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HumRRO Special Report No. 1  
December 1950

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**Survey of the  
Educational Program of The Artillery School  
Antiaircraft and Guided Missiles Branch  
Fort Bliss, Texas**

**Report and Recommendations  
By a Special Survey Commission**

**Training Methods Research Division**

**Supported under Contract  
Between the  
DEPARTMENT OF THE ARMY  
and  
The George Washington University  
HUMAN RESOURCES RESEARCH OFFICE**

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SURVEY OF THE EDUCATIONAL PROGRAM  
of

THE ARTILLERY SCHOOL  
Antiaircraft and Guided Missiles Branch  
Fort Bliss, Texas

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By a Special Survey Commission*

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HUMAN RESOURCES RESEARCH OFFICE

HumRRO  
Special Report No. 1

Copy **140**  
December 1952

**Foreword**

The report which follows presents the findings and recommendations of a Special Survey Commission of educational and psychological consultants who surveyed The Artillery School, Antiaircraft and Guided Missiles Branch, at Fort Bliss, El Paso, Texas, during the periods of 15 to 27 August; 20 to 24 October, 1952, at the request of the Assistant Commandant of the School. The members of the commission were selected by the George Washington University Human Resources Research Office (HumRRO), operating under contract with the Department of the Army. The professional qualifications of the members are set forth in Appendix B. The report in its present form was prepared by personnel of the Training Methods Research Division, HumRRO, under the direction of Dr. Kenneth W. Spence.

The commission wishes to state that complete cooperation was offered by the school, and that every courtesy and consideration was accorded its members as they went about their work. Complete freedom of action was enjoyed as regards choice of method and analysis of data. The recommendations are independently arrived at and are reported in the way that the commission considers apropos of its mission.

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## Chapter 1

## INTRODUCTION

## I. SCOPE AND PURPOSE OF THE SURVEY

1. Initiation of Survey Request

The Office, Chief of Army Field Forces, in a letter to The Artillery School, Fort Bliss, Texas, file ATTEIG-32 352, dated 2 April 1952, subject, "School Survey by Civilian Educators and Technicians" (see Appendix A), indicated that the Department of the Army could provide a survey team of civilian educators and technicians to evaluate school progress, and that such survey teams had been of value in the past.

The Artillery School, file AKBAADI-2 352, endorsed the proposal and requested that the survey team be composed of at least the following specialists:

- 1 Vocational Expert—General
- 1 Vocational Education Expert in Electronics Training
- 1 Expert in Tests and Measurements
- 1 Expert in Teaching Methods
- 1 Expert in the Preparation and Use of Graphic Aids.

The Office, Chief of Army Field Forces, requested that the Human Relations and Research Branch, Office of the Assistant Chief of Staff, G-1, expedite the proposed survey. The Personnel Research Section, Personnel Research and Procedures Branch of the Adjutant General's Office and the Human Resources Research Office were requested by the Human Relations and Research Branch to explore the subject of a school survey of the Artillery School and to submit a plan of implementation. The Human Resources Research Office undertook the organization of the survey team and the Personnel Research Section furnished the expert on tests and measurements.

2. Mission of Survey Team

The survey team was to evaluate and give suggestions regarding: (a) the improvement of methods of instruction, training devices, and the use of visual and auditory aids; (b) the improvement of the organization of course content for instructional purposes, the distribution and length of practice procedures, and the length of time devoted to various instructional phases of the several courses with a view toward possible reduction in the length of the courses; (c) improvement in the methods used in determining student progress and proficiency. In addition, they were to be concerned with identifying problems that would necessitate experimental research.

### 3. Recruitment and Briefing of Survey Team

Lt. Col. Howard O. Holt of the Office, Chief of Army Field Forces, and Dr. Meredith P. Crawford, Dr. Kenneth W. Spence, and Dr. Donald J. Lewis, of the Human Resources Research Office, visited the Antiaircraft and Guided Missiles (AA and GM) Branch of the Artillery School, 22-24 June, with Dr. Lewis remaining until 27 June. Members of this group talked to department heads of the school, to instructors, and to other members of the departments, and accumulated a quantity of literature about the school's organization and instruction.

In addition to a survey of the school program by a team of civilian educators and technicians, it was decided to administer an attitude questionnaire to a sample of students in the Department of Electronics.

In accordance with the request by the Artillery School, the survey team was composed as follows:

|                    |                         |
|--------------------|-------------------------|
| Dr. J. S. Brown    | Psychology              |
| Dr. D. J. Lewis    | Psychology              |
| Dr. M. Dreese      | General Education       |
| Dr. W. J. Micheel  | Vocational Education    |
| Mr. W. W. Taylor   | Graphic Training Aids   |
| Dr. G. F. Corcoran | Electronics             |
| Dr. H. G. Osburn   | Tests and Measurements. |

The members of the survey team were requested to report at the Human Resources Research Office on 16 August, one day before departure for Fort Bliss. This day was used in giving the members of the survey team as complete a briefing on the project as was possible within the time allowed. The briefing was conducted by Dr. Lewis of the Human Resources Research Office. A set of mimeographed materials was prepared for the members of the team. The materials consisted of: (a) a glossary of military terms of frequent usage at the school; (b) a statement of the mission of the school; (c) an organizational chart of the school; (d) a chart indicating the number of hours of instruction in each department for each Program of Instruction (POI); (e) POI summaries for each course; and (f) a copy of the official correspondence leading up to and constituting the survey requirement. In addition, members of the team were shown photographs of the major pieces of equipment on which training was given at the school and were given a brief description of the operation of these pieces of equipment. The educational problems of the school were also discussed briefly.

### 4. The Survey Procedure

The team left Washington on 17 August 1952 and began its work on the morning of 18 August. The first two days were utilized by the team in an on-the-spot orientation. The group visited each of the departments, talked to various members of the department, and received a briefing by the department head. For the remainder of the period at the school, each member of the team pursued the course of action which he felt necessary to the accomplishment of his mission. During the late afternoon of each day, the team members assembled to discuss and organize their findings. Because of their different assignments, the team members completed their missions at different times. Most of the members left on 23-24 August. The questionnaire was administered 25 August by officers of the Artillery School under the supervision of Dr. Lewis.

To aid in writing reports, each team member took a large block of POI's, lesson plans, manuscripts, and such other literature and materials as would be useful for later study and analysis. The reports were written as individual papers by each member of the team. Copies of each report were then circulated to all other members for criticisms and amplifications. Final drafts of each report were then sent to the Human Resources Research Office for coordination and synthesis.

