S.0016          TEMP2=NHRPR(I)
S.0017          TEMP3=JHRPR(I)
S.0018          LHRPR(I)=LHRPR(J)
S.0019          JHRPR(I)=JHRPR(J)
S.0020          NHRPR(I)=NHRPR(J)
                C     MOVE PRIORITY TO LOCATION BEFORE THE PRIORITY HOUR
                C     MOVE REMAINING NOS. ONE LOCATION DOWN
S.0021          IB2=J-I-1
                C     TEST TO SEE ANY NOS. LEFT TO BE MOVED
S.0022          IF(IB2) 25,25,15
S.0023       15 DO 20 IB=1,IB2
S.0024          IS1=J-IB
S.0025          IS2=IS1+1
S.0026          LHRPR(IS2)=LHRPR(IS1)
S.0027          JHRPR(IS2)=JHRPR(IS1)
S.0028       20 NHRPR(IS2)=NHRPR(IS1)
S.0029       25 LHRPR(J)=TEMP1
S.0030          NHRPR(J)=TEMP2
S.0031          JHRPR(J)=TEMP3
S.0032          GO TO 36
S.0033       30 CONTINUE
S.0034       35 CONTINUE
S.0035          GO TO 40
S.0036       36 IA1=IC
S.0037          GO TO 3
                C     REMOVE ANY DUPLICATE PRIORITY HOUR DEPTS. FROM ARRAY
                C     AND MOVE UP ARRAY DECREASE TOTAL NO. OF HOUR DEPTS. THAT ARE
                C     PRIORITY AS WELL
S.0038       40 IFLAG=0
S.0039          IZ2=IA2
S.0040          DO 48 I=1,IZ2
S.0041          II1=I+1
S.0042       41 JJ2=IHR
S.0043          DO 42 J=II1,JJ2
S.0044          IF(LHRPR(I)-LHRPR(J)) 42,43,42
S.0045       42 CONTINUE
```

```
S.0046          IF(IFLAG) 45,48,45
S.0047       43 JJ1=J
S.0048          DO 44 JA=JJ1,IA2
S.0049          JHRPR(JA)=JHRPR(JA+1)
S.0050          NHRPR(JA)=NHRPR(JA+1)
S.0051       44 LHRPR(JA)=LHRPR(JA+1)
S.0052          IHR=IHR-1
S.0053          IA2=IHR-1
S.0054          II1=JJ1
S.0055          IFLAG=1
S.0056          IF(IA2) 90,90,41
S.0057       45 IF(I-IA2) 48,50,50
S.0058       48 CONTINUE
C               DECIDE WHICH PRIORITIES MUST BE DONE TOGETHER
S.0059          ISTART=1
S.0060       50 DO 80 I=1,IA2
S.0061       53 IVAL=NHRPR(I)
S.0062          II=I+1
S.0063          JJ2=IHR
S.0064       55 DO 75 J=II,JJ2
S.0065       58 IF(IVAL-LHRPR(J)) 60,78,60
S.0066       60 IF(IVAL-NHRPR(I+1)) 65,80,65
S.0067       65 IS1=I+1
S.0068          IF(IS1-IHR) 68,80,80
S.0069       68 TEMP1=NHRPR(I+1)
S.0070          TEMP2=LHRPR(I+1)
S.0071          TEMP3=JHRPR(I+1)
S.0072       69 DO 70 IST=IS1,IA2
S.0073          NHRPR(IST)=NHRPR(IST+1)
S.0074          JHRPR(IST)=JHRPR(IST+1)
S.0075       70 LHRPR(IST)=LHRPR(IST+1)
S.0076          NHRPR(IHR)=TEMP1
S.0077          LHRPR(IHR)=TEMP2
S.0078          JHRPR(IHR)=TEMP3
S.0079          JJ2=JJ2-1
S.0080          IF(JJ2-II) 53,72,55
S.0081       72 TEMP1=NHRPR(I)
S.0082          TEMP2=LHRPR(I)
S.0083          TEMP3=JHRPR(I)
S.0084          IS1=I
S.0085          GO TO 69
S.0086       75 CONTINUE
S.0087          GO TO 80
S.0088       78 ISTART=I+1
S.0089       80 CONTINUE
S.0090          GO TO 100
S.0091       90 ISTART=1
S.0092      100 RETURN
S.0093          END

FORTRAN DIAGNOSTIC MESSAGES.

GENERAL DIAGNOSTICS
IFC0031161 SUGGEST SUBDIVIDING PROGRAM
END OF COMPILATION  ORDER
```

```
/FTC NAME=SELECT,LIST,NORFF
BPS FORTRAN D COMPILER
S.0001          SUBROUTINE SELECT(IA1,IA2,ILOC,ILST,IVAL)
          C     VALUES READ AS INPUT
S.0002          COMMON DDIS(48,48),IGRPR(19,18),ITRES(48),LPRN(48,15),NGRP(48),
               1NPRD(48),NSIM(48),TMRES(48)
          C     ARRAY VALUES COMPUTED BY PROGRAM
S.0003          COMMON IRST(15),ISYS(48),JARRY(35,30),JHRPR(50),KTOTAL(35),
               1LHRPR(50),NHRPR(50)
          C     SINGLE CELL VALUES COMPUTED BY PROGRAM
S.0004          COMMON IDDR,IHR,ISA,ISTART,LGROUP,LSMTN,LSMTY,LSTAT,TIME,TIMEP
S.0005          COMMON ICOUNT,IOP,NGPS
          C     INITIALIZE ANSWER
S.0006          IVAL=0
S.0007          DO 35 I=IA1,IA2
S.0008          IF(ILOC) 5,7,9
          C     FOR LYAR SIMILARITY ARRAY
S.0009        5 IDD=I
S.0010          IF(ILST) 13,13,14
          C     FOR JHRPR HOUR PRIORITY ARRAY
S.0011        7 IDD=JHRPR(I)
S.0012          GO TO 13
          C     FOR LNAR NON-SIMILARITY ARRAY
S.0013        9 IDD=I
S.0014       13 ILST=KTOTAL(IDD)
S.0015       14 IDV=JARRY(IDD,1)
S.0016          IF(ISYS(IDV)) 15,15,35
S.0017       15 IF(ILST-1) 18,18,20
S.0018       18 ISUB=IDV
S.0019          IF(ISA-NGRP(IDV)) 19,60,19
S.0020       19 IF(LGROUP-NGRP(IDV)) 35,60,35
S.0021       20 NUMBR=JARRY(IDD,ILST)
S.0022          MS=0
S.0023          DO 30 K=1,NUMBR
S.0024          ISUB1=ILST-K
S.0025          ISUB=JARRY(IDD,ISUB1)
S.0026          IF(ISYS(ISUB)) 25,25,30
S.0027       25 IF(ISA-NGRP(ISUB)) 27,45,27
S.0028       27 IF(LGROUP-NGRP(ISUB)) 29,45,29
S.0029       29 MS=1
S.0030       30 CONTINUE
S.0031          IF(MS) 32,32,35
S.0032       32 ILST=ISUB1-1
S.0033          GO TO 15
S.0034       35 CONTINUE
S.0035          GO TO 80
S.0036       45 IF(K-1) 60,60,48
S.0037       48 ISS=ILST-1
S.0038          TEMP=JARRY(IDD,ISS)
S.0039          JARRY(IDD,ISS)=JARRY(IDD,ISUB1)
S.0040          JARRY(IDD,ISUB1)=TEMP
S.0041       60 CALL TIMCAL(IDV,IDD,ILST)
S.0042          IVAL=I
S.0043       80 RETURN
S.0044          END

FORTRAN DIAGNOSTIC MESSAGES.

GENERAL DIAGNOSTICS
I2C031161 SUGGEST SUBDIVIDING PROGRAM
END OF COMPILATION  SELECT
```

```
/FTC NAME=INPUT,NOREF,LIST
DPS FORTRAN D COMPILER
S.0001              SUBROUTINE INPUT
                C   VALUES READ AS INPUT
S.0002              COMMON DDIS(48,48),IGRPR(19,18),ITRES(48),LPRN(48,15),NGRP(48),
                   1NPRD(48),NSIM(48),TMRES(48)
                C   ARRAY VALUES COMPUTED BY PROGRAM
S.0003              COMMON IRST(15),ISYS(48),JARRY(35,30),JHRPR(50),KTOTAL(35),
                   1LHRPR(50),NHRPR(50)
                C   SINGLE CELL VALUES COMPUTED BY PROGRAM
S.0004              COMMON IDDR,IHR,ISA,ISTART,LGROUP,LSMTN,LSMTY,LSTAT,TIME,TIMEP
S.0005              COMMON ICOUNT,IOP,NGPS
S.0006              INP=5
S.0007              IOP=6
S.0008              NDPTS=48
S.0009              NGPS=17
S.0010              DO 50 I=1,NDPTS
S.0011              READ(INP,100) TMRES(I),NSIM(I),NGRP(I),NPRD(I),ITRES(I)
S.0012              WRITE(IOP,200) I,TMRES(I),NSIM(I),NGRP(I),NPRD(I),ITRES(I)
S.0013              IF(NPRD(I)) 5,5,4
S.0014            4 ISUB=NPRD(I)
S.0015              READ(INP,101) (LPRN(I,IB),IB=1,ISUB)
S.0016              WRITE(IOP,201) (LPRN(I,IB),IB=1,ISUB)
S.0017            5 READ(INP,102) (DDIS(I,IA),IA=1,NDPTS)
S.0018              WRITE(IOP,202) (DDIS(I,IA),IA=1,NDPTS)
S.0019           50 CONTINUE
S.0020              DO 60 J=1,NGPS
S.0021              IGRPR(J,1)=J
S.0022              READ(INP,101) (IGRPR(J,I),I=2,NGPS)
S.0023           60 WRITE(IOP,203) J,(IGRPR(J,I),I=1,NGPS)
S.0024              READ(INP,104) TIMEP,TIME,LSTAT,LGROUP,ISA
S.0025              WRITE(IOP,204) TIMEP,TIME,LSTAT,LGROUP,ISA
S.0026          100 FORMAT(F10.3,2I3,I4,I3)
S.0027          101 FORMAT(24I3)
S.0028          102 FORMAT(6(9F8.2/))
S.0029          104 FORMAT(2F10.3,3I3)
S.0030          200 FORMAT(1X,18HINPUT FOR STATION I2/1X,F10.3,4I3)
S.0031          201 FORMAT(1X,10HPRIORITIES/1X,24I3)
S.0032          202 FORMAT(1X,14HTIME DISTANCES/(1X,9F8.4/))
S.0033          203 FORMAT(1X,28HGROUP PREFERENCES FOR GROUP I2/24I3)
S.0034          204 FORMAT(1X,18HINITIAL CONDITIONS/1X,2F10.3,3I3)
S.0035              RETURN
S.0036              END

FORTRAN DIAGNOSTIC MESSAGES.

GENERAL DIAGNOSTICS
1 FD031161 SUGGEST SUBDIVIDING PROGRAM
END OF COMPILATION  INPUT
```

```
/FTC NAME=TIMCAL,LIST,NOREF
DOS FORTRAN D COMPILER
S.0001            SUBROUTINE TIMCAL(MSTT,IDD,ILST)
S.0002       C    VALUES READ AS INPUT
                  COMMON DDIS(48,48),IGRPR(19,18),ITRES(48),LPRN(48,15),NGRP(48),
                 INPRD(48),NSIM(48),TMRES(48)
S.0003       C    ARRAY VALUES COMPUTED BY PROGRAM
                  COMMON IRST(15),ISYS(48),JARRY(35,30),JHRPR(50),KTOTAL(35),
                 1LHRPR(50),NHRPR(50)
S.0004       C    SINGLE CELL VALUES COMPUTED BY PROGRAM
                  COMMON IDDR,IHR,ISA,ISTART,LGROUP,LSMTN,LSMTY,LSTAT,TIME,TIMEP
S.0005            COMMON ICOUNT,IOP,NGPS
S.0006          5 IF(ILST-1) 20,10,20
S.0007         10 IF(ISYS(MSTT)) 15,15,70
S.0008         15 TIME=DDIS(LSTAT,MSTT)+TIME
S.0009            ISYS(MSTT)=1
S.0010            LSTAT=MSTT
S.0011            TEMP=TIME/100.
S.0012            FRAC=AMOD(TEMP,1.)
S.0013            IF(FRAC-.599999) 60,60,17
S.0014         17 TIME=(TEMP+.4)*100.
S.0015            GO TO 60
S.0016         20 NUMBR=JARRY(IDD,ILST)
S.0017            DO 50 K=1,NUMBR
S.0018            IEN=ILST-K
S.0019            MSTA=JARRY(IDD,IEN)
S.0020            IF(ISYS(MSTA)) 50,30,50
S.0021         30 TIME=DDIS(LSTAT,MSTA)+TIME
S.0022            ISYS(MSTA)=1
S.0023            IDDR=IDDR+1
S.0024            IRST(IDDR)=MSTA
S.0025            LSTAT=MSTA
S.0026            TEMP=TIME/100.
S.0027            FRAC=AMOD(TEMP,1.)
S.0028            IF(FRAC-.599999) 50,50,40
S.0029         40 TIME=(TEMP+.4)*100.
S.0030         50 CONTINUE
S.0031            ILST=IEN-1
S.0032            GO TO 5
S.0033         60 IDDR=IDDR+1
S.0034            IRST(IDDR)=MSTT
S.0035         70 RETURN
S.0036            END

FORTRAN DIAGNOSTIC MESSAGES.

GENERAL DIAGNOSTICS
1D0031161 SUGGEST SUBDIVIDING PROGRAM
END OF COMPILATION  TIMCAL
```

```
/FTC NAME=PHOUR,LIST,NOREF
BPS FORTRAN D COMPILER
S.0001          SUBROUTINE PHOUR(MSIM,LYAR)
                C     VALUES READ AS INPUT
S.0002          COMMON DDIS(48,48),IGRPR(19,18),ITRES(48),LPRN(48,15),NGRP(48),
               1NPRD(48),NSIM(48),TMRES(48)
                C     ARRAY VALUES COMPUTED BY PROGRAM
S.0003          COMMON IRST(15),ISYS(48),JARRY(35,30),JHRPR(50),KTOTAL(35),
               1LHRPR(50),NHRPR(50)
                C     SINGLE CELL VALUES COMPUTED BY PROGRAM
S.0004          COMMON IDDR,IHR,ISA,ISTART,LGROUP,LSMTN,LSMTY,LSTAT,TIME,TIMEP
S.0005          COMMON ICOUNT,IOP,NGPS
S.0006          DIMENSION LYAR(15)
S.0007          ITRY=1
S.0008          ILOC=0
S.0009          IOP=0
S.0010          MSIM=0
S.0011          IB1=0
S.0012        4 IA1=1
S.0013          IF(ISTART-1) 5,5,10
S.0014        5 IA2=IHR
S.0015          ISEC=1
S.0016          GO TO 12
S.0017       10 IA2=1
S.0018          ISEC=0
S.0019       12 CALL SELECT(IA1,IA2,ILOC,ILST,IVAL)
S.0020          IF(IVAL) 15,15,30
S.0021       15 IF(ISEC) 20,20,25
S.0022       20 IA1=ISTART
S.0023          GO TO 5
S.0024       25 ITRY=ITRY+1
S.0025          LGROUP=IGRPR(ISA,ITRY)
S.0026          IF(IOP) 4,4,12
S.0027       30 IST=LHRPR(IVAL)
S.0028          IF(MSIM) 105,40,105
S.0029       40 IF(LSMTY) 45,45,50
S.0030       45 MSIM=1
S.0031          GO TO 105
S.0032       50 DO 54 J=1,LSMTY
S.0033          IAB=J
S.0034          IF(LYAR(J)-IST) 54,55,54
S.0035       54 CONTINUE
S.0036          GO TO 105
S.0037       55 MSIM=1
S.0038          ILST=1
S.0039       56 ITRY=0
S.0040          IB1=IB1+1
S.0041       57 ISA=NGRP(IST)
S.0042       60 ITRY=ITRY+1
S.0043          LGROUP=IGRPR(ISA,ITRY)
S.0044          IF(IB1-LSMTY) 62,70,70
S.0045       62 CALL SELECT(1,LSMTY,-1,ILST,IAB)
S.0046          IF(IAB) 60,60,65
S.0047       65 IST=LYAR(IAB)
S.0048          GO TO 56
S.0049       70 IF(IVAL-ISTART) 110,132,132
S.0050      105 IF(IVAL-ISTART) 110,130,130
S.0051      110 I1=1
S.0052      111 I2=ISTART-1
S.0053          DO 120 I=I1,I2
S.0054          IDD=JHRPR(I)
S.0055          MSTA=LHRPR(I)
```

```
S.0056            ILST=KTOTAL(MSTA)
S.0057            CALL TIMCAL(MSTA,IDD,ILST)
S.0058        120 CONTINUE
C             SET FLAG TO SAY DOUBLE PRIORITIES HANDLED
                  IDP=1
S.0059            ITRY=1
S.0060            ISA=NGRP(MSTA)
S.0061            LGROUP=IGRPR(ISA,ITRY)
S.0062            IF(IHR-ISTART) 165,124,124
S.0063        124 IA1=ISTART
S.0064            GO TO 5
S.0065        130 ISB=LHRPR(IVAL)
S.0066            ISA=NGRP(ISB)
S.0067            ITRY=1
S.0068            LGROUP=IGRPR(ISA,ITRY)
S.0069        132 IF(IVAL-IHR) 135,145,145
S.0070        135 IAN1=IVAL+1
S.0071            DO 140 IAN=IAN1,IHR
S.0072            JHRPR(IAN-1)=JHRPR(IAN)
S.0073            NHRPR(IAN-1)=NHRPR(IAN)
S.0074        140 LHRPR(IAN-1)=LHRPR(IAN)
S.0075        145 IHR=IHR-1
S.0076            IF(IHR) 165,165,155
S.0077        155 IF(IHR-ISTART) 160,158,158
S.0078        158 IF(IDP) 4,4,20
S.0079        160 IF(IDP) 162,162,165
S.0080        162 I1=1
S.0081            GO TO 111
S.0082        165 RETURN
S.0083            END
S.0084

FORTRAN DIAGNOSTIC MESSAGES.

GENERAL DIAGNOSTICS
IFC031161  SUGGEST SUBDIVIDING PROGRAM
END OF COMPILATION  PHOUR
```

```
/FTC NAME=PRIOR,LIST,NOREF
BPS FORTRAN D COMPILER
S.0001          SUBROUTINE PRIOR(N1,NVT,NARRY,LAAR)
S.0002        C VALUES READ AS INPUT
              COMMON DDIS(48,48),IGRPR(19,18),ITRES(48),LPRN(48,15),NGRP(48),
             1NPRD(48),NSIM(48),TMRES(48)
S.0003        C ARRAY VALUES COMPUTED BY PROGRAM
              COMMON IRST(15),ISYS(48),JARRY(35,30),JHRPR(50),KTOTAL(35),
             1LHRPR(50),NHRPR(50)
S.0004        C SINGLE CELL VALUES COMPUTED BY PROGRAM
S.0005          COMMON IDDR,IHR,ISA,ISTART,LGROUP,LSMTN,LSMTY,LSTAT,TIME,TIMEP
              COMMON ICOUNT,IOP,NGPS
S.0006        C PROGRAM TO FIND ALL PRIORITIES FOR EACH HOUR DEPT.
S.0007          DIMENSION NARRY(15),LAAR(15)
S.0008          IF(N1-1) 2,2,3
S.0009        2 IHR=0
S.0010          IB=0
S.0011        3 NPVL=0
S.0012          DO 300 IA=1,NVT
S.0013          IR=2
S.0014          ISUB=NARRY(IA)
S.0015          I=IB+IA
                JARRY(I,1)=ISUB
              C THE JARRY ARRAY WILL HAVE ALL THE PRIORITIES FOR EACH HOUR DEPT.
              C THE FIRST DIMENSION REPRESENTS THE HOUR DEPT. AND THE SECOND
              C DIMENSION ALL THE PRIORITIES UNDER EACH HOUR DEPT.
              C TEST TO SEE IF HOUR DEPT. HAS ANY PRIORITIES
S.0016          NPVL=NPRD(ISUB)
S.0017          IF(NPVL) 80,80,20
S.0018       20 DO 30 IAD=1,NPVL
S.0019          JARRY(I,IR)=LPRN(ISUB,IAD)
S.0020       30 IR=IR+1
              C STORE NO. OF PRIORITIES AT THIS LEVEL
S.0021          JARRY(I,IR)=NPVL
S.0022       35 IL=IR
S.0023          IBB=0
              C FIND PRIORITIES AT ALL REMAINING LEVELS
S.0024          DO 60 IAD=1,NPVL
S.0025          ISUB=IR-IAD
S.0026          ISUB2=JARRY(I,ISUB)
S.0027          NPV=NPRD(ISUB2)
              C TEST FOR HOUR DEPT. THAT IS A PRIORITY DEPT.
S.0028       40 DO 41 ICC=1,NVT
S.0029          IF(ISUB2-NARRY(ICC)) 41,50,41
S.0030       41 CONTINUE
S.0031          IF(NVT-ICOUNT) 42,47,47
S.0032       42 IF(N1-1) 43,43,45
S.0033       43 DO 44 ICT=1,LSMTN
S.0034          ICC=LSMTY+ICT
S.0035          IF(ISUB2-LAAR(ICT)) 44,50,44
S.0036       44 CONTINUE
S.0037          GO TO 47
S.0038       45 DO 46 ICC=1,LSMTY
S.0039          IF(ISUB2-LAAR(ICC)) 46,50,46
S.0040       46 CONTINUE
              C TEST FOR ANY PRIORITIES OF EACH PRIORITY
S.0041       47 IF(NPV) 48,60,48
S.0042       48 IBB=IBB+NPV
S.0043          DO 49 IJ=1,NPV
S.0044          IL=IL+1
S.0045       49 JARRY(I,IL)=LPRN(ISUB2,IJ)
S.0046          GO TO 60
```

```
C       COUNT NO. OF HR. DEPT THAT ARE PRIORITY DEPTS. AS WELL
S.0047    50 IHR=IHR+1
C       NO. OF HOUR DEPT. THAT IS A PRIORITY TOO
S.0048     IHRPR(IHR)=ISUB2
S.0049     JHRPR(IHR)=ICC
C       NO. OF HOUR DEPT. WHICH HAS HOUR DEPT. AS A PRIORITY
S.0050     NHRPR(IHR)=NARRY(IA)
S.0051    60 CONTINUE
S.0052     IR=IL+1
S.0053     IF(IBB) 80,80,65
S.0054    65 JARRY(I,IR)=IBB
S.0055     NRVL=IBB
S.0056     GO TO 35
S.0057    80 KTOTAL(I)=IR-1
S.0058     IRM2=IR-1
S.0059   300 CONTINUE
S.0060     IB=NVT
S.0061     RETURN
S.0062     END

FORTRAN DIAGNOSTIC MESSAGES.

GENERAL DIAGNOSTICS
IEF031161 SUGGEST SUBDIVIDING PROGRAM
END OF COMPILATION  PRIOR
```

```
/FTC NAME=OUTPUT,LIST,NORFF
BPS FORTRAN D COMPILER
S.0001              SUBROUTINE OUTPUT(ITYP)
S.0001        C     VALUES READ AS INPUT
S.0002              COMMON DDIS(48,48),IGRPR(19,18),ITRES(48),LPRN(48,15),NGRP(48),
                   1NPRD(48),NSIM(48),TMRES(48)
              C     ARRAY VALUES COMPUTED BY PROGRAM
S.0003              COMMON IRST(15),ISYS(48),JARRY(35,30),JHRPR(50),KTOTAL(35),
                   1LHRPR(50),NHRPR(50)
              C     SINGLE CELL VALUES COMPUTED BY PROGRAM
S.0004              COMMON IDDR,IHR,ISA,ISTART,LGROUP,LSMTN,LSMTY,LSTAT,TIME,TIMEP
S.0005              COMMON ICOUNT,IOP,NGPS
S.0006              TIMEPR=TIME/100.
S.0007              TIMEPS=TIMEP/100.
S.0008              WRITE(IOP,100) TIMEPS,TIMEPR
S.0009              WRITE(IOP,101) (IRST(I),I=1,IDDR)
S.0010              WRITE(IOP,102)
S.0011          100 FORMAT(1X,14HSTART TIME IS F9.5,10X,14HFINAL TIME IS F9.5)
S.0012          102 FORMAT(///)
S.0013          101 FORMAT(1X,31HORDER OF DEPTS. FOR THIS PERIOD/2013)
S.0014              RETURN
S.0015              END

FORTRAN DIAGNOSTIC MESSAGES.

