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An Analysis of Research Methods in Projects in Industrial Arts

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Abstract

The writers agreed that the basic problem of this study was to determine methods and procedures which are best suited and most valuable to the student pursuing the required work involved in the successful completion of the Projects course, Industrial Arts 33:270. It is hoped that these methods will prove to be of value to all research work in the Industrial Arts field. More specifically, the following questions should be kept in mind while reading this study:

1. What are the research methods and procedures used in the successful completion of the work required in Industrial Arts 33:270?

2. Of these methods and procedures, which ones seem to be the most valuable in assisting the student?

3. What sources are available and most helpful in the selection of a topic for the Project report?

4. Does the area of study have any effect upon the methods used?

5. Is industry in general willing to be of help by providing material and information pertinent to a study of this type?

6. Are trade journals or technical publications of value to the student in the course Projects in Industrial Arts 33:270?

AN ANALYSIS OF RESEARCH METHODS IN PROJECTS IN INDUSTRIAL ARTS

A Study

Presented to

Dr. H. O. Reed

University of Northern Iowa

In Partial Fulfillment

of the Requirements for Industrial Arts Research

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by

Loren Seebach
Jim Sherman

Fall 1967

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CHAPTER I

INTRODUCTION, THE PROBLEM, AND DEFINITION OF TERMS

This paper is the result of a research study which was begun by a class in Industrial Arts research methods at the University of Northern Iowa during the summer session of 1967. A questionnaire was prepared and mailed to sixty-five men who had received the M.A. degree in Industrial Arts from this university and, in a few cases, men who were nearing the completion of the degree. These people had all ~~have~~ taken the course Projects in Industrial Arts 33:270 at least twice and in many cases several times. Their project reports covered all of the various Industrial Arts areas offered at the University of Northern Iowa. Prior to mailing the final questionnaire, one was prepared and ten students and former students typical of the group involved in the study were asked to respond and make comments on the questionnaire. Revisions were made on the final questionnaire on the basis of their suggestions. Procedure

This final questionnaire was mailed to sixty-five students and former students on October 15, 1967. A copy of the questionnaire used ~~will~~ may be found in Appendix A. The writers set a deadline of December 1, 1967 as the date after which no responses would be used. As of December 1, forty-nine completed questionnaires had been received and the in-

formation tallied and evaluated by the writers. A partial listing of the names and addresses of the respondents furnishing information for this study will be found in Appendix B. The respondents were given the choice of either signing or not signing their names to the questionnaire. Eight of these respondents chose not to identify themselves. This is the reason for the partial listing.

I. THE PROBLEM

The writers agreed that the basic problem of this study was to determine methods and procedures which are best suited and most valuable to the student pursuing the required work involved in the successful completion of the Projects course, Industrial Arts 33:270. It is hoped that these methods will prove to be of value to all research work in the Industrial Arts field. More specifically, the following questions should be kept in mind while reading this study:

1. What are the research methods and procedures used in the successful completion of the work required in Industrial Arts 33:270?
2. Of these methods and procedures, which ones seem to be the most valuable in assisting the student?
3. What sources are available and most helpful in the selection of a topic for the Project report?
4. Does the area of study have any effect upon the methods used?

5. Is industry in general willing to be of help by providing material and information pertinent to a study of this type?

6. Are trade journals or technical publications of value to the student in the course Projects in Industrial Arts 33:270?

II. NEED FOR THE STUDY

The course Projects in Industrial Arts 33:270 is required of graduate students in Industrial Arts at the University of Northern Iowa. Graduate students on the thesis program are required to take this course twice, while those students on the non-thesis program are required to take it three times. The course may be taken twice in the same area of study in the Industrial Arts field. The writers felt there was a definite need for a research study to provide some insight into the activities and benefits to the student as a result of taking part in an experience of this nature. It was also felt that a study of this type could provide information from which guidelines for the course could be established which would be beneficial to future students of Industrial Arts research. It seemed necessary that research methods and techniques and other procedures used by students pursuing the work involved within the course should be gathered and evaluated in order that this information could be made available to assist future graduate Industrial Arts students at the University of Northern Iowa.

A further need for a study of this type might be determined to point out the possibilities available to upgrade and improve the Industrial Arts programs in the schools of the country. Since Industrial Arts is a study of industry this research study should help point out a rather definite pattern and method which could successfully be used in the Industrial Arts programs which are current.

III. DEFINITIONS OF TERMS USED

In order for the reader of this report to interpret its meaning properly, the following terms will be intended to have these meanings:

Research. Research is the objective use of systematic methods to evaluate ideas or to pursue new knowledge.

Correspondence. Correspondence is intended to mean all letters and other material received in response to letters or other inquires.

Experimental. Activities such as preliminary calculations, shop work, improvements in design or methods, and subsequent tests on the finished product if any.

Library. This method includes all published material such as historical records, newspapers, periodicals, bulletins, catalogs and technical publications which may or may not be readily obtainable from libraries.

Visitations. Visitations are intended to mean per-

sonally observing skilled workers and conferring with knowledgeable persons in the area being investigated; may later be supplemented by telephone.

Projects or Projects Course. These terms refer to the course Industrial Arts 33:270, Projects in Industrial Arts offered at the University of Northern Iowa.

CHAPTER II

should start new page.

FINDINGS OF THE STUDY

As has been stated previously, this study was based upon a questionnaire which was sent to sixty-five men who either have already received the Master's Degree in Industrial Arts or who are very near to receiving this degree at the University of Northern Iowa. Of the sixty-five questionnaires mailed, forty-nine were completed and returned before the deadline date. This represents a 75.38% return which the writers feel indicate a valid sampling of the group surveyed. A study of the respondent group reveals that the average number of years of teaching experience of this group is 8.87 years. The individual teaching experience of this group varies from 0 to 17 years. The respondent group also had an ~~average~~ of 3.17 years of industrial experience.

How about authorities?

Further examination of the respondent group indicates that the majority of the group are teachers in the senior

high school. Twelve of the men in the group surveyed spend the majority of their time in the junior high school. Five of the group indicated college or university as the place most of their time was spent and two indicated that they were teaching in a trade or vocational school. It was also noted that administration, supervision, and Driver Education were areas that some of the group spent the majority of their time.

To further analyze the background of the respondent group, the writers found that the group members are teaching in a wide variety of areas in Industrial Arts. The listing below will indicate the areas and the number of respondents who are teaching in the various areas.

5--Auto	17--Electricity	22--Metals
4--Design	2--Graphic Arts	8--Plastics
21--Drafting	8--Machine Shop	21--Wood
	14--Other areas	

The following is a list of the other areas which fourteen of the respondents indicated they were now teaching or were involved with.

Electronic management	Administrator
Research	Power Mechanics
Sales Representative	Diversified Occupations
General Shop	Electronics
Elementary School	T & I, Voc. & Tech. Programs

As can be seen from the preceding information, the respondent group ~~represents~~ possesses a very broad and diversified

background. The writers feel that information gathered from a group such as this offers the opportunity to make some valid conclusions in this study regarding research methods in the Projects course.

Since one of the prime concerns of this study is to attempt to determine the effectiveness of the research methods used in the Projects course, the respondents were asked to rate these research methods: (a) Correspondence (b) Experimental (c) Library (d) Visitation.

When considering all of the areas within the Projects course it would appear that the Experimental method of research was considered to be of the most value to the student. The experimental method received sixty-five first place choices as a method of research. Visitation was considered to be the second best method with thirty-nine choices. Correspondence was rated third with thirty-two choices. Least effective of the four methods rated appeared to be the Library method of research with only twenty-two choices. It should be noted that this rating is based upon all of the areas of study within the Projects course.

Research methods appeared to differ according to the area being studied. In the area of Auto, Visitation was considered to be the most effective research method used. Experimental was rated second while Correspondence was third.

The least effective research method used in the Auto area was the Library.

In the area of Design the Library was rated as the most useful research method; the Experimental method and Visitation method both were rated second with an equal number of favorable responses. According to the findings of this study Correspondence was considered to be the least effective in the area of Design.

In the area of Drafting the Experimental method was rated most effective; Correspondence rated second most effective. The Library and Visitation methods seemed to be the least effective research tools in the area of Drafting.

In the area of Electricity the Experimental method was noted by the respondents as being the most effective method. Visitation was rated as second and Library was rated in third place. Least effective in the area of Electricity seemed to be the Correspondence method of research.

In the Graphic Arts area the respondents indicated that the Experimental and Library methods of research were best and equally useful and effective in the pursuit of information needed to complete the required research. The Correspondence and Visitation methods were both rated number two. It would therefore seem that these last two methods were of little value to the student in this particular area.

In the Machine Shop area the writers again found that two methods were considered to be most effective and valuable. They are Visitation and the Experimental methods of research. Second in order of value was the Library method and the method considered to be of least value was found to be Correspondence.

In the area of Metal it was again found that the Experimental method was considered to be most effective. Second most effective was Visitation. Third most important in effectiveness was the Library method. The least effective method used in research in this area was the Correspondence method.

The writers found that in the area of Plastics again two methods were considered to be of equal importance and of most value to the researcher in Industrial Arts. They were Experimental and Correspondence. Next in line of effectiveness as a research method used in the Plastics area is the Visitation method. Library seemed to be the least effective method of research in this area.

The Experimental method was found to be the most helpful method of research in the area of Wood in the Projects course. The Correspondence method was rated second with Visitation being rated third most effective. The Library method was judged to be the least effective method of research in the area of Wood.

Figures 1, 2, and 3 in Appendix C show how the various research methods were rated by the respondents. While the Experimental method is rated as number one in importance in the overall research project, its rating should be noted in all of the areas in these figures.

In a further attempt to evaluate the research methods used in the Projects course, the respondents were asked to record a percentage figure of time actually devoted to each research method. They were also asked to assign a percentage figure of time which they would recommend being spent on each method. Figure 4 in Appendix C will supplement the following chart. It must be remembered that in both the Appendix figure and the chart that data represents an average percentage of all the respondents in all of the areas studied in the Projects course.

RESEARCH METHOD	ACTUALLY DEVOTED	RECOMMENDED
CORRESPONDENCE	14.88%	13.48%
EXPERIMENTAL	36.56%	40.41%
LIBRARY	31.52%	27.79%
VISITATION	16.62%	20.16%

Another phase of this study considered highly important by the writers is how a topic is selected for study in the Projects course. As can be seen by referring to Appendix A in the questionnaire on page 5, question 6 asks that the

respondents rate the sources used in securing a suitable topic for their project report. The respondents rated these sources in the following order from most recommended to least recommended. Figure 5 in Appendix C will supplement this information.

1. Trade Journal or Technical Publication
2. Industrial Visitation or Conference
3. Instructor
4. Book
5. Film

The respondents were also given the opportunity to recommend other means which they felt were helpful in the selection of a topic. Some of these recommendations were: (a) the student's strongest interest area, (b) the student's need, (c) teaching experience, (d) experiences in previous project courses and, (e) suggestions from other persons who had taken the Projects course previously. Almost all of the respondents suggested that after a tenative selection of the topic had been made some preliminary research and perhaps some shop work should be done to make sure that the topic was one that could be pursued and would fulfill the requirements set up in the Projects course.

This study thus far has been concerned with general and broad overview of the Projects course. In the following pages, each of the research methods will be examined more closely.

I. CORRESPONDENCE METHOD

In order for the researcher to use the Correspondence method of research he must first have the names and addresses of the people he wishes to contact. A rating of methods for obtaining these names and addresses in shown in Figure 1 in Appendix D. The respondents indicated that the library was the best source for this information. We must assume here that the library as a source for this information would include Trade and Technical Journals, Periodicals, Thomas's Register and the like.

Second in line of importance as a source of locating names and addresses for correspondence was indicated to be the telephone directory.

Third choice of the respondents in this matter seemed to be Industry with Visitation being placed as fourth choice. as a means of securing names and addresses for correspondence to gain needed information for the Projects report. Some of the respondents indicated that their friends were able to supply this needed information. Several suggested that the instructor was an excellent source of this information.

In the specific area of letter correspondence the writers found that twenty-two of the forty-nine respondents used a more personalized letter as opposed to a form letter when attempting to gain information for the Projects report. Six of the respondents did however use a form type letter.

Figure 2, Appendix D shows the percentage of form-type letters sent by the respondents and the frequency of the respondents reporting these data.

When considering the area of letter correspondence, the time element would seem to be of considerable importance. In this regard the majority of the respondents indicated that the greatest number of replies were received from ten to fifteen days after they had mailed their original letter of request. Figure 3 in Appendix D shows the frequency of the respondents favoring a particular day following the mailing of the letters the greatest number of replies were received.

The majority of the respondents were of the opinion that the day of the week which the letters arrived at ~~its~~ their destination had little or no effect on the amount of information received from the recipient of the letter of request. Refer to Figure 4 in Appendix D. Figure 5, Appendix D shows, however, that the majority of the respondents felt that it was preferable that the letter of request arrived at its destination during the first part of the week.

In further analysis of the information gathered during the survey of the study group the writers found a rather wide range in the number of industries contacted by letter correspondence in an attempt to gain information or materials to be used in the Projects course. In Figure 6, Appendix D

the data show that nine of the respondents indicated that they contacted five industries by means of letter correspondence. One respondent contacted fifty industries and one indicated that he contacted sixty industries by means of letter correspondence.

Another area of concern to this study seemed to be the relatively short period of time available for research during the summer session. Figure 7 in Appendix D shows the affect the amount of time available to write the letters of request and receive the necessary information in return as opposed to the longer time available in the full length semester of the regular school year. It was found that twelve of the respondents group felt that the short time available had a great deal to do with the chances of receiving the necessary information in time to be used in the completion of the Project report. Eight of the group did not feel that this was of any importance in the completion of the required work in the course.

In considering letter correspondence as a research method the percentage of replies received from industry is quite important. In Figure 8, Appendix D it is found that of the forty-nine respondents in this study group, twenty indicated that they received replies in one form or another from industry to seventy-five per cent of their letters of request. Eight respondents indicated that they received

one hundred percent response to their letters of request.

Figures 8 and 9 in Appendix D that all of the material received from industry as a result of letter correspondence was very helpful in preparing the written and oral report for the Projects course. Twenty-one of the forty-nine persons responding to the questionnaire indicated that only fifty percent of the material received was of any value to them in preparation of the written report.

In consideration of the oral report in the Projects course the finding in this area was very similar to those pertaining to the written report. Two persons indicated that one-hundred percent of the material received from industry was very helpful. Nineteen persons indicated that only fifty percent of the material received was of help to them. Four persons indicated that fifty percent of the information received from industry arrived too late to be of any help in preparing either the written or the oral report. According to Figure 10, Appendix D, seventeen persons indicated that twenty-five percent of this type information was of no use to them because of late arrival.

In the consideration of letter correspondence it would seem of great importance if the student had some idea of what type of material he might anticipate receiving from industry in response to his letter correspondence. Figure

11 in Appendix D shows the percentage of various types of material that the respondents to this questionnaire received from industry. Some respondents indicated that they received some teaching aids but did not specify exactly what these aids consisted of.

In the questionnaire the study group was asked to assign a numerical rating as to its usefulness in the project, to the list of materials or services provided by industry. Below is a list of those materials and services and the order in which the respondent group rated them as to their usefulness to their project.

1. Resource person
2. Raw Materials
3. Examples of industrial products
4. Experiments
4. Films
5. Photocopies or photographs
6. Examples of construction
7. Machine parts used in industry
8. Formulas
8. Industrial equipment
9. Overhead transparencies

Other data regarding this rating will be found in Figure 12, Appendix D. The respondents also specified the following list of materials or services supplied by industry which were very useful to them in the completion of their research in the Projects course.

Field Trips, Company Training Sessions, General Information Brochures, Encouragement from Industrial Personnel, Industrial usage information

From the foregoing information and the information found in Figure 13, Appendix D, it would seem that letter correspondence is a very useful research tool. Thirty of the forty-nine respondents of the questionnaire indicated that letter correspondence was very helpful to them in all phases of the Projects course. Thirteen of the respondents noted that letter correspondence was most helpful in the writing of the paper in the Projects course. Two persons indicated that their oral presentation was most helped by information gathered through letter correspondence. Two other respondents indicated that their laboratory demonstration was the phase which was most benefited by the letter correspondence.

In the consideration of letter correspondence it was felt by the writers that it would be beneficial to know if "thank you" letters were used by the study group and if they were to whom they were sent. According to data gathered from the completed questionnaires shown in Figure 14, Appendix D, thirty of the forty-nine respondents wrote "thank you" letters to a resource person who had been of assistance. Twenty-three wrote to technicians or other persons met on a visitation. Three respondents indicated that they did not ~~not~~ write "thank you" letters to anyone.

Figure 15, Appendix D shows the number of contacts made by means other than letter.

II. EXPERIMENTAL METHOD

In investigating the experimental method of research, the writers found that forty-seven of the forty-nine men in the respondent group indicated on the questionnaire that they did some experimental work during the time they were involved in the Projects course. Forty-four of these forty-seven persons who did experimental work indicated that during their experimentation they encountered some unforseen problems. Of these forty-four persons who encountered unforseen problems, forty-one of them were able to solve the problem.

In the experimental method of research certain experimental apparatus must be designed and constructed. The stage of their project in which this work is done in shown in Figure 1, Appendix E. Figure 2, Appendix E, shows at what stage of the project calculations necessary to design and construct this apparatus was made while Figure 3, Appendix E shows at what stage the respondents recommended that the experimental-constructive activities take place.

Twenty-one of the respondents designated the first stage of their project was the time when this work was done. Fifteen persons indicated that they did this work more in the middle stages of the project. It was highly recommended by the respondent group that the experimental-constructive activities be carried on during the first and middle stages

of the project.

In conducting the experimentation which may be necessary in this particular phase of the research some equipment is needed. The writers of this paper feel that the sources of this equipment should be obtained. The Figure 4 in Appendix E shows that thirty-nine persons of the group responding to the questionnaire indicated that the equipment which they used was obtained from the school. Thirty-one of the group made the necessary equipment and twenty-seven purchased the equipment used in their experimentation. In ten instances industry donated the equipment and in another ten cases the required apparatus used was borrowed from industry.

Technical assistance in the experimental method of research is a valuable aid to the student involved in this type of research. The respondents indicated a very wide range in the number of persons who provided this assistance to them. Four of the respondents indicated that they received technical assistance from only one person while one respondent indicated that fifteen persons provided technical assistance in his experimentation. Figure 5 in Appendix E shows the number of persons providing actual technical assistance to the researcher in this study of the Projects course.

Figure 6 in Appendix E indicates the average cost of materials involved during the development of the project by

the student researcher. As will be noted in this figure, the cost ranges from five dollars to one hundred fifty dollars with the majority of cases falling between ten and thirty dollars as an average cost per project.

In the pursuit of experimental type research adequate facilities must be available for this work. Figure 7 in Appendix E locates the places where the respondents reported they had completed their experimental work. Thirty-four of the respondent group indicated that most of their experimental shop type work was done in the shops of the Department of Industrial Arts and Technology at the University of Northern Iowa. Eighteen indicated that their home-school shop was the location of their experimental work. The respondents were asked in the questionnaire if safety devices were incorporated into their experimental work. Seventeen stated that they used safety devices in their experimentation consisting of safety glasses, goggles, foundry protective equipment, rubber gloves, and the like. It would appear that in general most safety devices used are the common types ordinarily used in shop type work and no new safety inovations were incorporated.

Twenty-four of the forty-nine persons in the respondent group stated that no further investigation had been done on the work which they did for the Projects course. The other twenty-five persons indicated that very little further study

had been done on their research topic. They did indicate that they were able in some instances to use this material as an aid in their teaching. It was also felt that their study in the Projects course benefited them in the area by providing some background for their teaching.

III. LIBRARY METHOD

In dealing with the library method of research the term library material is meant to include all printed material and audio-visual material which may or may not be found in the usual library.

The people receiving the questionnaire were asked how much library material influenced their choice of topics for their research projects. Sixteen of the respondents felt that library materials had some influence upon their choice of topics for their research project. Five of the group indicated that the library materials had very much influence on their choice of topics. Eleven indicated that this material had little influence. Figure 1 in Appendix F shows graphically the influence of library materials on topic selection.