Finally, a three-man team revisited the School during the period 19-24 October for the purpose of (a) verifying observations of the original team, (b) making additional supplementary observations, and (c) ascertaining further research leads. The composition of the latter team was as follows:

Dr. M. Dreese, Consultant

Dr. K. W. Spence, Training Methods Research Division, HumRRO

Dr. F. E. Jones, Training Methods Research Division, HumRRO.

The product of this re-check was then incorporated, wherever deemed necessary, into the final draft of the report.

## II. SUMMARY OF RECOMMENDATIONS

The detailed findings of the survey with respect to various aspects of the school will be found in the following chapters. These findings are not to be regarded as an exhaustive description of the school, but represent areas in which the survey commission felt that improvement could be achieved. The major recommendations are summarized below by chapters.

### 1. Organization and Administration

a. The services of a civilian educator with prior military service and appropriate personal qualities should be procured to serve as Educational Adviser to the Assistant Commandant in a staff capacity.

b. The Command should give serious consideration to reducing the work week of the staff to 40 or 45 hours so that a high level of efficiency may be maintained.

c. The staff of the Office of the Coordinator of Instruction should be increased so that more emphasis may be placed on quality control by means of observation of instruction.

d. Educational research should be established as a function of the Office of the Coordinator of Instruction and should be conducted by personnel qualified to initiate and conduct such studies.

e. The school library should be improved so that:

(1) Better staff studies can be retained and catalogued for use.

(2) Library of Congress cards can be installed and cataloguing be brought up-to-date with the service of a trained cataloguer.

(3) A complete and current set of Field Manuals and Army Regulations can be maintained.

## 2. Curricula, Instruction, and Instructional Aids

### a. Department of Electronics.

(1) Research should be undertaken with a view to obtaining as precise a specification as possible of the knowledges and skills required by the radar mechanic to perform his job efficiently. This would require a careful, detailed study of the on-the-job activities of the radar mechanic, direct observation of day-to-day activities, interviews with experienced technicians, etc., along with such other studies as analyses of the malfunction histories of the various kinds of equipment used.

(2) A study should be made of the problems of radar and fire control system maintenance in the field so far as continuous availability of trained personnel is concerned. Such an investigation should be directed at a clarification of the responsibilities of AA radar mechanic personnel and those of the Ordnance (Signal Corps).

(3) Consideration should be given to the possibility of training two levels of radar repairmen: one with a generalized background of electronic knowledge that provides a considerable degree of understanding of the functioning of the equipment and hence flexibility in meeting the problems involved in the operation and maintenance of the equipment; a more specialized radar mechanic helper who would perform set procedures aimed at checking the adequacy with which the equipment was functioning and reporting any malfunctioning. The problems, administrative, personnel, and training, of having such dual-level radar mechanics need to be studied carefully. The experiences of other services or industry in making use of low-level trained personnel should also be surveyed for relevant information.

(4) Research should be instituted, preferably after some definite job specification has been established, to ascertain the minimum amount of fundamental electronics needed to provide a given level of competence. Such investigations would involve variation of the amount of time spent in fundamentals training and in the content of fundamentals training.

(5) Experimentation should be undertaken with parts of the radar mechanic curricula other than basic electronics, such as relegating portions of them to the subsequent on-the-job training program. Such studies would need to be coordinated with investigations of the on-the-job training program. The latter would also indicate whether a need exists for the present inclusion of training in methods of instruction in the radar maintenance courses.

(6) Careful consideration should be given to research studies designed to investigate factors that might increase the efficiency of learning and thus reduce the length of any training program. Such factors needing study are: (a) the nature and quality of the lesson plans, (b) capabilities (knowledge of subject and skill in teaching) of instructors, (c) intellectual capabilities of students, (d) motivational factors, and (e) work (fatigue, boredom) factors.

### b. Department of Guided Missiles.

(1) The present 32-week course for officers is a good compromise between that length suitable for design engineers and that suitable for officers

who will handle and operate guided missiles. The purpose of the program should be re-examined periodically to ascertain whether this arrangement satisfies current needs.

(2) The future need of this department will be for officers who possess not only the actual know-how, but also technical skill and knowledge of a high order. Consideration should be given to ways and means by which such personnel can be induced to follow an Army career. The establishment of a technical branch with adequate pay and prestige but without command function may be necessary to achieve this end.

(3) Some consideration should be given to gradually lengthening the 32-week course for officers as suitable laboratory apparatus and cut-aways of the missiles become available.

(4) Serious consideration should also be given, in the event of a shortage of missiles for instructional purposes, to the development of techniques for laying out a training missile on a large test table so that three or four groups of two men each can work independently.

#### c. Department of Gunnery and Materiel.

(1) Means of making more students appreciate the importance of gunnery subjects should be investigated. One possibility is to stage the shoots so that they are seen by incoming classes for motivational purposes, as well as having them seen by the out-going classes for instructional value. Through proper timing and appropriate administration one shoot could be used for both purposes.

(2) The hours devoted to methods of instruction should be eliminated from courses for enlisted men.

(3) Relevant and thought-provoking instructional aids should be used wherever possible. The construction of the M33 mock-up should be hurried to completion. If some distinctively beneficial aid is produced, provision should be made for other interested arms and services to benefit.

#### d. Department of Tactics and Combined Arms.

(1) In the event that an educational advisor to the Commandant is appointed, it is recommended that a portion of his duties consist of working with the "murder boards" of this department.

(2) The scenarios now used as a basis for informal dramatic presentations should be developed into locally produced sound motion pictures to be used for instructional purposes.

#### e. Department of General Studies.

(1) The present course in methods of instruction (MOI) should be retained in these curricula only when it is clear that the students will later be responsible for formal group instruction.

(2) Although much class time is devoted to student participation, even more is needed. Ingenuity should be exercised in stimulating student activity where the subject matter would ordinarily be taught by the direct lecture method.

(3) The number of opportunities for each student to speak to the class should be increased. This can be achieved by dividing the class into smaller sub-groups, provided additional staff members are available to monitor student performance.

(4) The service provided by the Reading Laboratory should be publicized, and students should be encouraged to avail themselves of its facilities. Thought should be given to the desirability of including work in the laboratory as a requirement, in view of the vast amount of reading required in this school and in Army schools generally.

f. Department of Non-Resident Instruction.

(1) More thought should be given to the design of all printed materials.

(2) Tests for readability should be made of all printed materials.

3. The Grading and Evaluation System

a. Either some system of cumulative type examinations should be inaugurated, or final examinations should be given at the conclusion of a sub-course.

b. Grades on examinations should be reported more precisely to the students. It seems desirable to give the student a chance to evaluate realistically his progress in course work and to encourage competition within the student body.

c. The present weighting system used to combine sub-course grades into a final grade should be revised. Either a standard score system should be used, or the weighting procedure mentioned in Chapter 4 should be adopted.

d. The current procedure for constructing and evaluating examinations should be continued unless the services of an educational advisor are secured. In the latter event, the educational advisor could set more elaborate procedures for constructing and evaluating examinations.

