

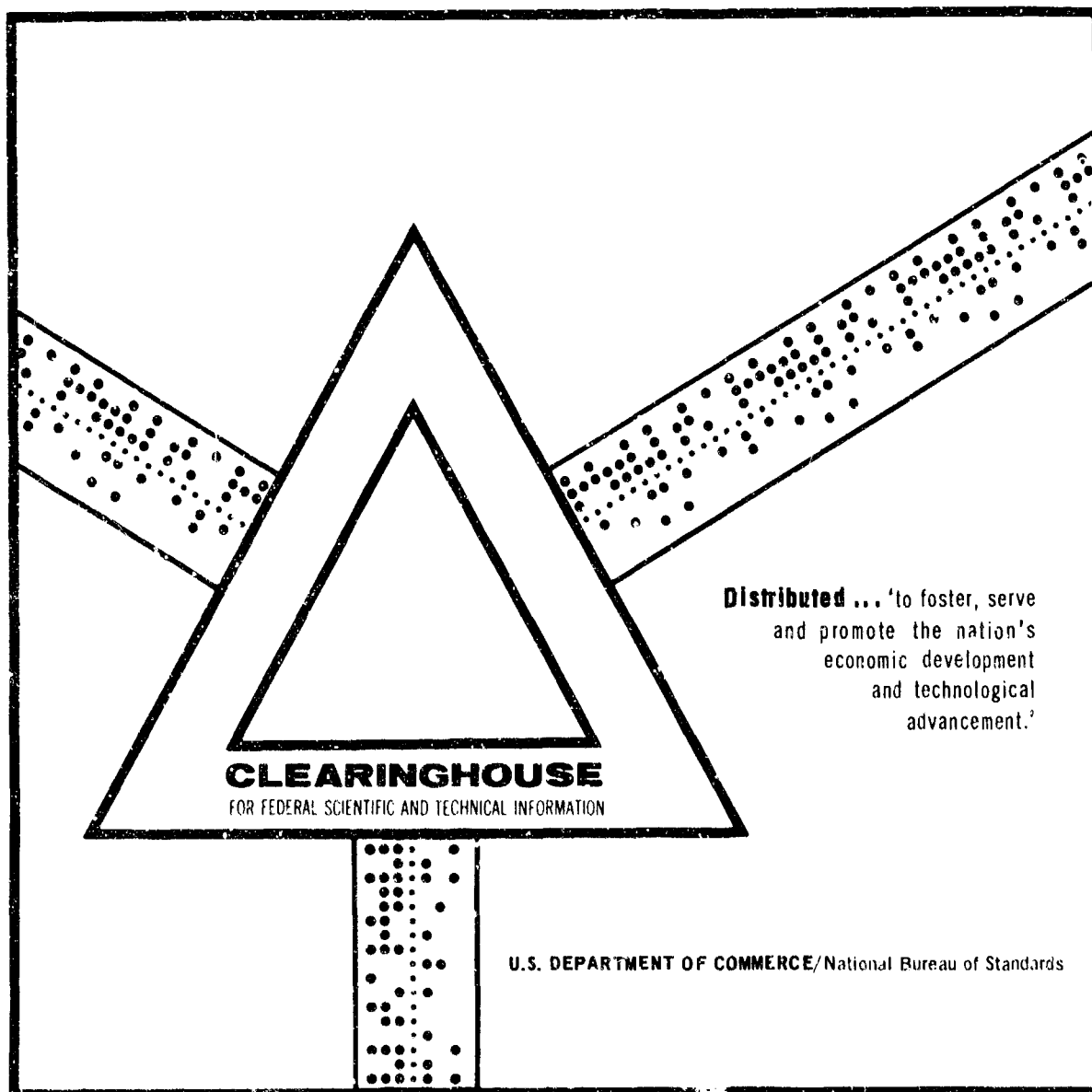
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PROGRAMMED INSTRUCTION FOR SELECTED CIC WATCH  
OFFICER TASKS: II. AN EXPERIMENTAL EVALUATION  
OF THE AUDIO NOTEBOOK IN THE TEACHING OF THE  
ALLIED NAVAL SIGNAL BOOK