Due to the fact that the library offers a wide variety of facilities to the student, the respondents were asked to rate the indexes found there as to their value to them in their research project. Figure 2 in Appendix F shows the frequency of number one ratings of the various library indexes.

Below the indexes are listed in the order of their value to the student in the Projects course as indicated by the respondent group.

1. Applied Science and Technology Index
2. Card Index
3. Education Index
3. Business Periodical Index
4. Art Index

As can be seen from the listing above the Education Index and the Business Periodical Index were felt by the respondents to be of equal value. It was also suggested by the respondents that Thomas's Register and the New York Times Index was of value to the student in his attempt to locate material pertinent to his research project.

It was also discovered in examining the returned questionnaires that forty-eight of the forty-nine respondents used the library facilities of the University of Northern Iowa. Thirty-three persons indicated that they took advantage of public library facilities in order to gather necessary information. Twenty persons used their home-school library and seventeen used the library of an industrial firm. Fourteen persons were able to use a private library and one person used the library at the Iowa State University. This information is shown in Figure 3, Appendix F.

Trade magazines and journals seemed to be of considerable value to the student in his research projects.

Seventeen of the respondents indicated that this source of information was of very much assistance. Figure 4 in Appendix F shows the amount of usefulness attributed to trade magazines and journals by the respondent group. This group also recommended the following list of trade journals that were of great value to them in their research. If a number appears following the title this indicates the number of persons recommending it.

Graphic Science 2
I.A.V.E. 6
Plastic Journal
Electronics World
Industrial Design 2
Engineering
Modern Metals
Metals Monthly
American Machinist
Metalworking Manufacture
Machine Design
Welding Journal
Electronics Technician
Welder
Missiles and Rockets
Industrial Finishing
Electronic Industries
Wireless World
Modern Plastics
Industrial Heating
Foundry
Plastics Encylopedia
P. F. Reporter
School Shop 4
Mississippi Valley Lmbr.
Graphic Arts Monthly
Inland Printer and American Lithographer

In the evaluation of the library method of research it was of great importance to determine if the libraries which were consulted yielded pertinent and current materials. The majority of the respondents concurred that the libraries consulted did have some of this type materials available. Figure 5 in Appendix F reveals how the respondent group rated these library facilities.

Various type directories are an intergral part of

library facilities and it was considered important by the writers to survey the value placed upon the Chamber of Commerce directories in locating firms related to the students research project. The findings for this particular phase of the study are found in Figure 6 in Appendix F.

Film libraries are another part of the general library facility used in Industrial Arts research. In an attempt to evaluate the film libraries used, the respondents were asked to rate in order of value to them the following film sources. The number preceding the type of film facility indicates the respondents preference.

1. A film library of an industry
2. Commercial film libraries
3. Other college or university libraries
4. University of Northern Iowa film library
4. Private collection
5. Others-specified-U.S. Government

Figure 7 in Appendix F shows the frequency of the respondents choice and their rating of the facilities.

Libraries in general offer a wide variety of research sources. The respondent group rated the following list of sources in order of their importance to them in their research project.

1. Trade and Technical Journals
2. Iowa Digest of Manufacturers
3. Thomas's Register
4. Films
5. Master's or Doctor's Theses

Figure 8 in Appendix F shows the frequency of this rating.

IV. VISITATION METHOD

Visitation is another research method frequently used in ~~research for~~ the Projects course. An attempt was made by the writers to evaluate the findings of this study to determine how useful this method was. Four to six visitations seemed to be the most common average of the number of visitations made per project. Figure 1 in Appendix G shows the frequency of the respondents and the average number of visitations made.

On these visitations twenty-nine of the respondents found the people where visits were made to be very willing to be of assistance. Eleven found an attitude of willingness to be of assistance. Eight of the respondents found the people visited to be extremely enthusiastic. None of the respondents reported an uncooperative or reluctant attitude to assist the researcher. It was found to be extremely unusual to have a visitation request refused. However a few cases of refusal were reported.

Forty-five persons indicated that the purpose of their visitation was to observe a specific item or process. Twenty-eight respondents related the purpose of their visit was to gather general information such as occupational or historical information. Twenty-three people had a specific

question to be answered when they made the visit and sixteen were merely exploring in regard to topic selection.

In further consideration of the visitation method of research the writers felt that it was important to determine the number of miles traveled to complete these visitations. The respondents reported that forty-six visitations were made with a total of 6,160 miles traveled for all forty-nine respondents. This is an average of 133.9 miles traveled per project. Two researchers traveled no miles while one traveled 680 miles round trip to complete a visitation. One respondent traveled 10 miles, eight traveled 20 miles, six traveled 40 miles, two traveled 60 miles, two traveled 80 miles, two traveled 100 miles, four traveled 120 miles, three traveled 140 miles, two traveled 160 miles, one traveled 180 miles, and seven traveled 200 miles. Seven respondents traveled over 200 miles to complete their visitations.

The writers arbitrarily place telephone conferences in the general area of visitations. It appears from the responses received from the study group that this is a useful method in gaining information for the project report. Some of these telephone conferences were long distance calls. The following chart shows the numbers of calls made by the respondents that were actually conferences as opposed to a telephone call to make an appointment.

Number of Telephone Conferences

0	1	2	3	4	5	6	7	8	9	10
8	13	13	7	5	1	0	0	0	0	0

Number of Respondents

A number of the telephone conferences held by the respondents were long distance telephone conferences. The following chart shows this information.

Number of Long Distance Telephone Conferences

0	1	2	3	4	5	6	7	8	9	10
14	17	9	2	1	1	0	1	0	0	0

Number of Respondents

A further consideration to be made in making visitations is the question of admission charges. It would seem from the information received from the respondents that admission charges are very seldom required in making a visitation and therefore would not be a detremental factor.

It appeared that the respondents generally feel that a conference in person with a knowledgeable person is the best method of gaining information for the project report. Observation was considered to be second best and the conference by telephone was next in line of importance in gathering information for the Projects course.

In order for the student in the Projects course to make visitations he must first secure names or people and

and firms which he might desire to visit. The respondents have rated the following sources as to their importance in securing such names.

1. Iowa Directory of Manufacturers
2. Thomas's Register
3. Yellow Pages of the telephone directory
4. Trade Journals
5. Other Periodicals
6. State Employment Security Commission Office

The respondents further evaluated the usefulness of ways the initial contact was made with the people or the firm with which they desired to visit. The results of this evaluation are listed below.

1. In person
2. By personal letter
3. By telephone
4. Other-specified-two respondents specified personal introduction.

A request was placed at the end of the questionnaire for the respondent to make comments or suggestions in regard to areas of the Projects course which might not have been specifically covered in the main body of the questionnaire. Twenty-one of the respondents chose not to make any further comments. Twenty-eight respondents expressed their opinions and made some suggestions in this regard. The consensus of opinion of these respondents seemed to be that the Projects course was a very worthwhile experience. Some of the respon-

dents suggested that perhaps too much emphasis was placed upon the written report thereby requiring an excessive amount of time being used in this area when this time might be better spent in the research area. Another suggestion which the writers feel is worthy of mention is that copies of the written Projects report should be kept on file in an Industrial Arts library.thus making them more readily available to the student who is taking the Projects course for the first time. This would help to give the student a better idea of what is required and could avoid some false starts. It was also the consensus of opinion of the twenty-eight respondents who voiced an opinion that the Projects course offered some very valuable experience in the art of research and the writing of a report of this nature.

CHAPTER III

SUMMARY, CONCLUSIONS AND, SUGGESTIONS FOR FURTHER STUDY

The primary purpose of this study was to attempt to discover and evaluate the research methods and procedures used to successfully complete the research work for the Projects course. Of the many and varied methods and procedures used in the Projects course, the writers hope to recommend those that are most applicable to the course by use of the data gathered in this study. It is hoped also that the findings of this study will provide methods and

sources which will be beneficial to the student in his selection of the topic for his report.

It was the writers desire to determine if industry in general is willing to be of assistance to the student by sharing with him some of ~~their~~ its knowledge and information. Also it was anticipated that the findings of this study could provide some general and specific guidelines for the future student of the Project course.

I. SUMMARY OF FINDINGS

In summary it should be said that the writers were fortunate in that they had an excellent response to the questionnaire. A response of slightly over 75% gave the writers a valid base from which to work. The respondent group represented all of the many areas of study in Industrial Arts offered at the University of Northern Iowa as well as all grade levels of teaching experience.

In general it would appear that the experimental method of research was considered to be of the most value and assistance to the student in the Projects course. The visitation method was also considered to be of great benefit. Trade journals and technical publications were found to be of great assistance in preparation of the report and in the selection of the topic. These publications also proved

to be beneficial in obtaining names and addresses for visitation purposes and providing a considerable amount of general information important to the project topic.

It was evident from the findings of this study that industry in general has a cooperative attitude toward people involved in the Projects courses. Industry seems very willing to provide information, to make visitations possible and in some cases provide material and equipment to the student performing experimentation. It seems that industry is also willing to make available to the student researcher ~~their~~ its resource persons.

According to the data gathered in this study, the library method of research was considered to be the least effective method which was considered. Upon close study of the findings it is apparent that the many areas of the library did provide much information and assistance to the student. It was especially important in topic selection, locating names and addresses of firms to be visited or contacted for information.

II. CONCLUSIONS

It can be concluded from the findings of this study that the various research methods evaluated are adequate, useful and, effective in the research necessary for the

successful completion of the Projects course. It can be further concluded that the majority of the respondent group considered the Projects course to be of considerable benefit to the student. It appeared to broaden the background of the student who, in turn, was able to upgrade and broaden the Industrial Arts program in his school.

Another conclusion which may be drawn from the findings of this study is that industry, in general, is quite interested and willing to assist in many ways the student in the Industrial Arts area.

III. SUGGESTIONS FOR FURTHER STUDY

It seems to the writers of this report that further study could be made of a more detailed nature into each of the research methods used in the Projects course. Further study should also be done regarding the written and oral report necessary for the Project course.

The writers feel that a further study be made specifically designed to gather information which would make possible the preparation of guidelines to guide future students in the proper direction when pursuing the necessary work required in the successful completion of the Projects course.

APPENDIX A

UNIVERSITY OF NORTHERN IOWA
CEDAR FALLS, IOWA
50613

Department of Industrial
Arts and Technology

October 11, 1967

TO: Master Degree Alumni and Selected Graduate Students who have attended the University of Northern Iowa

FROM: Howard O. Reed, Head,
Department of Industrial Arts and Technology

You were on the frontier so far as research in industrial arts was concerned when you were actively enrolled in the "33:270 - Projects" courses here at our University. We think that we now have a sufficient number of graduates and near-graduates for the MA degree who have the background to help us evaluate the research techniques and practices used in this course.

A class in Industrial Arts Research started this investigation during the 1967 summer session. Two full-time graduate students, Loren Seebach and James Sherman, are attempting to complete the study this semester including the preparation of the manuscript for a publication on Industrial Arts Research by our University.

Since you are among those who have an adequate background to express informed opinions on these matters, I am appealing to you to muster up your finest professional attitude when you undertake to fill in the attached questionnaire. You are urged to complete the questionnaire at your earliest convenience and return it in the enclosed envelope. Your assistance on this work shall be greatly appreciated.

Sincerely yours,

H. O. Reed, Head

P. S. I regret that circumstances have prevented me from writing each of you a personal letter; therefore, request your forgiveness for this form letter at this time.

GENERAL INSTRUCTIONS

In order to to obtain a high degree of consistency, you are requested to answer the questions to the best of your ability while keeping the following in mind:

1. The following definitions or descriptions of "research" and "industrial arts research" methods shall be used throughout the questionnaire:

   RESEARCH: The objective use of systematic methods to evaluate ideas or to pursue new knowledge.

   INDUSTRIAL ARTS RESEARCH:

   Correspondence: Letters and other material received in response to letters or other inquiries.

   Experimental: Activities such as preliminary calculations, shop work, improvements in design or method, and subsequent tests on the finished product (if any).

   Library: Includes all published material such as historical records, newspapers, periodicals, bulletins, catalogs, and technical publications which may or may not be readily obtainable from libraries.

   Visitations: Personally observing skilled workers and conferring with knowledgeable persons in the area being investigated; may later be supplemented by telephone.

2. There are two basic types of questions asked on the following form:

   a. The first type of question should be answered as accurately as possible with respect to what you actually did when conducting your research for the course, Projects, 33:270. Also note that unless otherwise specified, you are requested to indicate your response to the question as an average of all the project

reports which were written by you.

b. In view of the experiences which you encountered during the investigative aspects of the Projects courses in which you were involved, the second type of question requests that you indicate a recommendation of what you believe should be performed.

3. Instructions which apply only to specific questions will immediately precede those questions.

4. The response to most of the questions is by means of a rating scale. If your desired response lies somewhere between two of the printed answers, circle the available response that is closest to the preferred answer.

5. Space is provided for specific comments or responses following certain questions. If you have comments with respect to any aspects of the questionnaire or the Projects reports in general, space is provided for these additional comments at the end of the questionnaire.

GENERAL QUESTIONS

1. A. Not counting 1967-68, how many years of teaching experience do you have? _____

   B. How many years of industrial experience do you have? _____

2. In what area is the majority of your time spent?

   _____ Junior High School _____ College or University

   _____ Senior High School _____ Trade or Vocational School

   _____ Industry _____ Technical School

   _____ Other (specify)_____

3. Specify in which area(s) you now teach or work:

   _____ Auto _____ Electricity _____ Metal

   _____ Design _____ Graphic Arts _____ Plastics

   _____ Drafting _____ Machine Shop _____ Wood

   _____ Other (specify)_____

4. Please rate the effectiveness of the research methods you used, using the chart below. Use this rating scale: 1, 2, 3, 4, and 5. (1, most effective; 5, least effective). Note that space has been provided for you to rate the research methods for as many as two reports in the same area (automotive, design, and the like). Use one of the columns of the chart for each of the reports you completed at the University of Northern Iowa (SCI, ISTC).

Research Methods (Refer to instructions)	Auto 1	Auto 2	Design 1	Design 2	Drafting 1	Drafting 2	Electricity 1	Electricity 2	Graphic Arts 1	Graphic Arts 2	Machine Shop 1	Machine Shop 2	Metal 1	Metal 2	Plastics 1	Plastics 2	Wood 1	Wood 2
Correspondence																		
Experimental																		
Library																		
Visitation																		
Other (Describe)																		

5. On the chart below, indicate the following:

   A. In column A, for each research method, indicate the approximate percent of the total research time you devoted to that method for all reports prepared.

   B. In column B, for each research method, indicate the approximate percent of the total research time you recommend to be devoted to that method for any given report. The entries in each column should total 100%.

RESEARCH METHOD	A Actually devoted	B Recommended
Correspondence		
Experimental		
Library		
Visitation		
Other (specify)		
TOTAL	100%	100%

6. Which of the following would you recommend for ideas in the selection of a topic for a project report? Designate in rank order. (1, most recommended; 5, least recommended.)

_____ Book

_____ Film

_____ Instructor

_____ Industrial Visitation or Conference

_____ Trade Journal or Technical Publication

_____ Other (specify)_____

7. How did the several aspects of your preliminary research and shop work assist you in the development of a suitable project?

_____

_____

_____

_____

_____

_____

_____

8. If you desire to receive a summary of the results of this survey, indicate below where the summary should be mailed.

Name_____

Address_____

_____ _____
Zip

CORRESPONDENCE

PART I Sending the letter of inquiry.

1. Where were names and addresses for correspondence obtained?

   Library _____ Telephone directory _____ Visitation _____

   Industry _____ Other (specify)_____

2. What estimated percentage of the letters you sent were a form-type letter, as opposed to a more personalized letter?

   0% 25% 50% 75% 100%

3. Upon which day following the mailing of the letters did you receive the greatest number of replies:

   1 2 3 4 5 6 7 8 9 10 12 15

4. What number best describes the total number of industries contacted by you through initial letters of inquiry?

   1 5 10 15 20 25 30 35 40

5. Judging from your experience with writing letters of request, did the day of the week the letter arrived at its destination have an effect?

   none little some much great deal

6. Which period of the week would be most desirable for the arrival of your letter at its destination?

   first middle last week end other

7. How does the length of time available (i.e., summer school, regular session) affect the chances of receiving a prompt reply from industry?

   none some much great deal

8. What was the percentage of responses to all of your letters written to industry, for all of your projects?

   0% 25% 50% 75% 100%

9. What estimated percentage of these returns were helpful in the writing of your report?

0% 25% 50% 75% 100%

10. About what percentage of these returns were helpful in the giving of your oral report?

0% 25% 50% 75% 100%

11. About what percentage of returns arrived too late for use in your paper or presentation?

0% 25% 50% 75% 100%

12. About what percentage of the following items did you receive from industry?

_____ Printed matter _____ Sample of merchandise

_____ Audio-Visual aids _____ Industrial equipment

_____ Other (specify)_____

13. For each type of material or service provided to you by industry, assign a numerical rating as to its usefulness in your project. (1, most useful; 5, least useful).

_____ Examples of industrial products

_____ Examples of construction

_____ Experiments

_____ Films

_____ Formulas

_____ Industrial equipment

_____ Machine parts used in industry

_____ Overhead transparencies

_____ Photocopies or photographs

_____ Raw materials

_____ Resource person

_____ Other (specify)_____

14. Which phase of your project was helped most by letter correspondence? (check one).

_____ writing of the paper _____ oral presentation

_____ laboratory demonstration _____ some value to each phase

15. To whom did you write "thank you" letters for help received on your project? (check one or more).

_____ Resource person

_____ Technician or other persons met on visitations

_____ All industries responding

_____ All industries sending pertinent information

_____ Owners or presidents of businesses or industries

_____ Department heads or vice presidents

_____ Form letter sent to any source contributing to the project

_____ Individual letter to every source contributing to the project

_____ Did not write "thank you" letters

16. In the above question, which do you consider to be of Number One importance? (list more than one, if desired).

_____

17. On the scale below, what number best describes the number of industries you communicated with by telephone, telegraph, radio, or means other than letter correspondence.

0 1 2 3 4 5 6 7 8 9 10

EXPERIMENTAL (SHOP-LAB) METHOD

1. Did you do actual experimental work in the shop or laboratory?

   _____ Yes _____ No

   (If "No", skip 2 through 5, and continue with 6)

2. Were any unforeseen problems encountered?

   _____ Yes _____ No

3. Were you able to solve the problems?

   _____ Yes _____ No

4. During what stage of the project did you conduct:

   a. The calculations necessary to design and construct your experimental apparatus?_____

   b. The actual experimentation and shop work?_____

5. During what stage of the project do you recommend the experimental-constructive activities?_____

6. Indicate the source(s) of major equipment used:

   _____ School _____ Donated by industry

   _____ Made _____ Borrowed from industry

   _____ Bought _____ Other (specify)_____

7. How many persons provided actual technical assistance?

   0 1 2 3 4 5 6 7 8 9 10

8. What was the approximate cost of materials involved during the development of the projects? (average)

   $0 $10 $20 $30 $40 $50 $60 $70 $80 $90 $100

   (If over $100, please state amount $_____)

9. Where was most of the experimental work done?

   _____ Home _____ UNI (SCI) shops _____ Home-school shop

   _____ Industry _____ Other (specify)_____

10. Were any safety devices incorporated in your project?

    _____ yes _____ no If "yes", what were they?_____

    _____

11. To what extent was your experiment submitted to further investigation, development, and testing?

_____

_____

_____

LIBRARY METHOD OF RESEARCH

In the following questions, "library material" is meant to include all printed material and audio-visual material which may or may not be found in the usual library.

1. How much did library material influence your choice of topics for your research projects?

1	2	3	4	5
little		some		very much

2. During your search of the library for materials pertinent to your research project, you no doubt used one or more of the indexes located there. Evaluate the following list of indexes from 1 to 5 as to their particular value to you. (1, highest; 5, lowest.)

_____ Applied Science and Technology Index

_____ Art Index _____ Card Index

_____ Business Periodical Index _____ Education Index

_____ Other (specify)_____

3. In gathering library information, possibly more than one library was consulted. Check the facilities you used.

_____ Library of an industrial firm _____ UNI (SCI) library

_____ Public library _____ Home-school library

_____ Private library _____ Other (specify)_____

4. How much useful information did you obtain from current trade magazines and journals:

1	2	3	4	5
little		some		very much

5. If you found particular trade magazines or journals that were of great value to you and that you would recommend to others doing research, please list the titles.