4. The Student Body

a. An Aptitude Area IX score of 110 or greater should be a prerequisite for the fire control maintenance courses until research evidence can be brought to bear on this problem.

b. Research should be directed toward the problem of the optimum selection requirements for the fire control maintenance course and toward the possibility of having two levels of trainees that proceed through the curriculum at different rates.

c. Research should be directed toward the problem of optimum selection requirements for the guided missiles courses.

d. Research should be directed toward the problem of optimum selection requirements for the gunnery courses with special emphasis on the reduction of the formal mathematical requirement.

e. Experimentation should be instituted with a view toward determining the optimum length of formal class-laboratory time.

f. A system of faculty advisors should be established, and all students should be interviewed periodically in regard to their educational progress and related problems.

g. The instructional classes should be made more homogeneous in terms of background and/or ability.

h. The present system of reporting test performance to students in terms of U (unsatisfactory) or S (satisfactory) should be replaced by reports in terms of numerical grades.

i. The orientation program for new students should include a short unit on "How to Study."

#### 5. Officer Candidate School

a. The mission of the school should be re-evaluated in the light of the peculiar future responsibilities of AA and GM officers and an effort should be made to place more emphasis upon a program of instruction and upon methodology designed to encourage originality of thinking and flexibility in meeting new situations.

b. There should be no change in selection procedures, pending results of current research undertaken by the Personnel Research Section, AGO, D/A, and by the AFF Human Research Unit No. 2, which is part of the HumRRO program.

c. It should be ensured that platoon officers direct every effort toward achievement of independent ratings.

d. An attitude of "provisional judgment" should be cultivated by platoon officers so that a candidate will not be judged deficient by one or two dramatic incidents.

e. The tour of duty as instructor should be increased from the present average of 5 months to at least the duration of a class, and preferably to the length of two classes.

## Chapter 2

## ORGANIZATION AND ADMINISTRATION

The organization and administration of The Artillery School, Antiaircraft and Guided Missiles Branch, is described in the present chapter as background for the survey. The school, located at Fort Bliss, Texas, provides training for a variety of jobs associated with operation, maintenance, and command aspects of antiaircraft and guided missiles weapons.

The missions of the Antiaircraft and Guided Missiles Branch, The Artillery School, are:

- (a) To instruct selected officers and enlisted men of the artillery and other arms and services in the tactics and techniques of the employment of antiaircraft artillery and guided missiles against hostile targets on the land, on the sea, or in the air.
- (b) To assist in the development of tactical and technical doctrine pertaining to antiaircraft artillery and guided missiles; to prepare and revise, as appropriate, necessary field and technical manuals, training literature and training aids; to review training literature of other arms and services pertaining to antiaircraft artillery and guided missiles in order to ensure its accuracy; and to give such advice or recommendations as may be necessary or be called for on new weapons and equipment, tables of organization, and research projects.
- (c) To maintain contact by visits or correspondence with antiaircraft and guided missiles units in order to keep instruction current and adequate to meet problems being encountered by units in the field.
- (d) To prepare and distribute instructional material to civilian components of the Armed Forces of the United States and to aid and advise the instructors of such units.

## I. DUTIES OF THE MAJOR ADMINISTRATIVE OFFICERS

1. Commandant

The commandant serves in a dual capacity as commanding general of the Antiaircraft Artillery and Guided Missile Center and commandant of the Antiaircraft and Guided Missiles Branch of the Artillery School. He has charge of the general administration of the school and is responsible for all matters of instruction therein.

## 2. Assistant Commandant

The assistant commandant, under the direction of the commandant, is in charge of all instruction and administration pertaining to the school. He has general charge of the preparation and publication of texts, reference books, and mailing list matter. He exercises general supervision over the preparation of Army extension courses and preparation and revision of field manuals and other publications as directed by higher headquarters. He is commanding general of the 4054th Area Service Unit.

## 3. Secretary

The secretary is the administrative executive for the assistant commandant and as such is responsible for the content and processing of school correspondence. In addition, he is the secretary of the faculty board. He attests all diplomas, certificates, and academic efficiency reports issued by the school. He exercises staff supervision over the library of the school and the book department, and he performs such other duties as directed by the assistant commandant. The secretary is the adjutant of the 4054th Area Service Unit.

## 4. Registrar

The registrar is the custodian of permanent academic records of all students enrolled in past and current resident courses of instruction. He is responsible for the preparation of diplomas, certificates, academic efficiency reports, and other reports pertinent to the scholastic progress of students.

# II. DIVISION OF ADMINISTRATION

## 1. Coordinator of Administration (C/A)

The coordinator of administration is a special staff officer. He plans, supervises, and directs the activities of the Division of Administration. He is responsible to the assistant commandant for:

- a. Advising the assistant commandant on the administrative and logistical support situation.
- b. Formulation of plans and policies necessary for operation of the Division of Administration.
- c. Preparation, consolidation, and submission of administrative reports pertaining to the operation of the school.
- d. Preparation and maintenance of administrative records pertaining to personnel assigned or attached to the 4054th Area Service Unit.
- e. Supervision of personnel and supply activity of the school.
- f. Supervision of the operation of various non-appropriated fund activities of the school.
- g. Operation of the visitors' bureau.
- h. Acting as executive officer, 4054th Area Service Unit.

## 2. Headquarters Commandant

The headquarters commandant is the commanding officer of school troops and detachments. He is responsible for:

- a. Command of all personnel assigned and attached to Headquarters Battery, 4054th Area Service Unit.
- b. Supervision over the operation of the consolidated mess.
- c. Providing quarters, mess, and administrative support for officer and enlisted students.

## III. DIVISION OF INSTRUCTION

### 1. Coordinator of Instruction (C/I)

The coordinator of instruction is a special staff officer. He plans, supervises, and directs the activities of the Division of Instruction.

#### a. Responsibilities:

- (1) Coordination of all school departments to achieve unity of action.
- (2) Normal liaison and supervision functions exercised by a plans and operations staff officer as a representative of the assistant commandant.

#### b. Duties:

The specific duties of the coordinator of instruction include coordination, planning, and staff supervision of activities pertaining to:

- (1) Instruction.
- (2) Formulation of tactical doctrine.
- (3) Preparation of the school recommendation on AA and GM planning, and organizational and functional plans for AA and GM units.
- (4) Preparation of long-range plans for future school requirements.
- (5) Current instructional schedules and operations of the school, and school troop units.
- (6) Preparation of Programs of Instruction.
- (7) Research pertaining to the effectiveness of AA and GM weapons systems, their deployments, and technical studies leading to new concepts of tactical employment.
- (8) Preparation of itineraries for special visitors.