John F. Brock

Naval Personnel and Training Research Laboratory  
San Diego, California

January 1970



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NAVAL PERSONNEL AND TRAINING  
RESEARCH LABORATORY  
SAN DIEGO CALIFORNIA 92152

RESEARCH REPORT SRR 70-16

JANUARY 1970

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PROGRAMMED INSTRUCTION FOR SELECTED CIC WATCH OFFICER TASKS:  
II. AN EXPERIMENTAL EVALUATION OF THE AUDIO NOTEBOOK  
IN THE TEACHING OF THE ALLIED NAVAL SIGNAL BOOK

by

John F. Brock

January 1970

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Research Report SRR 70-16

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Navy Training Research Laboratory  
Naval Personnel and Training Research Laboratory  
San Diego, California 92152

A LABORATORY OF THE BUREAU OF NAVAL PERSONNEL

## SUMMARY AND CONCLUSIONS

### Problem

The CIC Watch Officer has a major responsibility for the receipt, interpretation, and transmission of tactical communications during his watch. To carry out this responsibility he must be able to recognize and understand tactical signals contained in the Allied Naval Signal Book. The purpose of this research was to evaluate oral programmed instruction used with a multitrack tape recorder (the Audio Notebook) as a means of promoting flexibility in Allied Naval Signal Book instruction and better adaption to individual student differences; particularly those differences in experience level.

### Background and Requirements

The student body for the CIC Watch Officer Course (X-2G-351) at the Fleet Anti-Air Warfare Training Center (FAAWTRACENS) varies from petty and commissioned officers with as much as 15 years experience to newly commissioned ensigns. The lecture/classroom drill program presently used in Allied Signal Book instruction is scarcely needed by some in such a student body and does not permit proper pacing or sufficient practice for others. To cope with such individual differences an oral program was developed for learning the Allied Naval Signal Book. Such a program not only takes advantage of the adaption to differences in experience as well as to individual learning rates, but it also introduces flexibility into instruction by permitting instructors to work with individuals or small groups for other purposes while most students are learning the Signal Book procedures from the program.

### Approach

The program was written to achieve the tactical communications learning objectives as stated in the recently redesigned curriculum for the FAAWTRACENS CICWO course. Allied Naval Signal Book procedures were taught to student officers utilizing the oral learning program. Their achievement was compared with groups taught by the lecture/classroom drill method. Data on time required were obtained. Student attitudes toward the program were solicited.

### Findings, Conclusions, and Recommendations

1. The objectives of the Signal Book segment of the curriculum are met significantly better using the oral learning program. (Page 3)
2. The student controlled programmed learning takes less time than the conventional lecture for all but the very slowest student. (Pages 3 and 11)
3. The above findings resulted in immediate incorporation of the subject program into the present CICWO course. (Page 10)

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PROGRAMMED INSTRUCTION FOR SELECTED CIC WATCH OFFICER TASKS:

II. AN EXPERIMENTAL EVALUATION OF THE AUDIO NOTEBOOK  
IN THE TEACHING OF THE ALLIED NAVAL SIGNAL BOOK

A. Introduction

The Allied Naval Signal Book is a confidential publication which is widely used for fleet tactical communications. Whether a signal is sent by flaghoist or radiotelephone, the Combat Information Center Watch Officer (CICWO) has the responsibility of encoding or decoding, or monitoring the encoding or decoding of every signal which his ship either originates or receives while he is on watch. Not only does CIC support the bridge by so doing, but the tactical picture in CIC is kept current by accurate use of the Signal Book. It is essential that the CICWO be intimately familiar with the Allied Naval Signal Book and other tactical signaling publications.