_____

_____

6. Were current materials pertaining to your research project readily available in the libraries consulted?

1	2	3	4	5
not available		some available		readily available

7. How valuable were the Chamber of Commerce directories in locating firms related to your research?

1	2	3	4	5
little value		some value		very valuable

8. While gathering materials for your research projects, if films were used, evaluate the following sources from 1 to 5, according to their value to you. (1, highest; 5, lowest).

_____ UNI (SCI) film library

_____ Other college or university libraries

_____ A film library of an industry

_____ Commercial film library

_____ Private collection

_____ Other (specify)_____

_____

9. Of the library research sources listed and used by you in your research project, evaluate the following six as to their importance. (1, highest; 5, lowest).

_____ Iowa Digest of Manufacturers

_____ Trade and technical journals

_____ Films

_____ Thomas's Register

_____ Master's or Doctor's Theses

_____ Other (specify)_____

VISITATIONS

Definition: Assistance and information received through observation, personal conferences, and telephone calls with informed persons.

1. Indicate by checking below the number that best describes the average number of visitations per project made by you in your research project.

   1 2 3 4 5 6 7 8 9 10

2. Indicate by checking below the phrase that best describes the attitude of the industries toward your visitation.

   _____ Uncooperative

   _____ Reluctant to be of assistance

   _____ Willing to be of assistance

   _____ Very willing to be of assistance

   _____ Extremely enthusiastic

3. Indicate the approximate percent of visitation requests you made which were refused.

   0% 5% 10% 15% 20% 25% 30% 35%

4. Were your visitations made with: (check one or more)

   _____ A specific question to be answered

   _____ The purpose of exploring in regard to topic selection

   _____ The purpose of gathering general information such as occupational or historical information

   _____ The purpose of observing a specific item or process

   _____ Other (specify)_____

5. What was the greatest estimated distance in miles traveled, round-trip, to make a visitation?

   0 20 40 60 80 100 120 140 160 180 200

   If over 200 miles, indicate the number of miles traveled____

6. Circle the number that best describes the number of conferences (to get information, not to make an appointment) per project held by telephone.

1 2 3 4 5 6 7 8 9 10

7. Indicate the number that best describes the number of telephone conferences per project that were long distance calls.

1 2 3 4 5 6 7 8 9 10

8. A. Indicate the number of visitations you attempted which involved admission charges.

1 2 3 4 5 6 7 8 9 10

B. If there were admission charges involved in any attempted visitations, indicate the approximate amount.

$0 $5 $10 $15 $20 $25

C. If there was a fee did you make the visitation(s)?

_____ yes _____ no

9. Evaluate the following methods as to their importance for your project. (1, highest; 5, lowest).

_____ Observation _____ conference by telephone

_____ Conference in person

_____ Other (specify)_____

10. In the blanks below check the sources you used to locate names of people and firms you contacted for visitations and place numbers to indicate your evaluation of the sources you would recommend. (1, highest; 5, lowest).

_____ Trade Journals (specify)_____

_____ Other Periodicals (specify)_____

_____ Iowa Directory of Manufacturers

_____ Thomas's Register

_____ Yellow pages of the telephone directory

_____ State Employment Security Commission office

_____ Other (specify)_____

11. Evaluate the usefulness of the ways you made initial contact with the person or firm which you wished to visit. (1, highest, 5, lowest).

_____ In person

_____ By personal letter

_____ By telephone

_____ Other (specify_____

If you have ideas concerning the research methods used in the 33:270 Projects course which you have not shared with us through this questionnaire, you are invited to share those ideas with us in the space below, using the other side of the page, if necessary.

APPENDIX B

RESPONDENT GROUP

should be systematized

Lawrence Reinke	Albia, Iowa
Wm. C. McKeown	Mason City, Iowa
Dean Odekirk	Cedar Rapids, Iowa
Donald Darrow	Cedar Falls, Iowa
DeWitt Booth	Keokuk, Iowa
Michael W. Horton	Altoona, Iowa
Harlan E. Giese	Des Moines, Iowa
Jerry Cuffel	Marion, Iowa
Kenneth G. Gordon	Niceville, Florida
John A. Oldenkamp	Marshalltown, Iowa
[illegible]	Iowa City, Iowa
Teru Mukai	Cedar Falls, Iowa
Maynard Reynolds	Waterloo, Iowa
Jack Roorda	Carpentersville, Illinois
R. L. Bullis	LaPorte City, Iowa
Leon Hunnicutt	Columbus Junction, Iowa
Wayne R. Tjelmeland	Vinton, Iowa
Terry Brown	Manly, Iowa
William Paup	Cedar Falls, Iowa
Clayton B. Lindscheid	Harmon, Illinois
William E. Stock	St. Paul, Minnesota
Raymond K. Forret	West Union, Iowa
Ronald Bro	Cedar Falls, Iowa
Gene E. Stoltenberg	Cedar Rapids, Iowa
Bill Rustemier	Farmington, Michigan
William Naus	Cedar Falls, Iowa
Nick E. Teig	Cedar Falls, Iowa
Jean R. Roush	Bettendorf, Iowa
Walter Dunning	Waterloo, Iowa
Paul Shih	College Station, Texas
Gene E. Tychsen	Clive, Iowa
John L. Byers	Marble Rock, Iowa
Mason D. Maach	Humboldt, Iowa
Rex W. Pershing	Cedar Falls, Iowa
Kenneth Nakakura	Torrance, California
Daniel L. Ryan	Council Bluffs, Iowa
Herlon VanderSchaat	Rock Valley, Iowa
Walter D. Hartman	Cedar Rapids, Iowa
DeWayne Fintel	Hudson, Iowa
Vernon Dillman	Villa Park, Illinois

APPENDIX C

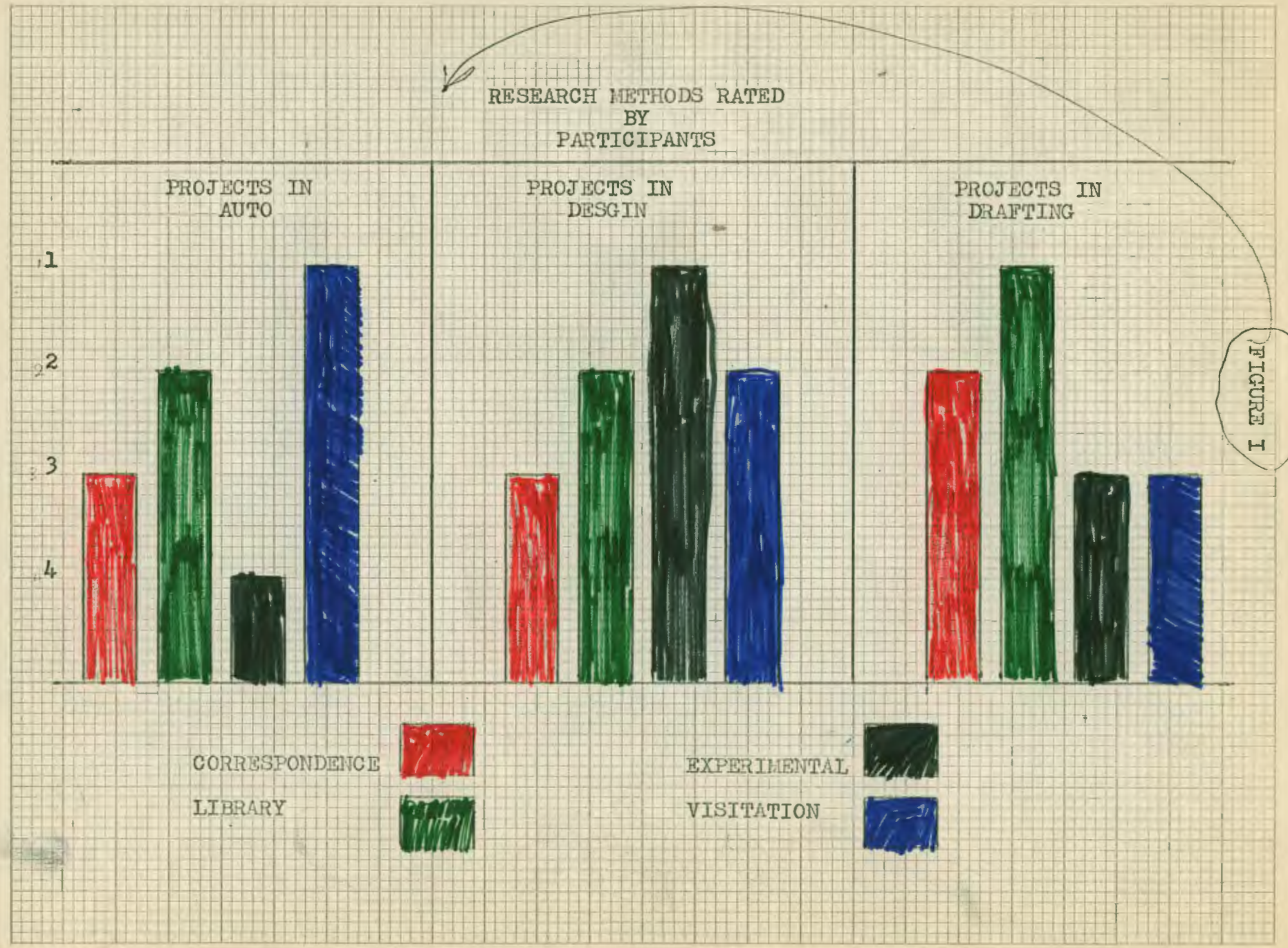


FIGURE I

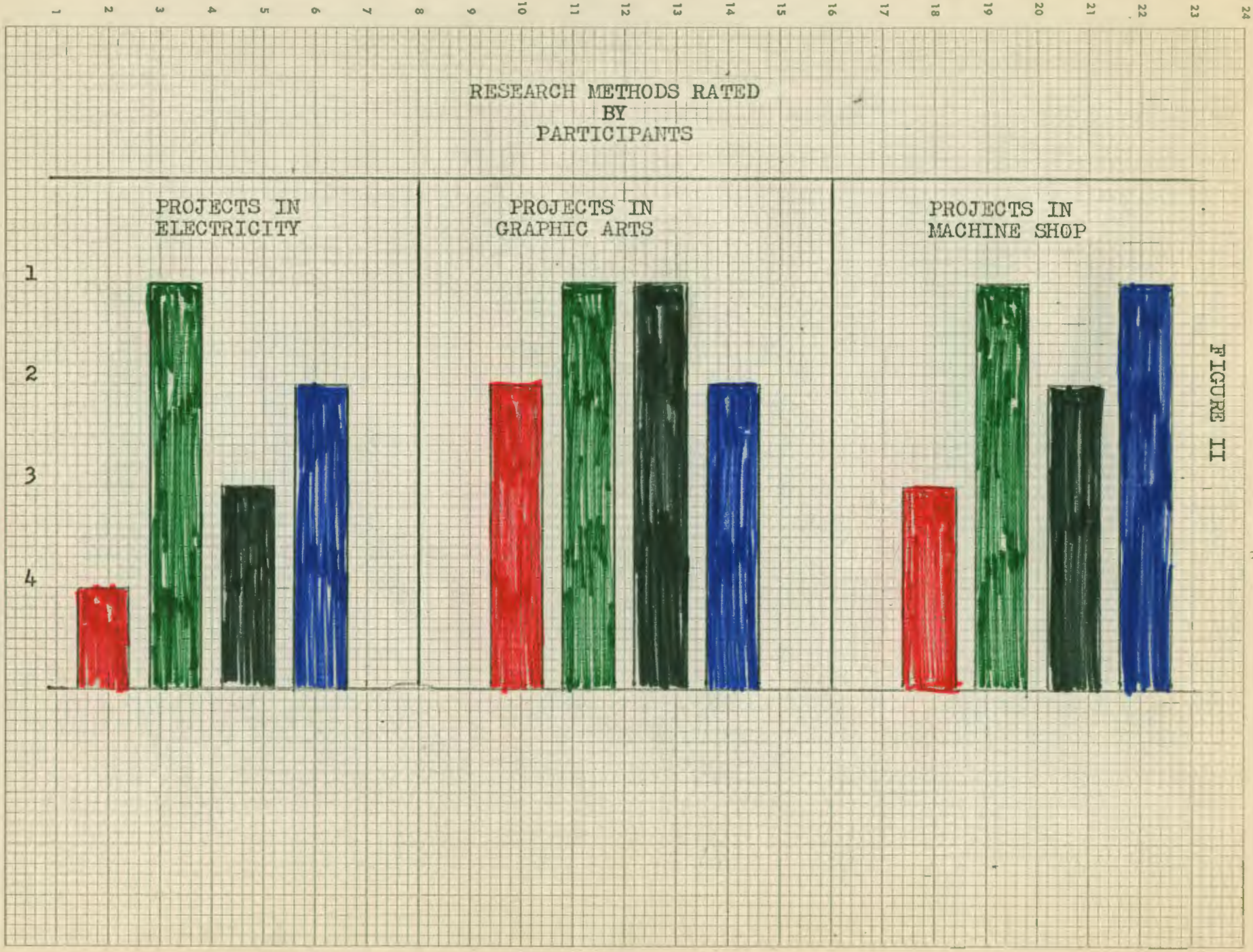
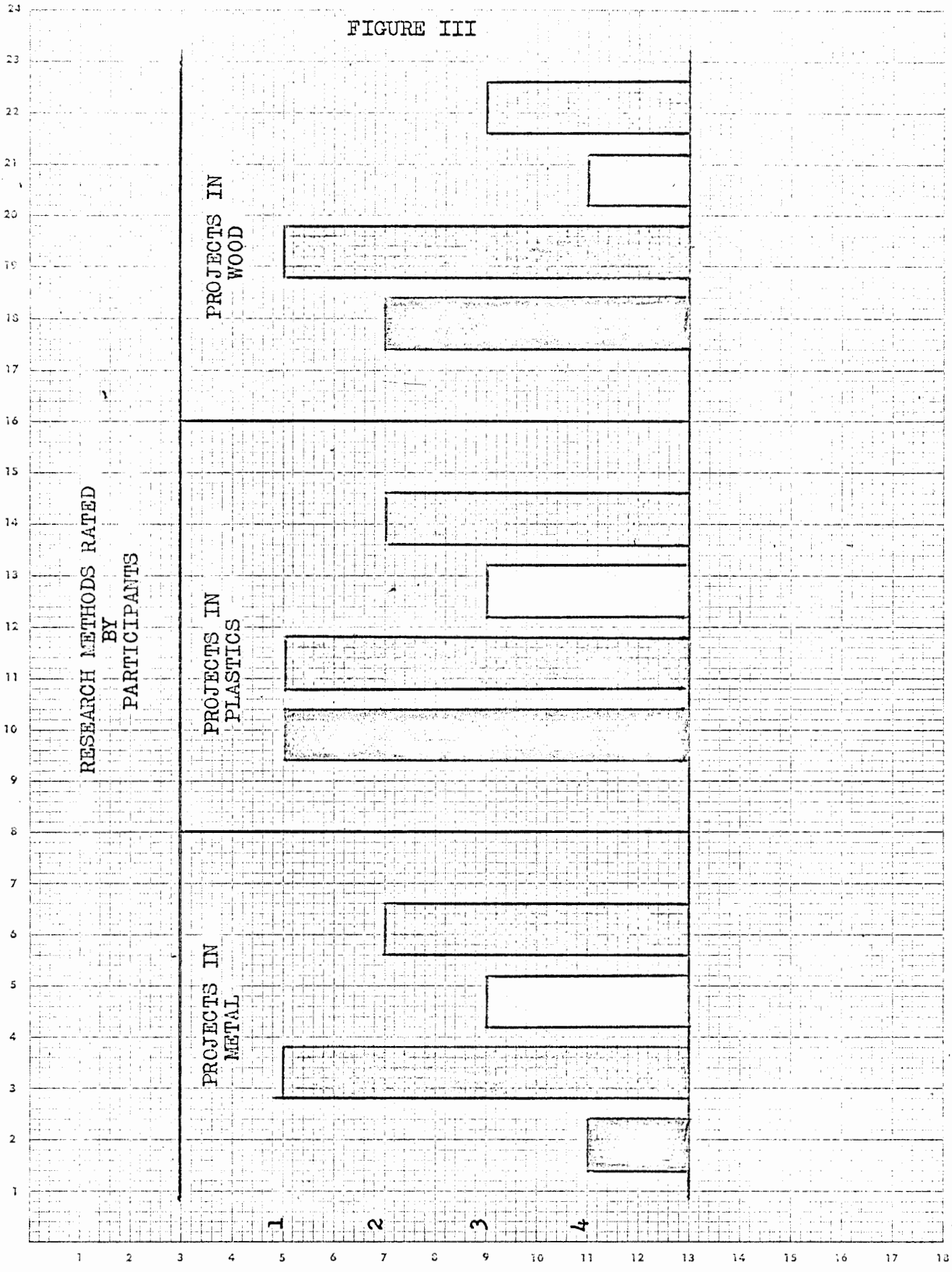
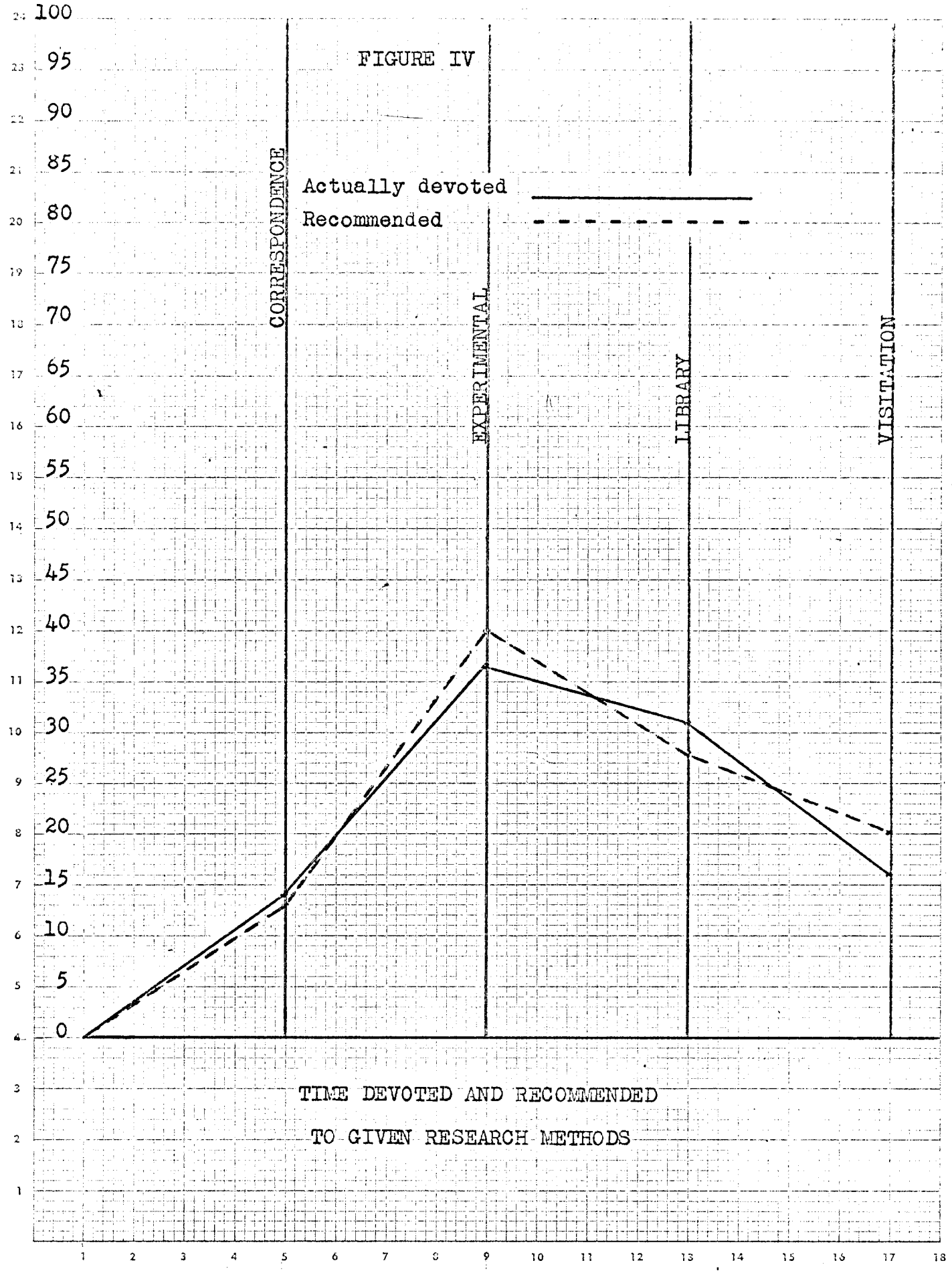