### 2. Departments of Resident Instruction

The director of each department is charged with the conduct of instruction in accordance with programs published by the coordinator of instruction. He is charged with the preparation of lesson plans and manuscripts and the conduct of tests and studies taught by the department. Following are the departments of resident instruction:

- a. Department of Electronics.
- b. Department of General Subjects.
- c. Department of Guided Missiles.

- d. Department of Gunnery and Materiel.
- e. Department of Tactics and Combined Arms.
- f. Department of Officer Candidate School.

### 3. Department of Non-resident Instruction (NRI)

The director of non-resident instruction is charged with the preparation and revision of field manuals, technical manuals, training circulars, and extension courses pertaining to AAA and some common artillery subjects. He is also charged with the preparation of draft scenarios for AAA training films, the reproduction and printing of graphic and instructional material used in the school and at the center, and the review of editorial projects that may be assigned to his department. He is also responsible for the preparation of subject schedules for National Guard, ORC, and ROTC courses, and the selection and distribution of instructional material for NG and ORC staff training programs and ORC schools.

## IV. OBSERVATIONS

The present plan of organization has evolved over a period of years and reflects certain changes which have been put into operation of necessity in an effort to conserve manpower. The following observations are offered:

- (a) The survey commission was favorably impressed by the excellent morale and enthusiasm of the administrative staff. It was apparent, however, that the 49-hour work week in effect at the time of the survey commission's first visit in August was taking its toll and that many of the officers were chronically tired and overworked. Psychological research and experience in business, industry, and education have demonstrated conclusively that it is wishful thinking to expect more production over a period of time by lengthening the work week beyond 40 or 45 hours. The work load of the officers appeared to be very heavy and left the impression that the administrative staff was seriously undermanned. It has been gratifying to learn that the work week has since been decreased to 45 hours.
- (b) Excellent use was being made of reserve officers; their civilian professional and technical competence was being appreciated and used to good advantage. Reserve officers and career officers were working together as a team.
- (c) The Assistant Commandant, who, under the direction of the Commandant, is in charge of all instruction and administration pertaining to the school, was eager for new ideas and suggestions which would help the school accomplish its mission more effectively. He recognized that the professional civilian educator with long experience in education, combined with appropriate military experience, was in a position to be of material assistance and said that he would be glad to have such an educational adviser on his staff on a continuing basis. A number of officers on the headquarters staff likewise expressed a desire for such an educational consultant.

(d) The Office of the Coordinator of Instruction appeared to be seriously undermanned, particularly in the Plans Section. Because of the pressure of other duties, relatively little time was devoted to quality control by means of classroom observation in the various departments. The survey commission recognizes that supervision of instruction is largely a departmental responsibility, but it is essential that the Office of the Coordinator of Instruction exercise over-all supervision to ensure comparability of quality between the various departments. The members of the commission were advised that only 5 per cent of the time of the Coordinator of Instruction is customarily spent in classroom observation. Since the Course Evaluation Section was eliminated as a manpower economy move, there is apparently less emphasis upon supervision in this office. The wisdom of this is questioned.

(e) The Plans Section is heavily burdened with special projects, many of which have high priority although only distantly related to instruction in the school; consequently relatively little time and energy are spent on research and analysis designed to improve school organization and methodology of instruction. Considerable emphasis, however, is placed on incorporating new doctrine in the program of instruction. There might well be in the Plans Section several qualified officers whose primary mission would be educational research and development. Should there be appointed an educational adviser to the Assistant Commandant, these officers would work closely with him in planning and conducting investigations concerning the educational operations of the school. The Research and Analysis Section of the Office of the Coordinator of Instruction is engaged in research pertaining to the effectiveness of the AA and GM weapon systems and is not concerned with educational research.

(f) The school secretaryship serves an essential coordinating function and appears to be functioning in a commendable manner. In view of the importance of this post and the inevitable turnover in personnel, the grooming of an understudy for this assignment is desirable. The tour of duty in this assignment should be as long as is compatible with Army policy.

(g) In the Office of the School Secretary the school library is serving an important function. Nevertheless it is believed that because of insufficient manpower it is deficient in the following respects:

(1) The cataloguing is not current and leaves much to be desired. There is urgent need for a trained cataloguer (GS-7 level).

(2) No provision is made at present to retain and to catalogue the better staff studies so that future studies may take cognizance of their content and build upon them.

(3) The Field Manuals and Army Regulations on hand are incomplete and there is no provision for keeping them current. In an Army school, these are fundamental reference materials. This need is recognized at the School, but there appears to be some difficulty in securing such publications from the AGO.

## V. RECOMMENDATIONS

In the light of the foregoing, the following recommendations are submitted pertaining to the Offices of the Assistant Commandant, the Coordinator of Instruction, and the Secretary.

### 1. Assistant Commandant

That the services of a civilian educator with prior military service and appropriate personal qualities be procured to serve as Educational Adviser to the Assistant Commandant in a staff capacity. A man of the caliber desired could not be attracted at a salary less than that of a GS-15—as is the practice in certain other military schools—and probably could most readily be interested in a one-year contract while on leave from his institution.

### 2. Coordinator of Instruction

a. That the personnel of this office be increased so that more emphasis may be placed on quality control by means of direct observation of classroom and laboratory instruction.

b. That educational research be established as a function of this office and that it be conducted by personnel qualified to initiate and conduct such studies. In the event an educational adviser is added to the staff, much of the professional leadership in this research would come from him.

### 3. School Secretary

That the school library be improved in the following ways:

a. The cataloguing be brought up-to-date with the service of a trained cataloguer, and that action be initiated to secure the services of such a cataloguer.

b. The better staff studies be retained and catalogued for use so that future studies may take cognizance of them.

c. A complete set of Field Manuals and Army Regulations be maintained.

## Chapter 3

## CURRICULA, INSTRUCTION, AND INSTRUCTIONAL AIDS

The present chapter is concerned with an analysis and study of the several curricula, and the methods of instruction and instructional aids used in the various departments of the School. Each department is considered separately. Because of its relative autonomy the Officers' Candidate School is treated in a chapter by itself (Chapter 6).

The plan of discussion followed has been to begin by describing the main features of the present training programs. Wherever found, problems are specified and discussed both in relation to the mission of the program and in terms of possible approaches to a solution.

## Department of Electronics

## I. CURRICULA AND INSTRUCTION

1. Description of Present Curricula

The Department of Electronics is primarily involved in the programs concerned with the training of enlisted men as radar mechanics and fire control electricians. At the time of the survey there were four such courses concerned with integrated fire control systems for antiaircraft weapons and two for guided missiles.