GENERAL DIAGNOSTICS
1FC0031161  SUGGEST SUBDIVIDING PROGRAM
END OF COMPILATION  OUTPUT
```

DATA

```
/DATA
INPUT FOR STATION  1
    0.0    1  1  0  0
TIME DISTANCES
 0.0     1.9800  3.8729  1.8261  3.8340  2.6863  2.8615  2.9105  2.9349
 3.5220  3.8481  3.9949  4.1008  4.1661  4.3947  4.1664  4.0680  4.0359
 4.3947  4.2435  4.4175  4.7110  3.8408  3.7098  4.1338  3.8403  3.7424
 4.4925  3.8007  3.5467  4.5088  5.2058  3.3837  5.2058  5.2058  5.2058
 3.4978  2.6336  2.6336  3.0249  3.2858  4.3225  3.9181  3.0649  1.8460
 3.0358  3.8249  3.4249
INPUT FOR STATION  2
    0.0    2  2  0  0
TIME DISTANCES
 1.9800  0.0     3.4894  2.1278  3.2778  2.7800  2.2501  2.2990  2.3153
 3.0165  3.2121  3.3426  3.4567  3.5220  3.7519  3.5073  3.5073  3.5236
 3.9476  3.5236  3.5562  3.7763  3.3279  3.0996  3.7845  3.1648  3.0344
 3.2953  3.0670  3.3931  3.7030  3.9388  3.2464  3.9388  3.9388  3.9388
 3.1322  2.6499  2.6499  3.0086  3.2858  3.1253  3.2821  2.4453  1.5700
 3.0358  3.2053  2.8453
INPUT FOR STATION  3
  800.0    3  1  1  1
PRIORITI
 17
TIME DISTANCES
 3.8729  3.4894  0.0     3.5301  4.6634  3.7299  3.8155  3.8644  3.9256
 4.4351  4.7939  4.9243  5.0385  5.1037  5.7358  4.9749  4.9912  4.8933
 5.3010  5.0727  5.2912  5.5847  4.6814  4.5835  4.2864  4.7140  4.5020
 4.7466  4.5509  4.5509  5.2684  6.0352  4.7140  6.0352  6.0352  6.0352
 4.5998  3.8729  3.8729  3.9149  4.2085  4.5466  3.8639  4.0556  3.8729
 3.958   4.8156  4.4556
INPUT F    STATION  4
    0.     .4  2  1  0
PRIORIT
 22
TIME DISTANCES
 1.8261  2.1278  3.5301  0.0     3.1632  2.0707  2.2501  2.3153  2.3329
 2.8697  3.2611  3.3752  3.4404  3.4567  3.6867  3.4237  3.4237  3.3279
 3.7356  3.6377  3.7274  4.0209  3.1485  3.0344  4.1725  3.1322  3.0018
 3.2301  3.0670  3.3931  3.6703  4.2293  3.1875  4.2293  4.2293  4.2293
 3.0996  3.8660  4.6735  3.6214  3.3279  3.6601  3.3311  2.4629  1.4761
 3.5779  3.2229  2.8629
INPUT FOR STATION  5
```

```
    0.0     5  5  0  0
TIME DISTANCES
   3.8340  3.2778  4.6634  3.1632  0.0     2.7556  2.9349  3.0002  3.0165

   3.5546  3.9459  4.0601  4.1253  4.1416  5.0568  4.7144  4.7307  4.6166

   4.9079  4.5350  4.4372  4.1437  4.4290  4.3067  4.0458  4.3230  4.1600

   4.4861  5.0095  4.6002  4.9264  3.7727  4.2252  3.7727  3.7727  3.7729

   4.1110  4.9101  5.7176  4.6818  4.3720  4.3166  4.0159  3.1465  3.4840

   4.6220  3.9065  3.5465
INPUT FOR STATION  6
    0.0     6  6 11  0
PRIORITIES
 15 21 32 34 35 36 38 39 40 41  3
TIME DISTANCES
   2.6863  2.7800  3.7299  2.0707  2.7556  0.0     1.8587  1.9239  1.9402

   2.4783  2.8697  2.9838  3.0491  3.0654  3.1485  2.8876  2.8876  2.7898

   3.1648  3.0670  3.3605  3.4502  2.5778  2.4637  3.7648  2.5942  2.4637

   2.6920  2.5289  2.8550  3.1322  3.8665  2.6593  3.8665  3.8665  3.8665

   2.5615  3.3279  4.1354  3.0833  2.9202  2.5220  2.9397  2.0702  2.3363

   3.1702  2.8302  2.4702
INPUT FOR STATION  7
    0.0     7  6  0  0
TIME DISTANCES
   2.8615  2.2501  3.8155  2.2501  2.9349  1.8587  0.0     1.8750  1.8913

   2.2827  2.4947  2.6251  2.7229  2.7882  3.2953  2.9039  2.9202  2.8224

   3.2138  3.1159  3.2056  3.4991  2.6267  2.5126  4.2459  2.6430  2.5126

   2.7409  2.4800  2.8061  3.1322  4.3393  2.6593  4.3393  4.3393  4.3393

   2.5452  3.3442  4.1517  3.3768  2.8061  2.5709  2.5697  2.0213  2.5115

   3.0561  2.7813  2.3213
INPUT FOR STATION  8
    0.0     8  7  0  0
TIME DISTANCES
   2.9349  2.2990  3.8644  2.3153  3.0002  1.9239  1.8750  0.0     1.5326

   2.2501  2.8534  2.9838  3.0980  3.1632  3.3442  2.9529  3.0344  2.8713

   3.2627  3.1648  3.2545  3.5480  2.6756  2.5615  4.3679  2.6920  2.5615

   2.7898  2.5289  2.8550  3.1812  4.3720  2.7083  4.3720  4.3720  4.3720

   2.5941  3.3931  4.2066  3.4257  2.8550  2.6198  2.9234  1.6626  2.5805

   3.1050  2.4226  2.0626
INPUT FOR STATION  9
  900.000  9  7  0  1
TIME DISTANCES
   2.9349  2.3153  3.9256  2.3392  3.0165  1.9402  1.8913  1.5326  0.0
```

```
 2.2664  2.8697  3.0002  3.1143  3.1795  3.3605  2.9692  3.0507  2.8876
 3.2790  3.1812  3.2708  3.5644  2.6920  2.5778  4.3883  2.7083  2.5778
 2.8061  2.5452  2.8713  3.1975  4.3383  2.7246  4.3883  4.3883  4.3883
 2.6104  3.4044  4.2169  3.4421  2.8713  2.6361  2.9397  1.6630  2.5849
 3.1213  2.4230  2.0626
INPUT FOR STATION 10
    0.0   10 10  0  0
TIME DISTANCES
 3.5220  3.0165  4.4351  2.8697  3.5546  2.4783  2.2827  2.2501  2.2664
 0.0     1.6956  1.8261  1.9402  2.0055  2.6906  2.7395  2.9515  2.7884
 2.3971  3.0493  3.1390  3.4325  2.9841  3.0820  4.5024  3.4244  3.2939
 3.3755  4.1407  3.6364  3.9788  5.1098  3.4733  5.1098  5.1098  5.1098
 3.3429  4.0930  4.9005  3.7342  3.4407  3.2055  1.7656  2.3964  3.1720
 3.6907  3.1564  3.8481
INPUT FOR STATION 11
    0.0   11  8  0  0
TIME DISTANCES
 2.7964  3.2121  4.7939  3.2611  3.9459  2.8697  2.4947  2.8534  2.8697
 1.6956  0.0     1.6304  1.7445  1.7935  2.6906  2.7395  2.9515  2.7884
 2.3971  3.0493  3.1390  3.4325  2.9841  3.0820  4.6981  3.4244  3.2939
 3.3755  4.1407  3.6364  3.9788  5.3014  3.4733  5.3014  5.3014  5.3014
 3.3429  4.0930  4.9005  3.7342  3.4407  3.2055  1.5700  2.9997  3.4981
 3.6907  3.7597  3.3997
INPUT FOR STATION 12
    0.0   12  8  0  0
TIME DISTANCES
 3.9949  3.3426  4.9243  3.3752  4.0601  2.9838  2.6251  2.9838  3.0002
 1.8261  1.6304  0.0     1.6141  1.6793  2.8211  2.8700  3.0820  2.9189
 2.5275  3.1789  3.2695  3.5589  3.1146  3.2124  4.8285  3.5548  3.4244
 3.5059  4.2712  3.7668  4.1093  5.4360  3.6038  5.4360  5.4360  5.4360
 3.4733  4.2234  5.0309  3.8647  3.5712  3.3359  1.5604  3.1302  3.6449
 3.8212  3.8902  3.4302
INPUT FOR STATION 13
    0.0   13  8  0  0
TIME DISTANCES
 4.1008  3.4567  5.0385  3.4404  4.1253  3.0491  2.7229  3.0980  3.1143
 1.4402  1.7445  1.6141  0.0     1.5652  2.9352  2.9841  3.1961  3.0330
 2.6417  3.2939  3.3836  3.6771  3.2287  3.3266  4.6492  3.6690  3.5385
 3.6201  4.3853  3.8158  4.2234  5.4849  3.7179  5.4849  5.4849  5.4849
```

```
3.5875  4.3376  5.1451  3.9788  3.6853  3.4501  1.6745  3.2443  3.7508

3.9353  4.0043  3.6443
INPUT FOR STATION 14
   0.0   14  8  0  0
TIME DISTANCES
4.1661  3.5220  5.1037  3.4567  4.1416  3.0654  2.7882  3.1632  3.1795

2.0055  1.7935  1.6793  1.5652  0.0     3.0004  3.0493  3.2613  3.0983

2.7069  3.5630  3.6527  3.9462  4.2939  3.3918  5.0076  3.7342  3.6038

3.6853  4.4370  3.8810  4.2886  5.5501  3.7831  5.5501  5.5502  5.5501

3.6527  4.4028  5.2103  4.2397  3.7505  3.5153  1.7235  3.3095  3.8161

4.0005  4.0695  3.6095
INPUT FOR STATION 15
 800.000  3  9  1  1
PRIORITIES
 17
TIME DISTANCES
4.3947  3.7519  5.2359  3.6867  5.0568  3.1485  3.2953  3.3442  3.3605

2.6906  2.6906  2.8211  2.9352  3.0004  0.0     1.8098  2.0544  1.9076

1.8098  2.0544  2.2745  2.5680  2.0870  2.2011  3.0002  2.5436  2.4131

2.4947  3.1312  2.7719  3.1306  4.9916  2.6251  4.9916  4.9916  4.9916

2.4620  3.3263  4.1338  3.1143  2.7556  2.3247  2.7606  3.4905  4.3997

3.0056  4.2505  3.8905
INPUT FOR STATION 16
   0.0   16  9  0  0
TIME DISTANCES
4.1664  3.5073  4.9749  3.4237  4.7144  2.8816  2.9039  2.9529  2.9692

2.7395  2.7395  2.8700  2.9841  3.0493  1.8098  0.0     1.7935  1.6467

1.8587  1.7935  1.9973  2.2908  2.8261  2.9402  2.7392  2.2827  2.1522

2.2337  2.9202  2.5110  2.8697  4.7307  2.3642  4.7307  4.7307  4.7307

2.2011  3.0654  3.8729  3.8534  2.4947  2.0637  2.8095  3.0992  4.1664

2.7447  3.8592  3.4492
INPUT FOR STATION 17
 900.000 17 11  0  1
TIME DISTANCES
4.0680  3.5073  4.9912  3.4273  4.7144  2.8876  2.9202  3.0344  3.0507

2.9515  2.9515  3.0820  3.1961  3.2613  2.0544  1.7935  0.0     1.6630

2.1033  1.8261  2.0462  2.3397  1.7772  1.8750  3.3100  2.2337  2.1033

2.1848  2.8713  2.2664  2.5925  4.6818  2.2990  4.6818  4.6818  4.6818

2.1685  3.0656  3.8729  2.7229  2.4294  2.0148  3.0215  3.1807  4.0680

2.6794  3.9407  3.5807
INPUT FOR STATION 18
```

900.000 18 12 1 1
PRIORITIES
22
TIME DISTANCES
4.0359 3.5236 4.8933 3.3279 4.6166 2.7898 2.8224 2.8713 2.8876
2.7884 2.7884 2.9189 3.0330 3.0983 1.9076 1.6467 1.6630 0.0
1.4565 1.6630 1.8832 2.1767 1.7119 1.8098 3.1795 2.1685 2.0381
2.1196 2.8061 2.2011 2.5273 4.5513 2.2337 4.5513 4.5513 4.5513
2.1033 3.0002 3.8077 2.6577 2.2990 1.9496 2.8584 3.0176 4.0359
2.5490 3.7776 3.3176
INPUT FOR STATION 19
0.0 19 9 0 0
TIME DISTANCES
4.3947 3.9476 5.3010 3.7356 4.9079 3.1648 3.2138 3.2627 3.2790
2.3971 2.3971 2.5275 2.6417 2.7069 1.8098 1.8587 2.1033 1.9565
0.0 2.1196 2.3397 2.6333 2.1522 2.2664 3.0858 2.6088 2.4783
2.5599 3.2464 2.8371 3.1958 5.0568 2.6903 5.0568 5.0568 5.0568
2.5273 3.3915 4.1990 3.1795 2.8208 2.3899 2.9671 3.4090 4.3947
3.0708 4.1690 3.7890
INPUT FOR STATION 20
900.000 20 12 1 1
PRIORITIES
22
TIME DISTANCES
4.2435 3.5236 5.0727 3.6377 4.5350 3.0670 3.1159 3.1648 3.1812
3.0493 3.0493 3.1798 3.2939 3.5630 2.0544 1.7935 1.8261 1.6630
2.1196 0.0 1.6630 1.5815 1.8750 1.9728 2.4580 2.3316 2.2011
2.2664 2.9529 2.3805 2.7066 3.8298 2.4783 3.8298 3.8298 3.8298
2.6740 3.1633 3.9707 3.8371 2.4783 2.0964 3.1193 3.3112 4.2435
2.7283 4.0712 3.6112
INPUT FOR STATION 21
800.000 3 13 1 1
PRIORITIES
17
TIME DISTANCES
4.4175 3.5562 5.2912 3.7274 4.4372 3.3605 3.2056 3.2545 3.2708
3.1390 3.1390 3.2695 3.3836 3.6527 2.2745 1.9973 2.0462 1.8832
2.3397 1.6630 0.0 1.7935 2.0951 2.1930 2.1522 2.5517 2.4213
2.5028 3.1893 2.5843 2.9105 3.5240 2.6169 3.5240 3.5240 3.5240
2.4865 3.3834 4.1909 2.6333 2.6822 2.3328 3.2090 3.4008 4.4175
2.9322 4.1608 3.7008
INPUT FOR STATION 22

```
    0.0   22 13 11  0
PRIORITIES
 15 21 32 34 35 36 38 39 40 41  3
TIME DISTANCES
 4.7110  3.7763  5.5847  4.0209  4.1437  3.4502  3.4991  3.5480  3.5644

 3.4325  3.4325  3.5589  3.6771  3.9462  2.5680  2.2908  2.3397  2.1767

 2.6333  1.5815  1.7935  0.0     2.3887  2.4865  2.1848  2.8452  2.6740

 2.7963  3.4828  2.8779  3.2040  3.5566  2.8860  3.5566  3.5566  3.5566

 2.7800  3.6769  4.4844  3.3344  2.9757  2.6263  3.5025  3.6944  4.7110

 3.2357  4.4544  4.0944
INPUT FOR STATION 23
    0.0   23 11  1  0
PRIORITIES
 22
TIME DISTANCES
 3.8403  3.3279  4.6814  3.1985  4.4209  2.5778  2.6267  2.6756  2.6920

 2.9841  2.9841  3.1146  3.2287  4.2939  2.0870  2.8261  1.7772  1.2119

 2.1522  1.8750  2.0951  2.3887  0.0     1.6630  2.5436  1.9728  1.8424

 1.9402  2.6267  2.0544  2.3805  4.4372  2.0218  4.4372  4.4372  4.4372

 1.8913  2.7882  3.5957  2.4620  2.1685  1.7702  3.0541  2.8220  3.8403

 2.4185  3.5820  3.1220
INPUT FOR STATION 24
    0.0   24 15  1  0
PRIORITIES
 31
TIME DISTANCES
 3.7098  3.0996  4.5835  3.0344  4.3067  2.5126  2.4637  2.5615  2.5778

 3.0820  3.0820  3.2124  3.3266  3.3918  2.2011  2.9402  1.8750  1.8098

 2.2664  1.9728  2.1930  2.4865  1.6630  0.0     2.4294  1.8587  1.7282

 1.8098  2.4963  1.9239  2.2501  4.2904  1.9402  4.2904  4.2904  4.2904

 1.8098  2.6740  3.4815  2.3479  2.0544  1.6398  3.1520  2.7078  3.7098

 2.3044  3.4678  3.0578
INPUT FOR STATION 25
    0.0   25 13  0  0
TIME DISTANCES
 4.1338  3.7845  4.2864  4.1725  4.0458  3.7648  4.2459  4.3679  4.3883

 4.5024  4.6981  4.8285  4.6492  5.0076  3.0002  2.7392  3.3100  3.1795

 3.0858  2.4580  2.1522  2.1848  2.5436  2.4294  0.0     2.4457  2.3153

 2.6088  3.1975  2.7066  3.0328  3.1857  2.3316  3.1857  3.1857  3.1857

 2.2011  3.1143  3.9218  2.7882  2.4783  2.9388  4.7681  4.5183  4.1338

 2.7283  5.2783  4.8183
INPUT FOR STATION 26
```

```
   0.0    26 15  0  0
TIME DISTANCES
1.8403  3.1648  4.7140  3.1322  4.3230  2.5941  2.6430  2.6920  2.7083
1.4244  3.4244  3.5548  3.6690  3.7342  2.5436  2.2827  2.2337  2.1685
2.6088  2.3316  2.5517  2.8452  1.9728  1.8587  2.4457  0.0     1.6630
2.0055  2.5615  2.1359  2.4620  4.3393  1.9565  4.3393  4.3393  4.3393
1.8261  2.7066  3.5141  2.3153  2.0018  1.8355  3.4944  2.8383  3.8403
2.2718  3.5983  3.1383
INPUT FOR STATION 27
   0.0    27 15  0  0
TIME DISTANCES
3.7424  3.0344  4.5020  3.0018  4.1600  2.4637  2.5126  2.5615  2.5778
3.2939  3.2939  3.4244  3.5385  3.6038  2.4131  2.1522  2.1033  2.0381
2.4783  2.2011  2.4213  2.6740  1.8428  1.7282  2.3153  1.6630  0.0
1.8424  2.3984  1.9728  2.2990  4.1763  1.7935  4.1763  4.1763  4.1763
1.6630  2.5436  3.3511  2.1522  2.8587  1.6224  3.3639  2.7078  3.7424
3.1087  3.4678  3.0578
INPUT FOR STATION 28
   0.0    28 15  0  0
TIME DISTANCES
4.4925  3.2953  4.7466  3.2301  4.4861  2.6920  2.7409  2.7898  2.8061
3.3755  3.3755  3.5059  3.6201  3.6853  2.4947  2.2337  2.1848  2.1196
2.5599  2.2664  2.5028  2.7963  1.9402  1.8098  2.6088  2.0055  1.8424
0.0     2.6756  2.1033  2.4294  4.4698  2.0870  4.4698  4.4698  4.4698
1.9565  2.8534  3.6609  2.4620  2.1522  3.6961  2.9022  4.4925  2.9361
3.4355  1.6730  3.2361
INPUT FOR STATION 29
   0.0    29 15  0  0
TIME DISTANCES
3.8077  3.0670  4.5509  3.0670  5.0095  2.5289  2.4800  2.5289  2.5452
4.1407  4.1407  4.2712  4.3853  4.4370  3.1812  2.9202  2.8713  2.8061
3.2464  2.9529  3.1893  3.4828  2.6267  2.4963  3.1975  2.5615  2.3984
2.6756  0.0     2.8224  3.1485  5.0585  3.2560  5.0585  5.0585  5.0585
2.6104  3.4247  4.2332  3.0344  2.7409  2.5056  4.2107  2.6752  3.8077
2.9909  3.4352  3.0152
INPUT FOR STATION 30
   0.0    30 14  0  0
TIME DISTANCES
3.5467  3.3931  4.5509  3.3931  4.6002  2.8550  2.8061  2.8550  2.8713
3.6364  3.6364  3.7668  3.8158  3.8810  2.7719  2.5110  2.2664  2.2011
```

```
2.8371  2.3805  2.9105  2.8779  2.0544  1.9239  2.7060  2.1359  1.9728
2.1033  2.8224  0.0     1.8261  4.6002  2.2011  4.6002  4.6002  4.6002
2.0707  2.9675  3.7750  2.5762  2.2664  1.9333  3.7064  3.0013  3.5467
2.5164  3.7613  3.3013
INPUT FOR STATION 31
  900.000 31 14 11  1
PRIORITIES
15 21 32 34 35 36 38 39 40 41  3
TIME DISTANCES
4.5088  3.7030  5.2684  3.6703  4.9264  3.1322  3.1322  3.1812  3.1975
3.9788  3.9985  4.1093  4.2234  4.2886  3.1306  2.8697  2.6925  2.5273
3.1958  2.7066  2.9105  3.2040  2.3805  2.2501  3.0328  2.4620  2.2990
2.4294  3.1485  1.8261  0.0     4.9101  2.5273  4.9101  4.9101  4.9101
2.3968  3.2937  4.1012  2.9023  2.5925  2.2594  4.0488  3.3275  4.5088
2.8425  4.0875  3.6275
INPUT FOR STATION 32
  800.000  3 17  1  1
PRIORITIES
17
TIME DISTANCES
5.2058  3.9388  6.0352  4.2293  3.7727  3.8665  4.3393  4.3720  4.3883
5.1098  5.3014  5.4360  5.4849  5.5501  4.9916  4.7307  4.6818  4.5513
5.0568  3.8298  3.5240  3.5566  4.4372  4.2904  3.1857  4.3393  4.1763
4.4698  5.0585  4.6002  4.9101  0.0     4.0173  3.4996  3.4996  3.4996
3.8868  4.6000  5.6075  4.4739  4.3679  4.2998  5.3714  4.5183  4.9558
4.6179  5.2783  4.8183
INPUT FOR STATION 33
    0.0   33 16  0  0
TIME DISTANCES
3.3837  3.2464  4.7140  3.1875  4.2252  2.6593  2.6593  2.7083  2.7246
3.4733  3.4733  3.6038  3.7179  3.7831  2.6251  2.3642  2.2990  2.2337
2.6903  2.4783  2.6169  2.8860  2.0218  1.9402  2.3316  1.9565  1.7935
2.0870  3.2560  2.2011  2.5273  4.0173  0.0     4.0173  4.0173  4.0173
1.6304  2.2664  3.0739  1.9402  1.6630  0.9170  3.5433  2.8546  3.3837
1.9130  3.6146  3.2546
INPUT FOR STATION 34
  800.000  3 17  1  1
PRIORITIES
17
TIME DISTANCES
5.2058  3.9388  6.0352  4.2293  3.7727  3.8665  4.3393  4.3720  4.3883
5.1098  5.3014  5.4360  5.4849  5.5501  4.9916  4.7307  4.6818  4.5513
```

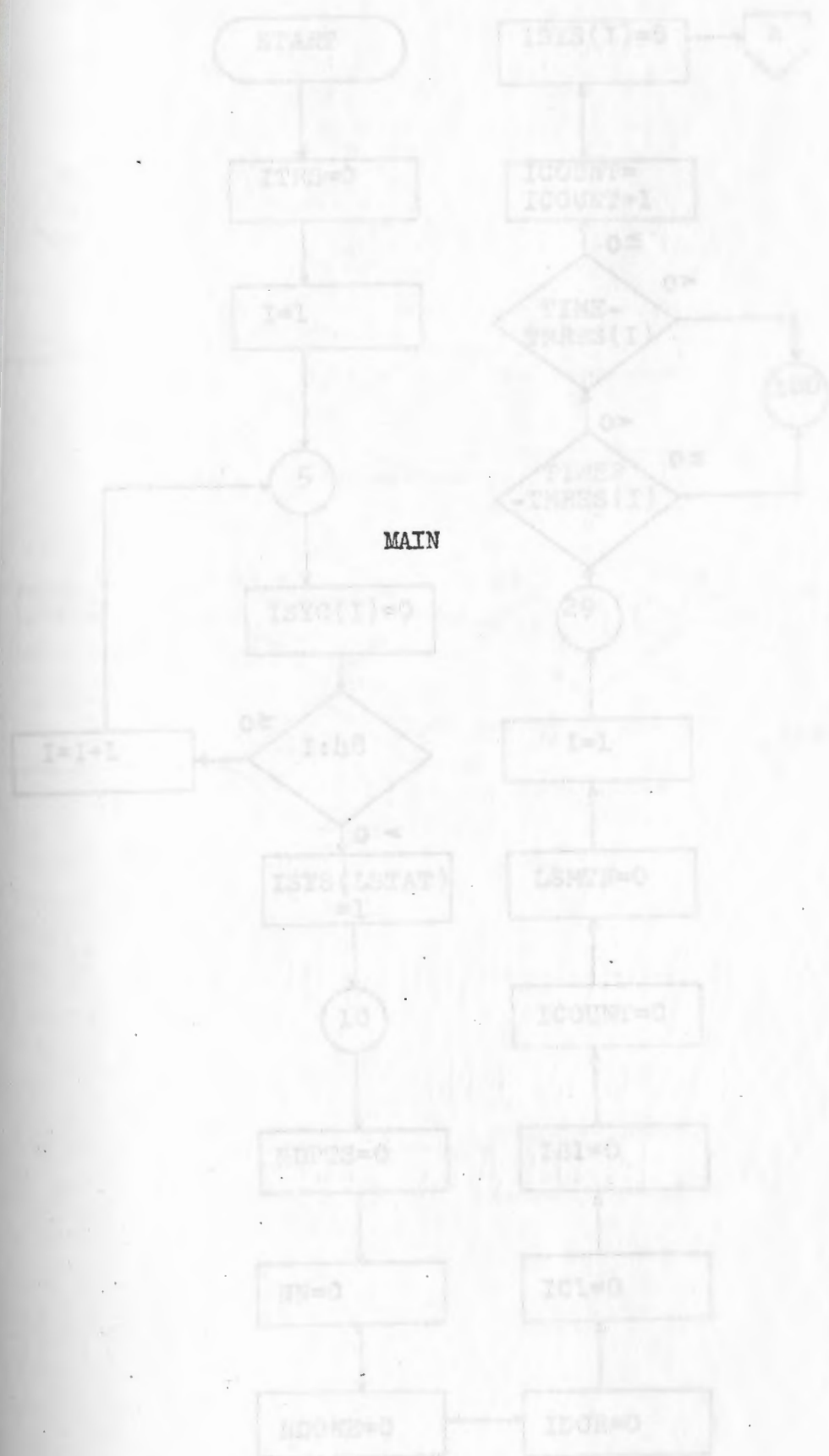
```
 5.0568  3.8298  3.5240  3.5566  4.4372  4.2904  3.1857  4.3393  4.1763
 4.4698  5.0585  4.6002  4.9101  3.4996  4.0173  0.0     3.4996  3.4996
 3.8868  4.8000  5.6075  4.4739  4.3679  4.2998  5.3714  4.5183  4.9558
 4.6179  5.2783  4.8183
INPUT FOR STATION 35
  800.000  3 17  1  1
PRIORITIES
 17
TIME DISTANCES
 5.2058  3.9388  6.0352  4.2293  3.7727  3.8665  4.3393  4.3720  4.3883
 5.1098  5.3014  5.4360  5.4849  5.5501  4.9916  4.7307  4.6818  4.5513
 5.0568  3.8298  3.5240  3.5566  4.4372  4.2904  3.1857  4.3393  4.1763
 4.4698  5.0585  4.6002  4.9101  3.4996  4.0173  3.4996  0.0     3.4996
 3.8868  4.8000  5.6075  4.4739  4.3679  4.2998  5.3714  4.5183  4.9558
 4.6179  5.2783  4.8183
INPUT FOR STATION 36
  800.000  3 17  1  1
PRIORITIES
 17
TIME DISTANCES
 5.2058  3.9388  6.0352  4.2293  3.7727  3.8665  4.3393  4.3720  4.3883
 5.1098  5.3014  5.4360  5.4849  5.5501  4.9916  4.7307  4.6818  4.5513
 5.0568  3.8298  3.5240  3.5566  4.4372  4.2904  3.1857  4.3393  4.1763
 4.4698  5.0585  4.6002  4.9101  3.4996  4.0173  3.4996  3.4996  0.0
 3.8868  4.8000  5.6075  4.4739  4.3679  4.2998  5.3714  4.5183  4.9558
 4.6179  5.2783  4.8183
INPUT FOR STATION 37
    0.0   37 16  0  0
TIME DISTANCES
 0.4978  3.1322  4.5998  3.0996  4.1110  2.5615  2.5452  2.5941  2.6104
 3.3429  3.3429  3.4733  3.5875  3.6527  2.4620  2.2011  2.1685  2.1033
 2.5273  2.6740  2.4865  2.7800  1.8913  1.8098  2.2011  1.8261  1.6630
 1.9565  2.6104  2.0707  2.3968  3.8868  1.6304  3.8868  3.8868  3.8868
 0.0     2.3968  3.2043  2.0870  2.8098  1.7865  3.4129  2.7404  3.4978
 3.0598  3.5004  3.1404
INPUT FOR STATION 38
  800.000  3  3  1  1
PRIORITIES
 17
TIME DISTANCES
 2.6336  2.6499  3.8729  3.8660  4.9101  3.3279  3.3442  3.3931  3.4044
 4.0930  4.0930  4.2234  4.3376  4.4028  3.3263  3.0654  3.0656  3.0002
```