RESEARCH METHODS RATED
BY
PARTICIPANTS
PROJECTS IN
ELECTRICITY
PROJECTS IN
GRAPHIC ARTS
PROJECTS IN
MACHINE SHOP
1
2
3
4

FIGURE II

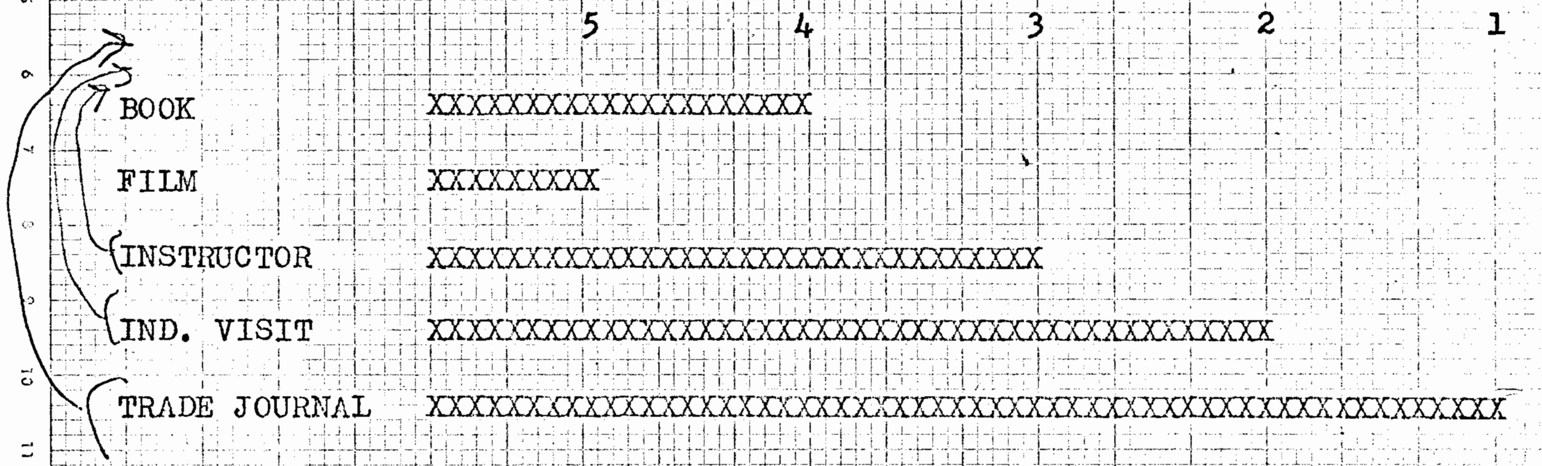
FIGURE III


RESEARCH METHODS RATED BY PARTICIPANTS
PROJECTS IN WOOD
PROJECTS IN PLASTICS
PROJECTS IN METAL
1
2
3
4



TIME DEVOTED AND RECOMMENDED

TO GIVEN RESEARCH METHODS



RECOMMENDATION RATING
FOR
TOPIC SELECTION

FIGURE V

APPENDIX D

RATING OF METHODS FOR OBTAINING NAMES AND ADDRESSES FOR CORRESPONDENCE

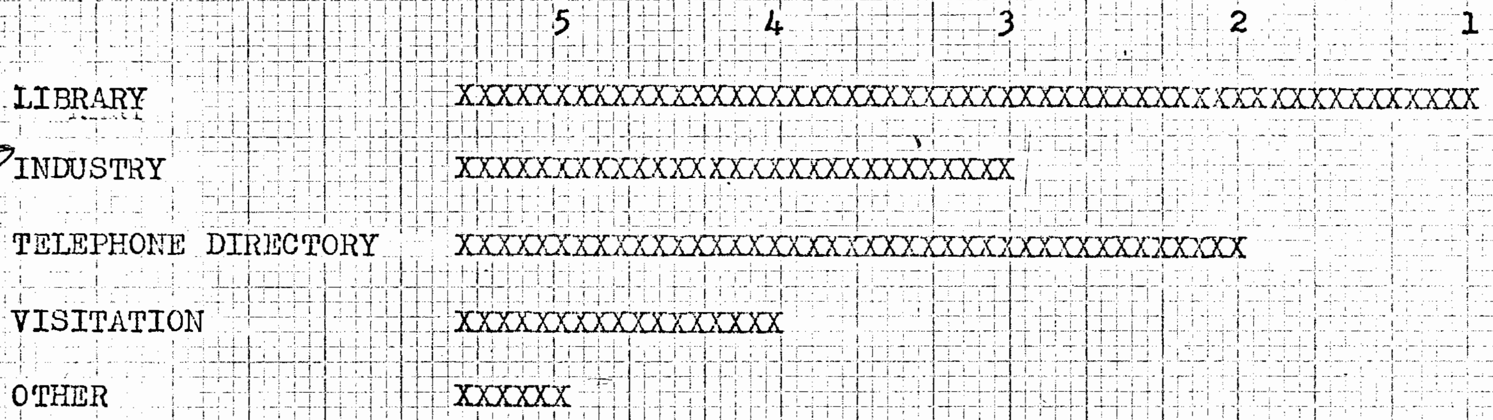


FIGURE I

FIG 1

how read?

• FIGURE II

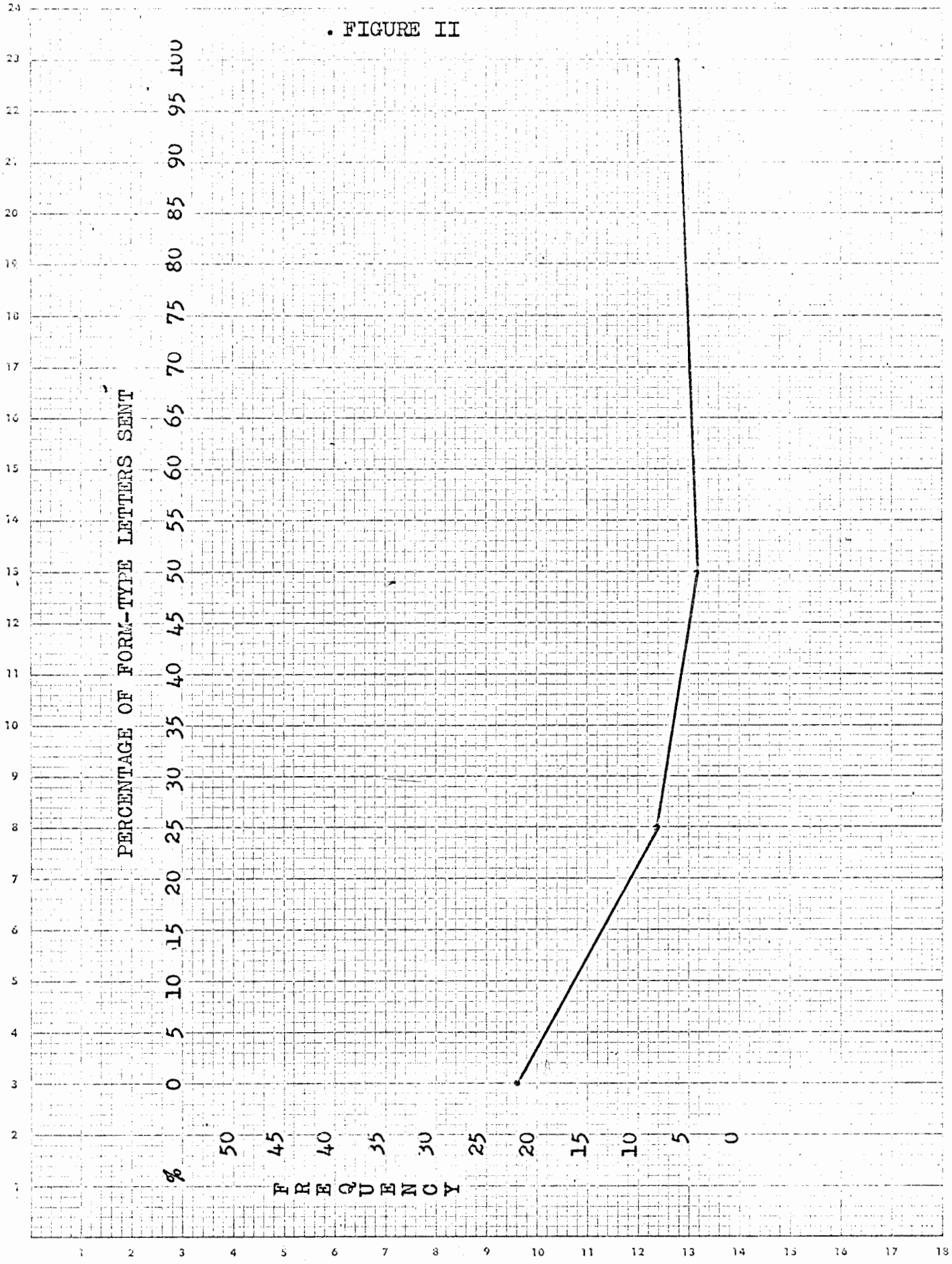
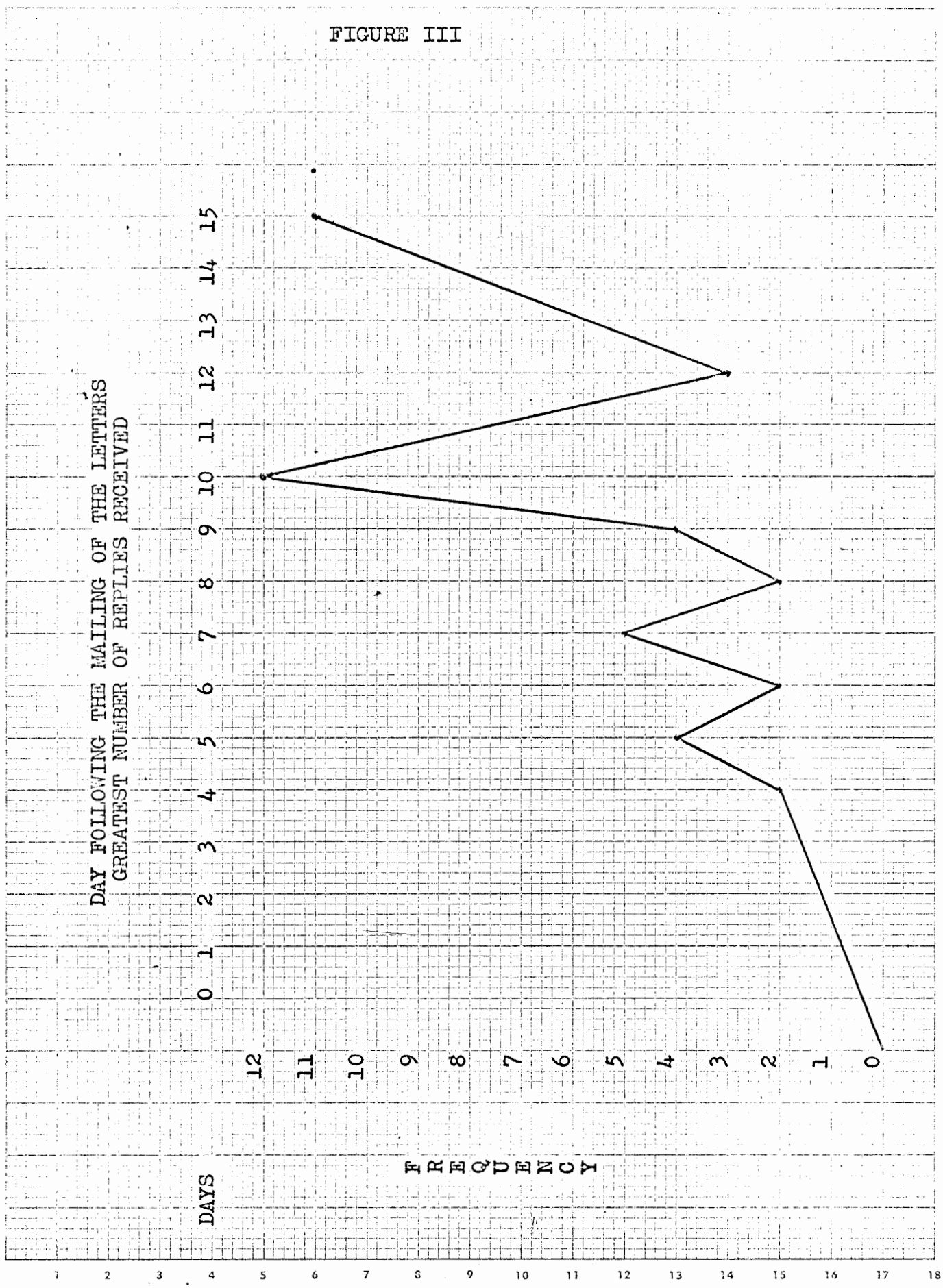


Fig 2, p

FIGURE III


DAY FOLLOWING THE MAILING OF THE LETTERS
GREATEST NUMBER OF REPLIES RECEIVED
DAYS
FREQUENCY
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
12 11 10 9 8 7 6 5 4 3 2 1 0

EFFECT OF DAY OF THE WEEK
LETTER ARRIVED AT DESTINATION

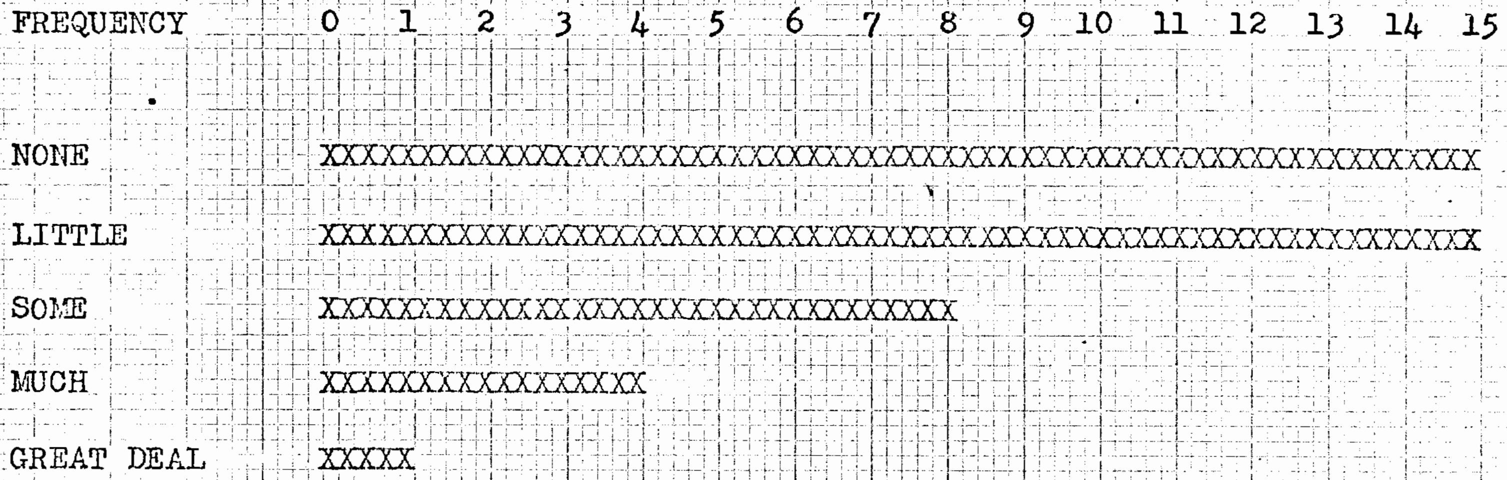


FIGURE IV

FIGURE V

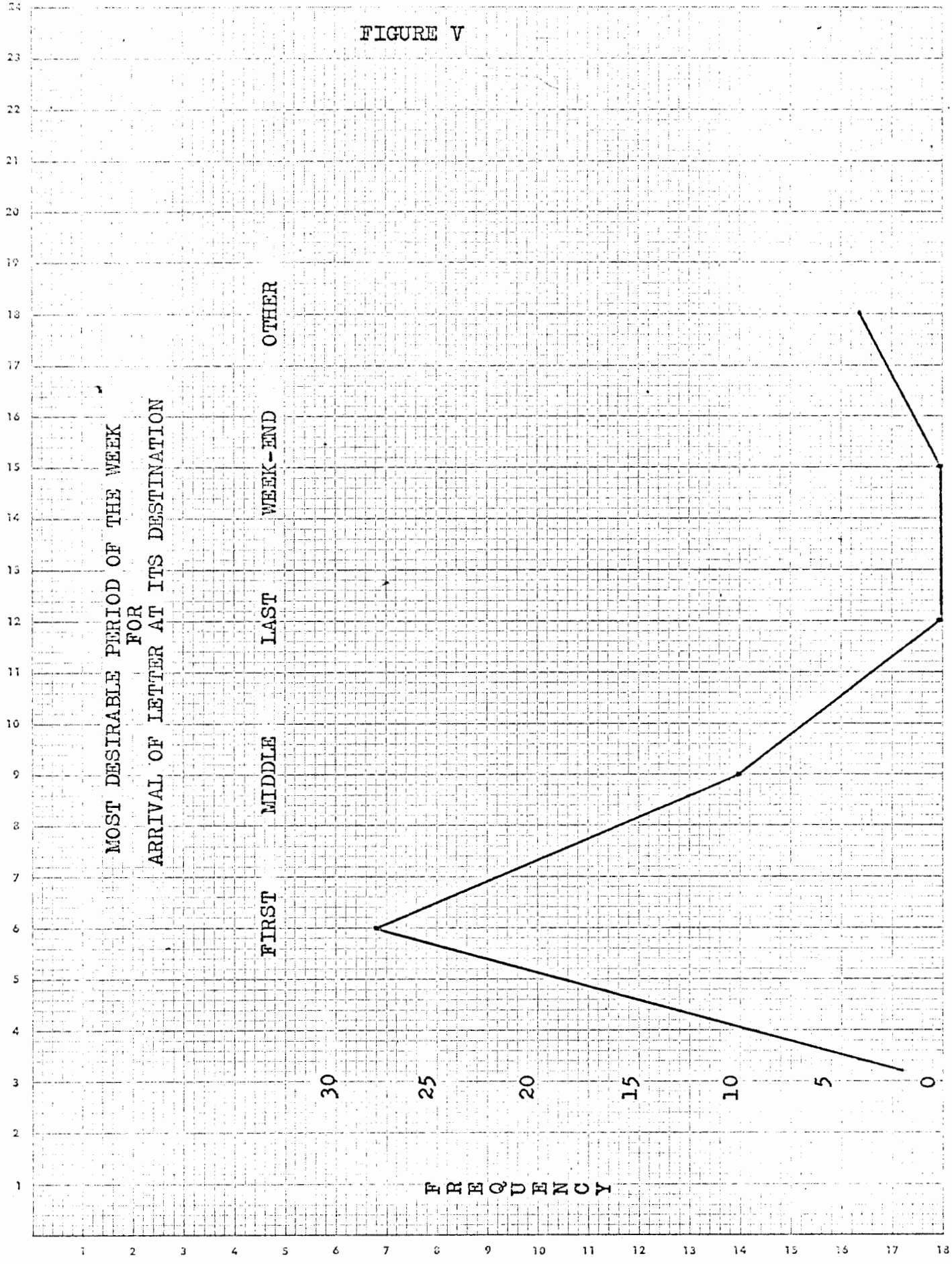
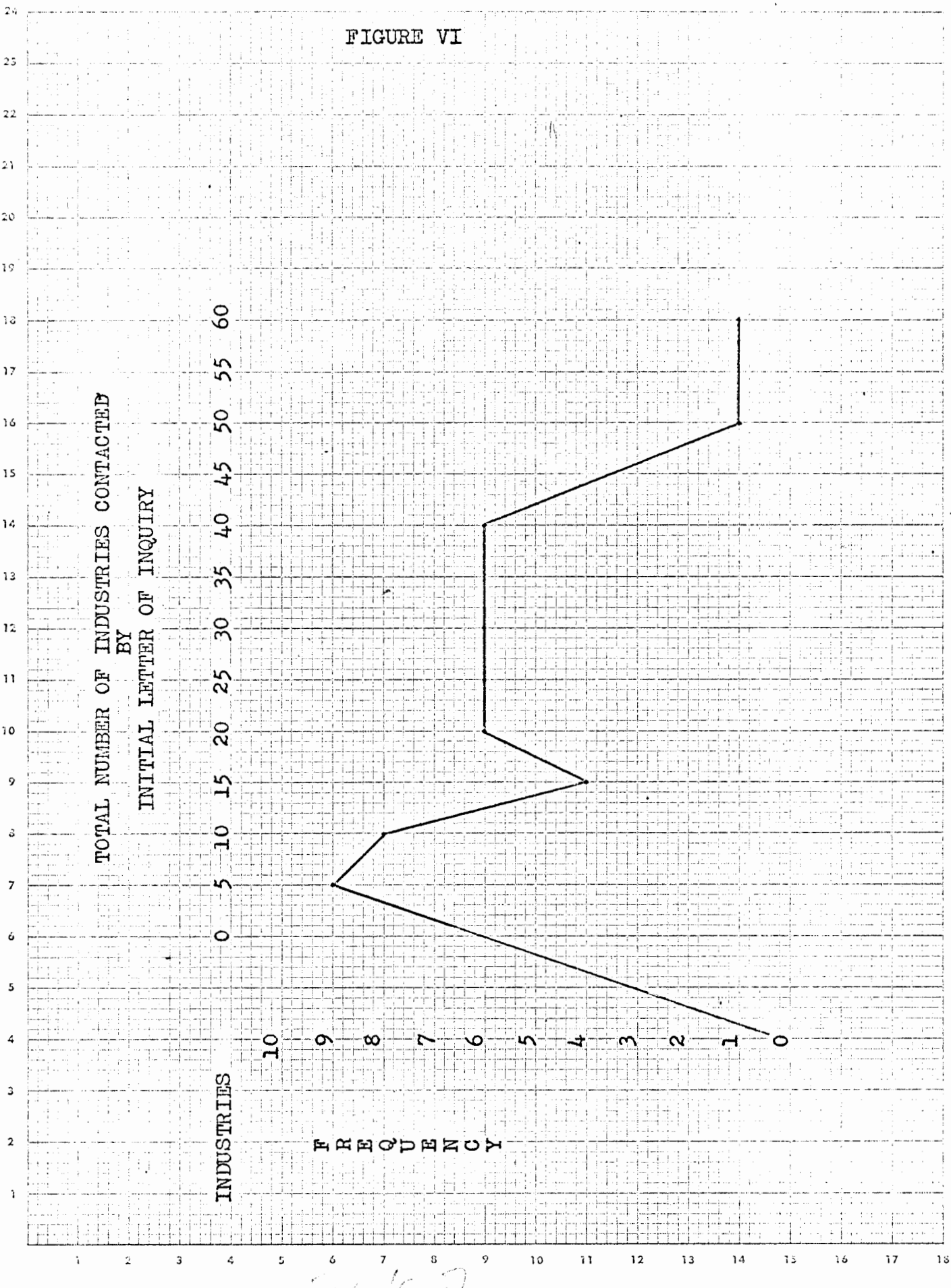