- a. 44-E-6(a) Artillery Fire Control System Maintenance, SCR-584 and Director M9 or M10
- b. 44-E-6(b) Artillery Fire Control System Maintenance, M33
- c. 44-E-6(c) Artillery Fire Control System Maintenance, M38
- d. 44-E-11 Artillery Fire Control System Maintenance, Counter-mortar Radar
- e. 44-E-8(b) Guided Missile Integrated Fire Control System Maintenance (NIKE)
- f. 44-E-8(c) Guided Missile Integrated Fire Control System Maintenance (CORPORAL).

The general objective of these courses is to produce a qualified radar and fire control system maintenance technician competent to perform necessary maintenance in the field under combat conditions. This requirement is the result of past experience in the AA field and stems from the necessity for self-sufficiency of AA units in operation. The capabilities of an acceptable maintenance man, as a member of an AA unit, require him to do all maintenance, including adjustment, isolation of defects, and their correction within the limits of test instruments, tools, and spare parts supplied him.

In addition to these electronic maintenance training programs for enlisted men, the department is also involved in a number of other training programs concerned with the training of antiaircraft officers. The principal course is: 44-0-5 Artillery Fire Control System Officer.

The objective of this course is to train artillery officers in the supervision of enlisted technicians and in the requisite staff duties of the radar officer at all levels of command. The officer graduate should be a sufficiently qualified technician to be able to instruct, and if necessary, to perform routines of maintenance and isolation of trouble in the fire control equipment. Because of the considerable number of different pieces of equipment, it has not been possible to train on all equipment within the allotted time. This defect has been partially overcome by a complete coverage of fundamental principles, coupled with training on a standard gun-laying radar, e.g., the M-33. Staff duties include capabilities and limitations of equipment, siting, clutter and coverage, orientation, and synchronization and inspection procedures. The graduate of this course should be qualified to advise his commander on all technical and operational aspects involved in the use of radar equipment.

The enlisted men's curricula are of approximately nine months duration, the exact period depending upon the particular fire control system. In terms of lecture and/or laboratory hours (39 hours = 1 week) the division of time among the different segments of curricula is approximately as follows:

|                                  |       |       |
|----------------------------------|-------|-------|
| Basic Electronics . . . . .      | 14    | weeks |
| Fire Control System . . . . .    | 16-20 | weeks |
| Surveillance Radar . . . . .     | 3     | weeks |
| IFF . . . . .                    | 1.25  | weeks |
| Methods of Instruction . . . . . | 1     | week. |

The basic electronics portion of the course consists first of a review of relevant mathematics (35 hours) and basic electricity (101-1/2 hours), followed by sections on radio electronics (185-1/2 hours) and radar electronics (210 hours). The latter represent an intensive but narrow segment of the general field of electronics with only those circuits which are relevant to the operation of the fire control equipment being considered in detail. Every effort is made to give the student a practical understanding of each basic circuit. For example, in a class in which the free-running multivibrator circuit was being taught, the instructor had available a large breadboard layout of an actual multivibrator circuit, all parts of which were clearly visible to the students. This layout was energized and the output characteristics displayed on an 11-inch oscilloscope. As the significant characteristics of the circuit were considered on the blackboard, the instructor referred to the breadboard layout and the corresponding visual display on the oscilloscope. This teaching procedure (followed by actual laboratory tests on the same circuit) gave the student a reasonably clear picture of how and why the circuit behaves as it does.

After the student has completed the basic electronics portion of the course he is assigned to a particular type of fire control system. Here he learns to trace the actual circuit layouts and is taught to repair simulated failures in and perform preventive maintenance on the equipment. This procedure works well in practice provided a sufficiently large number of circuits are available for study and experimentation.

The remaining segments of these curricula are concerned with the surveillance radar (117 hours), the IFF system (49 hours), and a section on methods of instruction (39 hours). The latter is given with a view to improving the teaching skills of the student, who, it is expected, will have to participate in subsequent on-the-job unit training. It involves a very brief review of the psychological principles of learning and their application to educational techniques.

## 2. Instruction

The material is taught in both formal lecture classes (conferences and demonstrations) and in laboratories in which practical exercises with various kinds of electronic equipment are given. The distribution between lecture and laboratory in the various sections of the curricula appears to have been worked out wisely and the emphasis upon practical experience with the actual circuits employed in the fire control systems is highly commendable. Considerable and effective use is made of such training aids as breadboards; training films are also used extensively in the electricity and radio electronics sections of the basic electronics course.

Both military and civilian personnel are engaged in instruction in this department, the latter being supplied on contract by the Philco Corporation. Appropriate instruction training is provided and consideration is given to proper gradation of responsibilities based on the experience and capabilities of the men. The lecture classes are kept within a range of 30-40 students, while the laboratories are typically manned so that there is one instructor for approximately four students.

## II. PROBLEMS IN RADAR MECHANIC TRAINING

Considerations based on shortages of personnel, duration of draftee service, and other factors have raised the question as to whether the training of adequate AA radar repairmen could not be achieved in a shorter period of time than is now required. Under the present program the total period of training, including basic training, furloughs and the like, leaves an effective utilization time in the field of the drafted radar mechanic of approximately nine months. A number of ways and means whereby this utilization time might be increased have been suggested and each poses serious problems. These proposals and the problems they produce will be discussed first in general terms and then specific recommendations, where possible, will be given.

### 1. Reduction of Amount of Electronics Fundamentals in Radar Mechanic Curricula

One suggestion that has been offered is that the amount of course time spent on the fundamentals of electricity and electronic theory be reduced and that stress be placed on the practical work of trouble-shooting. Any decision on this suggestion requires careful consideration of a number of related matters, of which the most important are the requirements of the job the AA radar mechanic is expected to do in the field.

In the present instance the job requirements of the AA radar mechanic need to be considered in relation to the division of responsibility assigned to him and to the Ordnance (Signal) radar maintenance man. Theoretically, the former is limited to first and second echelon maintenance only. Actual experience in the field, however, has indicated the need for a much more thorough understanding of the equipment than that required for first and second echelon maintenance. Presumably the Ordnance Radar Maintenance Units do not have either sufficient equipment or personnel to provide the immediate, field-wide service necessary for continuous, efficient functioning of the equipment under combat conditions. Consequently (as indicated by the stated objective of the courses currently being given at the Artillery School), the training of the AA radar mechanic goes beyond that necessary for organizational maintenance and attempts to provide sufficient understanding of the equipment to enable him to make all possible repairs within the limitations of the available testing equipment and spare parts.

The question as to what level of maintenance is to be required of AA and GM radar mechanics is not, of course, one that is within the province of the survey commission. Attention can only be called to the importance of establishing definite and specific job requirements which are realistic with respect to the all-important objective of maintaining the equipment at the highest level of efficiency at all times. In this connection, careful consideration should be given to the actual battle experiences of AA batteries with respect to the problem of equipment maintenance.