In the past the Allied Naval Signal Book has been taught in the CICWO course at Fleet Anti-Air Warfare Training Center, San Diego (FAAWTRACENS), by the lecture classroom drill method. An instructor lectured on the publication for three fifty-minute periods; each student had one copy of the Signal Book and as the instructor made his demonstration the student followed along as best he could. A final 50 minutes were spent in a drill; each student received a handout of signals to be decoded and encoded. These handouts were then reviewed in the classroom by the instructor for approximately 15 minutes. Evaluation of a student's ability consisted partly of instructor judgment of his performance on this drill and in a four-hour mock-up later in the course, but largely by a series of questions about the Signal Book on an objective, written examination. The first two methods, at best, gave each student three opportunities to be measured on his use of the Allied Naval Signal Book. The latter method tested not their skill in the use of the book but rather their knowledge about the book. However, based on the mock-up and classroom performances, the training procedure was considered to be producing a satisfactory level of achievement in the use of the Allied Naval Signal Book.

One problem has been consistently recognized in conducting the instruction for the COMTRAPAC course, K-2G-351, "The CIC Watch Officer": the wide variation in student input. Under an ongoing program of redesigning K-2G-351, stress is being placed on providing means of adapting instruction to this wide range of experience in the student body. One way of doing this is to program some of the subject matter now being taught by lectures.

The Allied Naval Signal Book was chosen for programming for three reasons: (1) a previous oral programming of radiotelephone procedures had proved successful (Curran and Brock, 1967), (2) experience in the use of the Signal Book among the CICWO students was extremely varied, and (3) using the Signal Book is both an intellectual and manual task which requires both hands of the user to be free. The Audio Notebook<sup>1</sup>, a miniaturized multitrack

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<sup>1</sup> A product of Electronic Futures, Inc., North Haven, Connecticut.

tape recorder which provides volume storage and selective playback for learning and practice of subject matter, meets the third criterion. It has earphones for the student and requires a minimum of manipulation.

A major advantage of the Audio Notebook is its capability for branching to and from the 22 15-minute channels on the tape. While the Signal Book novice may listen to all material on every channel of the program, the experienced student can branch around certain basic information which he already knows. The time required for the experienced student to cover a certain topic can therefore be greatly reduced. This contrasts sharply with the instructional method formerly employed, where each student and an instructor were tied to a common time frame which was too short for the inexperienced student to achieve the objectives and/or longer than necessary for the experienced man to achieve the same objectives.

It is emphasized that it is not only to provide opportunity for the student to begin where his previous experience has brought him and to pace his own instruction that the Signal Book was selected for programming; properly programmed an Audio Notebook can be effectively operated by a student independently of instructor assistance. The latter factor permits great flexibility in dealing with only part of the class or with single individuals. While some students are involved with the Signal Book program, others can be receiving remedial or advanced training from other programs or from newly freed instructors.

This study was intended to accomplish a dual purpose: (1) to develop an effective program for teaching the use of the Allied Naval Signal Book for the CIC Watch Officer and (2) to test the suitability of the Audio Notebook itself for use by FAAWTRACENS and other training and operational commands as a means of promoting flexibility in instruction. In the event the Audio Notebook proved satisfactory, the program could be introduced into the course.

## B. Procedure

### 1. Experimental Design

This study was carried out in the context of ongoing CIC Watch Officer courses at FAAWTRACENS. The students in the classes convening on the following dates were the control group for the experiment; they received the normal lecture: 13 May 1968, 24 June 1968, 8 July 1968, 22 July 1968, 5 August 1968, and 6 October 1968. There were a total of 114 control subjects. The experimental group of students, who attended the classes convening on 12 November 1968 and 25 November 1968, received the Audio Notebook program plus a 50-minute classroom drill. There were 29 subjects in the experimental group.

Every subject received a pretest and a post-test, both of which presented the student with five signals to decode and four signals to encode. The difference between the post-test scores of the control and experimental

groups, with pretest scores taken into account, was considered the measure of the difference in learning. Maximum score on both tests was 90. Students using the Audio Notebook were given a questionnaire on, among other things, the Allied Naval Signal Book program. Time samples were also obtained from notebook users so as to compare their time to learn with students receiving the 150 minutes of lecture.