MOST DESIRABLE PERIOD OF THE WEEK
FOR
ARRIVAL OF LETTER AT ITS DESTINATION
FIRST
MIDDLE
LAST
WEEK-END
OTHER
FREQUENCY
0
5
10
15
20
25
30

FIGURE VI


TOTAL NUMBER OF INDUSTRIES CONTACTED
BY
INITIAL LETTER OF INQUIRY
INDUSTRIES
FREQUENCY
0 5 10 15 20 25 30 35 40 45 50 55 60
10 9 8 7 6 5 4 3 2 1 0

AFFECT OF LENGTH OF TIME AVAILABLE
ON
RECEIVING PROMPT REPLIES

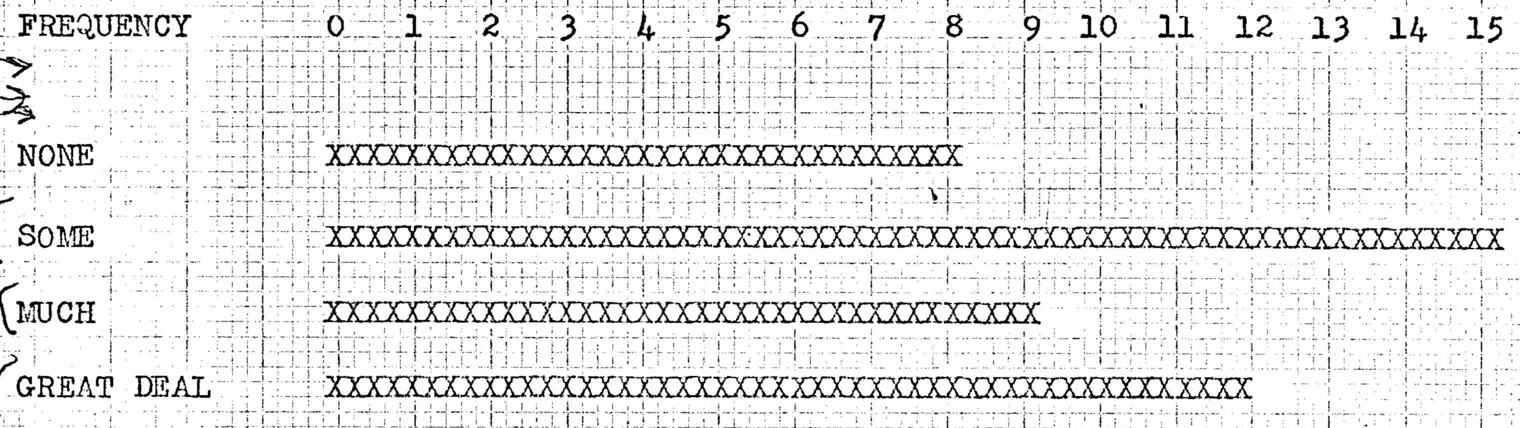


FIGURE VII

FIGURE VIII

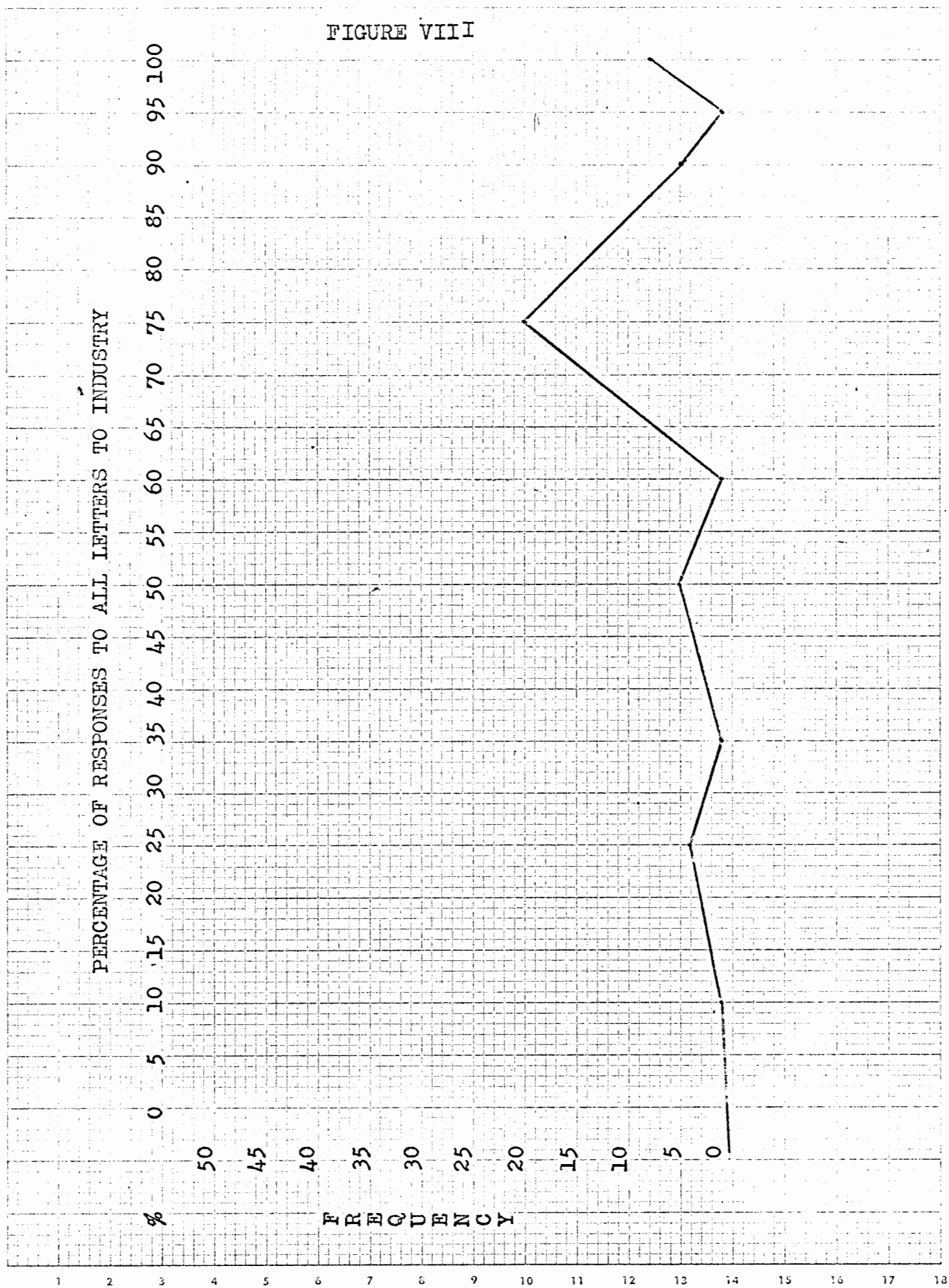


Fig 8, p

FIGURE VIII (a)

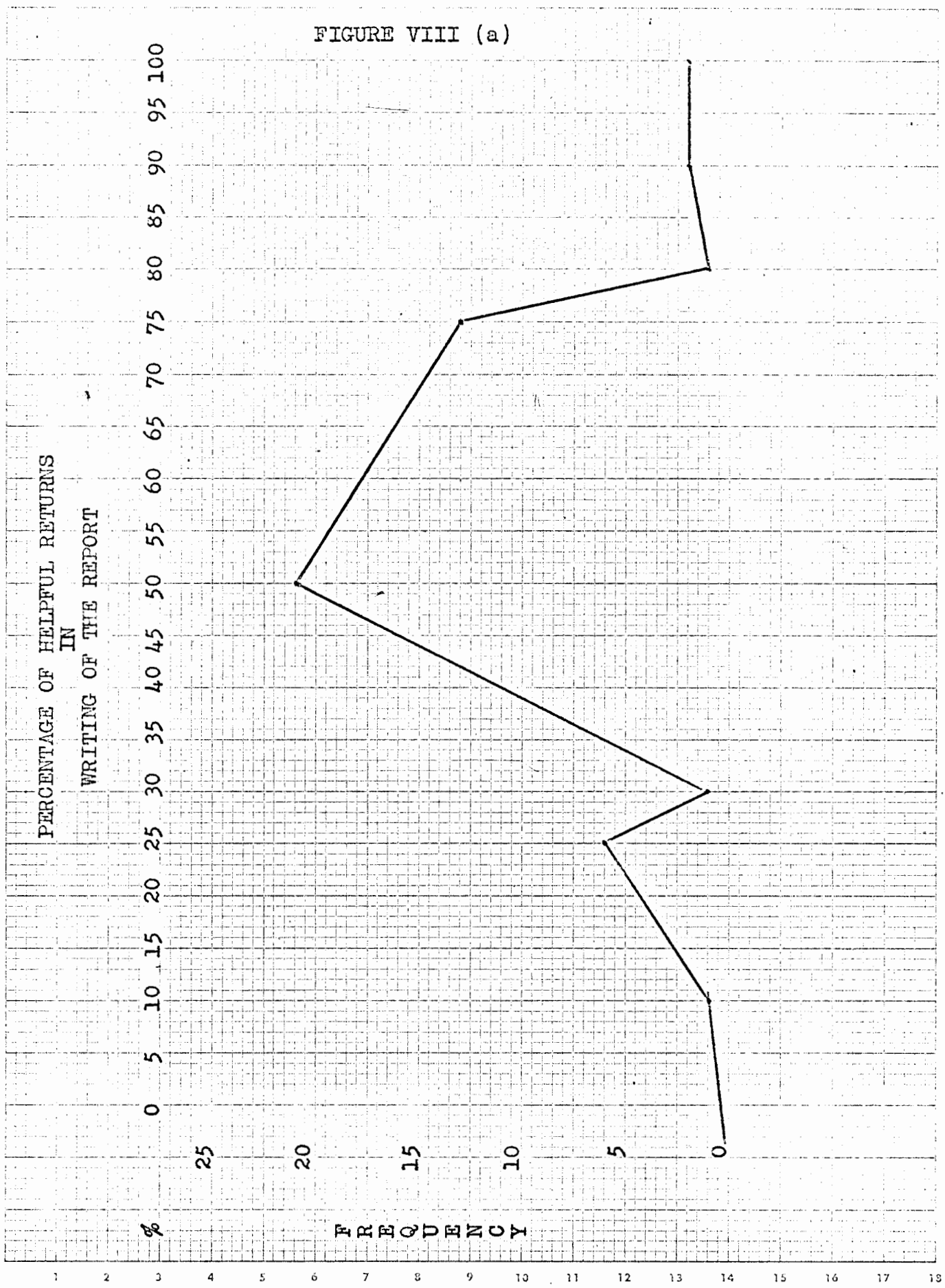


Fig 8, 15

FIGURE IX

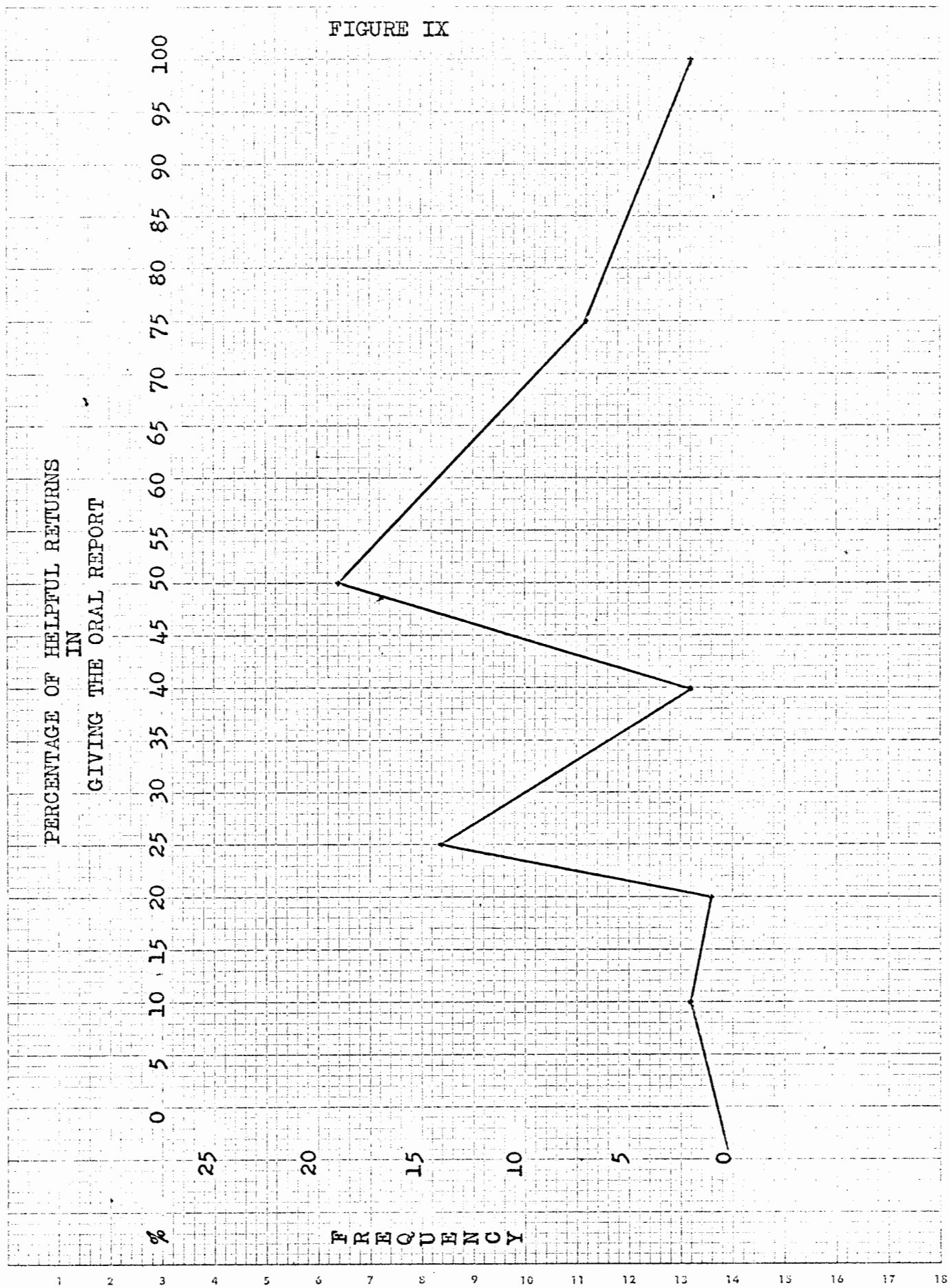

PERCENTAGE OF HELPFUL RETURNS
IN
GIVING THE ORAL REPORT
%
FREQUENCY
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
25 20 15 10 5 0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