```
  3.3915  3.1632  3.3834  3.6769  2.7882  2.6740  3.1143  2.7066  2.5436
  2.8534  3.4247  2.9675  3.2937  4.8000  2.2664  4.8000  4.8000  4.8000
  2.3968  0.0     2.3075  1.9565  2.2501  3.6853  4.1630  3.5344  2.6336
  2.6598  4.2944  3.8544
INPUT FOR STATION 39
   800.000  3  3  1  1
PRIORITIES
 17
TIME DISTANCES
  2.6336  2.6499  3.8729  4.6735  5.7176  4.1354  4.1517  4.2066  4.2169
  4.9005  4.9005  5.0309  5.1451  5.2103  4.1338  3.8729  3.8729  3.8077
  4.1990  3.9707  4.1909  4.4844  3.5957  3.4815  3.9218  3.5141  3.3511
  3.6609  4.2332  3.7750  3.2937  5.6075  2.2664  5.6075  5.6075  5.6075
  2.3968  2.3075  0.0     2.7640  3.0576  3.4909  4.9705  4.3469  2.6336
  2.0001  5.1069  4.7469
INPUT FOR STATION 40
   800.000  3  4  1  1
PRIORITIES
 17
TIME DISTANCES
  3.0249  3.0086  3.9149  3.6214  4.6818  3.0833  3.3768  3.4257  3.4421
  3.7342  3.7342  3.8647  3.9788  4.2397  3.1143  3.8534  2.7229  2.6577
  3.1795  2.8371  2.6333  3.3344  2.4620  2.3479  2.7882  2.3153  2.1522
  2.4620  3.0344  2.5762  2.9023  4.4739  1.9402  4.4739  4.4739  4.4739
  2.0870  1.9565  2.7640  0.0     1.9402  2.2620  3.8042  3.5721  3.0249
  1.6902  4.3321  3.9421
INPUT FOR STATION 41
   800.000  3  4  1  1
PRIORITIES
 17
TIME DISTANCES
  3.2858  3.2858  4.2085  3.3279  4.3720  2.9202  2.8061  2.8550  2.8713
  3.4407  3.4407  3.5712  3.6853  3.7505  2.7556  2.4947  2.4294  2.2990
  2.8208  2.4783  2.6822  2.9757  2.1685  2.0544  2.4783  2.0218  2.8587
  2.1522  2.7409  2.2664  2.5925  4.3679  1.6630  4.3679  4.3679  4.3679
  2.8098  2.2501  3.0576  1.9402  0.0     1.9822  3.5107  3.0013  3.2858
  1.7[illegible]  3.7613  3.3013
INPUT FOR STATION 42
     0.0    42 15  0  0
TIME DISTANCES
  4.3225  3.1253  4.5466  3.6601  4.3161  2.5220  2.5709  2.6198  2.6361
  3.2055  3.2055  3.3359  3.4501  3.5153  2.3247  2.0637  2.0148  1.9496
```

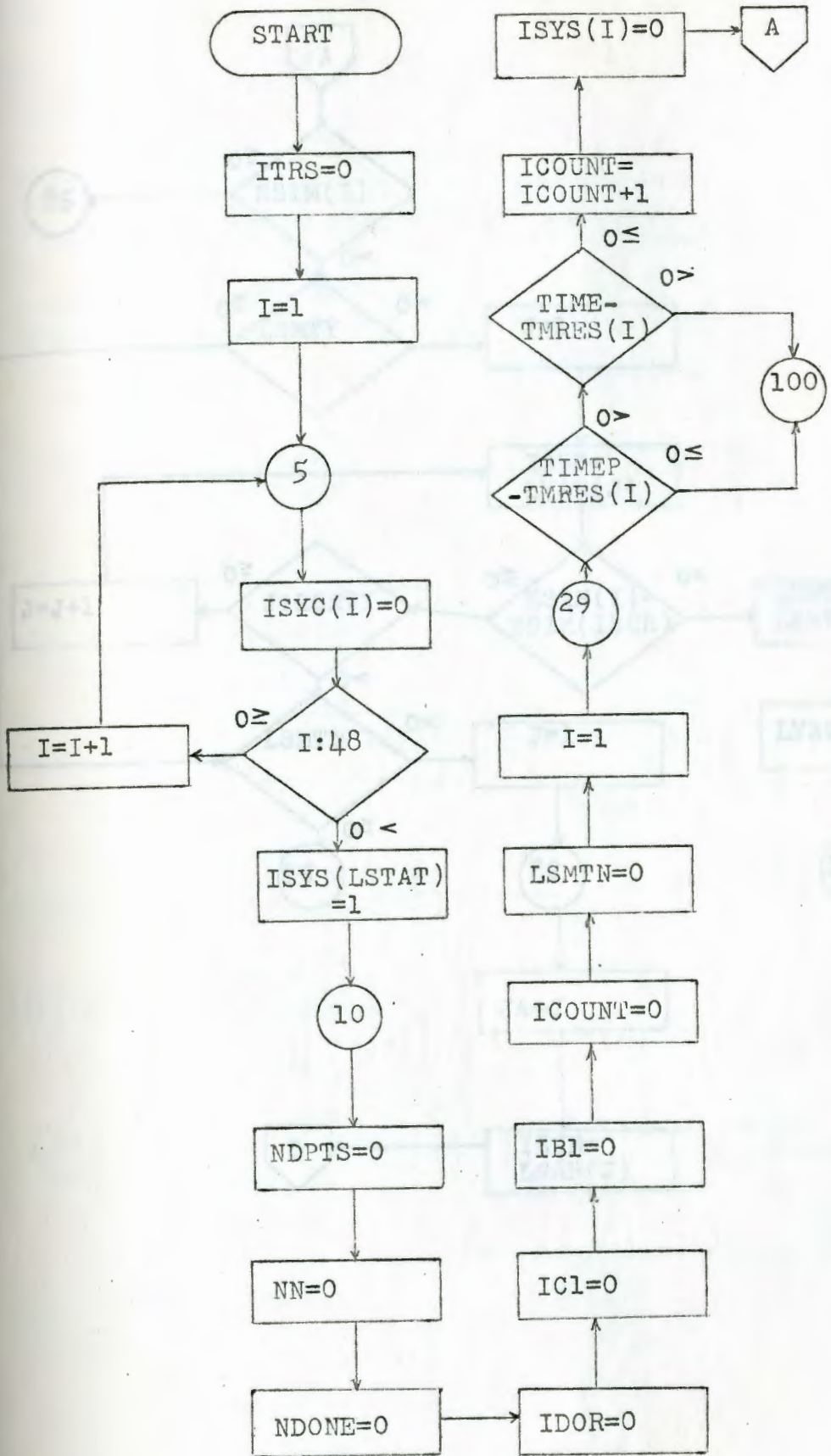
```
899  2.0964  2.3328  2.6263  1.7702  1.6398  2.9388  1.8355  1.6224

1.6730  2.5056  1.9333  2.2594  4.2998  1.9170  4.2998  4.2998  4.2998

1.7865  2.6853  3.4909  2.2620  1.9822  0.0     3.2755  2.7621  3.9765

2.1322  3.5221  3.1621
INPUT FOR STATION 43
   0.0   43  8  0  0
TIME DISTANCES
3.9181  3.2821  3.8639  3.3311  4.0159  2.9397  2.5697  2.9234  2.9397

1.7656  1.5700  1.5604  1.6745  1.7235  2.7606  2.0095  3.0215  2.8584

2.9671  3.1193  3.2090  3.5025  3.0541  3.1520  4.7681  3.4944  3.3639

3.4355  4.2107  3.7064  4.0488  5.3714  3.5433  5.3714  5.3714  5.3714

3.4129  4.1630  4.9705  3.8042  2.0567  3.2755  0.0     3.0657  3.5721

3.6507  3.8257  3.4657
INPUT FOR STATION 44
   0.0   44  7  0  0
TIME DISTANCES
3.0649  2.4453  4.0556  2.4629  3.1465  2.0702  2.0213  1.6626  1.6630

2.3964  2.9997  3.1302  3.2443  3.3095  3.4905  3.0992  3.1807  3.0176

3.4090  3.3112  3.4008  3.6944  2.8220  2.7078  4.5183  2.8383  2.7078

2.9361  2.6752  3.0013  3.3275  4.5183  2.8546  4.5183  4.5183  4.5183

2.7404  3.5344  4.3469  3.5721  3.0013  2.7621  3.0657  0.0     2.7189

3.3013  2.2600  1.8600
INPUT FOR STATION 45
   0.0   45  2  0  0
TIME DISTANCES
1.8460  1.5700  3.8729  1.4761  3.4840  2.3363  2.5115  2.5605  2.5849

3.1720  3.4981  3.6449  3.7508  3.8161  4.3997  4.1664  4.0680  4.0359

4.3947  4.2935  4.4175  4.7110  3.8403  3.7098  4.1338  3.8403  3.7424

4.4925  3.8077  3.5467  4.5088  4.9558  3.3837  4.9558  4.9558  4.9558

3.4978  2.6336  2.6336  3.0249  3.2858  3.9765  3.5721  2.7189  0.0

3.1749  3.4789  3.0189
INPUT FOR STATION 46
   0.0   46 16  0  0
TIME DISTANCES
3.0358  3.0358  3.9585  3.5779  4.6220  3.1702  3.0561  3.1050  3.1213

3.6907  3.6907  3.8212  3.9353  4.0005  3.0056  2.7447  2.6794  2.5490

3.0708  2.7283  2.9322  3.2357  2.4185  2.3044  2.7283  2.2718  3.1087

2.9022  2.9909  2.5164  2.8425  4.6179  1.9130  4.6179  4.6179  4.6179

3.0598  2.6598  2.0001  1.6902  1.7500  2.1322  3.6507  3.3013  3.1749
```

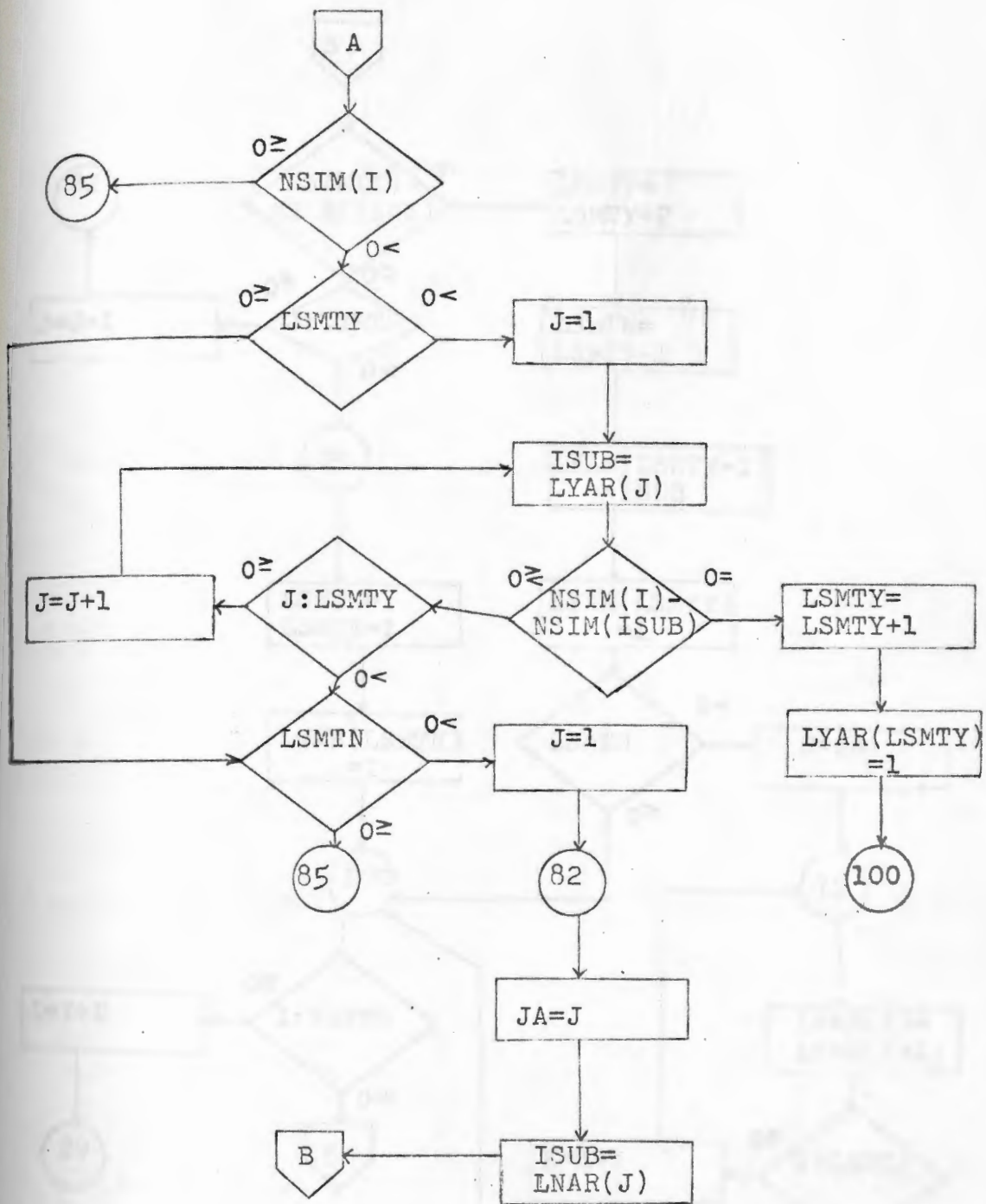
```
  0.0      4.0613  3.6013
INPUT FOR STATION 47
     0.0   47  7  0  0
TIME DISTANCES
  3.8249  3.2053  4.8156  3.2229  3.9065  2.8302  2.7813  2.4226  2.4230

  3.1564  3.7597  3.8902  4.0043  4.0695  4.2505  3.8592  3.9407  3.7776

  4.1690  4.6712  4.1608  4.4544  3.5820  3.4678  5.2783  3.5983  3.4678

  3.6961  3.4352  3.7613  4.0875  5.2783  3.6146  5.2783  5.2783  5.2783

  3.5004  4.2944  5.1009  4.3321  3.7613  3.5221  3.8257  2.2600  3.4789

  4.0613  0.0      1.1300
INPUT FOR STATION 48
     0.0   48  7  0  0
TIME DISTANCES
  3.4249  2.8453  4.4556  2.8629  3.5465  2.4702  2.3213  2.0626  2.0626