## 2. Description of Learning Program

In order to compare directly the results of the programmed instruction group with the lecture group, the content of the Audio Notebook program was essentially the same as that of the lecture. Using the lesson plan of the classroom lecture as a general guideline, one former naval officer, expert in the use of the Allied Naval Signal Book and also knowledgeable in the principles of programmed instruction, planned and developed the program for the Audio Notebook.

This program consisted of ten channels of material covering approximately two hours of actual tape time. The general outline of the presentation is given in Figure 1 and Table 1. The students received a brief lecture on administrative procedures, such as what to do when finished with the program, when to take coffee breaks, etc., and were then told to start the machine and receive further instructions on channel one of the program.

The primary difference between the Audio Notebook program and the lectures received by the control group was that the former (1) permitted the student to take as much time as needed to locate a particular signal before moving on into the program; and (2) provided immediate feedback on every signal in the program after presenting a signal to decode and a suitable time delay.

## C. Results

Means and standard deviations for the pretest and post-test scores for the two groups are shown in Table 2. An analysis of covariance shows the difference between the two mean scores is statistically significant (Table 3). Because of the small N in the experimental group, 25 students from each group were matched on pretest scores. Again, the experimental group is significantly better than the control group (Table 4).

Students who received the Audio Notebook program but were not used in the above analysis were asked to rate the program on a six point scale. The ratings and number of selections for each are shown in Table 5. Of the 83 students responding, 68 gave positive ratings. The students were also asked to rate the Audio Notebook as a teaching device using the standard Navy 1.0 - 4.0 scale. The results of this study are shown in Table 6. The mean rating was 3.47 with only five unsatisfactory ratings.

Additional data were collected to determine the amount of time spent in the program. One student completed the program in 55 minutes. However, most students fell in a range between 90 minutes and 150 minutes. A minimum