FIGURE X

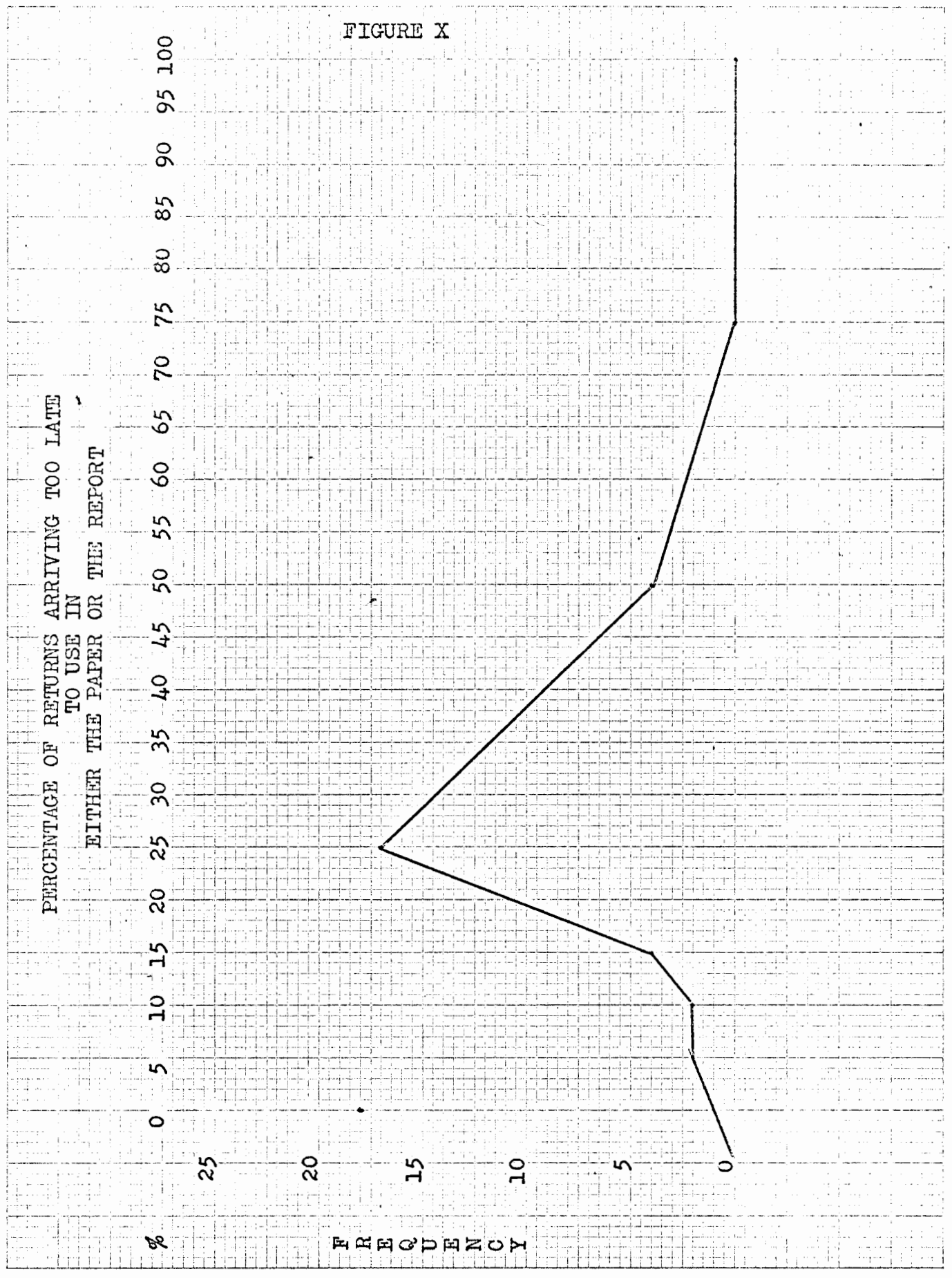


FIG 16, D

FIGURE XI

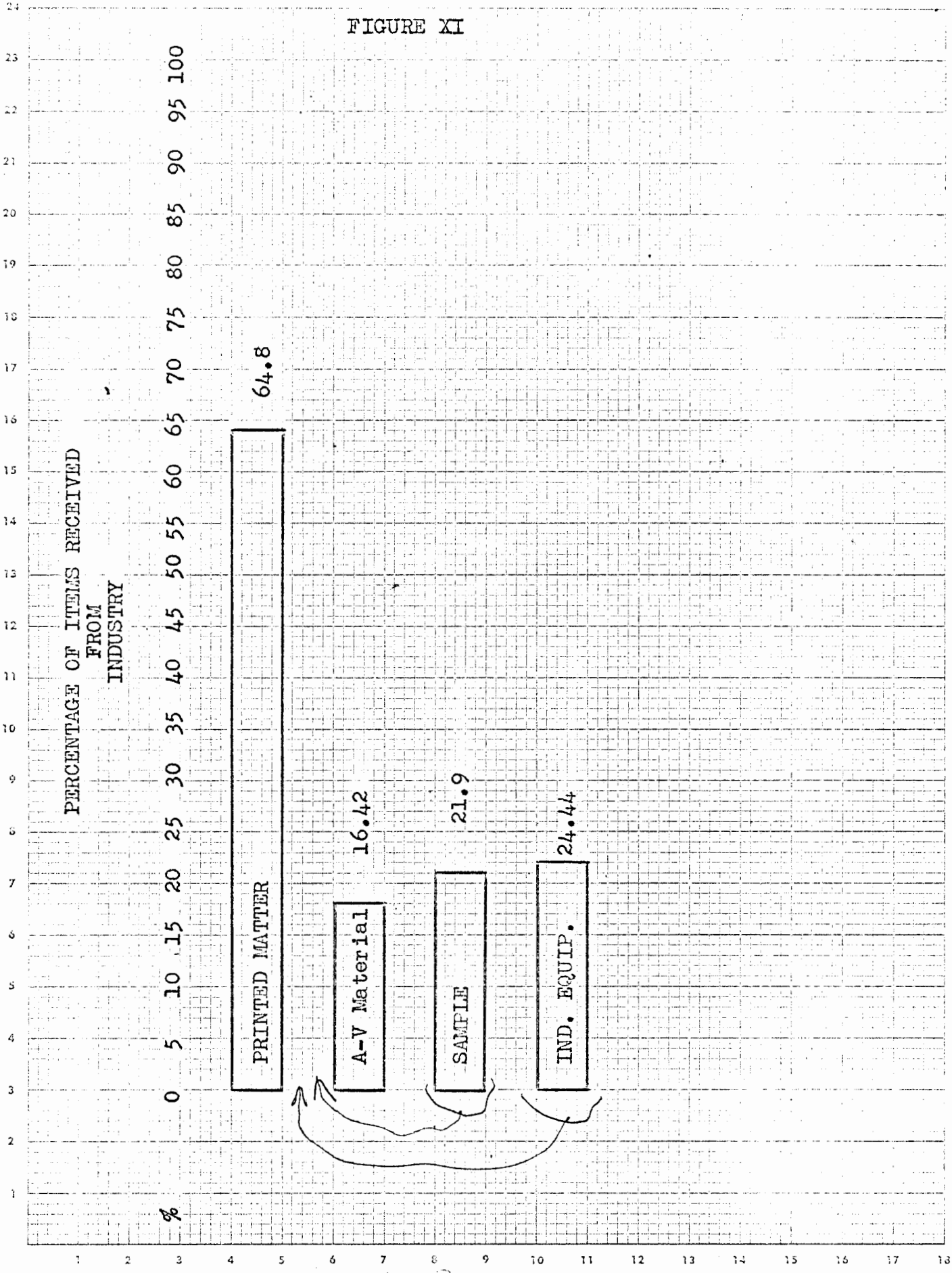


FIG II, D

RATING OF SERVICES PROVIDED BY INDUSTRY

	5 4 3 2 1
EXAMPLES OF IND. PRODUCTS	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX 2.5
EXAMPLES OF CONST.	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX 2.75
EXPERIMENTS	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX 2.56
FILMS	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX 2.56
FORMULAS	XXXXXXXXXXXXXXXXXXXXXXXXXXX 3.20
INDUSTRIAL EQUIPMENT	XXXXXXXXXXXXXXXXXXXXXXXXXXX 3.20
MACH. PARTS USED IN IND.	XXXXXXXXXXXXXXXXXXXX 3.57
OVERHEAD TRANSPARENCIES	XXXXXXXXXXXXXXXXX 3.83
PHOTOCOPIES OR PHOTOS	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX 2.63
RAW MATERIALS	XXXXXDXXXXXXXXXXXXXXXXXXXXXXXXXXXXX 2.23
RESOURCE PERSON	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX 2.06

FIGURE XII

FIGURE XIII

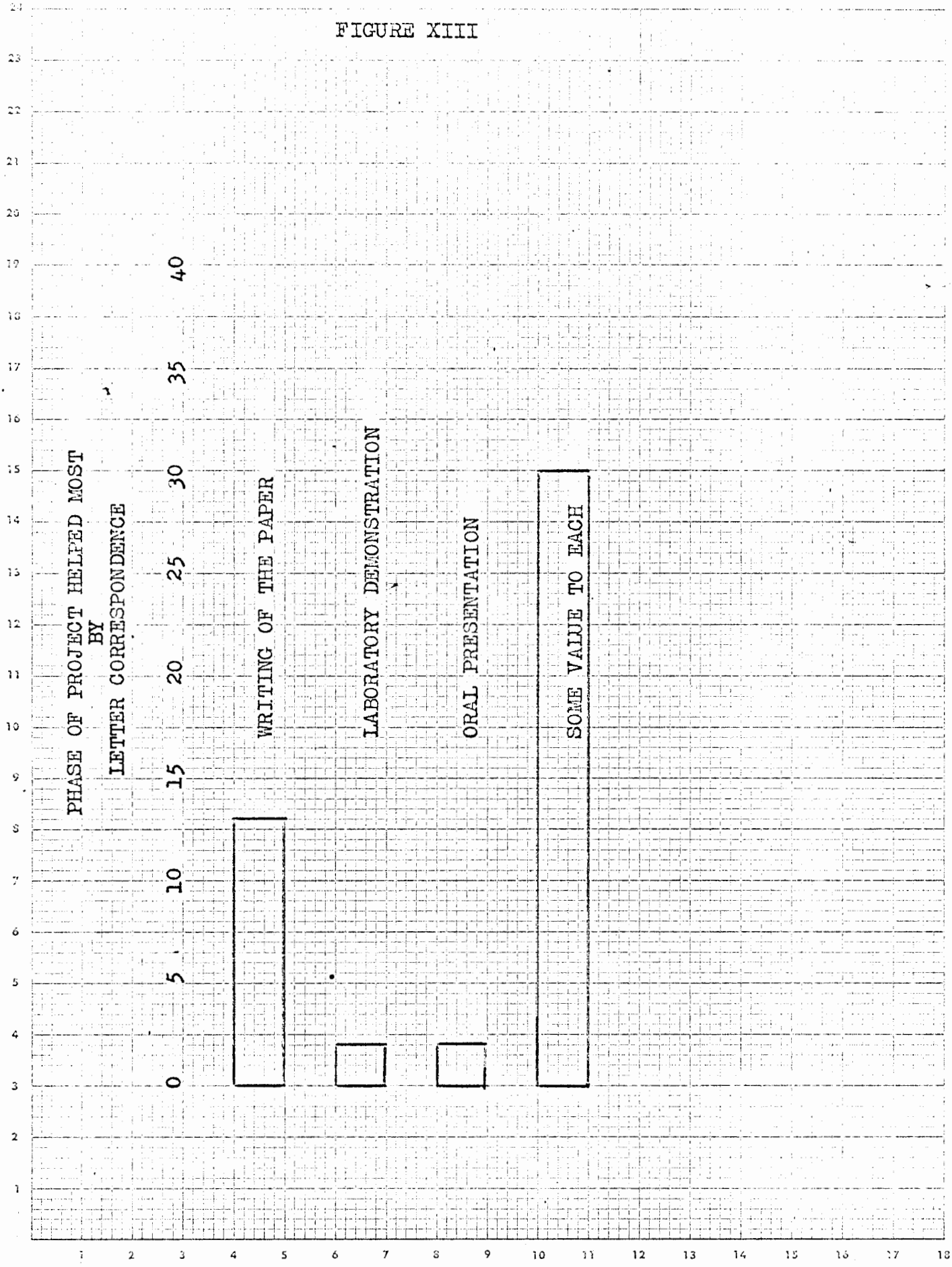


Fig 13

THANK YOU LETTERS SENT
FREQUENCY
0 1 2 3 4 5 6 7 8 9 10 12 14 16 18 20 22 24 26 28 30
RESOURCE PERSON
TECHNICIAN OR OTHER PERSON MET ON VISITATION
ALL INDUSTRIES RESPONDING
ALL IND. SENDING PERTINENT INFORMATION
OWNERS OR PRESIDENTS
DEPT. HEADS OR VICE PRES.
FORM LETTER SENT TO ANY SOURCE CONTRIBUTING TO PROJECT
INDIVIDUAL LETTER SENT TO EVERY SOURCE CONTRIBUTING
DID NOT WRITE "THANK YOU" LETTERS

FIGURE XIV

FIGURE XV

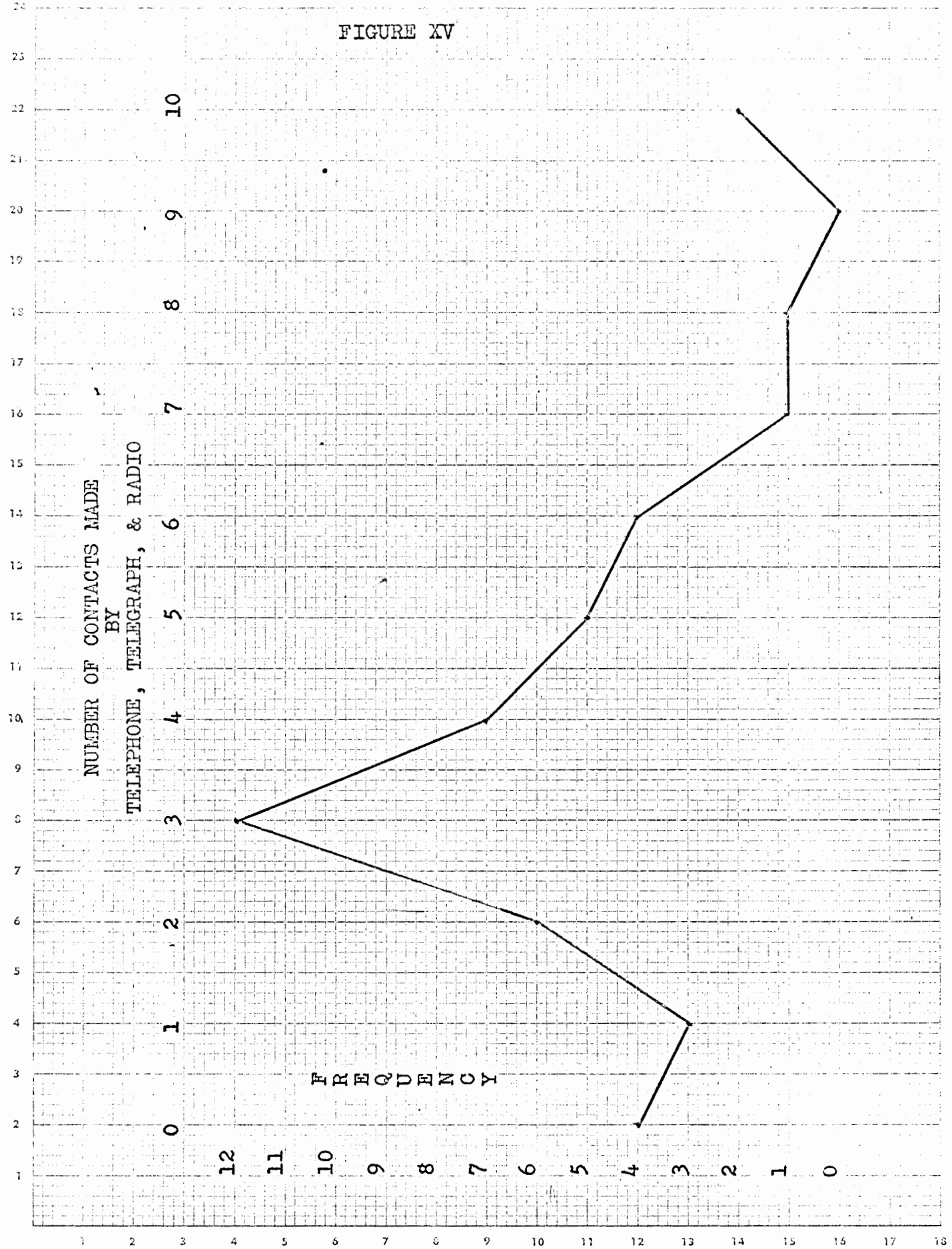


Fig 15 D

APPENDIX E

FIGURE I

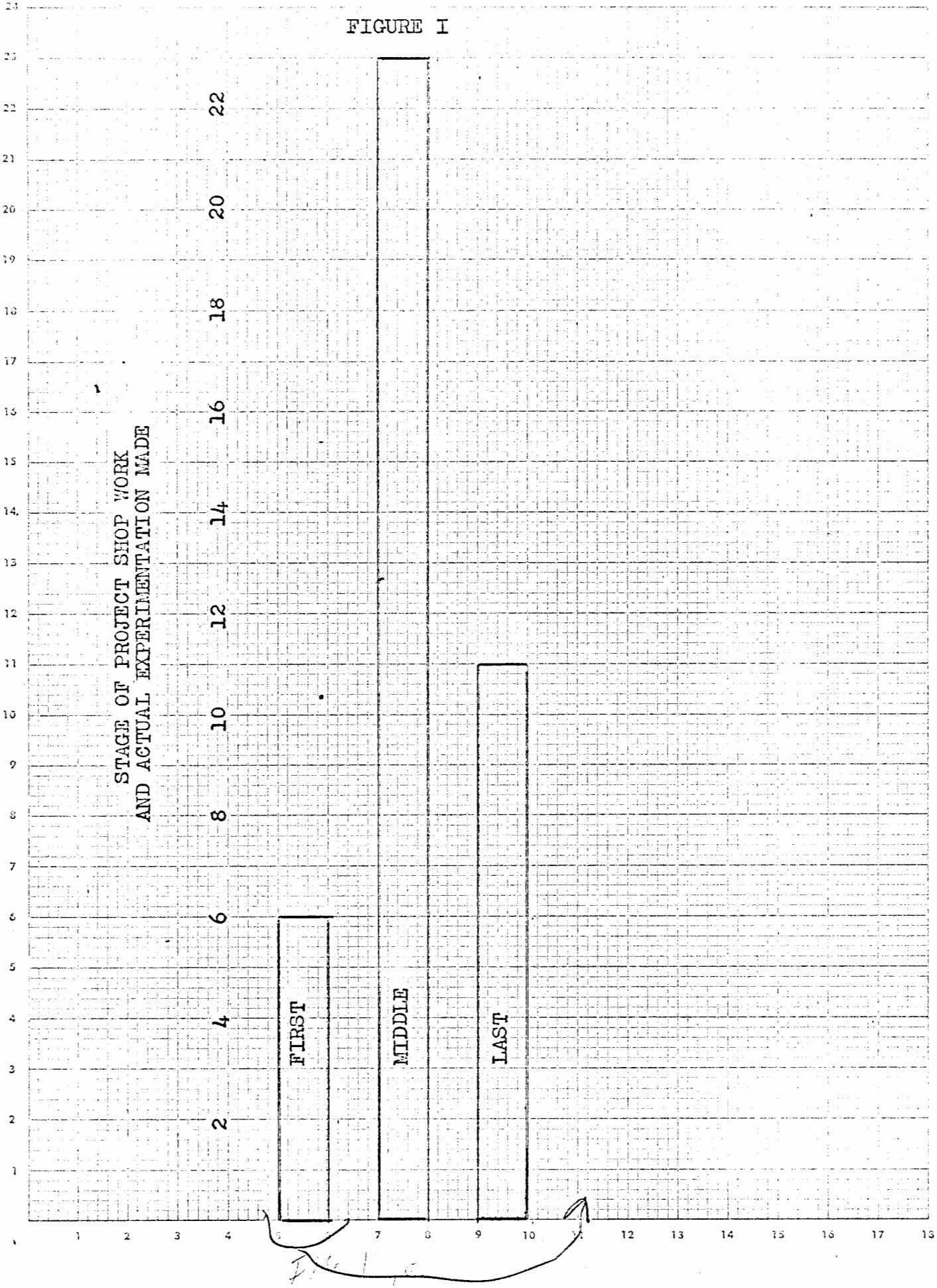

STAGE OF PROJECT SHOP WORK
AND ACTUAL EXPERIMENTATION MADE
FIRST
MIDDLE
LAST
2
4
6
8
10
12
14
16
18
20
22
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18