  2.7964  3.3997  3.4302  3.6443  3.6095  3.8905  3.4492  3.5807  3.3176

  3.7890  3.6112  3.7008  4.0944  3.1220  3.0578  4.8183  3.1383  3.0578

  3.2361  3.0152  3.3013  3.6275  4.8183  3.2546  4.8183  4.8183  4.8183

  3.1404  3.8544  4.7469  3.9421  3.3013  3.1621  3.4657  1.8600  3.0189

  3.6013  1.1300  0.0
GROUP PREFERENCES FOR GROUP  1
 1  2  3  4  5  6  7 10  8 16 15 14 11 12 13 17  9
GROUP PREFERENCES FOR GROUP  2
 2  1  5  6  7 10  8 15 14 16  4  3 11 12 13 17  9
GROUP PREFERENCES FOR GROUP  3
 3  4 16 15 14 11 12 13 17  9  1  2  5  6  7 10  8
GROUP PREFERENCES FOR GROUP  4
 4  3 16 15 14 11 12 13 17  9  1  2  5  6  7 10  8
GROUP PREFERENCES FOR GROUP  5
 5  6  7  2  1 10  8 13 17 12 11 15 14  9 16  4  3
GROUP PREFERENCES FOR GROUP  6
 6  7  2  5 10  1  8 15 14 11 12 13 17  9 16  4  3
GROUP PREFERENCES FOR GROUP  7
 7  6  2  5 10  1  8 15 14 11 12 13 17  9 16  4  3
GROUP PREFERENCES FOR GROUP  8
 8 10  9  6  7  5 11 12 13 17 14 15 16  2  1  4  3
GROUP PREFERENCES FOR GROUP  9
 9 11 12 13 17 15 14 16  4  3  8 10  6  7  5  2  1
GROUP PREFERENCES FOR GROUP 10
10  8  6  7  5  2  1 15 14 11 12 13 17  9 16  4  3
GROUP PREFERENCES FOR GROUP 11
11 12  9 13 17 15 14 16  4  3  6  7  5  2 10  8  1
GROUP PREFERENCES FOR GROUP 12
12 11 13 17  9 15 14 16  4  3  6  7  5  2 10  8  1
GROUP PREFERENCES FOR GROUP 13
13 17 12 11  9 15 14 16  4  3  6  7  5  2 10  8  1
GROUP PREFERENCES FOR GROUP 14
14 15 16 11 12 13 17  9  4  3  6  7  5  2 10  8  1
GROUP PREFERENCES FOR GROUP 15
15 14 11 12 13 17  9 16  4  3  6  7  5  2 10  8  1
GROUP PREFERENCES FOR GROUP 16
16  4  3 15 14 11 12 13 17  9  6  7  5  2 10  8  1
GROUP PREFERENCES FOR GROUP 17
```

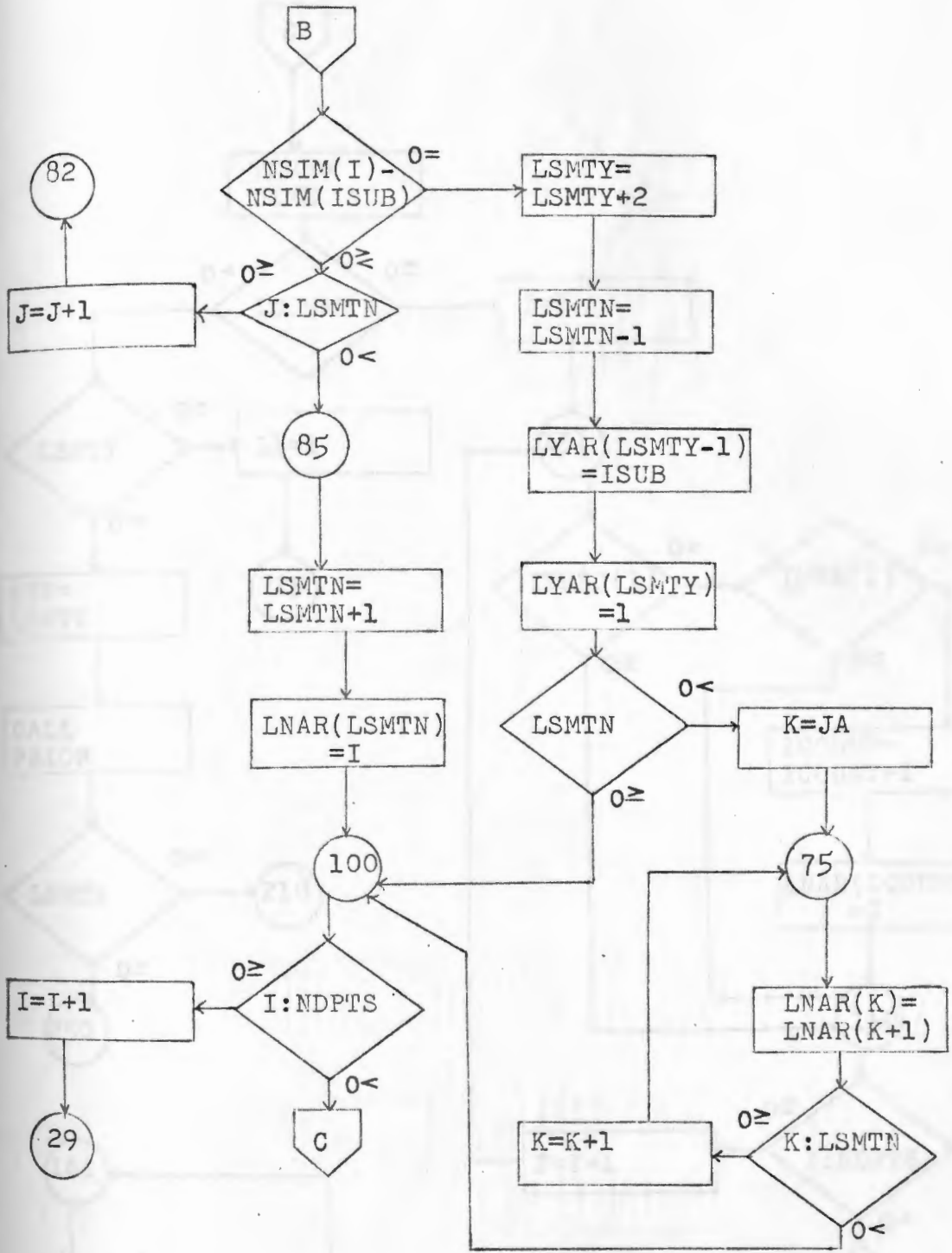
FLOW DIAGRAMS

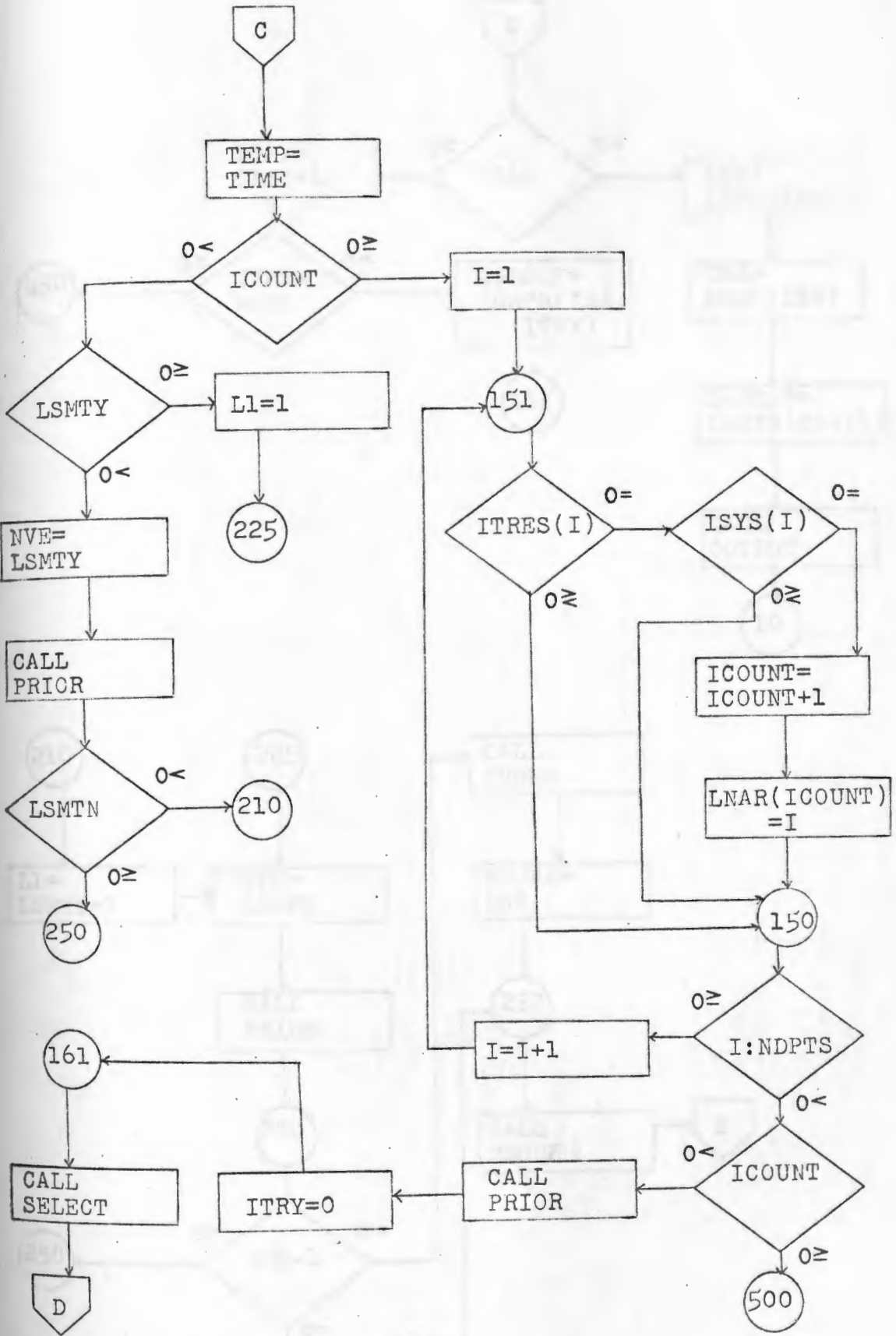


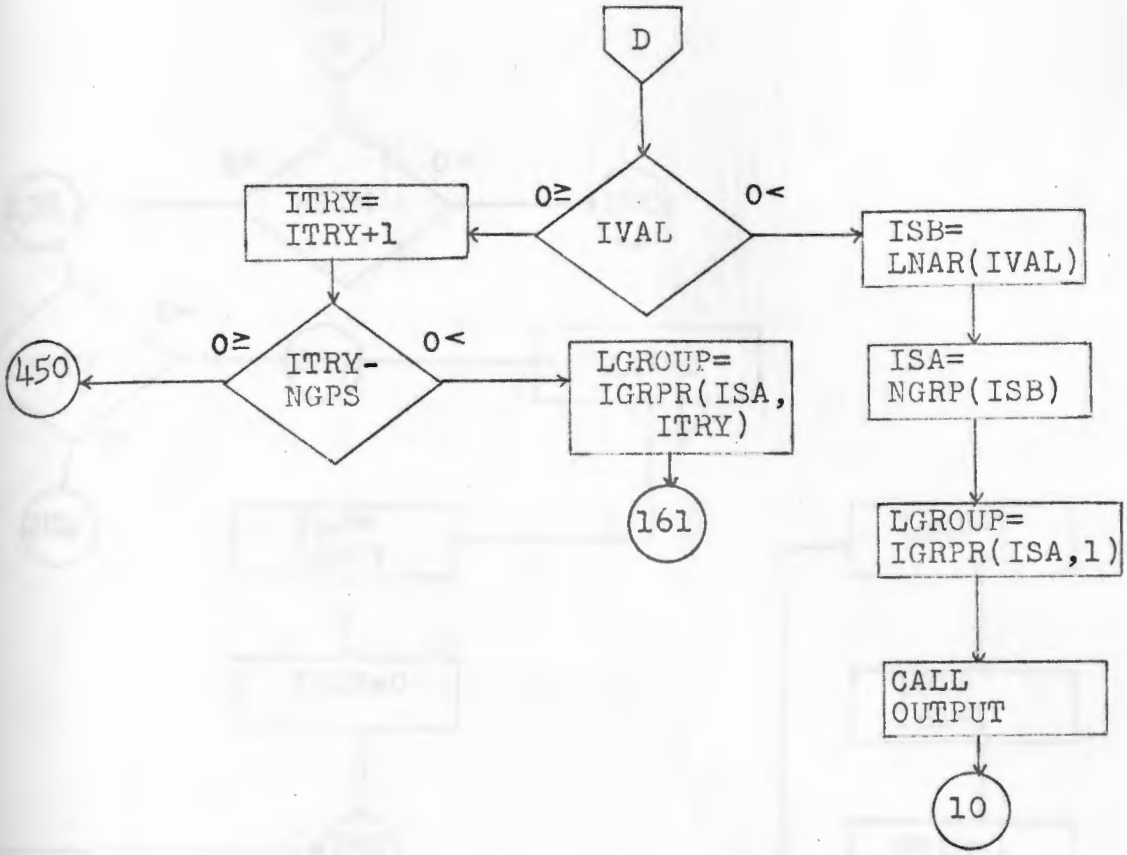
MAIN

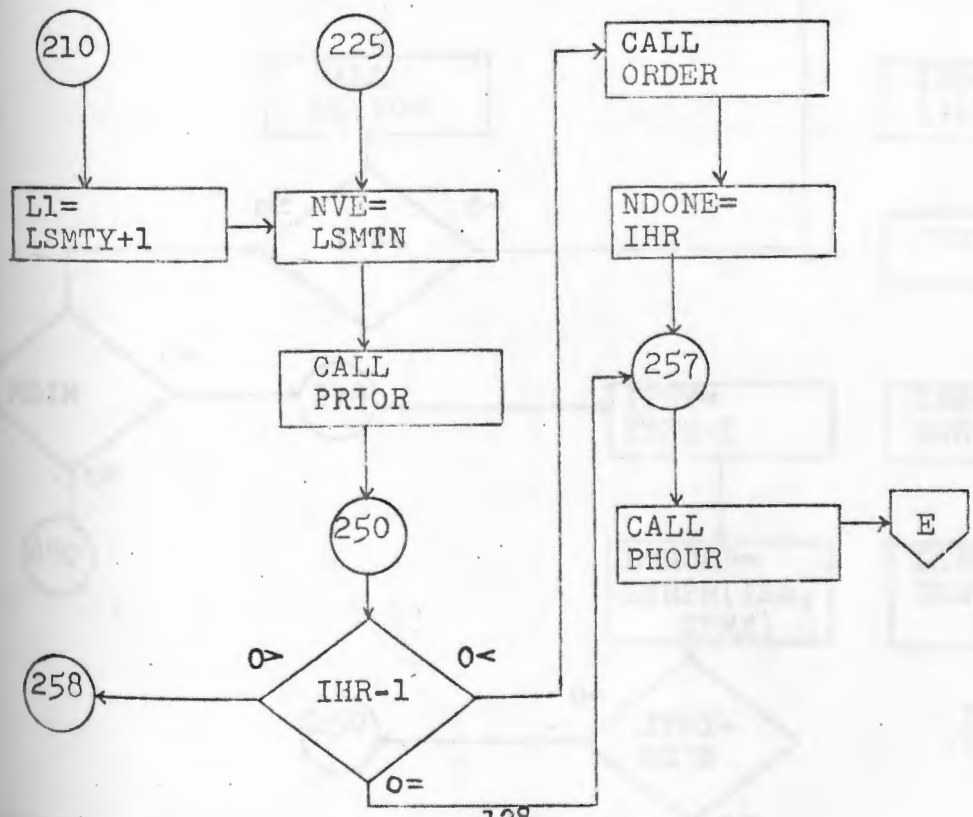

START
ITRS=0
I=1
5
ISYC(I)=0
I:48
0≥
I=I+1
0 <
ISYS(LSTAT)
=1
10
NDPTS=0
NN=0
NDONE=0
IDOR=0
IC1=0
IB1=0
ICOUNT=0
LSMTN=0
I=1
29
TIMEP
-TMRES(I)
0≤
0>
100
TIME-
TMRES(I)
0≤
0>