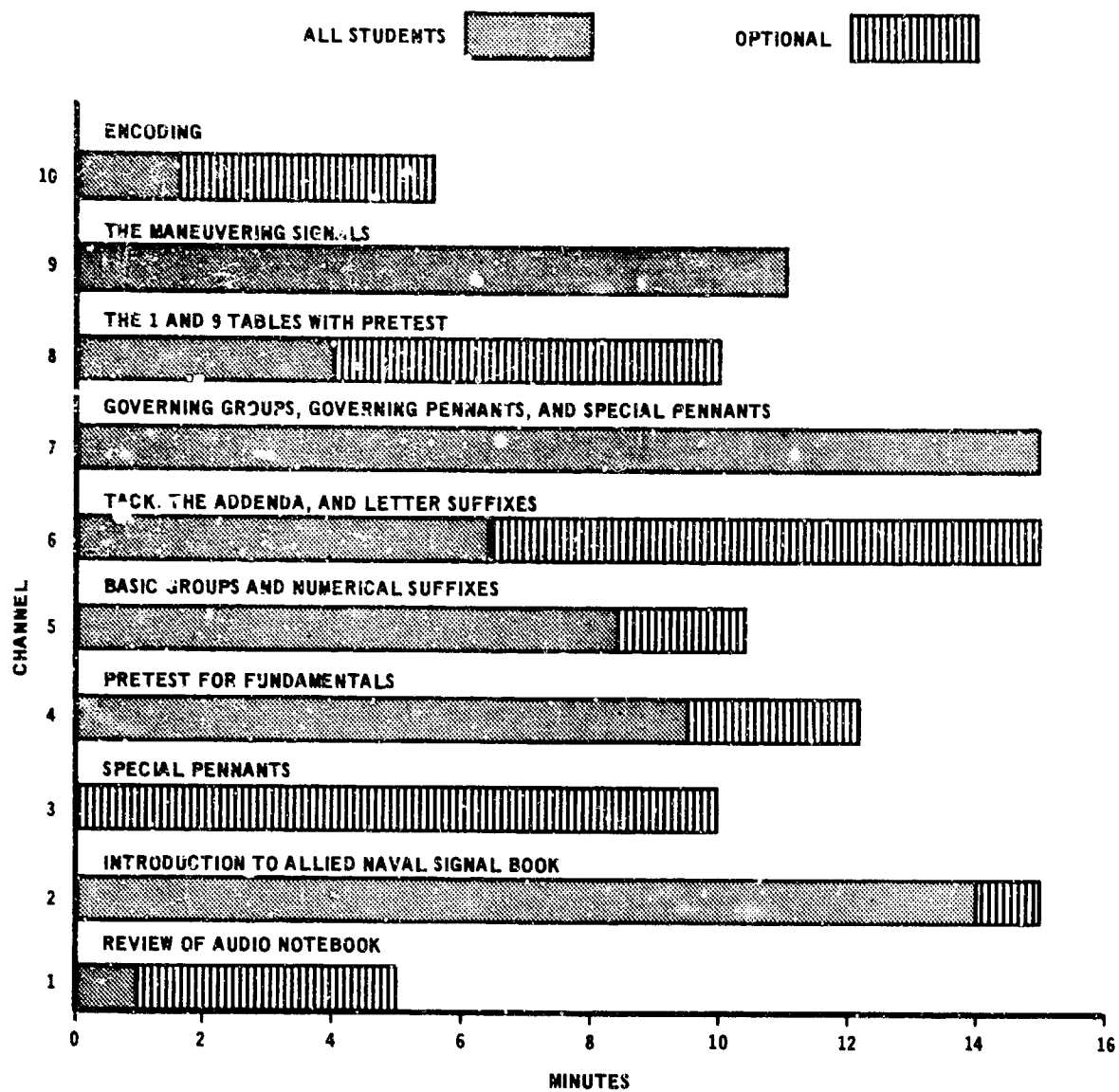


Fig. 1. Diagram of the Allied Naval Signal Book Audio Notebook Program.

TABLE 1

## Outline of the Allied Naval Signal Book Audio Notebook Learning Program

| Channel | Subject                                                    | Maximum Track Time | Minimum Track Time | Remarks                                                                                                                                                                                                 |
|---------|------------------------------------------------------------|--------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Introduction to the Audio Notebook                         | 4'55"              | 1'15"              | Most students will already have used the Audio Notebook                                                                                                                                                 |
| 2       | Introduction to the Allied Naval Signal Book               | 14'55"             | 14'30"             | Five-question test follows introductory material.                                                                                                                                                       |
| 3       | Special pennants                                           | 10'00"             | 10'00"             | If questions on channel 2 are all answered correctly, this channel is skipped.                                                                                                                          |
| 4       | Pre-test for fundamentals                                  | 12'15"             | 9'15"              | 15 signals are presented which student must evaluate as good or bad. No misses: go to channel 8; depending upon which of the signals is misjudged, student is sent to channels 5, 6, or 7 respectively. |
| 5       | Basic groups and numerical suffixes                        | 10'25"             | 8'40"              | After instruction is given, student receives same direction as on channel 4.                                                                                                                            |
| 6       | TACK, the Addenda, and letter suffixes                     | 15'00"             | 6'35"              | Same as for channel 5.                                                                                                                                                                                  |
| 7       | Governing groups, governing pennants, and special pennants | 15'00"             | 15'00"             | Same as for channel 5.                                                                                                                                                                                  |
| 8       | The One and Nine Tables with Pre-test                      | 10'05"             | 3'55"              | Four signal pre-test. If no errors, student goes on to channel 9.                                                                                                                                       |
| 9       | The yellow tabbed signals                                  | 11'20"             | 11'20"             |                                                                                                                                                                                                         |
| 10      | Encoding                                                   | 5'30"              | 1'35"              | Two signal pre-test. If both encoded, program ends.                                                                                                                                                     |

TABLE 2  
Comparison of Allied Naval Signal Book Scores

|                                 | Control Group<br>(N=114) |            | Experimental Group<br>(N=29) |               |
|---------------------------------|--------------------------|------------|------------------------------|---------------|
|                                 | Raw<br>Score             | Percentage | Raw<br>Score                 | Percentage    |
| Post-Test Mean                  | 65.08                    | 72.3       | 77.9                         | 86.5 p = .001 |
| Post-Test Standard<br>Deviation | 14.1                     |            | 15.5                         |               |
| Pretest Mean                    | 34.8                     | 38.6       | 35.4                         | 39.3 ns       |
| Pretest Standard<br>Deviation   | 10.1                     |            | 13.3                         |               |