FIGURE II

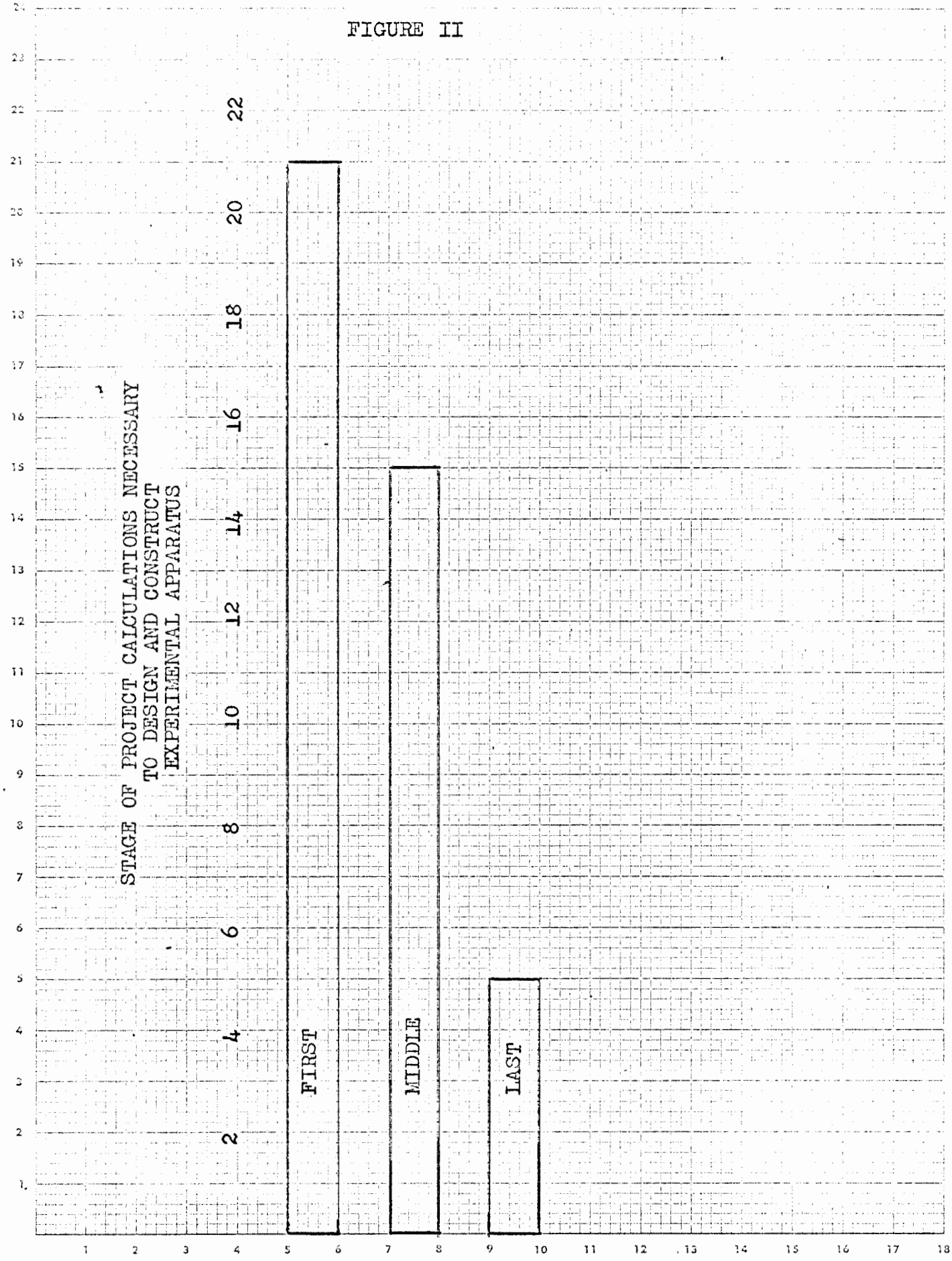


Fig 3, 3

STAGE OF PROJECT RECOMMENDED
FOR
EXPERIMENTAL-CONSTRUCTIVE ACTIVITIES

FIGURE III

FIGURE IV

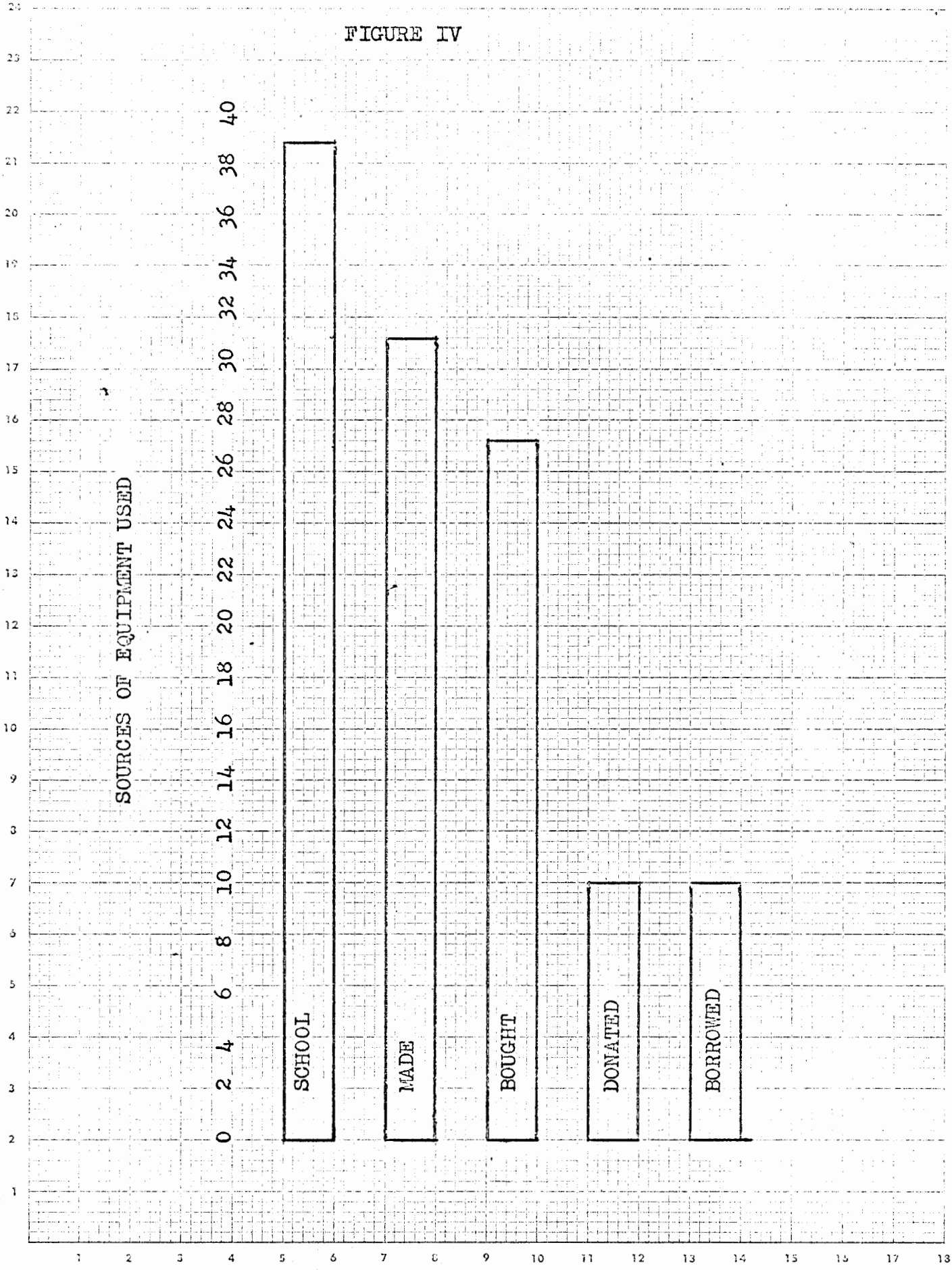
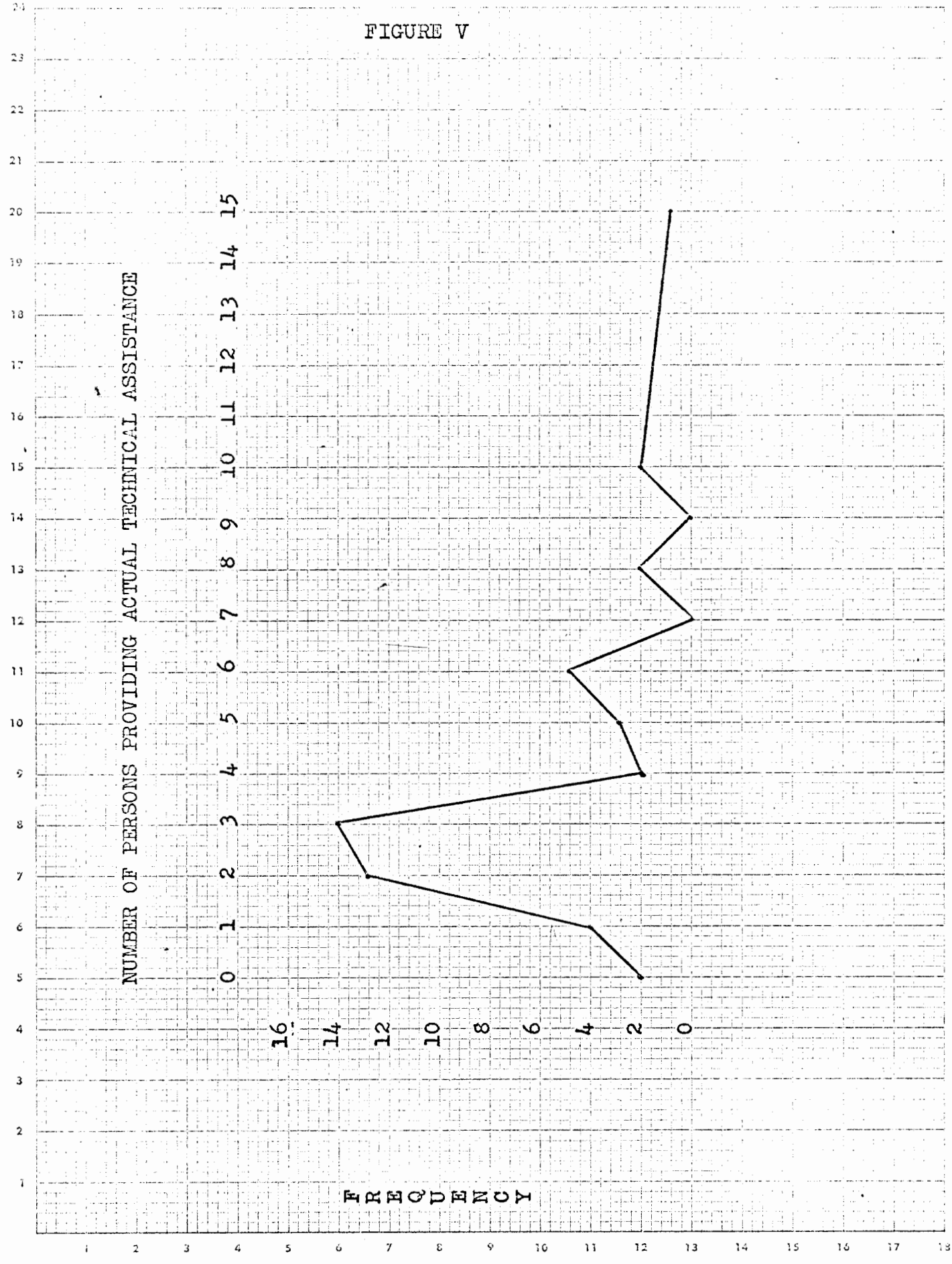


FIG 4 5

FIGURE V



AG 5, C

FIGURE VI

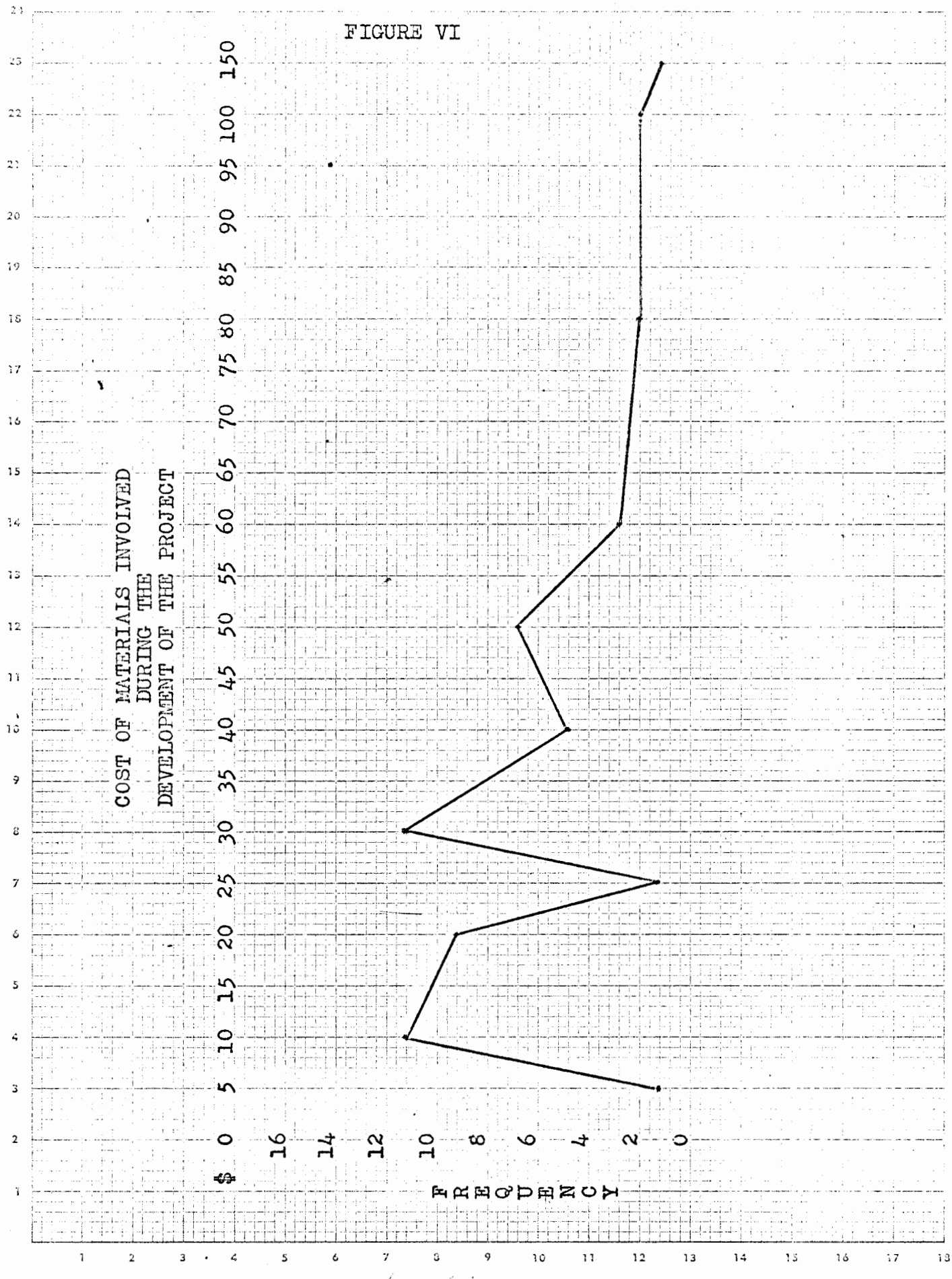


Fig 6

FIGURE VII

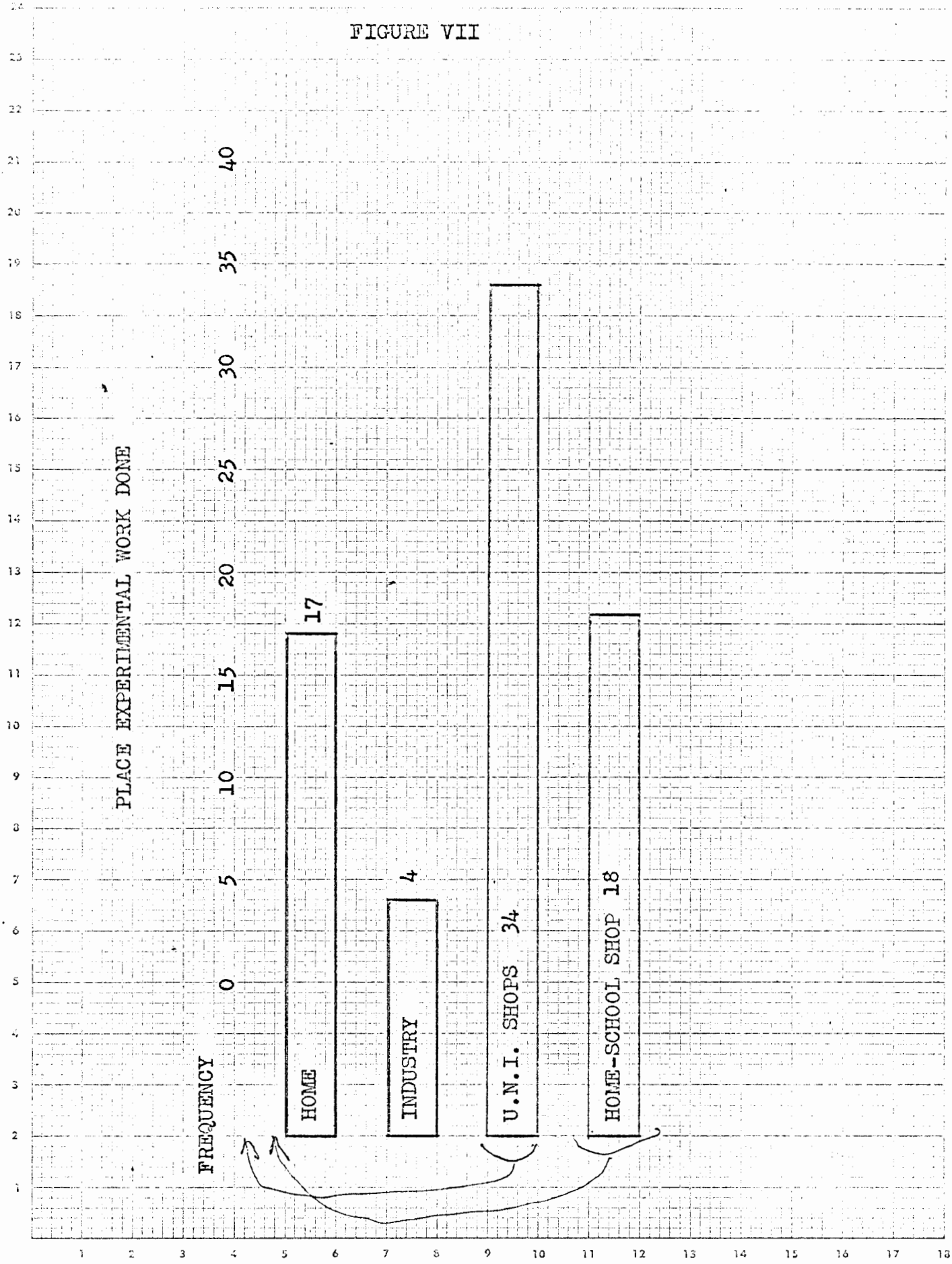


Fig 7, c

APPENDIX F

INFLUENCE OF LIBRARY MATERIALS
ON
TOPIC SELECTION

FIGURE I

FIGURE II

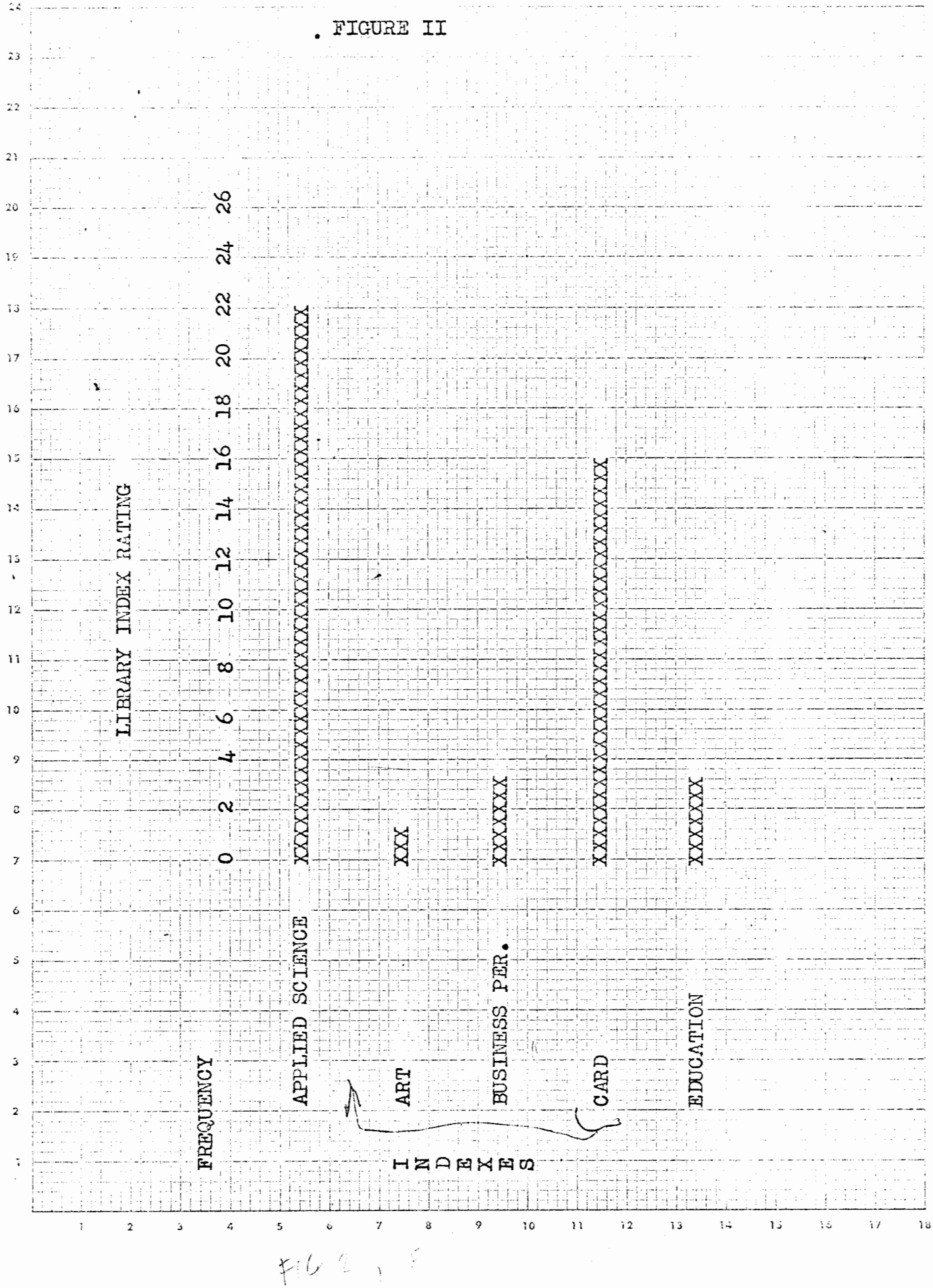

LIBRARY INDEX RATING
0 2 4 6 8 10 12 14 16 18 20 22 24 26
FREQUENCY
INDEXES
APPLIED SCIENCE
ART
BUSINESS PER.
CARD
EDUCATION
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