ICOUNT=
ICOUNT+1
ISYS(I)=0
A

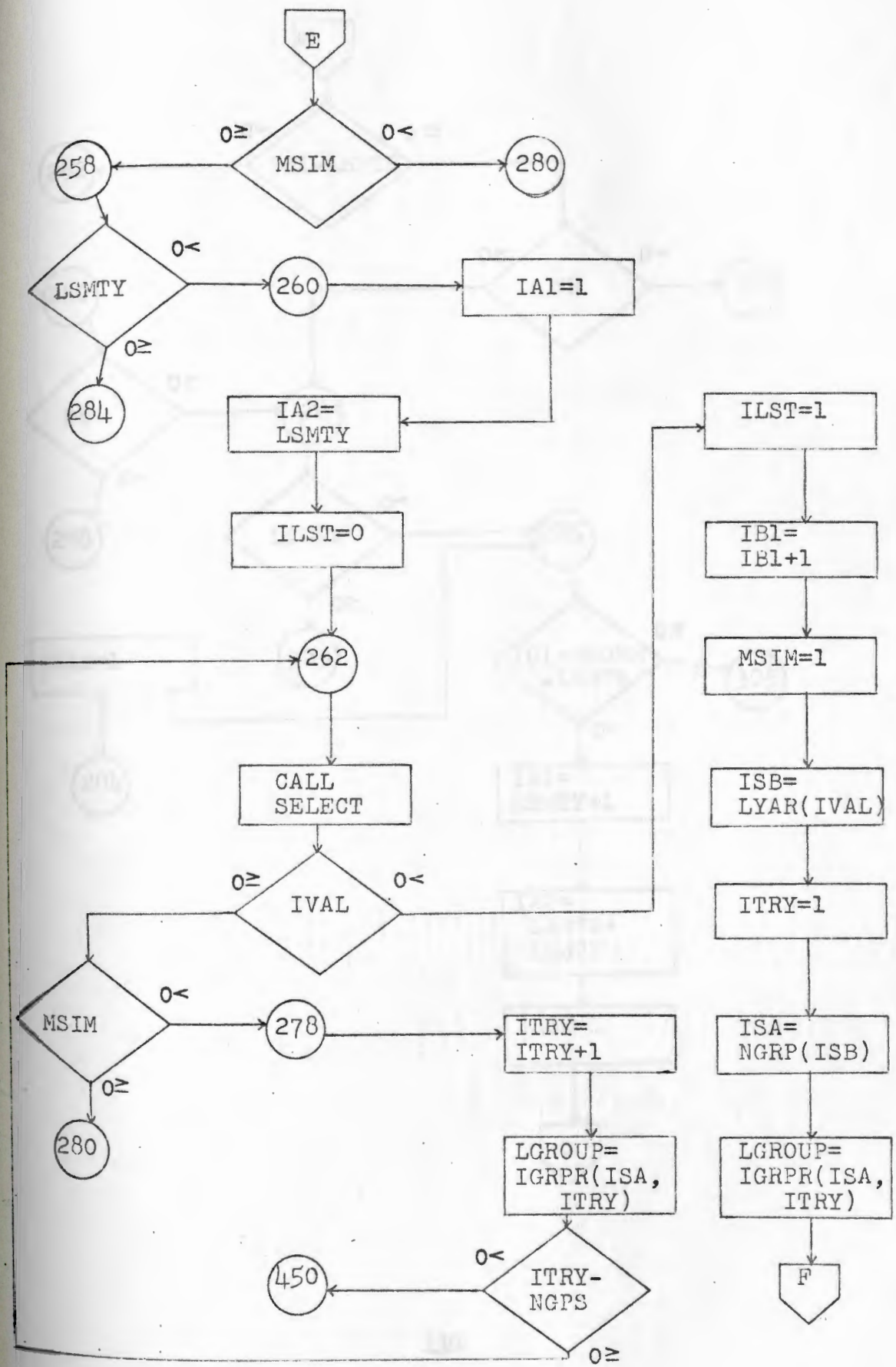

A
0≧
NSIM(I)
85
0<
0≧
LSMTY
0<
J=1
ISUB=
LYAR(J)
0≧
J:LSMTY
J=J+1
0≧
NSIM(I)-
NSIM(ISUB)
0=
LSMTY=
LSMTY+1
0<
LSMTN
0<
J=1
LYAR(LSMTY)
=1
0≧
85
82
100
JA=J
B
ISUB=
LNAR(J)

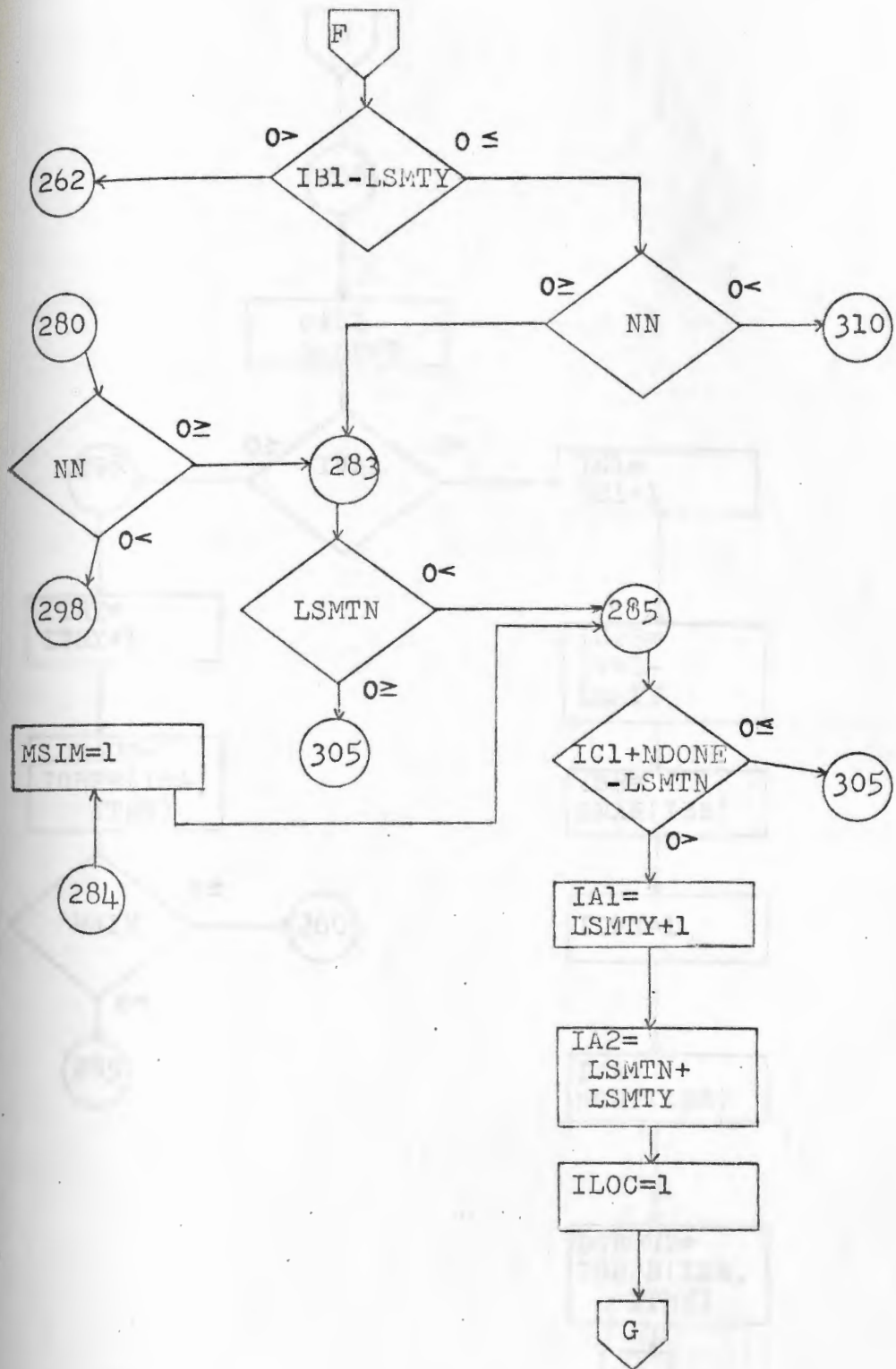

B
NSIM(I)-
NSIM(ISUB)
0=
LSMTY=
LSMTY+2
82
0≥
0≥
J=J+1
J:LSMTN
LSMTN=
LSMTN-1
0<
85
LYAR(LSMTY-1)
=ISUB
LSMTN=
LSMTN+1
LYAR(LSMTY)
=1
LSMTN
0<
K=JA
LNAR(LSMTN)
=I
0≥
100
75
0≥
I=I+1
I:NDPTS
LNAR(K)=
LNAR(K+1)
0<
29
C
K=K+1
0≥
K:LSMTN
0<

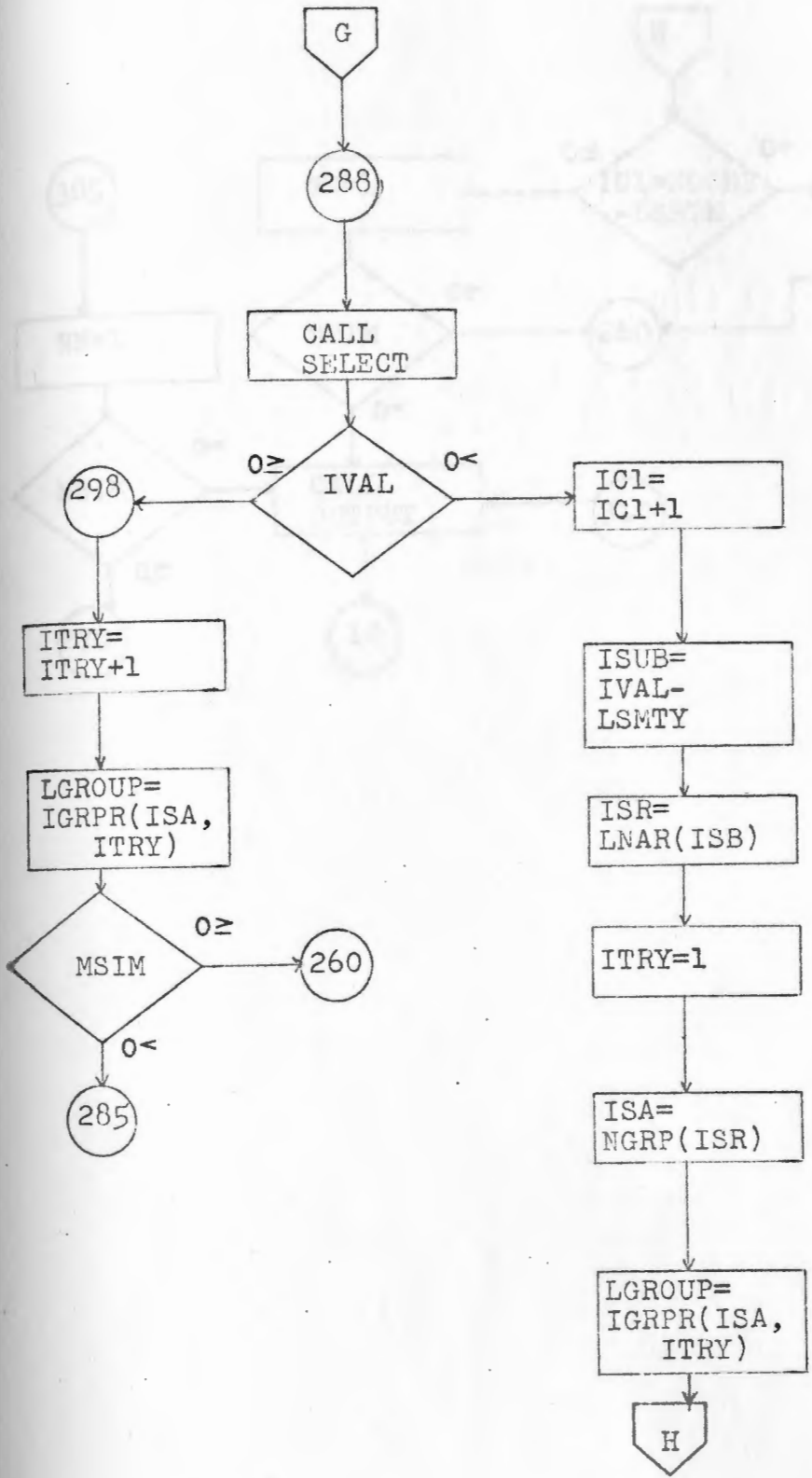

C
TEMP=
TIME
ICOUNT
0<
0≥
I=1
LSMTY
0≥
L1=1
0<
225
NVE=
LSMTY
CALL
PRIOR
LSMTN
0<
210
0≥
250
151
ITRES(I)
0=
ISYS(I)
0=
0≥
0≥
ICOUNT=
ICOUNT+1
LNAR(ICOUNT)
=I
150
I:NDPTS
0≥
I=I+1
0<
ICOUNT
0<
0≥
500
CALL
PRIOR
ITRY=0
161
CALL
SELECT
D

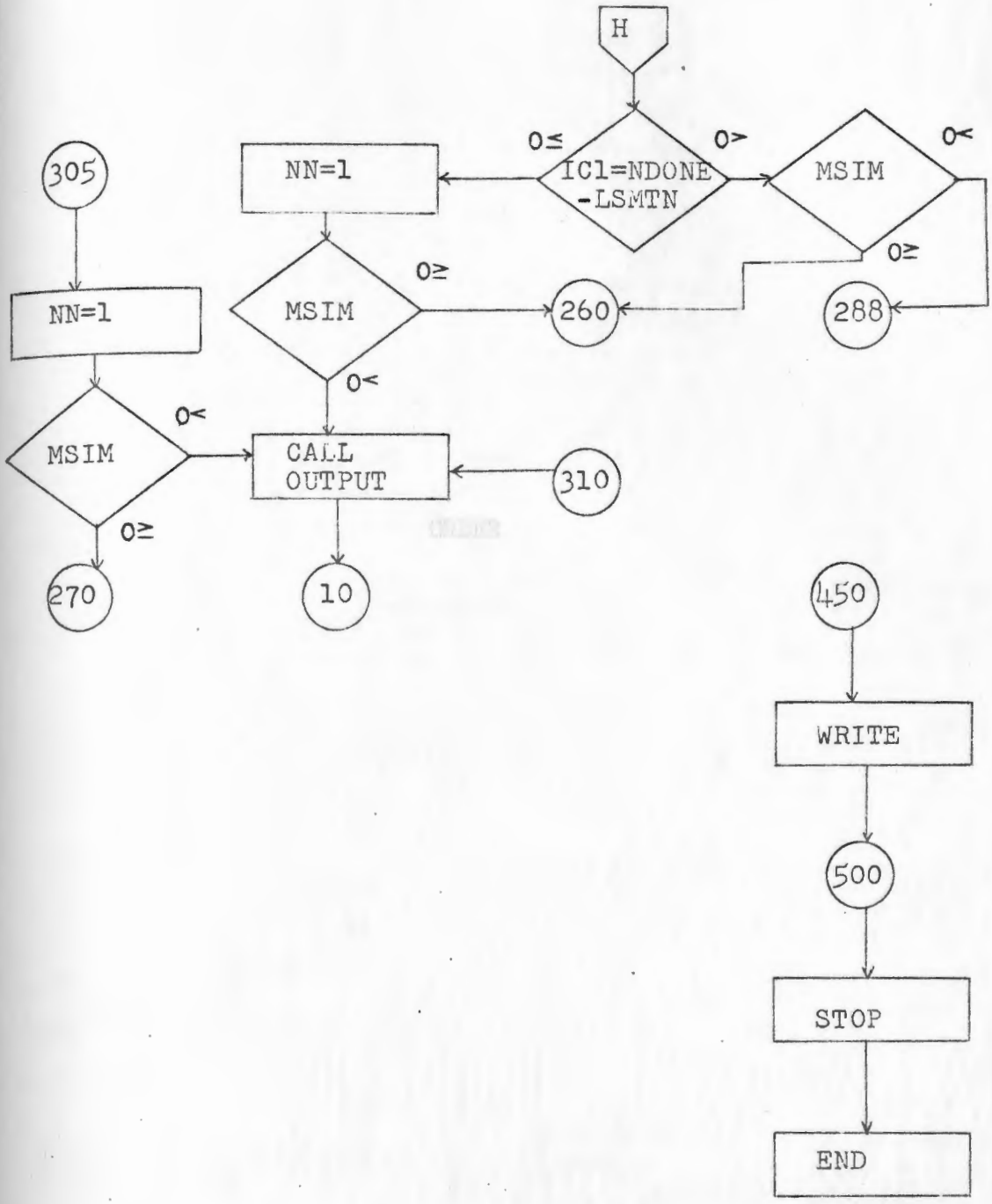

D
IVAL
0≥
0<
ITRY=
ITRY+1
ISB=
LNAR(IVAL)
ISA=
NGRP(ISB)
ITRY-
NGPS
0≥
0<
450
LGROUP=
IGRPR(ISA,
ITRY)
161
LGROUP=
IGRPR(ISA,1)
CALL
OUTPUT
10

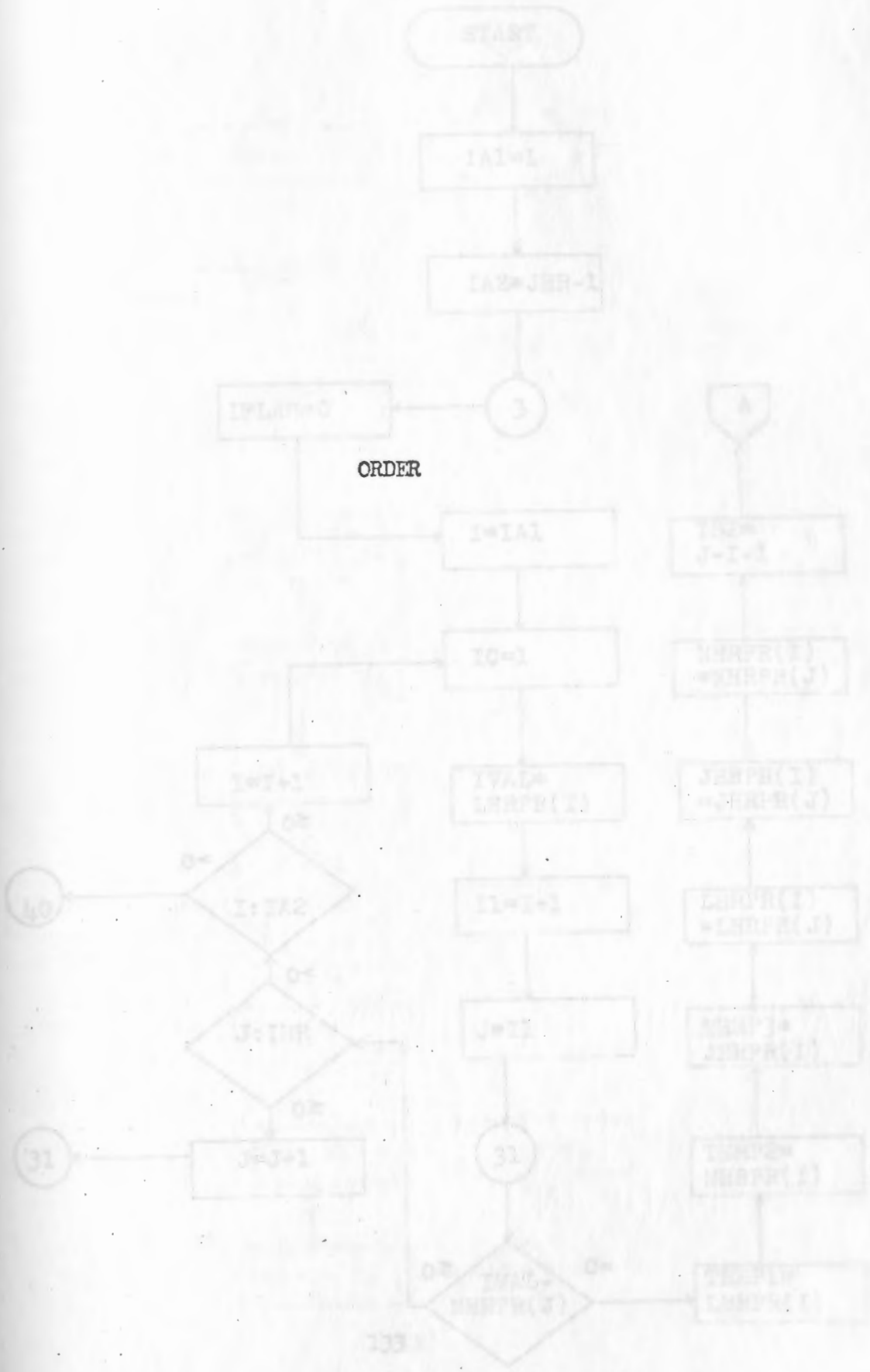

210
225
L1=
LSMTY+1
NVE=
LSMTN
CALL
PRIOR
250
IHR-1
0>
0<
0=
258
CALL
ORDER
NDONE=
IHR
257
CALL
PHOUR
E

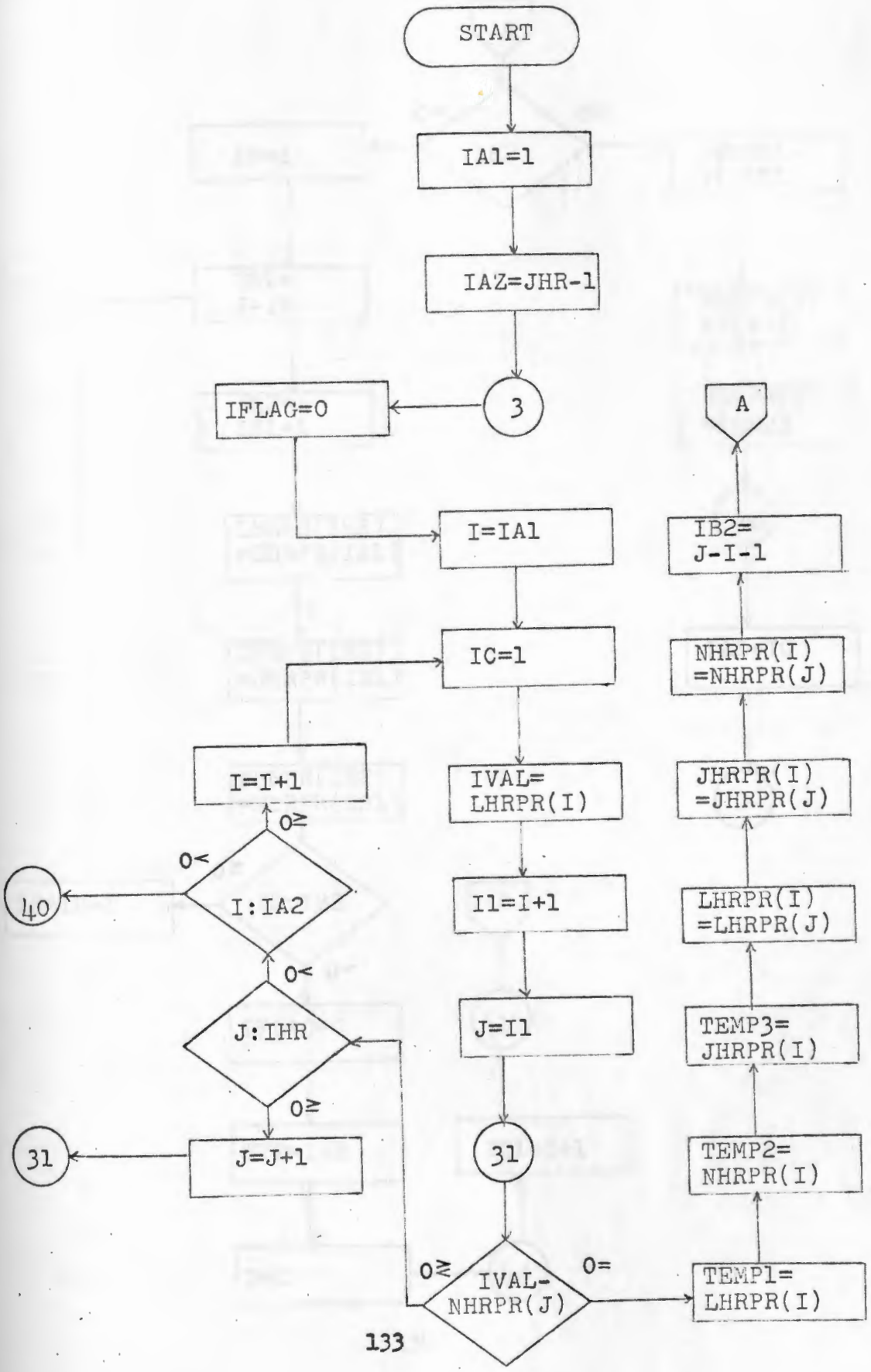

E
MSIM
0≥
0<
258
280
LSMTY
0<
260
IA1=1
0≥
284
IA2=
LSMTY
ILST=0
262
CALL
SELECT
IVAL
0≥
0<
ILST=1
IB1=
IB1+1
MSIM=1
ISB=
LYAR(IVAL)
ITRY=1
ISA=
NGRP(ISB)
MSIM
0<
278
0≥
280
ITRY=
ITRY+1
LGROUP=
IGRPR(ISA,
ITRY)
LGROUP=
IGRPR(ISA,
ITRY)
F
0<
450
ITRY-
NGPS
0≥

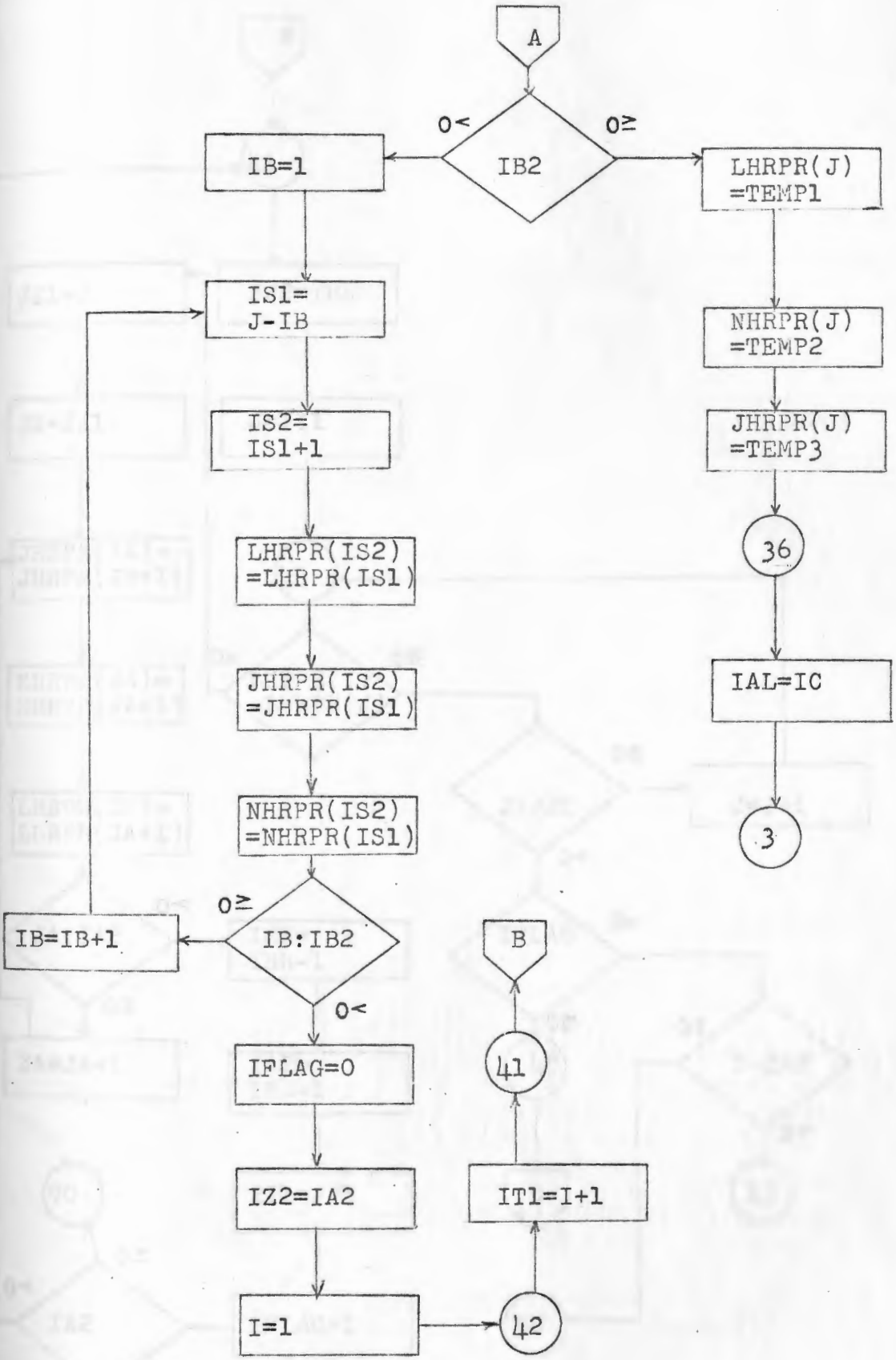

F
0>
0 ≤
262
IB1-LSMTY
0≥
0<
NN
310
280
NN
0≥
283
0<
298
LSMTN
0<
285
0≥
305
MSIM=1
284
ICl+NDONE
-LSMTN
0≤
305
0>
IA1=
LSMTY+1
IA2=
LSMTN+
LSMTY
ILOC=1
G

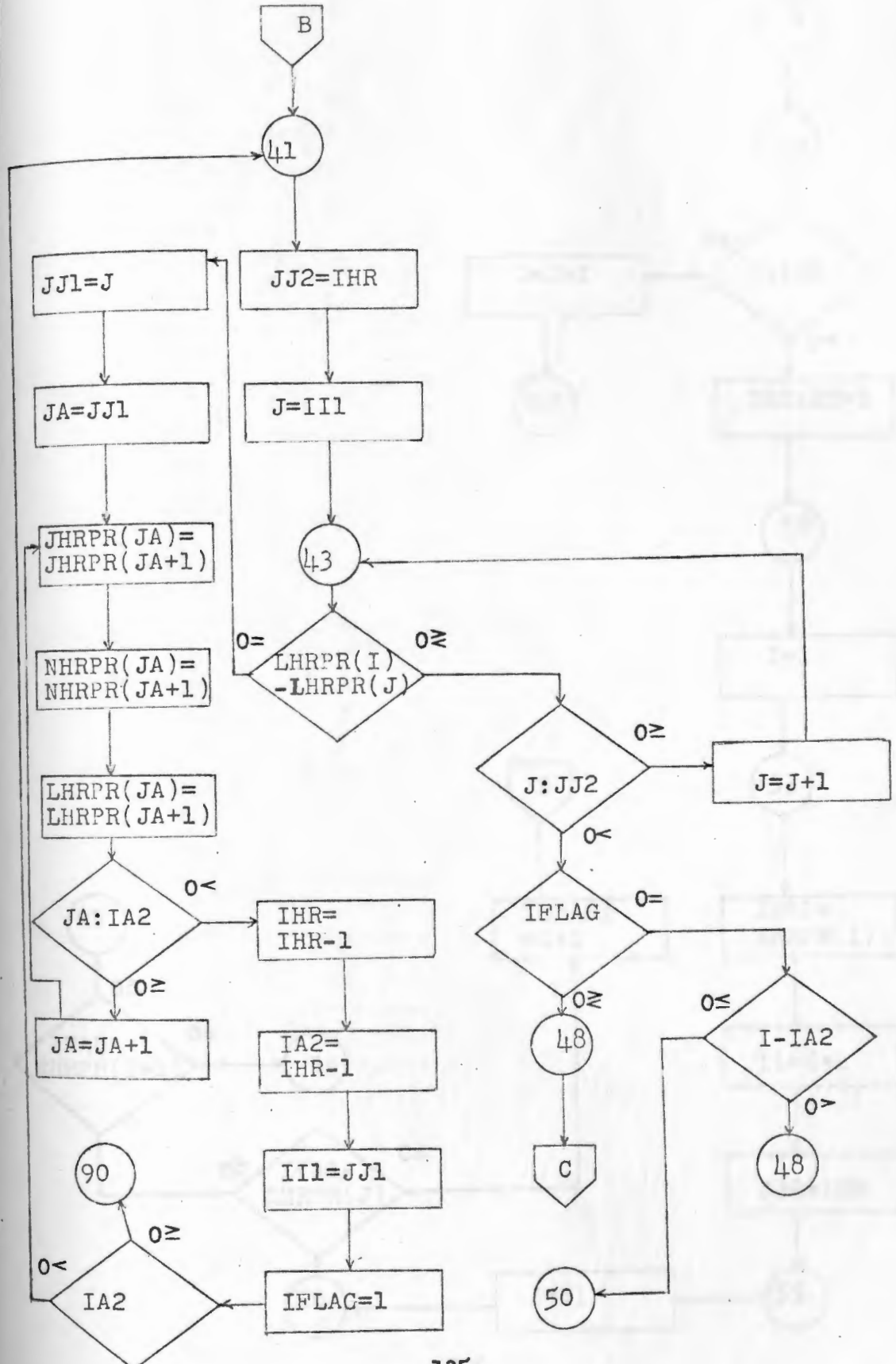

G
288
CALL SELECT
IVAL
0≥
0<
298
ICl= ICl+1
ITRY= ITRY+1
ISUB= IVAL- LSMTY
LGROUP= IGRPR(ISA, ITRY)
ISR= LNAR(ISB)
MSIM
0≥
260
ITRY=1
0<
285
ISA= NGRP(ISR)
LGROUP= IGRPR(ISA, ITRY)
H

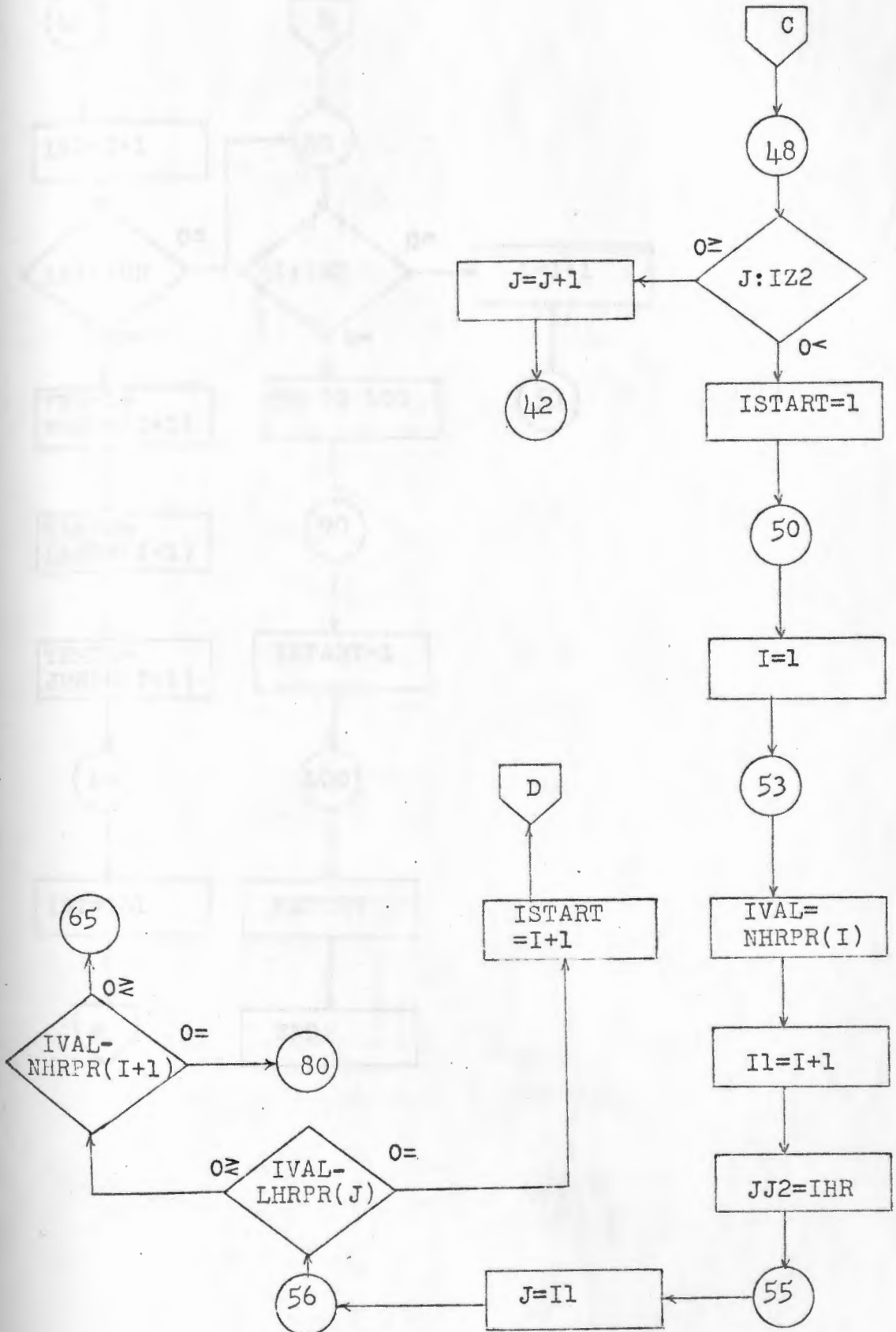

H
0≤
0>
0<
ICl=NDONE
-LSMTN
NN=1
MSIM
305
NN=1
MSIM
0≥
260
288
0<
MSIM
0<
CALL
OUTPUT
310
0≥
270
10
450
WRITE
500
STOP
END