TABLE 3  
Analysis of Covariance for Pretest and Post-Test Scores

| Source     | SS        | df  | MS      | F               |
|------------|-----------|-----|---------|-----------------|
| Treatments | 3627.21   | 1   | 3627.21 | 19.666 p < .001 |
| Error      | 25,821.47 | 140 | 184.44  |                 |

TABLE 4  
Comparison of Post-Test Scores for Matched Pairs  
(N=25 pairs)

|                                | Control Group |            | Experimental Group |              |
|--------------------------------|---------------|------------|--------------------|--------------|
|                                | Raw<br>Score  | Percentage | Raw<br>Score       | Percentage   |
| Mean                           | 63.0          | 70.0       | 77.0               | 85.5 p < .01 |
| Standard Deviation             | 17.0          |            | 16.3               |              |
| Pretest Mean:                  | 34.0          |            | 34.0               |              |
| Pretest Standard<br>Deviation: | 12.6          |            | 12.6               |              |

TABLE 5

Student Rating of the Allied Naval Signal  
Book Audio Notebook Program

| Rating |                                               | No.<br>of<br>Students | Percent |
|--------|-----------------------------------------------|-----------------------|---------|
| 1      | Highly superior to conventional instruction   | 19                    | 23      |
| 2      | Somewhat superior to conventional instruction | 21                    | 25      |
| 3      | Better than conventional instruction          | 28                    | 34      |
| 4      | As good as conventional instruction           | 11                    | 13      |
| 5      | Not as good as conventional instruction       | 3                     | 4       |
| 6      | Much worse than conventional instruction      | 1                     | 1       |
|        | TOTAL                                         | 83                    | 100     |

TABLE 6

Student Ratings of the Audio Notebook

| Rating              | 4.0 | 3.8 | 3.6 | 3.4 | 3.2 | 3.0 | 2.8 | 2.6 | Below<br>2.4 |
|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|--------------|
| No. of students     | 10  | 16  | 20  | 8   | 6   | 10  | 4   | 4   | 5            |
| Percent of students | 12  | 19  | 24  | 10  | 7   | 12  | 5   | 5   | 6            |

of one classroom hour savings, or 40 percent, was apparent for all but the slowest students. The distribution of times is shown in Figure 2, with the three-classroom-hour lecture shown for comparative purposes.

#### D. Discussion

As indicated by the findings reported in the preceding section, the Audio Notebook, in this case supplemented by the classroom drill, was found useful for increasing the flexibility of instruction. The improvement in performance of the students who learned Signal Book procedures by this method as compared to the traditional classroom lecture method, and the shorter time required in most cases to achieve the same objectives, indicates the advisability of expanding the use of this device to other instruction where the stimuli are oral, e.g., plotting tasks or sound powered phone talker procedures. The simplicity, reliability, and portability of the Notebook, and the favorable student reaction to the realism provided make it extremely useful for the teaching of such topics.

The time saving deserves further comment. With the additional time available, the student can either go to other learning programs or drill further on the signal book. The adjustment of the program to the students' individual differences seems the primary advantage of this program.

Used along with various written programs and individualized training exercises, the Audio Notebook Allied Naval Signal Book program has become a regular feature of FAAWTRACENS course K-2G-351.