A second aspect of the problem of how much basic electricity and electronic theory is to be included in a training program for radar mechanics has to do with the "generalized vs. specialized" personnel controversy. Some hold that adequate maintenance can be obtained only by means of high level personnel who have been given a thorough, generalized technical training; others believe that limited availability of qualified personnel demands that different level jobs be recognized, with a large portion of the maintenance men consisting of personnel who have been given a much lower level, specific type of training. Generalized technical training is defined usually as training which provides the student with an understanding of the general principles involved in the operation of the equipment and with the techniques for applying these principles to the operation and maintenance of the equipment. Such a trained person is assumed to be able, moreover, to develop his knowledge on the job and to be able to learn how to service new systems more or less on his own, or at least in much shorter time than would be the case if the basic principles and theory were not understood.

In contrast to such generalized training, specific training is described as training which provides students with a knowledge of a set of procedures which he can employ in "cook book" fashion in checking the operation of the equipment and performing maintenance on it. In this type of training the student is usually given little or no background of electronic knowledge and hence has little technical understanding of the functioning of the equipment. Such radar mechanic helpers, it is claimed, could carry on these routine procedures under the supervision of the more highly trained radar mechanics who would be responsible for the actual isolation and correction of the malfunction, and the team of two-level personnel would provide effective maintenance with a much smaller number of difficult-to-obtain personnel of high ability.

Again, it is not within the purview of the survey commission to attempt to offer any opinion, pro or con, on this issue. Attention should be called, perhaps, to the fact that different levels of trained radar personnel greatly complicate the administrative problem of appropriate personnel assignment. This area of administration has always been a difficult one in an organization as large as the Army.

Certain comments may also be offered with respect to the place at which the present radar mechanic courses fall on this generalized-specialized dimension. Considering the radar engineer to be at one extreme and the performance checker type of radar mechanic helper described above at the other extreme of the continuum, it is apparent that the basic electronics material given in the present courses would place them somewhere in between these two extremes and qualify the programs as semi-generalized in nature.

The further question as to whether more or fewer electronic fundamentals should be provided in the present courses can only be ascertained by (1) a careful specification as to what level of knowledge and skills is required by AA radar maintenance units to keep the equipment functioning satisfactorily, and (2) an experimental evaluation of the relevance of the various portions of the present basic electronics material against the specified performance criteria. There would appear to be a pressing need for such research.

In concluding discussion of this point, the members of the commission were impressed with the importance of the problem and with the necessity for serious thought being given to the conflicting requirement under present training conditions that the electronics technician be both a good soldier and a capable technician. To put the matter simply, a decision must be made as to whether future wars, if any, can be fought more successfully by the radar mechanic who is an excellent soldier and a fair technician, or by the person who is an excellent technician but only a fair soldier.

## 2. Condensing the Present Curricula by the Elimination of Other Than Basic Electronics Content

The suggestion has been made that portions other than the electronic material be eliminated from the present curricula. In the absence of evaluation of the present training on the particular fire control systems, there is no basis for determining which, if any, portions of it could be eliminated. If there were a well organized and functioning program of on-the-job maintenance training following assignment to a unit, it is possible that some portions of the present training involving the specific fire control systems, the surveillance radar, and the IFF system could be shifted to this period. Again, research would be needed in order to ascertain which particular kinds of material could be learned best in the school and which on the job.

Finally, one further obvious way in which the present courses could be shortened would be to eliminate the week given to training in methods of instruction. Before decision is made on this possibility, careful consideration should be given to the question of subsequent on-the-job training of the graduate of the school. It is possible that a sufficient number of experienced radar mechanics who have had training in instruction are now available to provide for this subsequent training. If on investigation this were actually found to be the case, this section could be eliminated from the courses for enlisted men.

Again, emphasis should be given to the point that the commission does not now possess adequate knowledge on which to make a definite decision. A careful survey should first be made of the status and need for on-the-job training after the student graduates.

### 3. Reduction of Present Training Period by Scheduling Present Course in Shorter Period of Time

This possibility was suggested by the impression gained by a number of the members of the commission that less material was covered in a single class, particularly in the lecture period, than is typically covered during a comparable period in a college class or in a technical radio institute. If this impression were substantiated by further study, the possible factors underlying it might be investigated with the hope that modification of them would make possible some reduction of course length. Some of these factors are:

#### a. Unnecessary repetition and unneeded elaboration of material in the lecture.

Careful re-examination of all lesson plans would reveal the extent to which this was the case.

#### b. Capabilities of instructors.

There appears to be no question of the desire of the instructors in this department to do a first-rate job, nor of the inherent ability of most of them to do so. There is the impression, however, that the rate of instructor turnover is much higher than it should be, and that it is much too high to be consistent with sound educational practice.

#### c. Intellectual capabilities of students.

Although the requirements for admission to the enlisted men's courses include a score of 110 or higher in Aptitude Area IX, there is apparently a considerable number of students who do not meet this requirement. In view of the evidence found in a study by the Electronics Department that there is a much higher percentage of failures among the students who do not meet this requirement than among those that do, it would be necessary to give careful consideration to this entrance requirement. One possibility would be to section the courses on the basis of this aptitude score and other available predictors of success and to set up two different time schedules. Experimentation may show that highly motivated students with scores well above 110 might be able to complete the present material with appropriately revised lesson plans in a considerably shorter period of time. If this were the case, there would not only be a considerable increase in the number of qualified radar mechanics produced in a given period of time but there would also be a corresponding increase in the average utilization time on the job.

#### d. Motivational factors and other variables determining performance efficiency.

Attention should also be drawn to the point that the amount of material that can be covered in a single class period may be a function of the length

of the student's classroom and laboratory day. The inordinately long day (seven hours) now required of the student probably produces considerable fatigue with consequent restlessness, reduced attentiveness, and lowered morale. Research efforts should be directed at minimizing these factors and should include exploration concerning the usefulness of interest inventories in selecting students who will be maximally motivated to succeed and investigations involving such things as concurrent scheduling of different subjects, lengthening of between-class breaks, etc.

While it is apparent that reducing the class and laboratory hours from seven to six hours daily would not be likely to make for a shortened course, it is quite possible that the level of learning would actually improve. The present schedule is, undoubtedly, well beyond the optimum period for maximum learning efficiency.

### III. RECOMMENDATIONS

In the light of the problems discussed in the previous section it is recommended that serious consideration be given to investigating a number of different aspects of utilization and training of the AA and GM radar mechanics. In making these recommendations it should be made clear that the present school personnel are well aware of the need for the kinds of knowledge sought. Concerned primarily as they are with giving the best training possible to the continuous flow of students through the present courses, however, they have not had the time to vary their training program in any major fashion or to attempt to carry out surveys to ascertain the proficiency of their graduates on the job. Such activities require the aid of specialized research personnel.