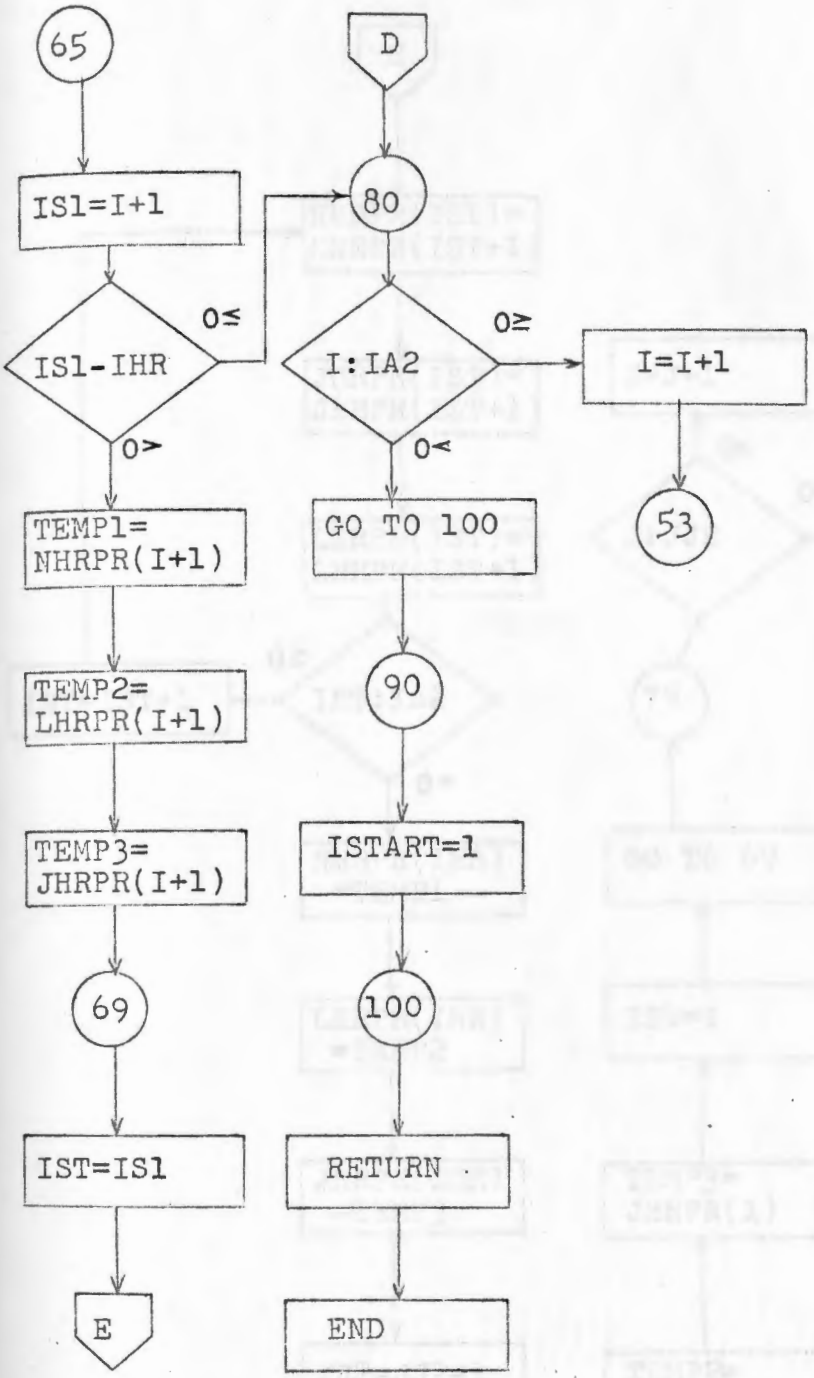

ORDER

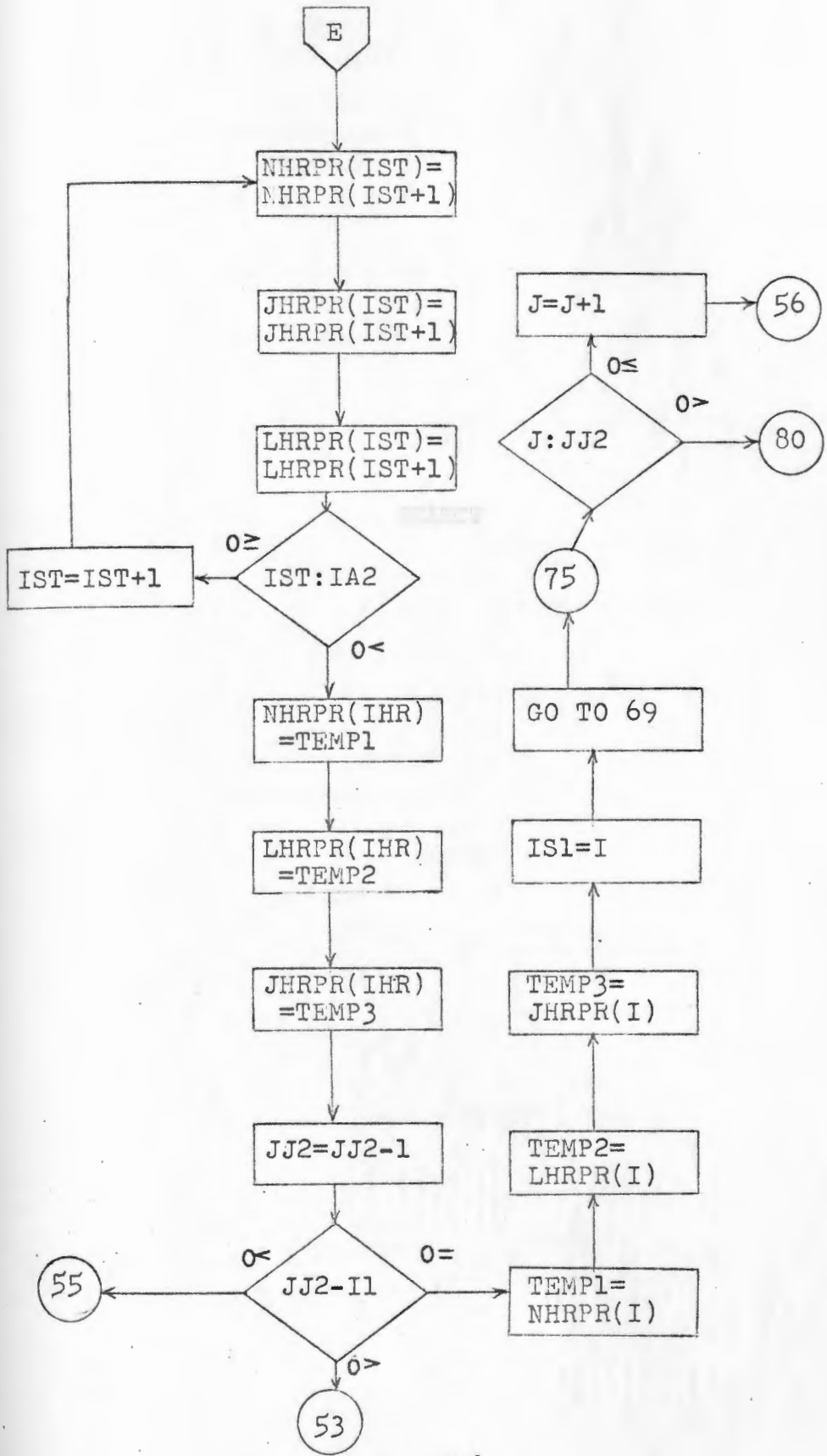

START
IA1=1
IAZ=JHR-1
3
IFLAG=0
I=IA1
IC=1
IVAL=
LHRPR(I)
I1=I+1
J=I1
31
IVAL-
NHRPR(J)
0≧
0=
TEMP1=
LHRPR(I)
TEMP2=
NHRPR(I)
TEMP3=
JHRPR(I)
LHRPR(I)
=LHRPR(J)
JHRPR(I)
=JHRPR(J)
NHRPR(I)
=NHRPR(J)
IB2=
J-I-1
A
J:IHR
0<
0≧
J=J+1
31
I:IA2
0<
0≧
I=I+1
40

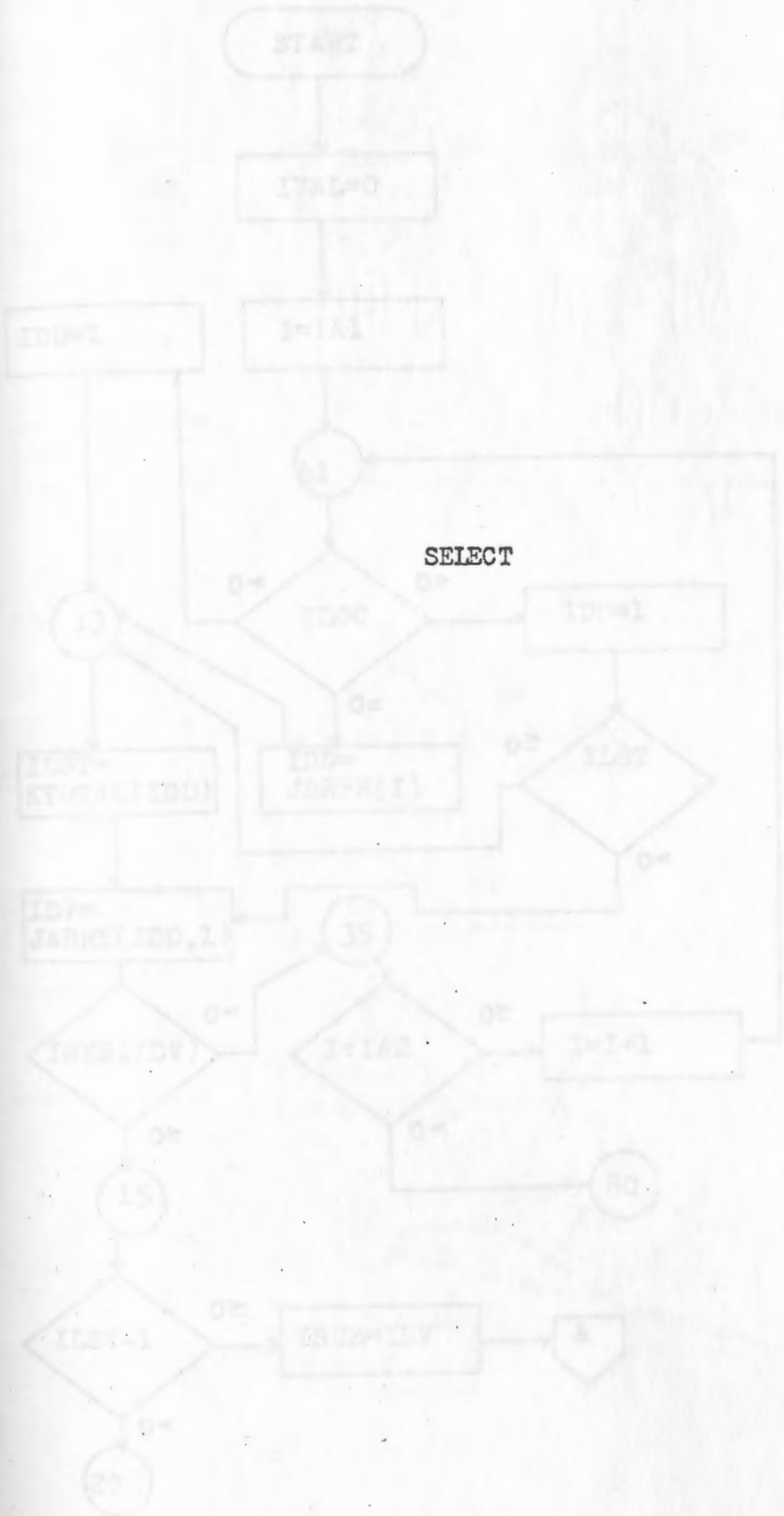

A
0<
0≥
IB2
IB=1
LHRPR(J)
=TEMP1
IS1=
J-IB
NHRPR(J)
=TEMP2
IS2=
IS1+1
JHRPR(J)
=TEMP3
LHRPR(IS2)
=LHRPR(IS1)
36
JHRPR(IS2)
=JHRPR(IS1)
IAL=IC
NHRPR(IS2)
=NHRPR(IS1)
3
0≥
IB=IB+1
IB:IB2
B
0<
41
IFLAG=0
IZ2=IA2
IT1=I+1
I=1
42

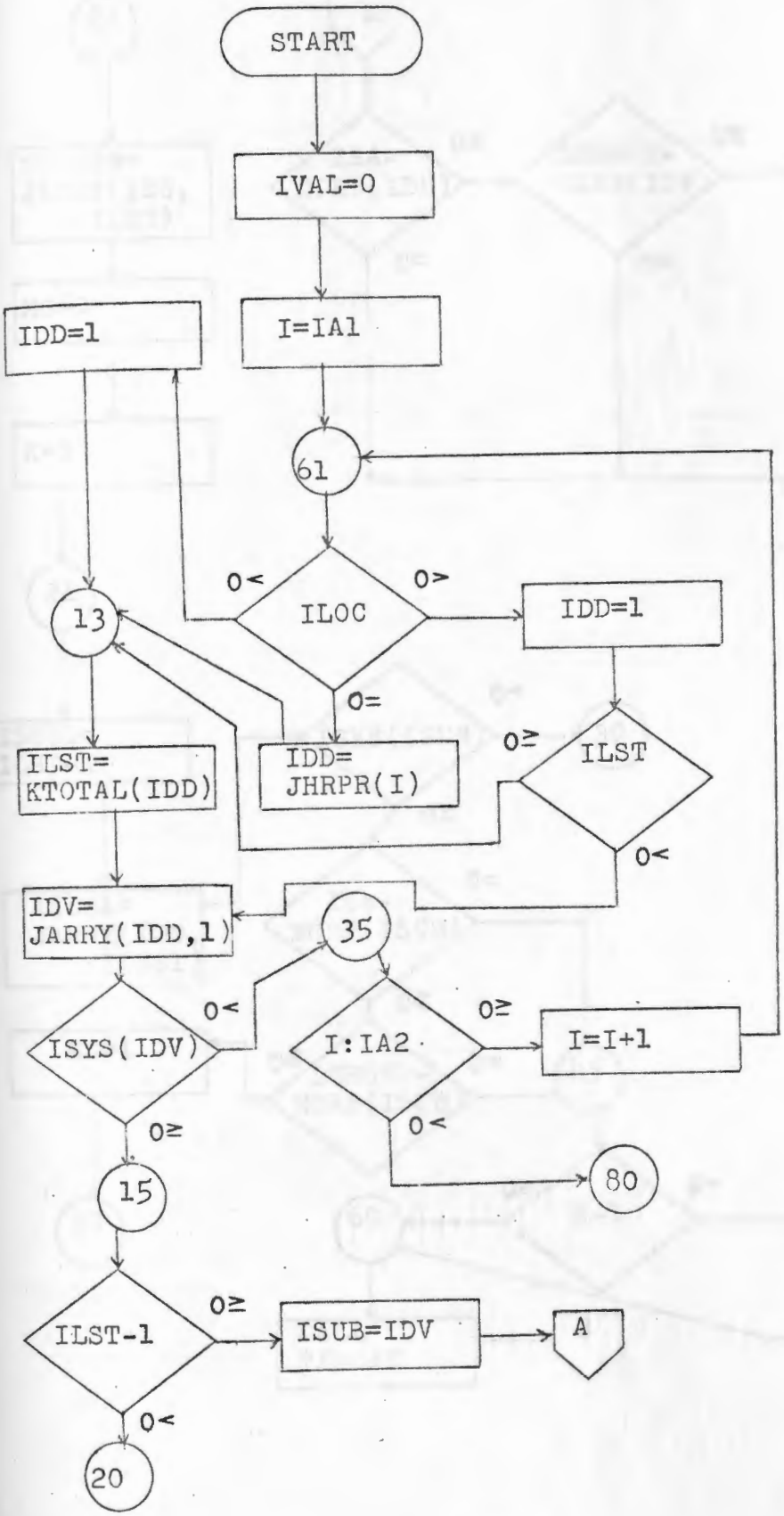

B
41
JJ1=J
JJ2=IHR
JA=JJ1
J=II1
JHRPR(JA)=
JHRPR(JA+1)
43
0=
LHRPR(I)
-LHRPR(J)
0≧
NHRPR(JA)=
NHRPR(JA+1)
J:JJ2
0≧
J=J+1
LHRPR(JA)=
LHRPR(JA+1)
0<
JA:IA2
0<
IHR=
IHR-1
IFLAG
0=
0≧
JA=JA+1
IA2=
IHR-1
48
0≦
I-IA2
0>
90
II1=JJ1
C
48
0≧
0<
IA2
IFLAC=1
50

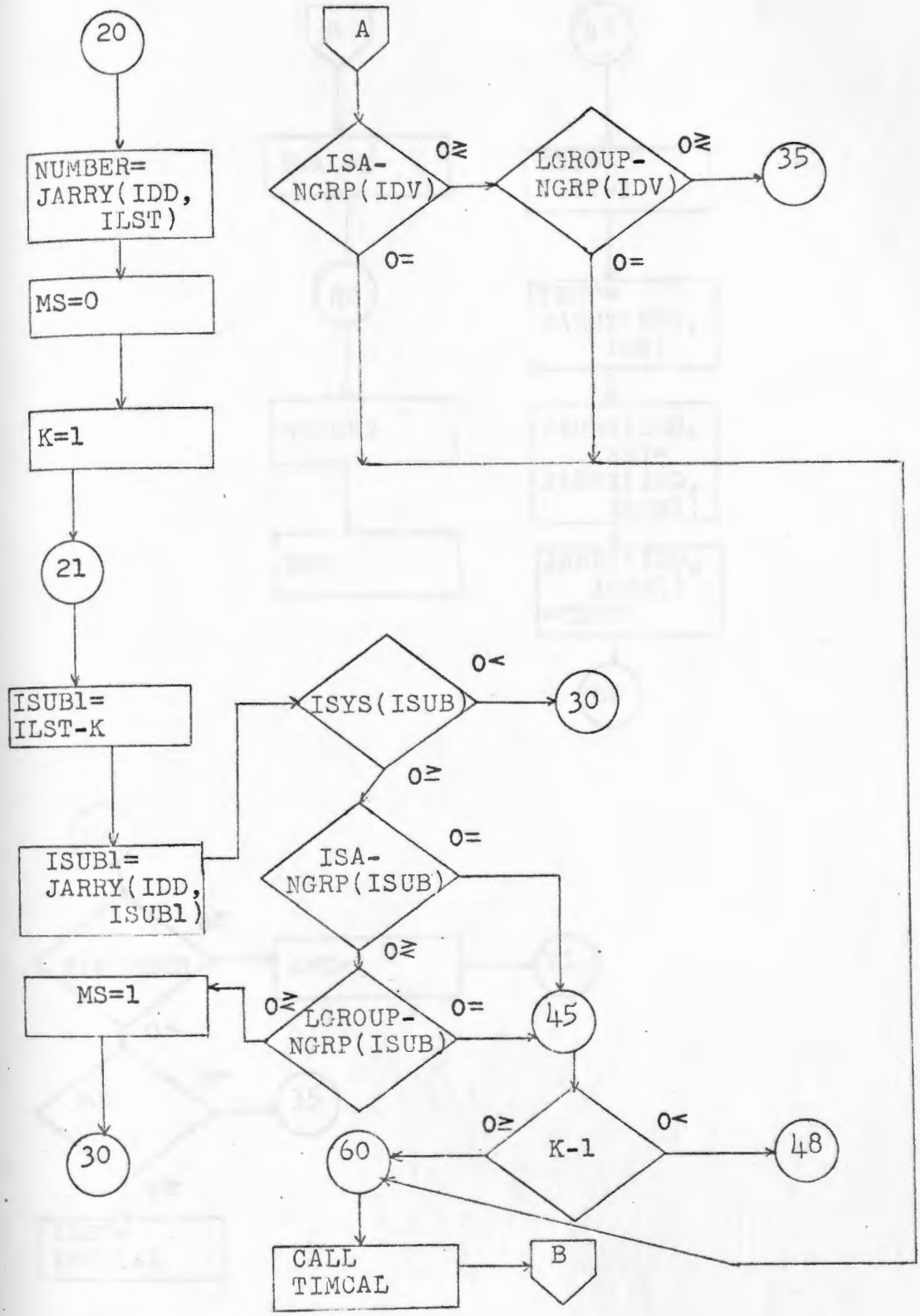

C
48
0≥
J:IZ2
J=J+1
42
0<
ISTART=1
50
I=1
53
IVAL=
NHRPR(I)
I1=I+1
JJ2=IHR
55
J=I1
56
D
ISTART
=I+1
65
0≧
IVAL-
NHRPR(I+1)
0=
80
0≧
IVAL-
LHRPR(J)
0=

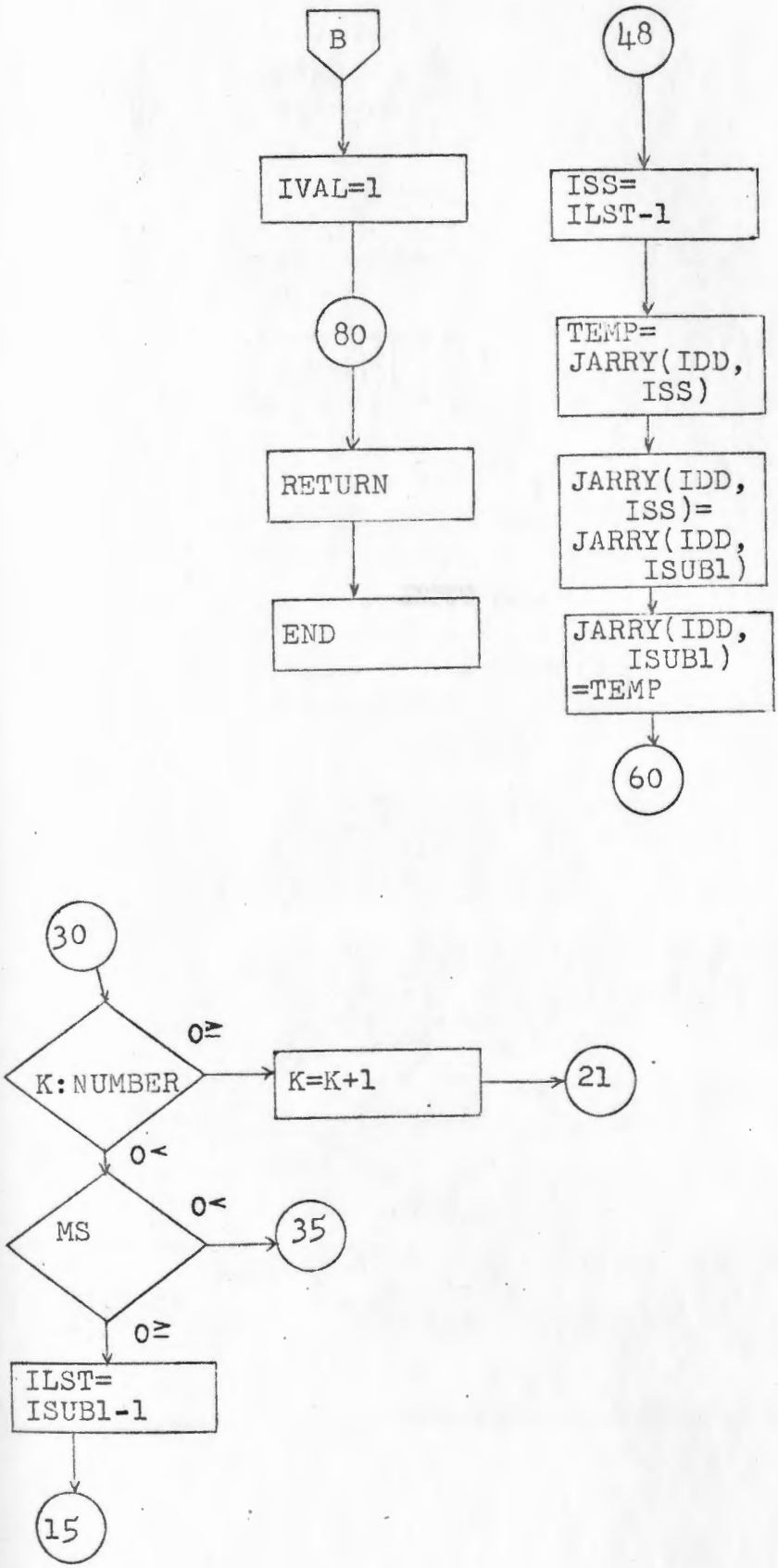

65
D
IS1=I+1
80
IS1-IHR
0≤
I:IA2
0≥
I=I+1
0>
0<
TEMP1=
NHRPR(I+1)
GO TO 100
53
TEMP2=
LHRPR(I+1)
90
TEMP3=
JHRPR(I+1)
ISTART=1
69
100
IST=IS1
RETURN
E
END

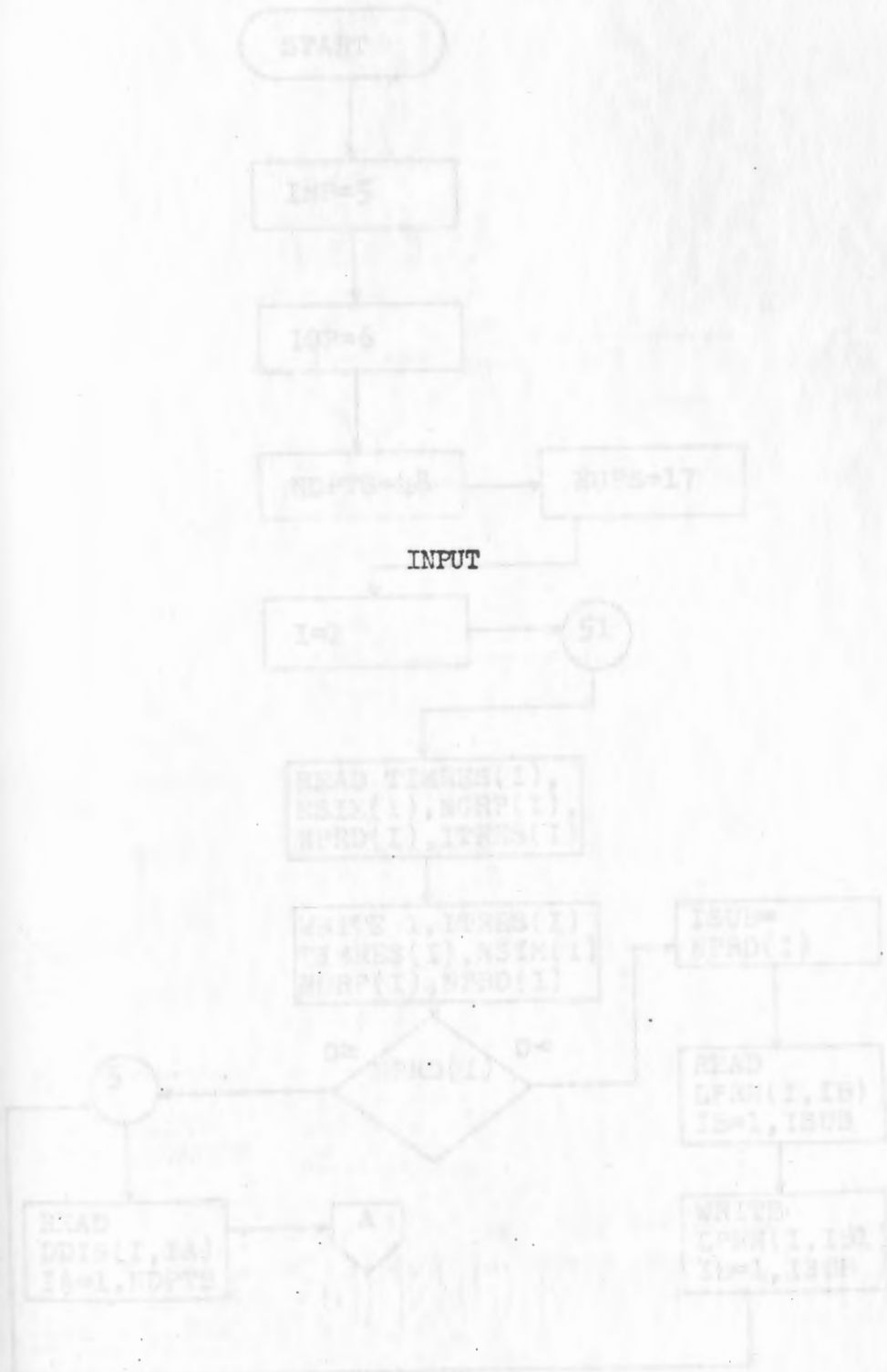

E
NHRPR(IST)=
NHRPR(IST+1)
JHRPR(IST)=
JHRPR(IST+1)
LHRPR(IST)=
LHRPR(IST+1)
0≥
IST:IA2
IST=IST+1
0<
NHRPR(IHR)
=TEMP1
LHRPR(IHR)
=TEMP2
JHRPR(IHR)
=TEMP3
JJ2=JJ2-1
0<
JJ2-I1
0=
0>
55
53
TEMP1=
NHRPR(I)
TEMP2=
LHRPR(I)
TEMP3=
JHRPR(I)
IS1=I
GO TO 69
75
0≤
J:JJ2
0>
J=J+1
56
80

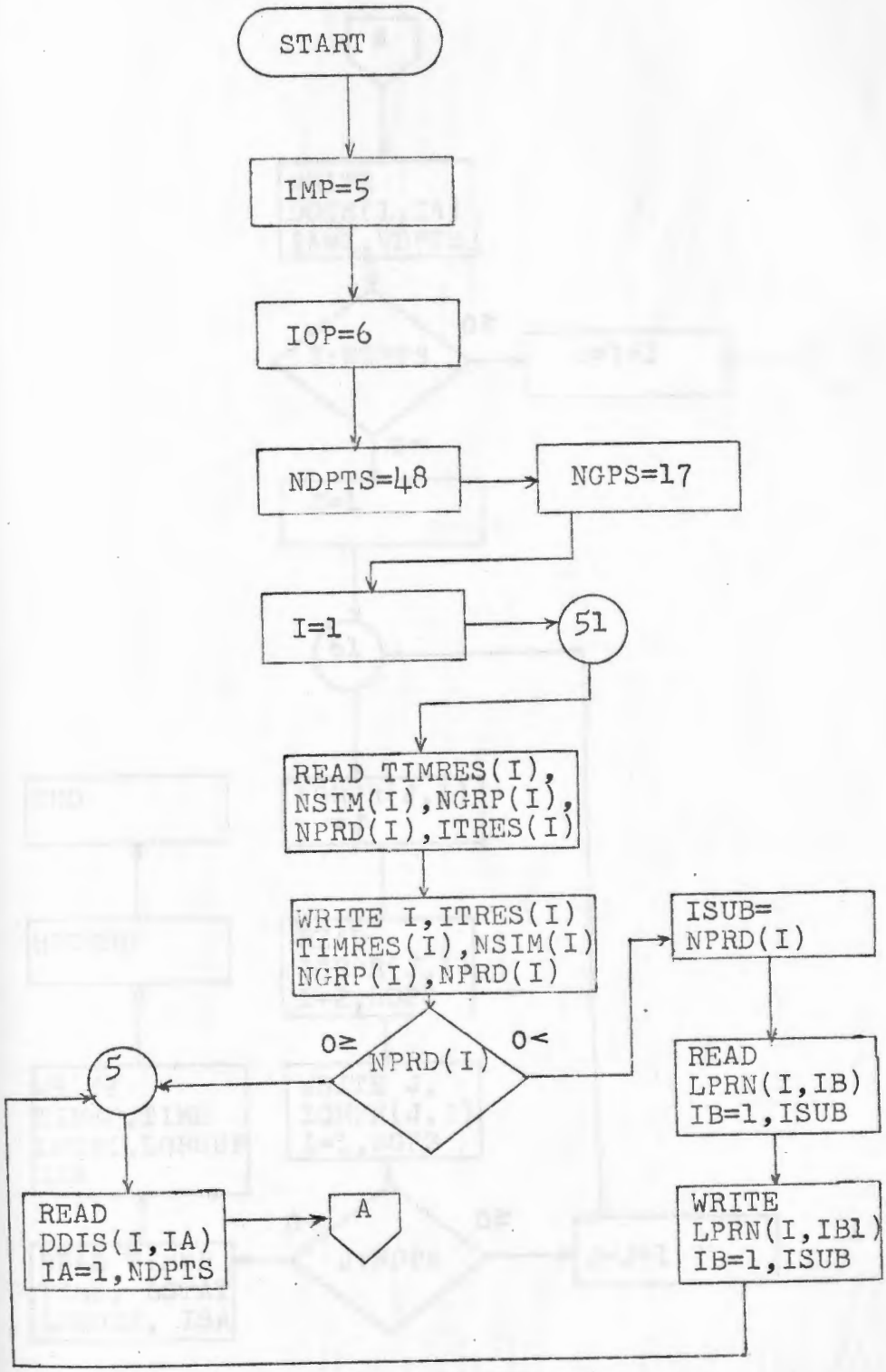

SELECT

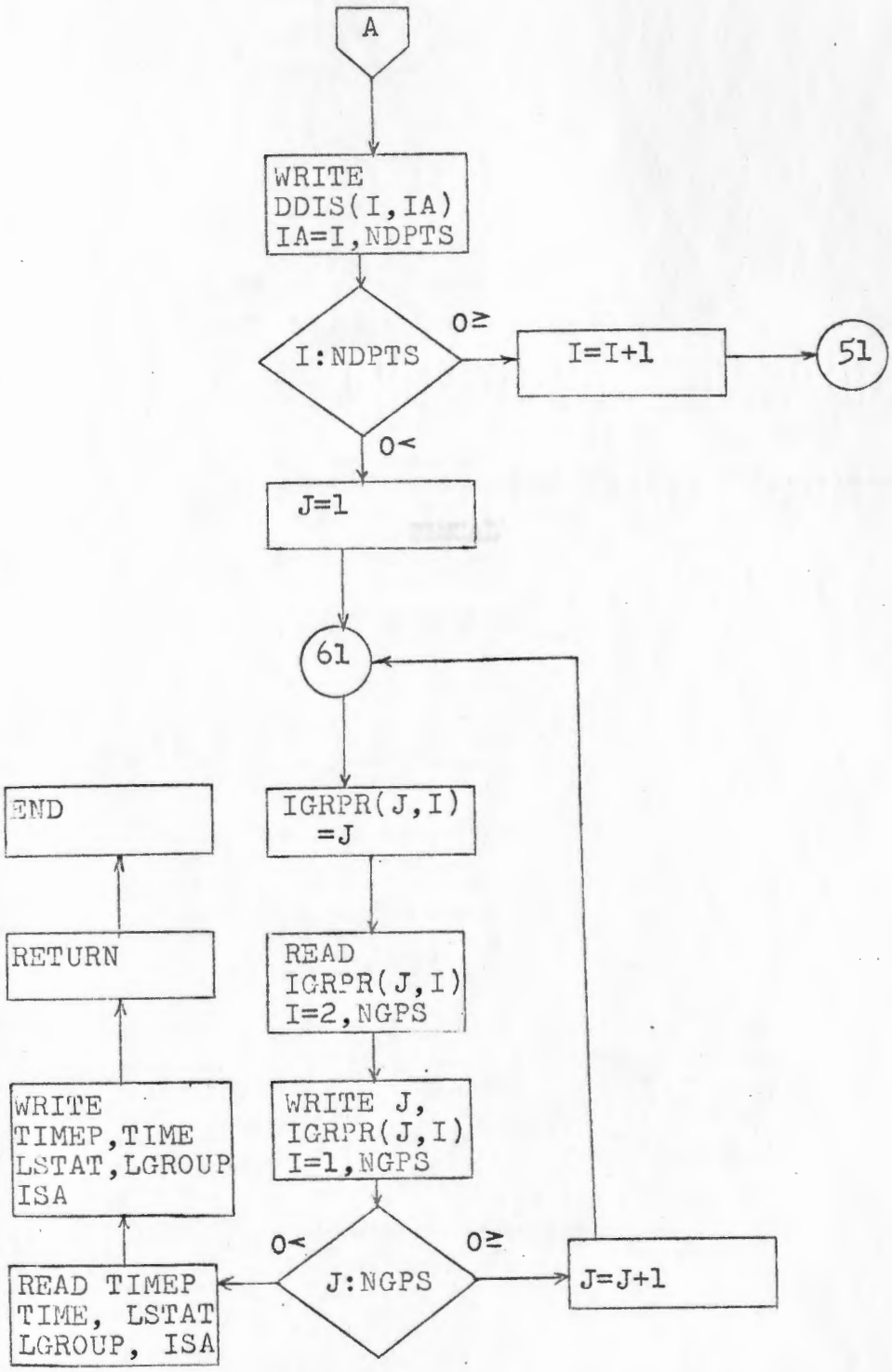

START
IVAL=0
IDD=1
I=IA1
61
13
0<
ILOC
0>
IDD=1
0=
ILST=
KTOTAL(IDD)
IDD=
JHRPR(I)
0≥
ILST
0<
IDV=
JARRY(IDD,1)
35
0<
ISYS(IDV)
0≥
I:IA2
0≥
I=I+1
0<
80
0≥
15
0≥
ILST-1
ISUB=IDV
A
0<
20

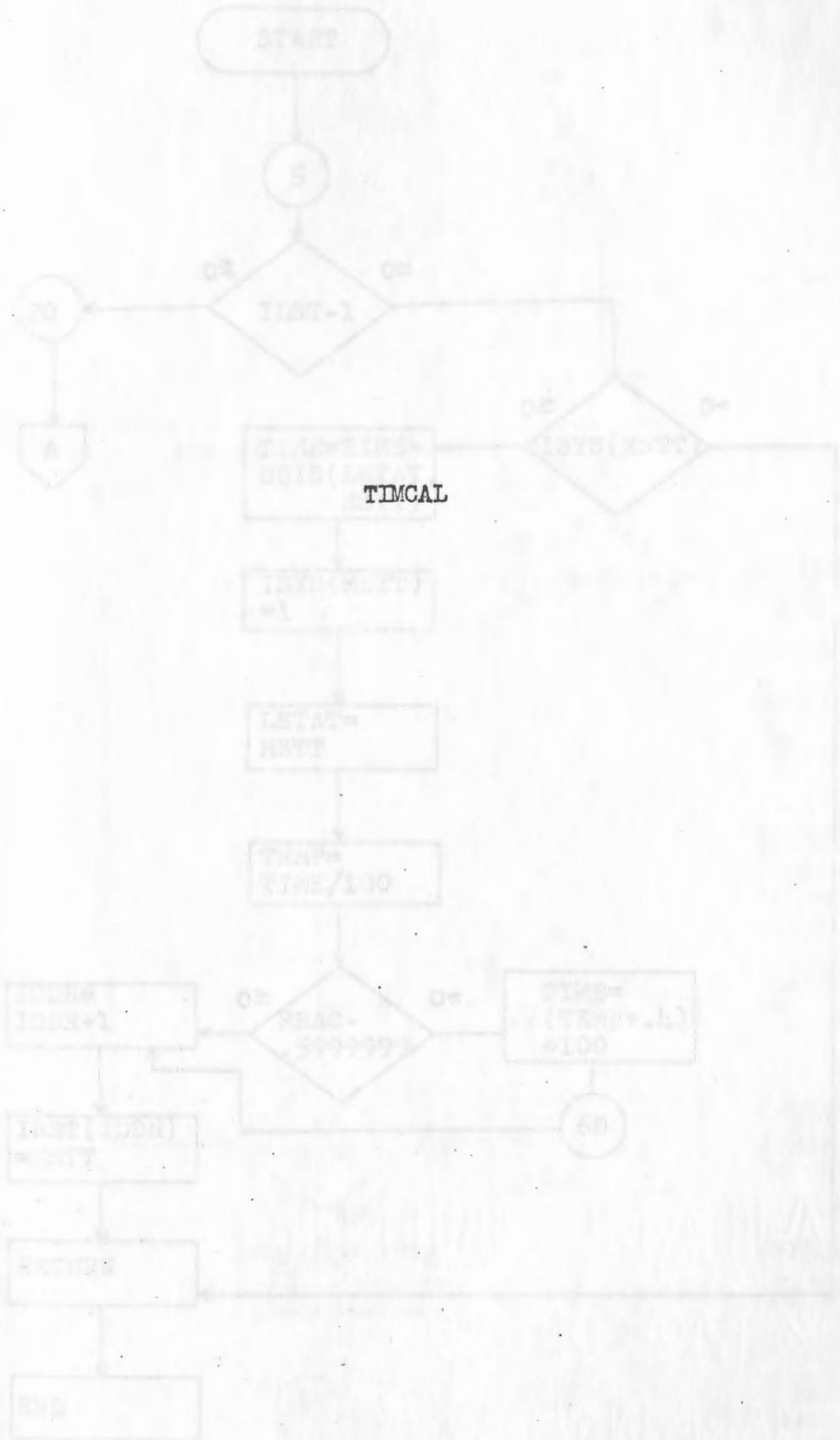

20
A
NUMBER=
JARRY(IDD,
ILST)
ISA-
NGRP(IDV)
0≧
LGROUP-
NGRP(IDV)
0≧
35
0=
0=
MS=0
K=1