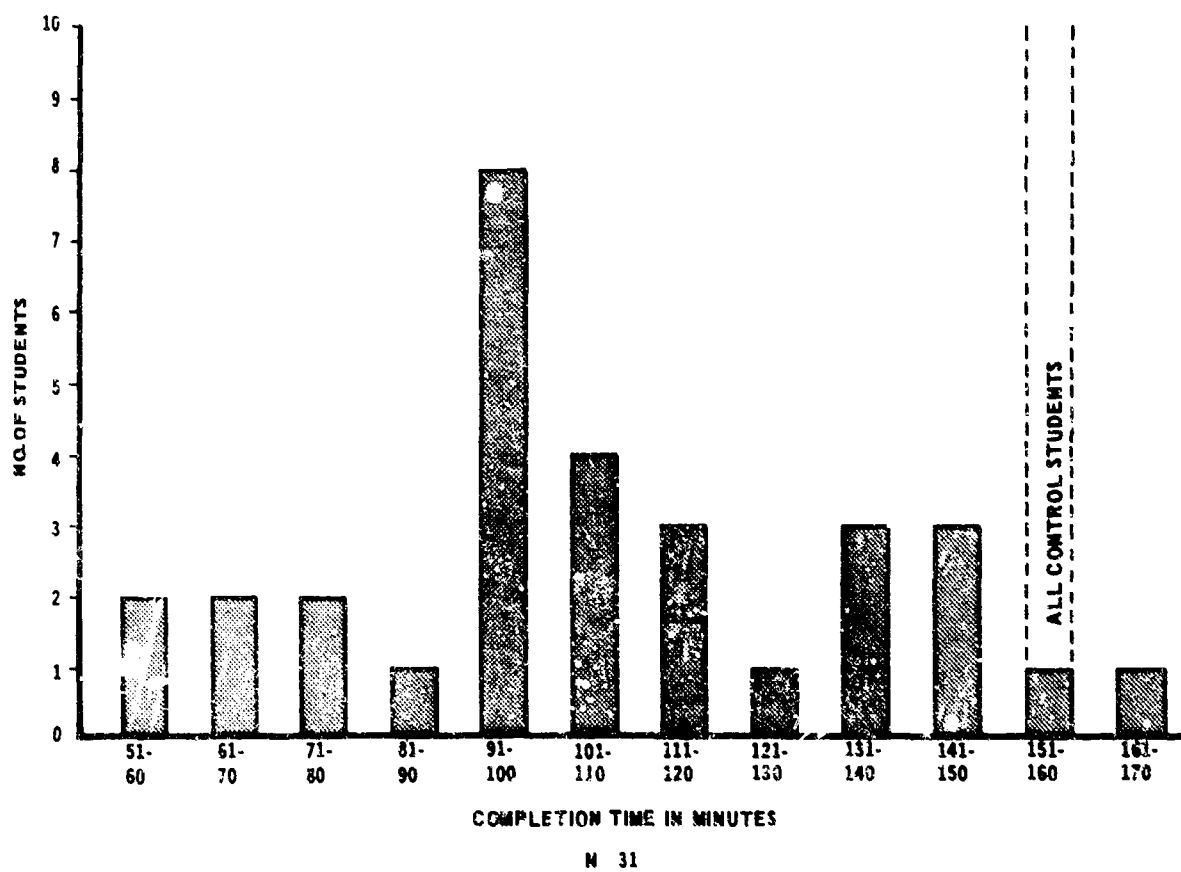


Fig. 2. Time to Complete the Allied Naval Signal Book Audio Notebook Program.

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| 17. ABSTRACT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                   |                                                                                  |
| <p>This research evaluates oral program instruction used with a multtape recorder, the Audio Notebook (Manufactured by Electronic Futures, Inc., North Haven, Connecticut), as a means of promoting adaptation to student differences and flexibility in instructional scheduling. Use of the Allied Naval Signal Book required by the CIC watch officer position was programmed for the Audio Notebook in terms of the same learning objectives as currently stated for the FAAWTRACENS course for the watch officer. The oral learning program took less time, much less for those with Navy experience, and achieved the objectives better than the classroom lecture method. The Audio Notebook proved resistant to down-time. This makes it potentially useful for shipboard training. The learning program developed can be used in any school or shipboard situation where the learning objectives correspond to those of the watch officer course in which it was evaluated. It can be readily expanded to include additional objectives which might be needed.</p> |                                   |                                                                                  |

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Audio Notebook  
CIC Watch Officer  
Programmed Instruction  
Allied Naval Signal Book