1. Research should be undertaken with a view to obtaining as precise a specification as possible of the knowledges and skills required by the radar mechanic to perform his job efficiently. This would require a careful, detailed study of the on-the-job activities of the radar mechanic, direct observation of day-to-day activities, interviews with experienced technicians, etc., along with such other studies as analyses of the malfunction histories of the various kinds of equipment used.

2. A study should be made of the problems of radar and fire control system maintenance in the field with respect to continuous availability of trained personnel. Such an investigation should be directed at a clarification of the responsibilities of AA and GM radar mechanic personnel and those of the Ordnance (Signal Corps).

3. Consideration should be given to the possibility of training two levels of radar repairmen: one with a generalized background of electronic knowledge that provides a considerable degree of understanding of the functioning of the equipment and hence flexibility in meeting the problems involved in the operation and maintenance of the equipment; the other a more specialized radar mechanic helper who would perform set procedures aimed at checking the adequacy with which the equipment was functioning, and reporting any malfunctioning. The problems (administrative, personnel, and training) of having such dual-level radar mechanics need to be studied carefully. The experiences of other services or industry in making use of low-level trained personnel should be surveyed for relevant information.

4. Research should be instituted, preferably after some definite job specification has been established, to ascertain the minimum amount of fundamental electronics needed to provide a given level of competence. Such investigations would involve variation of the amount of time spent in fundamentals training and in its content.

5. Experimentation should be undertaken with other portions of the radar mechanic curricula than the basic electronics, such as relegating portions of it to the subsequent on-the-job training program. Such studies would need to be coordinated with investigation of the on-the-job training program. The latter would also indicate the need, or lack of it, for the present inclusion of training on methods of instruction in the radar maintenance courses.

6. Careful consideration should be given to research studies designed to investigate factors that might increase the efficiency of learning and thus reduce the length of any training program. Factors needing study are: (a) the nature and quality of the lesson plans, (b) capabilities (knowledge of subject and skill in teaching) of instructors, (c) intellectual capabilities of students, (d) motivational factors, and (e) work (fatigue, boredom) factors.

## Department of Guided Missiles

## I. CURRICULUM AND INSTRUCTION

1. Objectives

This department is relatively young and has yet to feel the impact of a full and diversified teaching load. Its present activities, however, are all directed toward achieving its ultimate mission which is envisioned to be:

- a. To teach the tactics and techniques of guided missiles and to qualify officers for Army Field Forces Guided Missile Units.
- b. To train selected guided missiles personnel in guided missile techniques and maintenance (specifically) and to train guided missile instructors.
- c. To serve as an agency of Army Field Forces in the development and recommendation of guided missile doctrines.

2. List of Courses

- a. (44-0-5) Officer Guided Missiles (MOS 1181)
- b. (44-E-8b) GM Integrated FCS (NIKE)
- c. (44-E-8c) GM Integrated FCS (CORPORAL)
- d. (44-E-9b) GM Mechanic (NIKE)
- e. (44-E-9c) GM Mechanic (CORPORAL)
- f. (44-E-10b) GM Electronics Guidance (NIKE)
- g. (44-E-10c) GM Electronics Guidance (CORPORAL)

3. Scope and Purpose of Coursesa. Officers.

The principal curriculum of the Guided Missiles Department to date has been a high-level, 32-week course for officers. This curriculum consists of three sections: Tactics, Aerodynamics and Propulsion, and Guidance. For rather obvious reasons, the Tactics Section of this department is considered to be outside the scope of this survey. The Aerodynamics and Propulsion Section and the Guidance Section are well organized and operating smoothly. Advantageous use is made of concurrent scheduling of Mechanics and Aerodynamics.

b. Enlisted.

Enlisted courses in guided missiles may be broken down into on-missiles courses and off-missiles courses. Only the on-missiles courses are taught in the department; the off-missiles courses (44-E-8b and 44-E-8c) are taught in the Electronics Department. Within the GM Department two types of training are given: (1) to qualify electronics guidance technicians and (2) to qualify mechanics. In the Electronics Department, integrated fire control system (FCS) maintenance men are trained.

c. Combined.

At present (44-E-8c) is given as a combined course for both officer and enlisted personnel.

d. Other.

Several hours are given in the Department of General Studies. For enlisted men this time consists of instruction in methods of instruction (MOI).

4. Instructional Methods

The unique feature of the department is the relatively high academic level of the instructors and students. This feature permits the use of many standard college textbooks in the basic portions of the courses. Since the over-all course of instruction is without precedent and since there has been little or no opportunity to evaluate the end product of this instruction, detailed recommendations at this time would be rather meaningless if not actually presumptuous. An examination of the courses of study employed in the Aerodynamics and Propulsion, and Guidance Sections, however, reveals that these courses of study are taught in accordance with principles accepted as being consistent with good engineering education. The actual classroom instruction which was observed compared favorably with that found in engineering colleges.

## II. INSTRUCTIONAL AIDS

The department is in the process of organizing its program in instruction and the program contains reference to the use of many training films. At a conference attended by one member of the survey commission, reference was made to graphic training aids (GTA's) produced under the direction of Army Ordnance by the contractor for NIKE. These were described as being printed on a black surface capable of taking chalk and erasures. The GTA's were not seen but the Commission member present at this particular conference is familiar with the work done under Ordnance supervision and is of the opinion that it is excellent in concept, design, and execution. The GTA charts can be used in the field and the same content will be available on transparencies for class use.

Large and small breadboard layouts are being used here and in the Department of Electronics. One that was seen was part of the TERRIER package. Included in the TERRIER Instructional Aids Unit were three large operating displays that were considered adequate for the layman but not useful for training specialists. These well-constructed panels show by light relays a schematic story of guided missiles. They represent a cost of approximately \$70,000 and are used primarily to give a general overview of guided missiles to visitors. It is important to note, then, that these displays are not useful as training aids for instructional purposes.

### III. COMMENTS AND RECOMMENDATIONS

#### 1. Reduction of Training Period

A question arises as to whether or not the 32-week course for officers is of optimum duration. If all factors are considered, the 32-week period appears to be a nice balance between a longer course suitable for design engineers and a shorter course suitable for officers who will handle and operate guided missiles. Until evidence can be presented to the contrary, it may be assumed that the 32-week course will produce some officers, who, after graduation from this course, will continue to study the design requirements and the performance capabilities of guided missiles. These men would naturally become liaison officers between the Army and the manufacturing companies since the Army will undoubtedly need officers who can deal directly and authoritatively with the design engineers of the manufacturing companies. The other officers who graduate from this course (those who, through lack of natural inclination and/or aptitude, will fail in motivation or ability to pursue the subject further) will nevertheless profit by 32 weeks of training devoted to tactics, aerodynamics and propulsion, and guidance. Only with sufficient basic training, however, can these officers be expected to become expert in a short period of time with the operation and maintenance of a new guided missile.