21
ISUB1=
ILST-K
ISYS(ISUB)
0<
30
0≧
ISUB1=
JARRY(IDD,
ISUB1)
ISA-
NGRP(ISUB)
0=
0≧
MS=1
0≧
LGROUP-
NGRP(ISUB)
0=
45
30
60
0≧
K-1
0<
48
CALL
TIMCAL
B


B
IVAL=1
80
RETURN
END
48
ISS=
ILST-1
TEMP=
JARRY(IDD,
ISS)
JARRY(IDD,
ISS)=
JARRY(IDD,
ISUB1)
JARRY(IDD,
ISUB1)
=TEMP
60
30
K:NUMBER
0≧
K=K+1
21
0<
MS
0<
35
0≧
ILST=
ISUB1-1
15

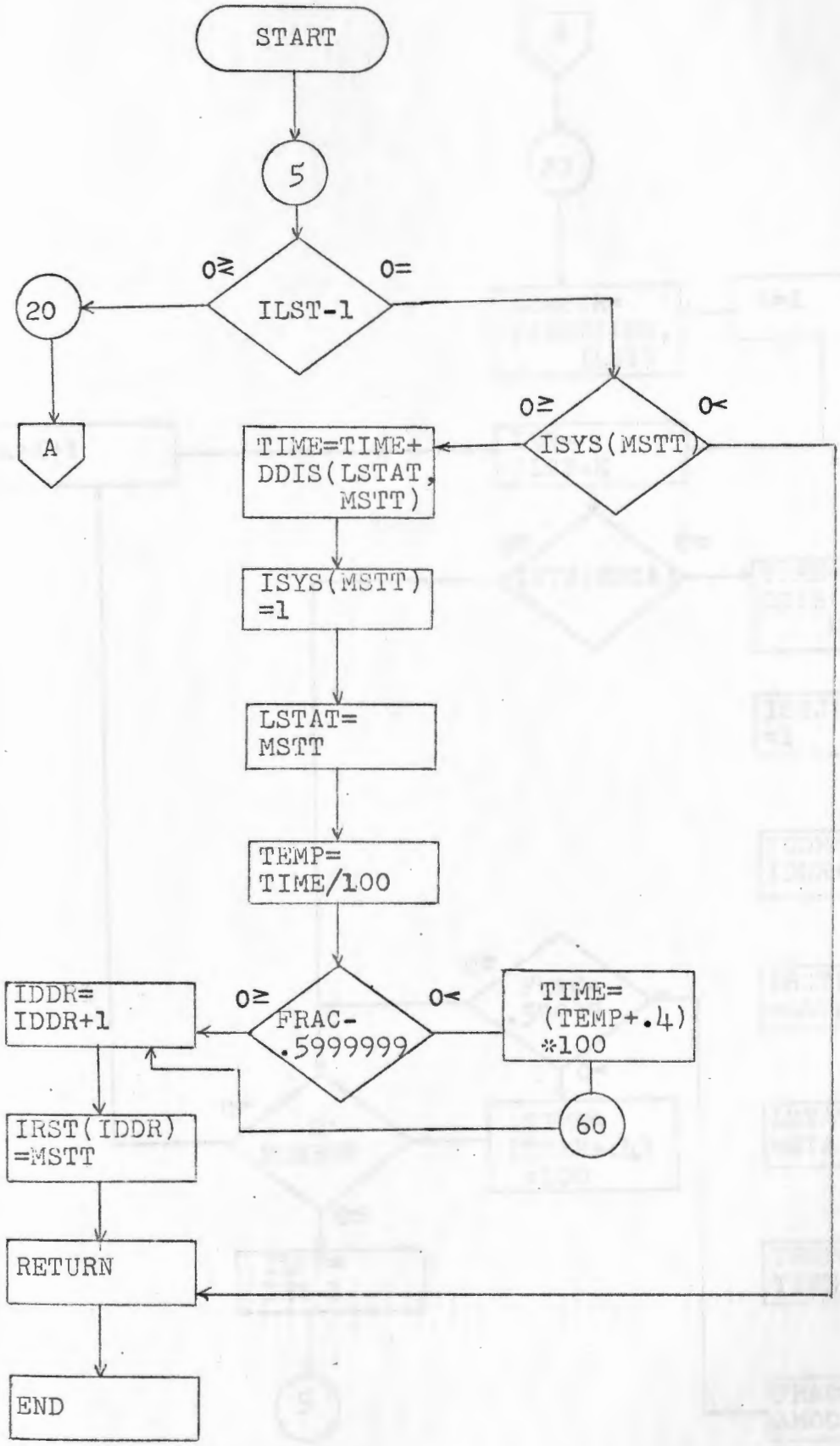

INPUT

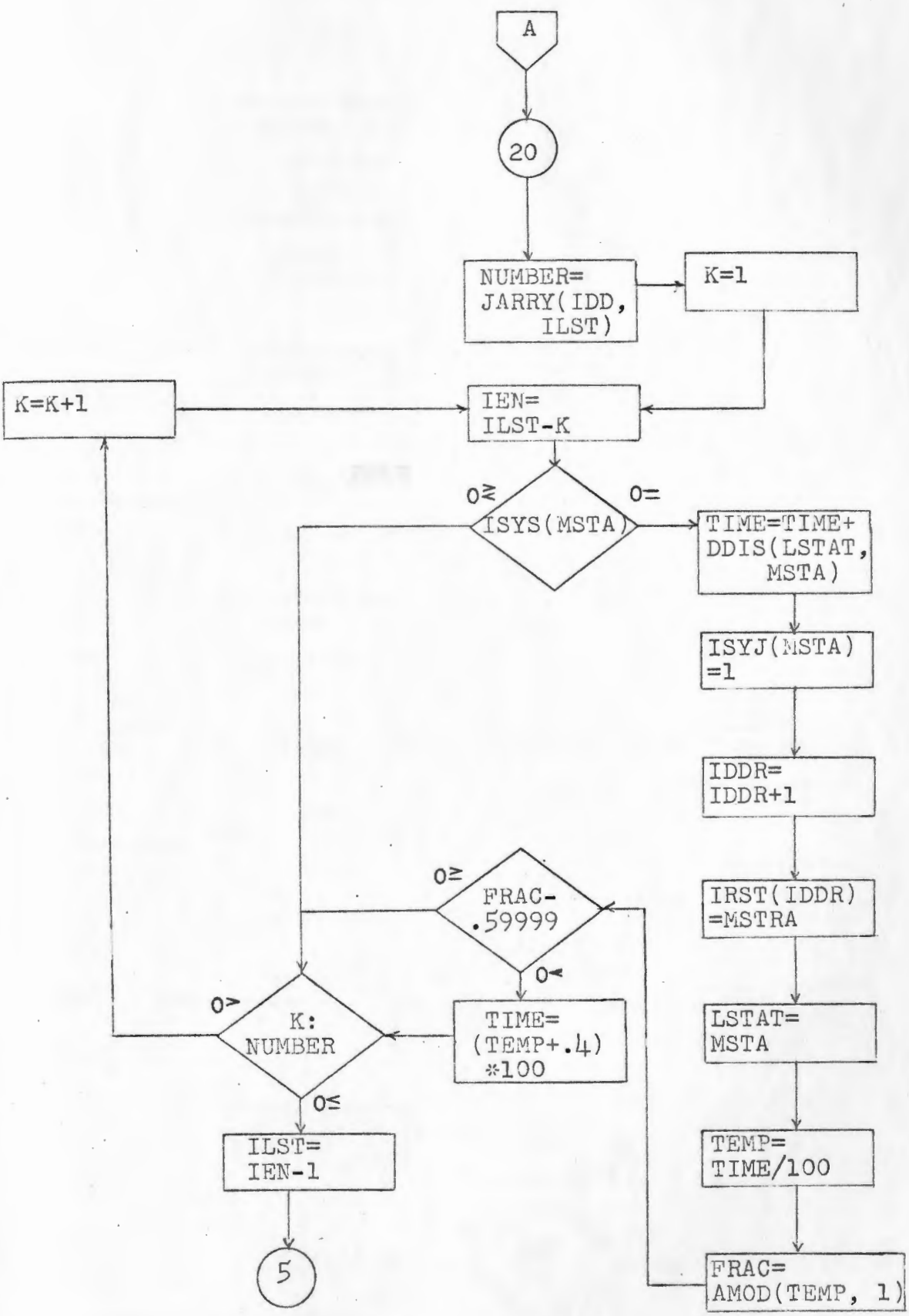

START
IMP=5
IOP=6
NDPTS=48
NGPS=17
I=1
51
READ TIMRES(I),
NSIM(I),NGRP(I),
NPRD(I),ITRES(I)
WRITE I,ITRES(I)
TIMRES(I),NSIM(I)
NGRP(I),NPRD(I)
0≥
NPRD(I)
0<
5
ISUB=
NPRD(I)
READ
LPRN(I,IB)
IB=1,ISUB
WRITE
LPRN(I,IB1)
IB=1,ISUB
READ
DDIS(I,IA)
IA=1,NDPTS
A


A
WRITE
DDIS(I,IA)
IA=I,NDPTS
I:NDPTS
0≥
I=I+1
51
0<
J=1
61
END
IGRPR(J,I)
=J
RETURN
READ
IGRPR(J,I)
I=2,NGPS
WRITE
TIMEP,TIME
LSTAT,LGROUP
ISA
WRITE J,
IGRPR(J,I)
I=1,NGPS
0<
J:NGPS
0≥
J=J+1
READ TIMEP
TIME, LSTAT
LGROUP, ISA

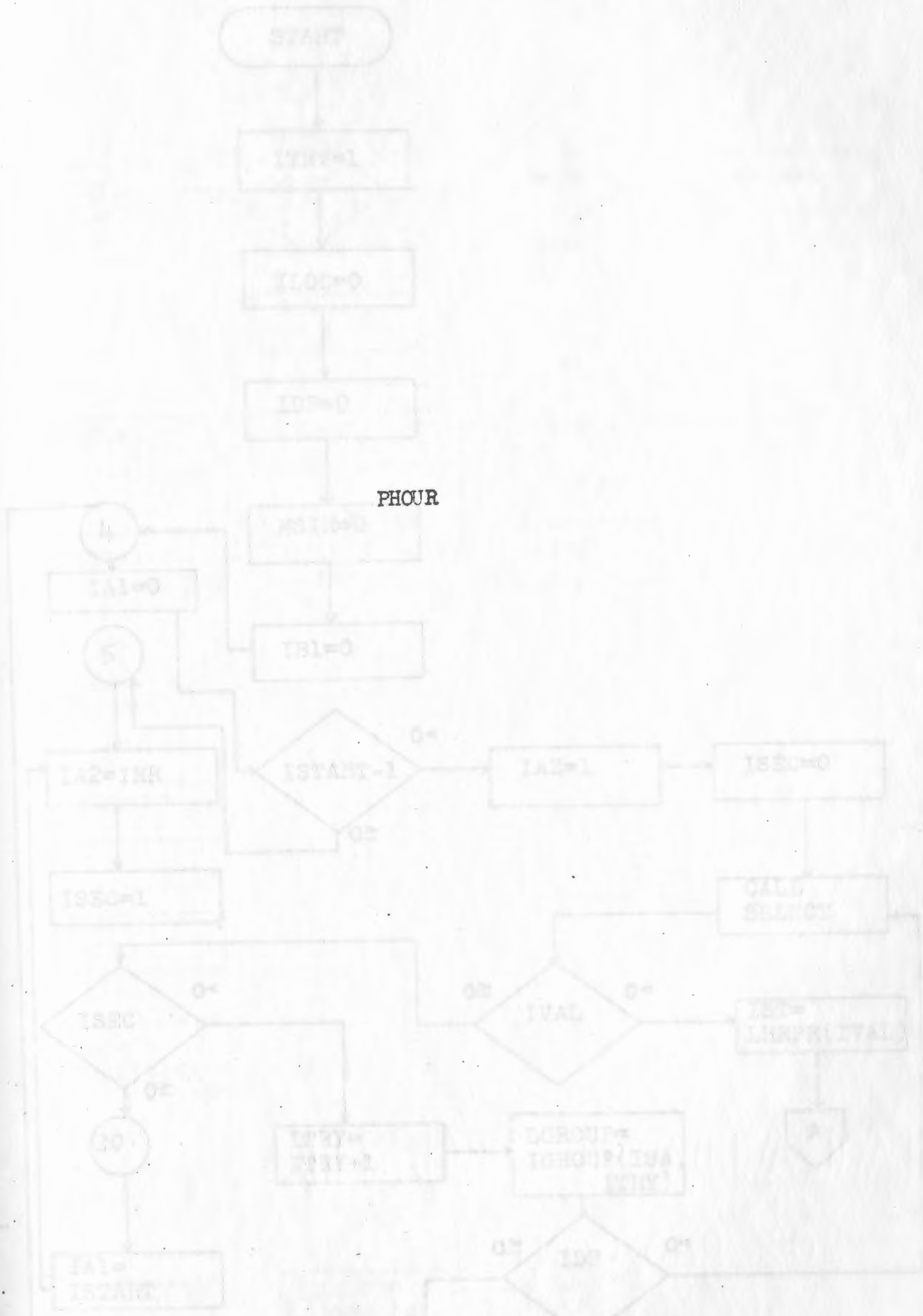


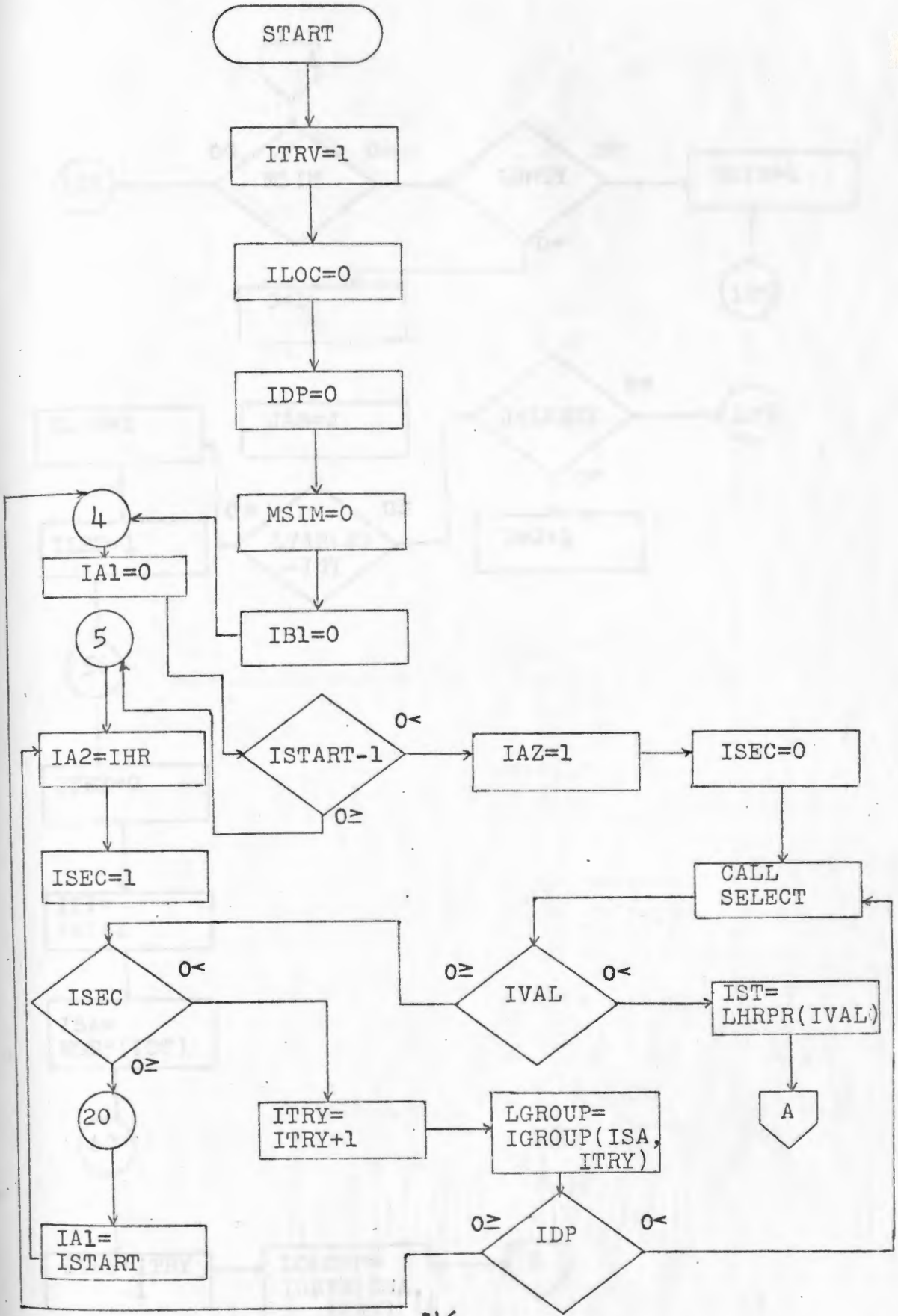
TIMCAL

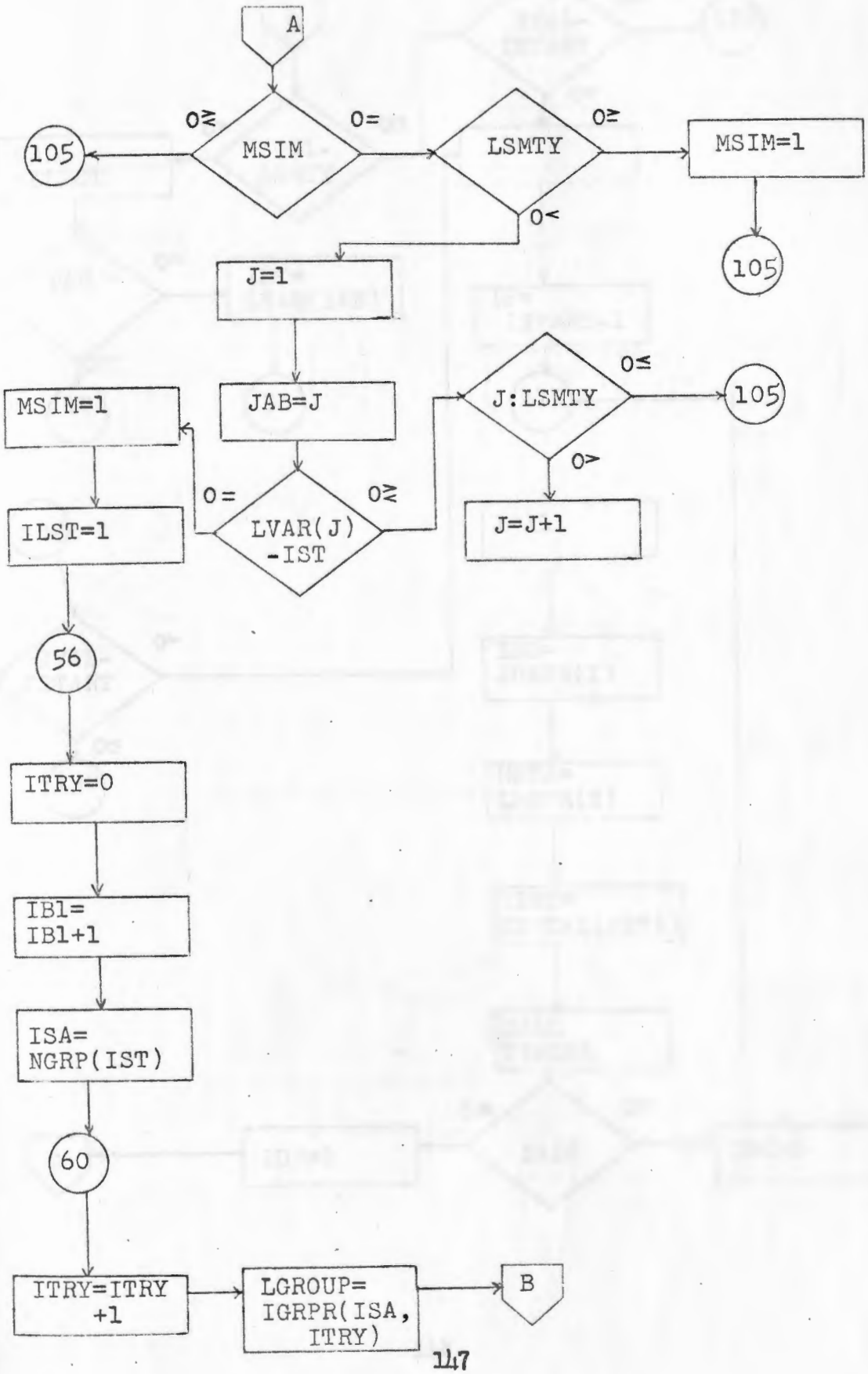

START
5
0≥
0=
ILST-1
20
A
0≥
0<
ISYS(MSTT)
TIME=TIME+
DDIS(LSTAT,
MSTT)
ISYS(MSTT)
=1
LSTAT=
MSTT
TEMP=
TIME/100
IDDR=
IDDR+1
0≥
FRAC-
.5999999
0<
TIME=
(TEMP+.4)
*100
60
IRST(IDDR)
=MSTT
RETURN
END

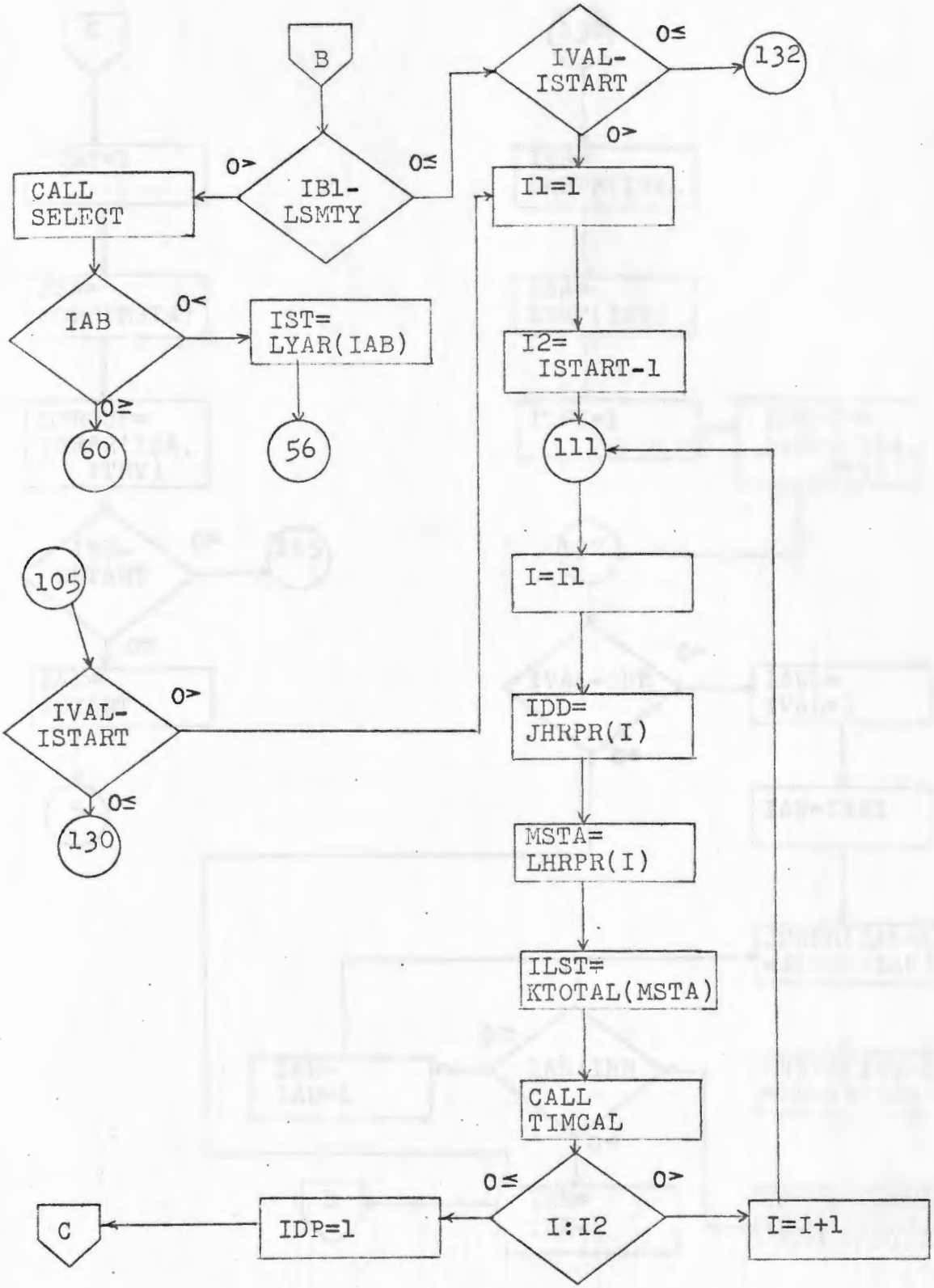

A
20
NUMBER= JARRY(IDD, ILST)
K=1
K=K+1
IEN= ILST-K
0≧
ISYS(MSTA)
0=
TIME=TIME+ DDIS(LSTAT, MSTA)
ISYJ(MSTA) =1
IDDR= IDDR+1
IRST(IDDR) =MSTRA
LSTAT= MSTA
TEMP= TIME/100
FRAC= AMOD(TEMP, 1)
0≧
FRAC- .59999
0<
TIME= (TEMP+.4) *100
0>
K: NUMBER
0≦
ILST= IEN-1
5

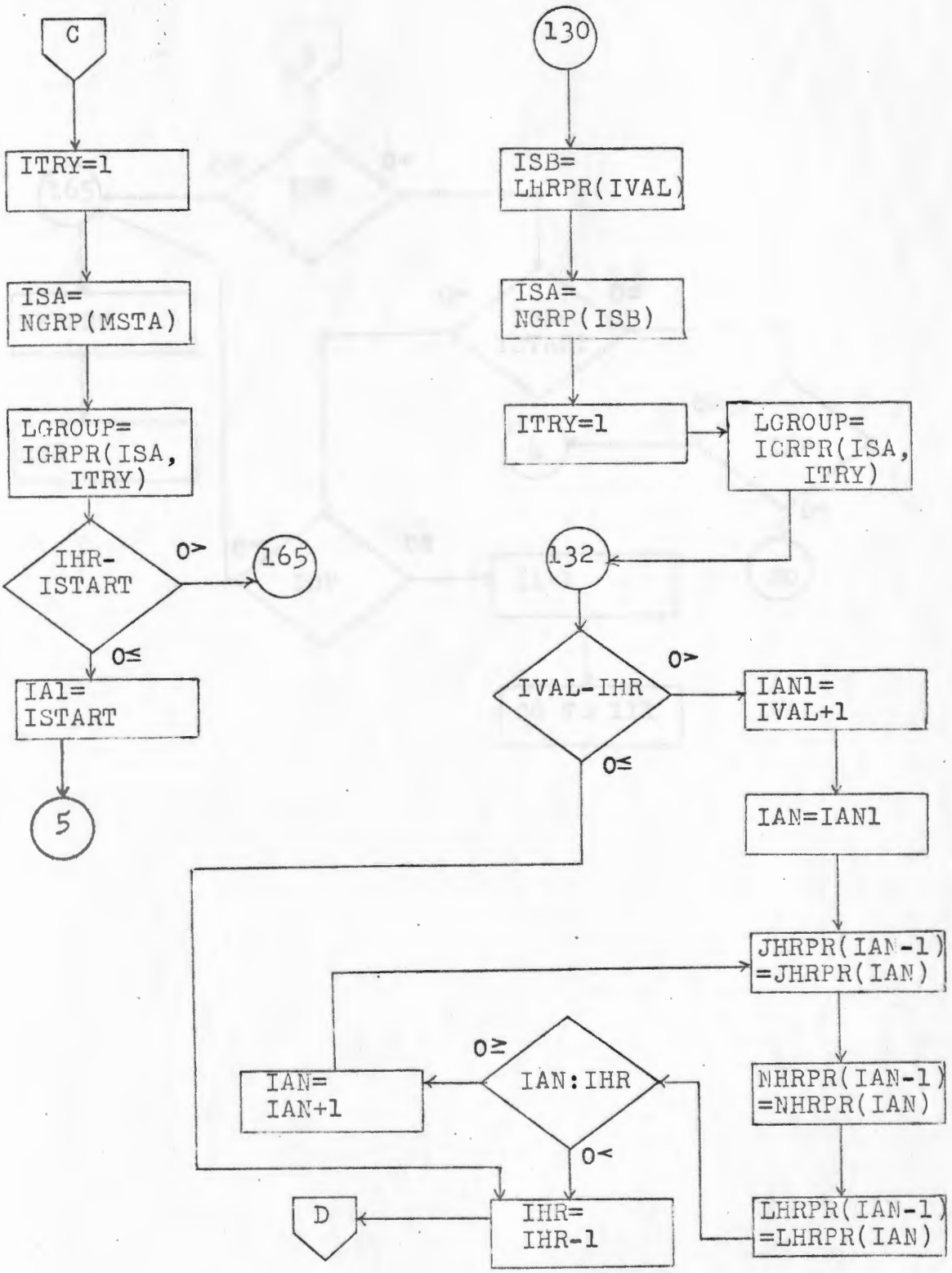
PHOUR

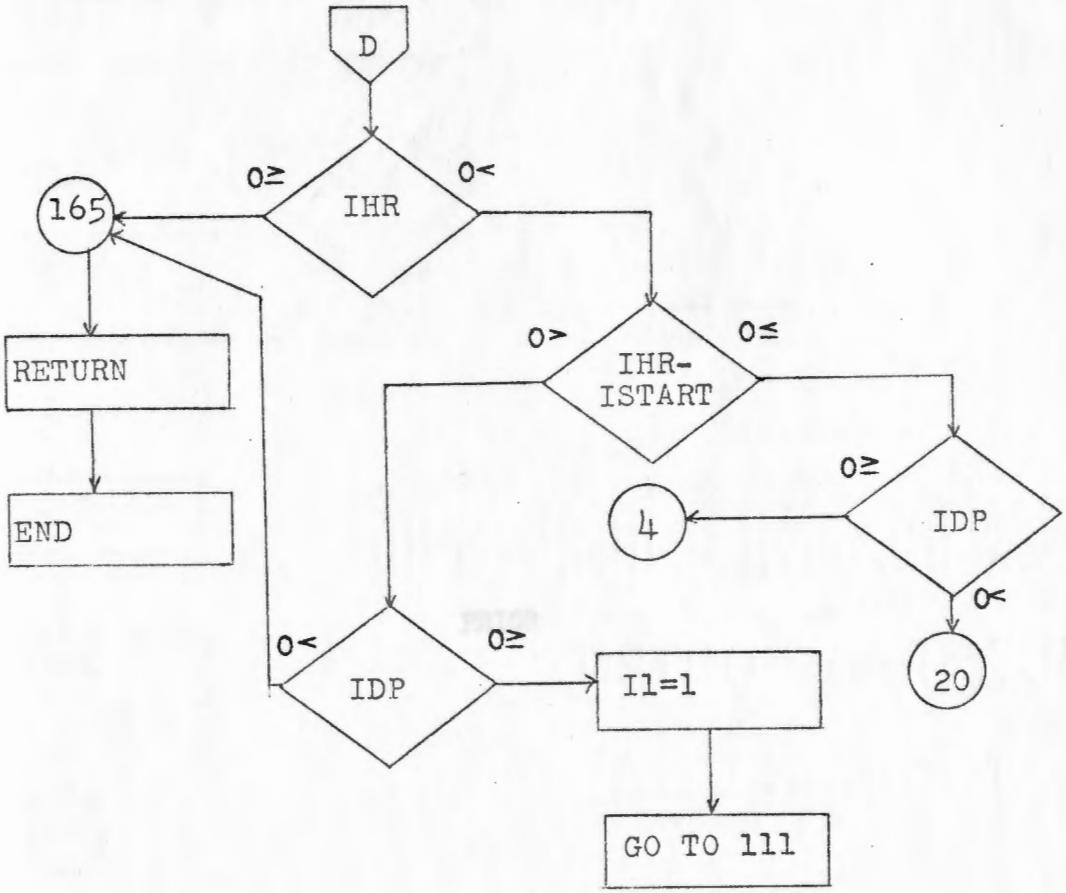

START
ITRY=1
ILOC=0
IDP=0
IB1=0
IA1=0
ISTART-1
IA2=IHR
IA2=1
ISEC=0
ISEC=1
CALL SELECT
ISEC
IVAL
IA1=
ISTART

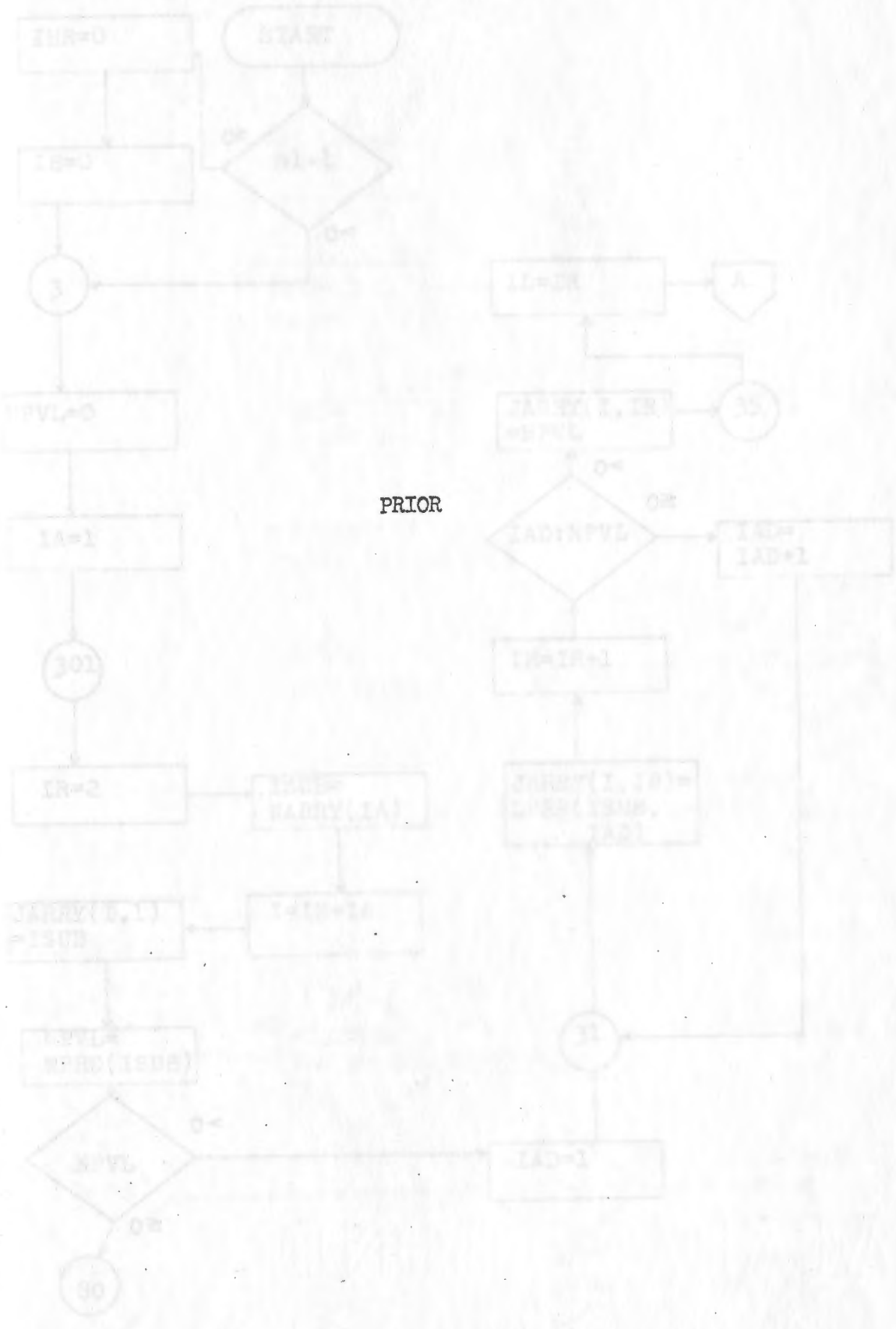

START
ITRV=1
ILOC=0
IDP=0
MSIM=0
4
IA1=0
5
IB1=0
IA2=IHR
ISTART-1
0<
0≥
IAZ=1
ISEC=0
ISEC=1
CALL
SELECT
ISEC
0<
0≥
IVAL
0≥
0<
IST=
LHRPR(IVAL)
20
ITRY=
ITRY+1
LGROUP=
IGROUP(ISA,
ITRY)
A
IA1=
ISTART
0≥
IDP
0<

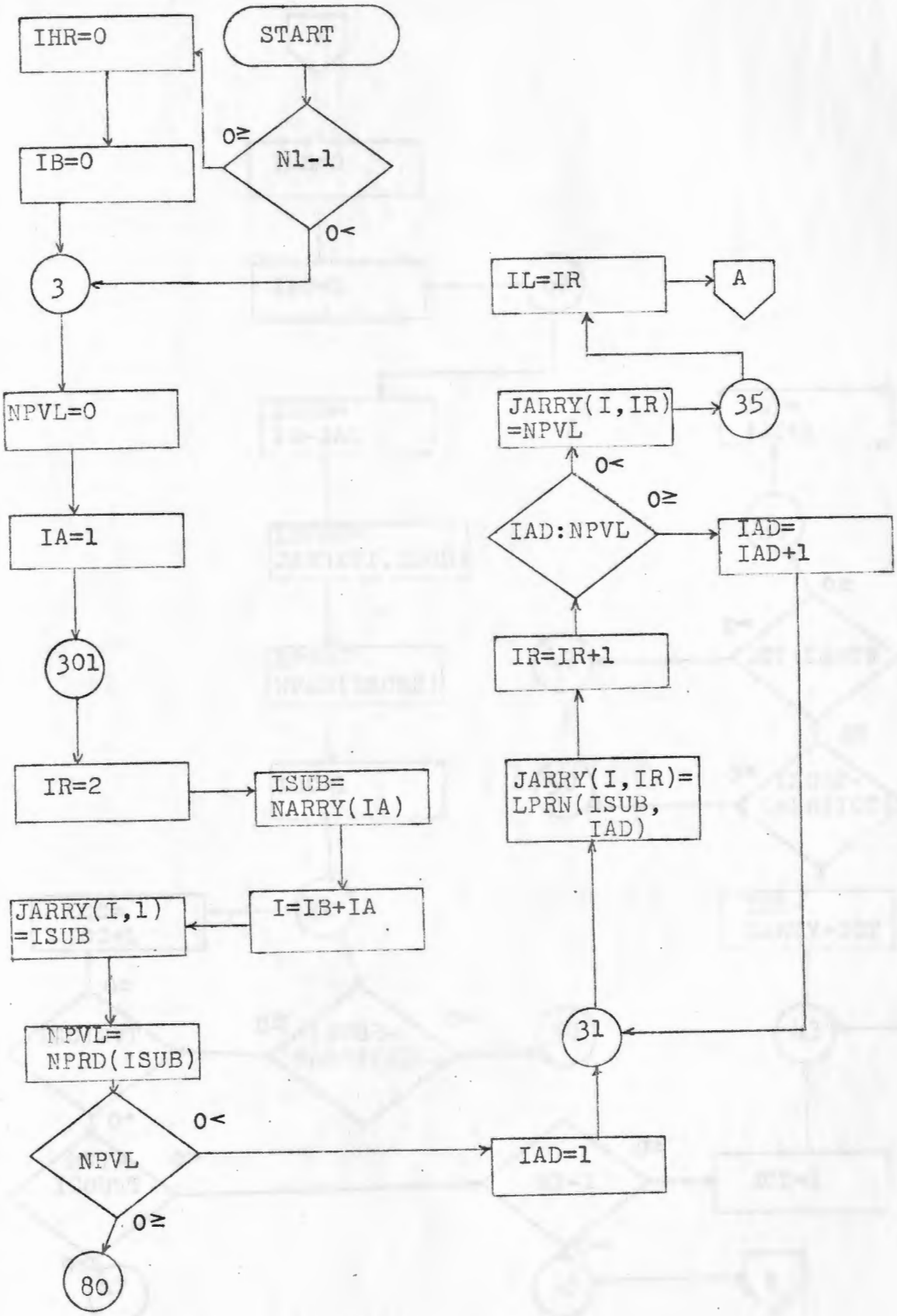