FIGURE III

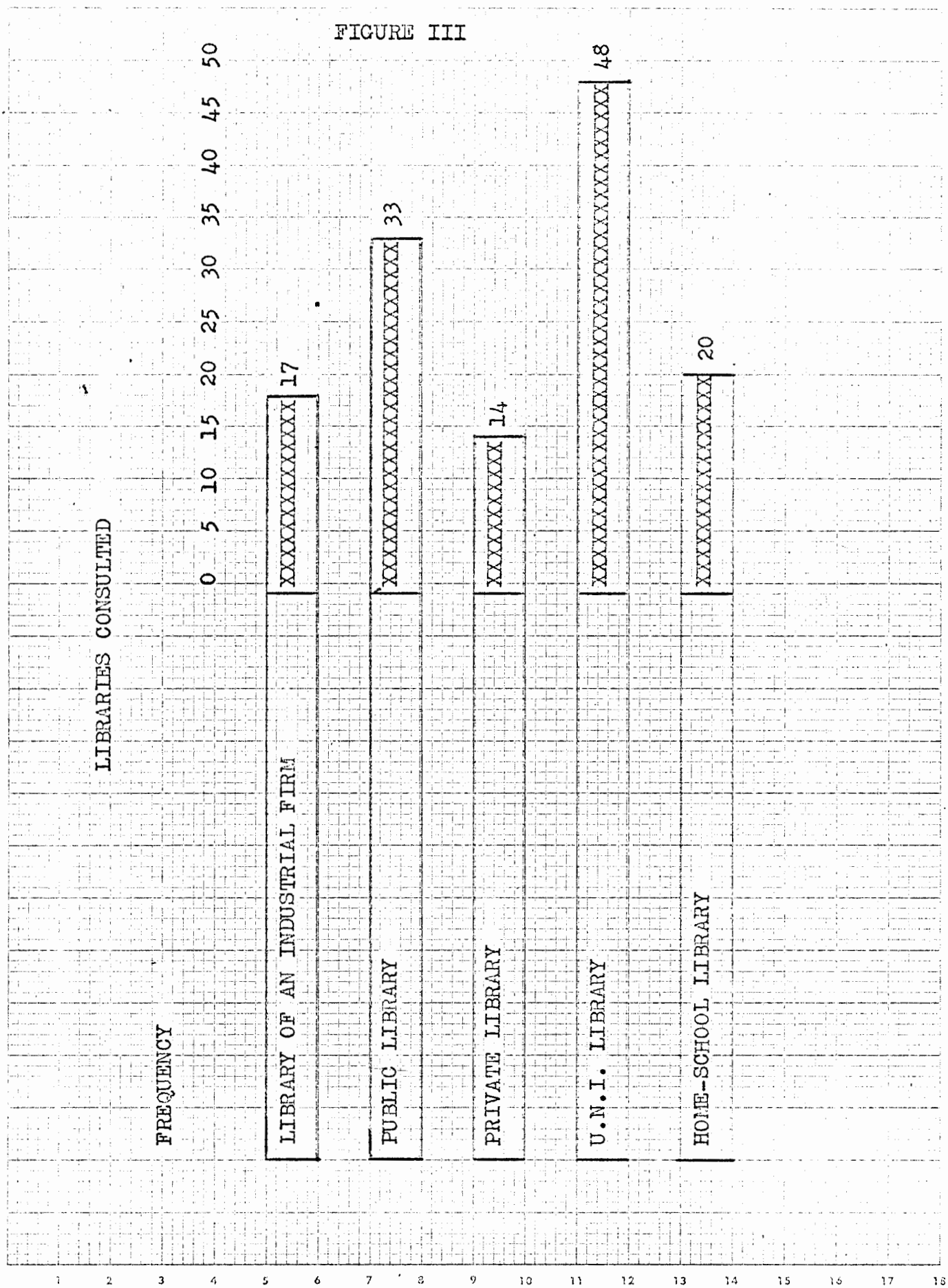


FIG 3, P

AMOUNT OF USEFUL INFORMATION
OBTAINED FROM
TRADE JOURNALS AND MAGAZINES

FIGURE IV

AVAILABILITY OF CURRENT MATERIALS IN LIBRARIES

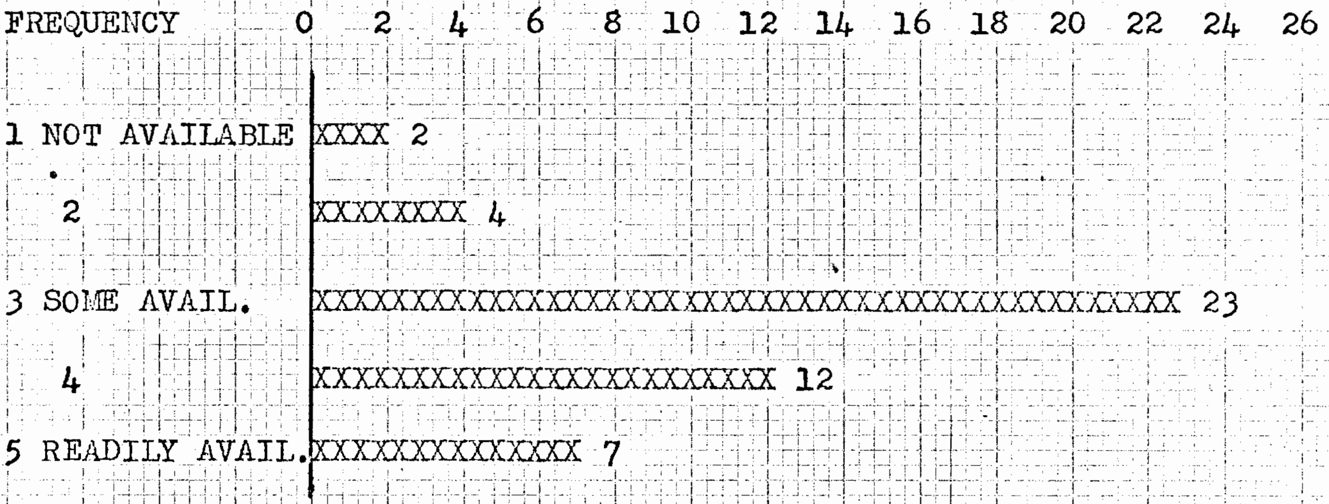


FIGURE V

Fig. 5 E

VALUE OF CHAMBER OF COMMERCE DIRECTORIES
IN
LOCATING FIRMS RELATED TO RESEARCH

FIGURE VI

FIGURE VII

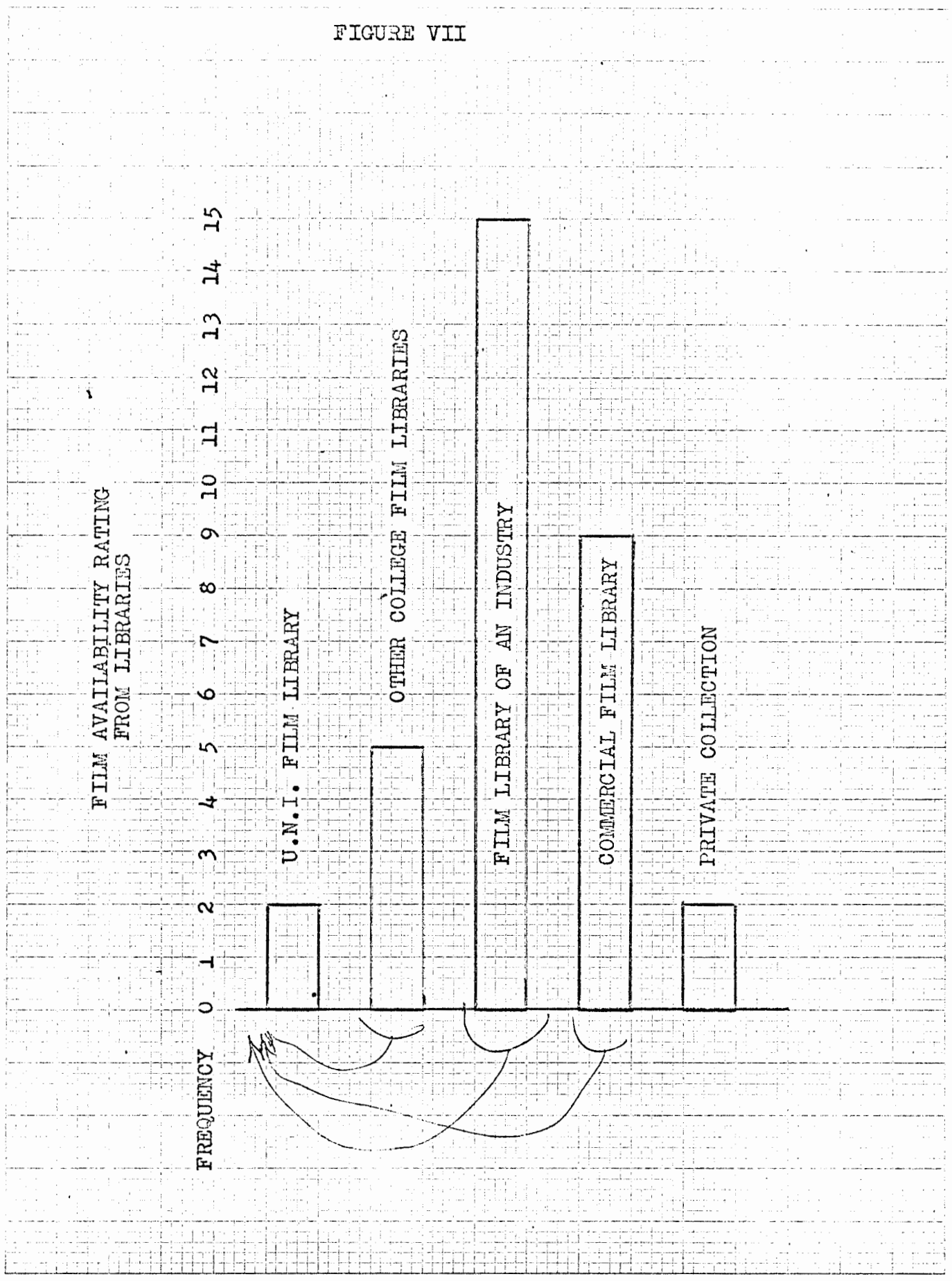

FILM AVAILABILITY RATING
FROM LIBRARIES
FREQUENCY
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
U.N.I. FILM LIBRARY
OTHER COLLEGE FILM LIBRARIES
FILM LIBRARY OF AN INDUSTRY
COMMERCIAL FILM LIBRARY
PRIVATE COLLECTION

FIGURE VIII

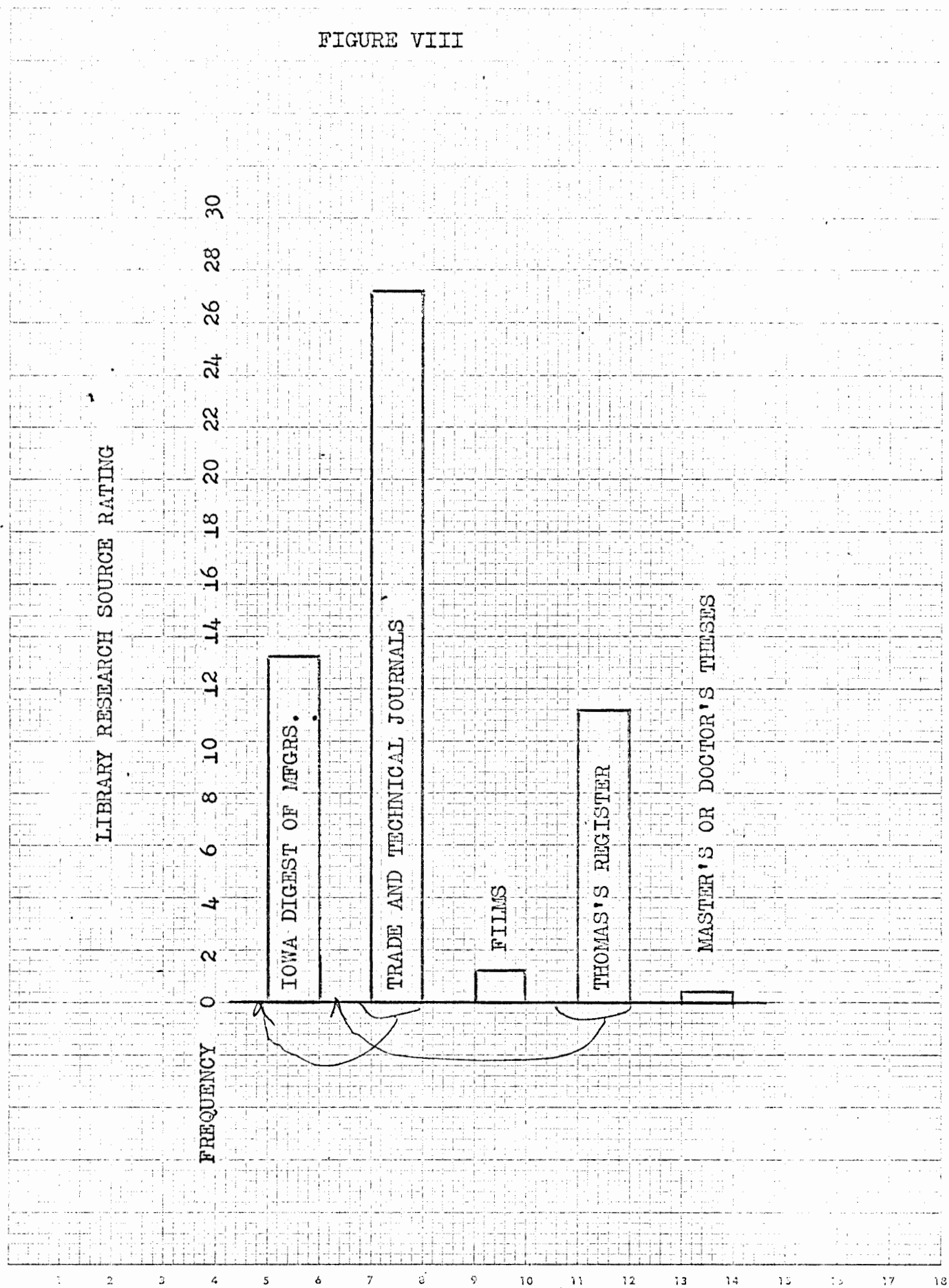


FIG 9.5

APPENDIX G

• FIGURE I

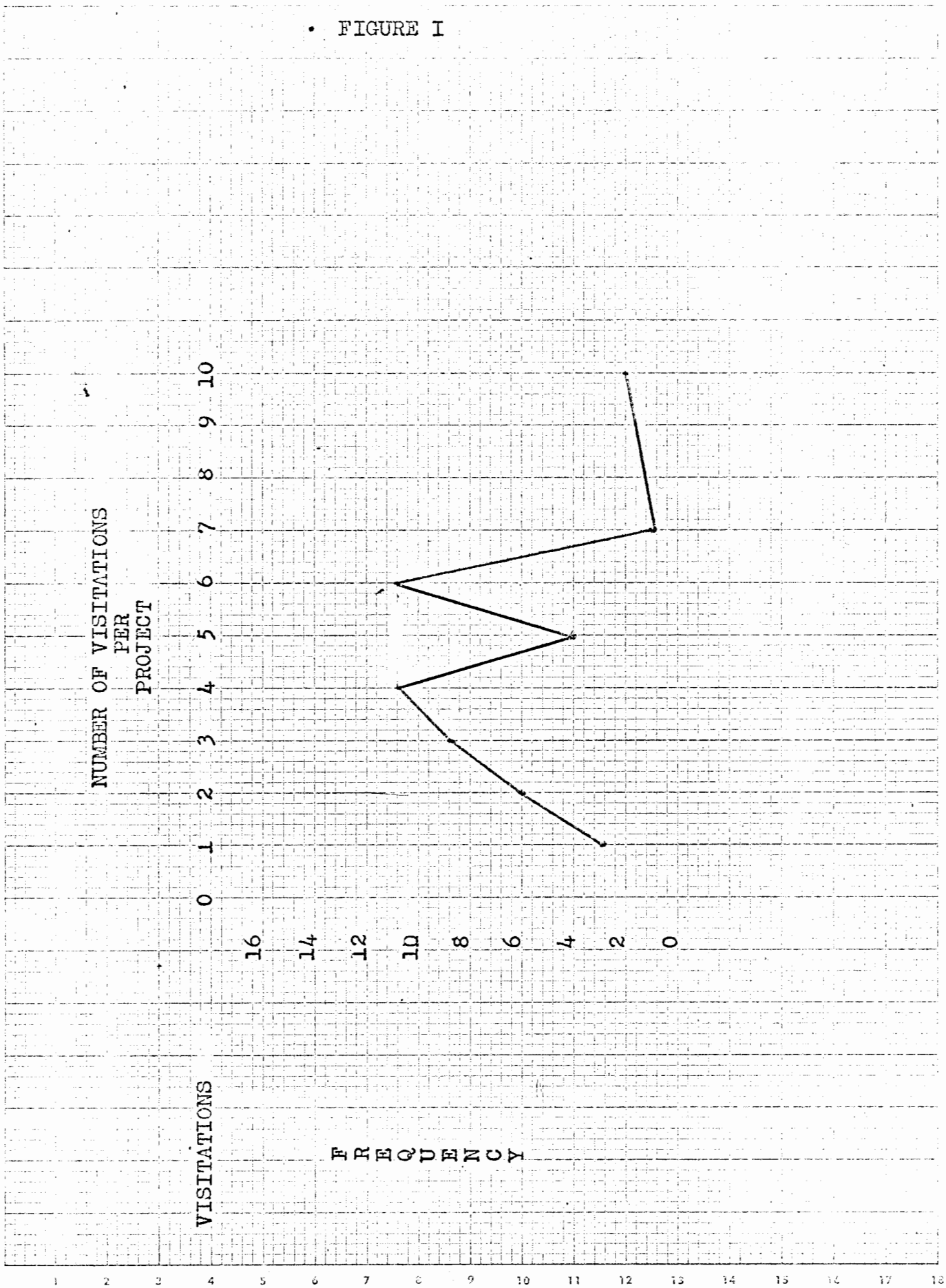


FIG 1, 6