A
MSIM
0≧
0=
105
LSMTY
0≧
MSIM=1
105
0<
J=1
JAB=J
J:LSMTY
0≦
105
0>
J=J+1
MSIM=1
0=
0≧
LVAR(J)
-IST
ILST=1
56
ITRY=0
IBl=
IBl+1
ISA=
NGRP(IST)
60
ITRY=ITRY
+1
LGROUP=
IGRPR(ISA,
ITRY)
B

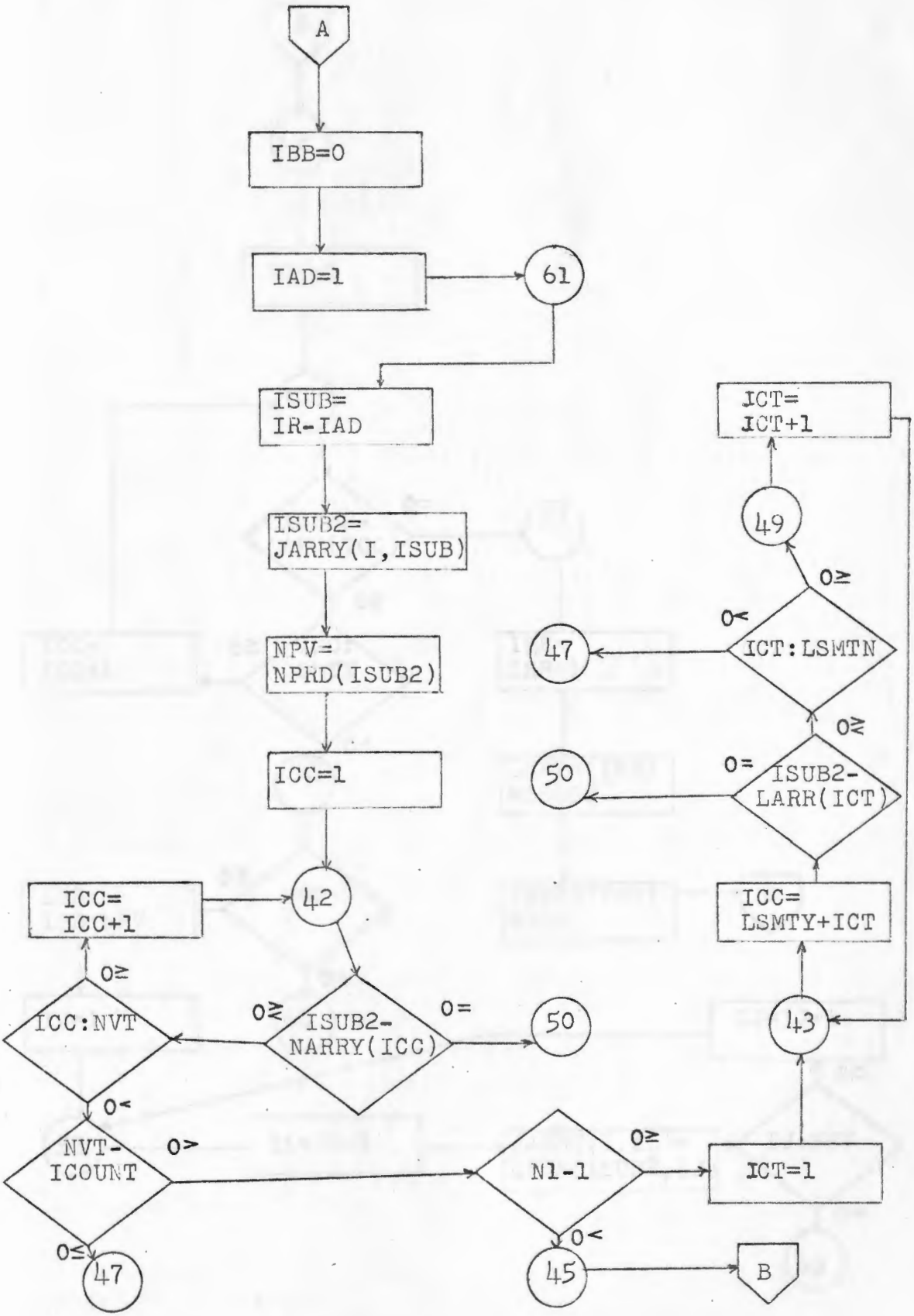

B
IVAL-
ISTART
0≤
132
0>
IB1-
LSMTY
0>
0≤
CALL
SELECT
I1=1
IAB
0<
IST=
LYAR(IAB)
I2=
ISTART-1
0≥
60
56
111
105
I=I1
IVAL-
ISTART
0>
IDD=
JHRPR(I)
0≤
130
MSTA=
LHRPR(I)
ILST=
KTOTAL(MSTA)
CALL
TIMCAL
0≤
0>
I:I2
C
IDP=1
I=I+1

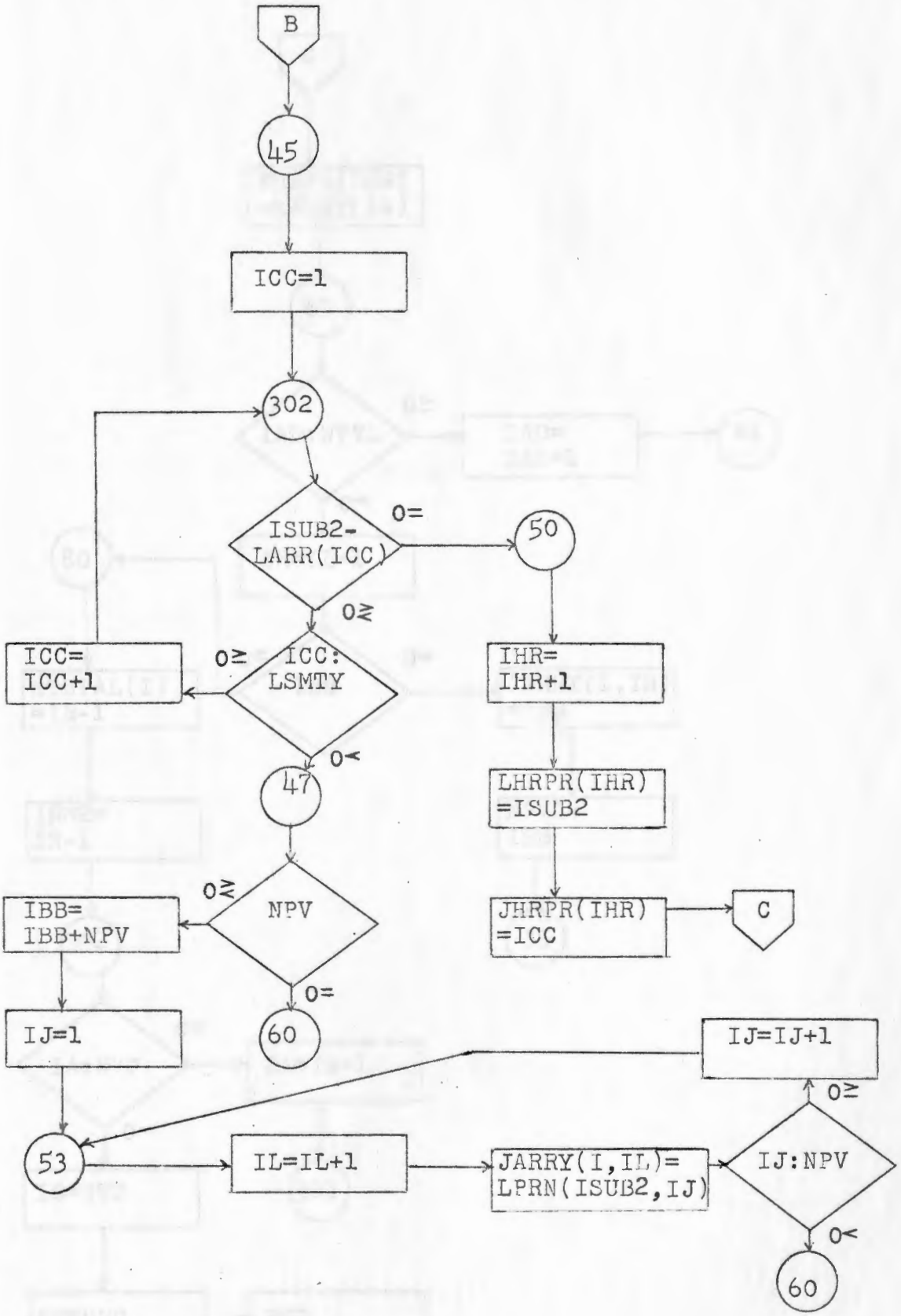

C
ITRY=1
ISA=
NGRP(MSTA)
LGROUP=
IGRPR(ISA,
ITRY)
IHR-
ISTART
0>
165
0≤
IA1=
ISTART
5
130
ISB=
LHRPR(IVAL)
ISA=
NGRP(ISB)
ITRY=1
LGROUP=
IGRPR(ISA,
ITRY)
132
IVAL-IHR
0>
IAN1=
IVAL+1
0≤
IAN=IAN1
JHRPR(IAN-1)
=JHRPR(IAN)
0≥
IAN:IHR
IAN=
IAN+1
NHRPR(IAN-1)
=NHRPR(IAN)
0<
D
IHR=
IHR-1
LHRPR(IAN-1)
=LHRPR(IAN)

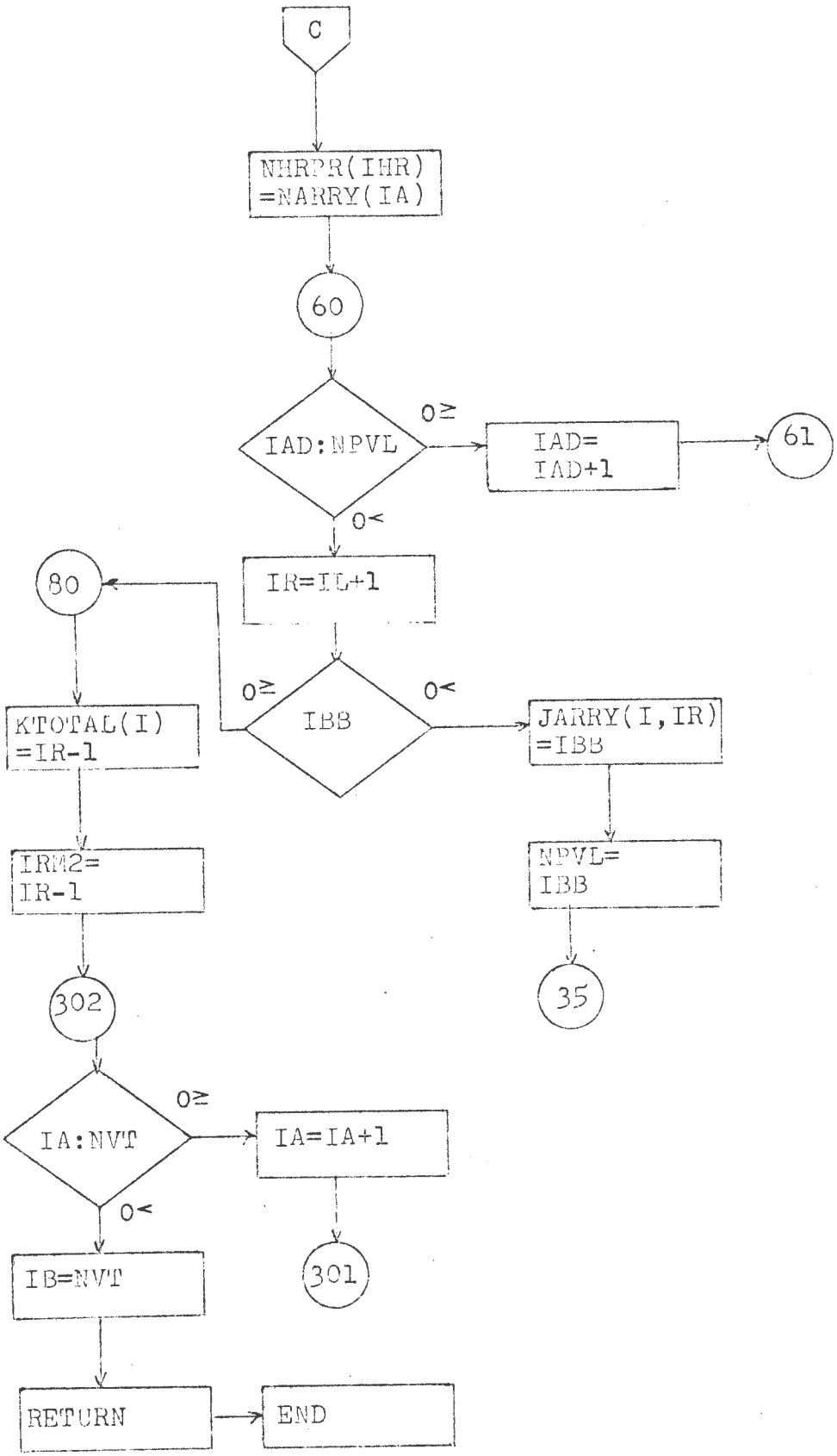

D
IHR
0≥
0<
165
RETURN
END
IHR-
ISTART
0>
0≤
IDP
0≥
4
IDP
0<
20
IDP
0<
0≥
I1=1
GO TO 111


PRIOR

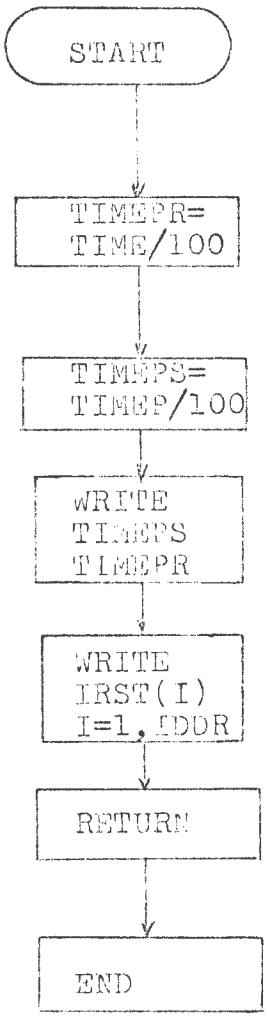

IHR=0
START
IB=0
0≥
N1-1
0<
3
NPVL=0
IA=1
301
IR=2
ISUB=
NARRY(IA)
I=IB+IA
JARRY(I,1)
=ISUB
NPVL=
NPRD(ISUB)
NPVL
0<
0≥
80
IAD=1
31
JARRY(I,IR)=
LPRN(ISUB,
IAD)
IR=IR+1
IAD:NPVL
0<
0≥
IAD=
IAD+1
JARRY(I,IR)
=NPVL
35
IL=IR
A


A
IBB=0
IAD=1
61
ISUB=
IR-IAD
ISUB2=
JARRY(I,ISUB)
NPV=
NPRD(ISUB2)
ICC=1
42
ICC=
ICC+1
0≥
ICC:NVT
0≥
ISUB2-
NARRY(ICC)
0=
50
0<
NVT-
ICOUNT
0>
0≤
47
N1-1
0≥
0<
45
B
ICT=1
43
ICC=
LSMTY+ICT
0=
ISUB2-
LARR(ICT)
50
0≥
0<
ICT:LSMTN
47
0≥
49
ICT=
ICT+1


B
45
ICC=1
302
ISUB2-
LARR(ICC)
0=
50
0≧
ICC=
ICC+1
0≧
ICC:
LSMTY
IHR=
IHR+1
0<
47
LHRPR(IHR)
=ISUB2
0≧
NPV
IBB=
IBB+NPV
JHRPR(IHR)
=ICC
C
0=
60
IJ=1
IJ=IJ+1
0≧
53
IL=IL+1
JARRY(I,IL)=
LPRN(ISUB2,IJ)
IJ:NPV
0<
60


C
NHRPR(IHR)
=NARRY(IA)
60
IAD:NPVL
0≥
IAD=
IAD+1
61
0<
IR=IL+1
80
0≥
IBB
0<
KTOTAL(I)
=IR-1
JARRY(I,IR)
=IBB
IRM2=
IR-1
NPVL=
IBB
35
302
IA:NVT
0≥
IA=IA+1
0<
IB=NVT
301
RETURN
END


OUTPUT


START
TIMEPR=
TIME/100
TIMEPS=
TIMEP/100
WRITE
TIMEPS
TIMEPR
WRITE
IRST(I)
I=1,IDDR
RETURN
END

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