#### 2. Establishment of Technical Career Fields

The future need of this department (as well as that of other departments operating complex apparatus) will be for officers who possess not only the actual know-how, but also technical skill and knowledge of high order. But, under existing conditions, the officer who follows a technical career in the Army appears to have fewer avenues of advancement than do non-technical officers. For this reason, if the policy of training officers technically is indefinitely pursued, eventually a technical branch or command within the Army may have to be established in order to attract and hold officers who are technically proficient and at the same time interested in the Army as a life-time career. It is not at all clear, however, that even a technical command would provide the best answer to this problem. Since command function is the desirable correlate of rank, the question may be pertinently raised whether any officer technicians should be trained at all. It is hard to conceive that the colonel-technician, or the brigadier-technician, would be required in any great numbers. Perhaps, then, a better solution yet might be achieved by having no technicians of officer rank, but by placing all such in the warrant officer category. In this way the touchy question of promotion in rank for those who will have no increasing command function may be avoided. A further advantage would be the fact that any appropriate number of step-increases in pay, to motivate and reward increasing experience and competence, could be set up in this category without accompanying these by rank changes and hence changes in responsibility. It is envisioned that the warrant officer technician would have no command function at all, but would always serve as a trusted technical advisor to his unit commander. The survey commission therefore recommends that such a plan be studied to determine its feasibility on an Army-wide basis.

### 3. Proportion of Laboratory Work

The 32-week course for officers should be increased gradually as suitable laboratory apparatus and cut-aways of the missiles become available. One piece of laboratory apparatus which is presently available and which is being used successfully in several of our leading schools is a small wind tunnel manufactured by the Aerolab Supply Company, 3411 Chatham Road, Hyattsville, Maryland. Several quantitative exercises in the field of aerodynamics can be performed with the aid of this apparatus.

### 4. Deficiencies in Training Equipment

The problem of training a large number of officers and maintenance technicians on a particular type missile with only a limited number of missiles available will tax the ingenuity of the department. Serious consideration should be given to laying out a training missile on a large test table so that three or four groups of two men each can work independently, each group having its independent and controllable "signal" or "signals." The parts should, of course, be so capable of interconnection that all parts function as a unit which is operative from a single simulated input signal.

## Department of Gunnery and Materiel

## I. CURRICULUM AND INSTRUCTION

1. Mission and Relative Importance

Broadly stated, the mission of this department is to train selected officers and enlisted men in the employment, operation, care, and repair (first and second echelon maintenance only) of existing antiaircraft artillery (AAA) weapons. Consequently, the department is, by its very nature, of fundamental importance to the Antiaircraft and Guided Missiles Branch of the Artillery School.

2. List of Courses

The department operates the following courses of instruction:

- a. (44-0-2) Associate AAA Battery Officer
- b. (44-0-9) AAA Battery Officer Refresher
- c. (44-0-10) AAA Field Officer Refresher
- d. (44-0-18) LAAA Transition Officer
- e. (44-0-19) M&HAAA Transition Officer
- f. (44-E-2) AAA Gunnery Control (MOS 2671)
- g. (44-E-4) LAAA Fire Control Mechanic (MOS 3633)
- h. (6-E-7) LAAA Mechanic (MOS 4833)
- i. (6-E-7) M&HAAA Mechanic (MOS 4834)
- j. (44-E-17) Skysweeper AAA Mechanic
- k. (44-0E-12) AAFCS T38 Gunnery and Employment
- l. (44-0E-14) AAFCS M33 Range Officer or Operator

3. Scope and Purpose of Course Curriculaa. Officers.

Three types of officers are trained in the department. These are (1) new officers, (2) refresher officers, and (3) transition officers. The course curricula for officers are therefore designed to provide practical working knowledges of (1) AAA gunnery, materiel, and communications and (2) the duties and responsibilities (appropriate to grade) of AAA officers.

b. Enlisted.

The course curricula for enlisted men are mainly designed to produce qualified AAA and FCS mechanics, equipped by experience and knowledge to perform the functions of first and second (organizational) echelon maintenance in the field.

c. Combined.

There are combined courses designed to familiarize personnel (both officer and enlisted) with the characteristics, capabilities, limitations, operation, and employment of newly developed equipment. Only in the case

of distinctly new equipment is operator training per se engaged in by the department. Normally such is thought to be an organizational unit training function.

d. Other.

All subjects in the course curricula are taught within the Gunnery Department, with the exception of MOI.

4. Student and Instructor Populations

At present the department has an enrollment of approximately 500 officer students and 300 enlisted students. The present complement of instructors is 105. Both civilian and military instructors are utilized.

5. Methods of Instruction

As far as practicable, instruction is of the practical-exercise or laboratory variety. In the practical exercises students are usually grouped four or five to the instructor, although it is realized by the staff that groups of one or two would be more desirable. Whenever possible, the latter ratio is sought. The practical periods observed by the survey commission appeared to run off smoothly with an adequately distributed participation by the students. Several classes in gunnery were visited, including one on Skysweeper. They appeared to operate smoothly with about the same amount of "give and take" between instructor and student that would be found in a course in applied mathematics in our engineering colleges.

A Gunnery Department shoot was viewed, with all materiel which is taught in the school participating (except Skysweeper). Both towed targets and drones were fired upon at various altitudes (in the case of towed targets, up to 30,000 feet). Appropriate ground targets were also engaged. The snap, precision, and effectiveness of this demonstration were notable.

Gunnery subjects are exacting in nature and difficult for the average student unless he applies himself diligently. In all aspects of its training program, the Gunnery Department lays great stress upon accuracy and coordination in performance of the various tasks that are set for students. By accuracy is here meant the meticulous following of stepwise procedures that have been tried and tested, and which have been found to ensure the maximization of the inherent operational potentialities of the equipment. By coordination is meant the timeliness of individual effort in its relation to the efforts of others. In such complicated systems as those utilized in the modern Anti-aircraft Artillery, where team-work is a paramount consideration, and where the responses of one team member may—if incorrect or untimely—nullify the effectiveness of all others, it would seem that the above orientation and emphasis is sound doctrine, and can scarcely be overstressed.

## II. INSTRUCTIONAL AIDS

By and large, the Gunnery Department was observed to make copious use of instructional aids of many types. Some idea of the scope of this coverage will be conveyed by the examples briefly described below.

1. A large, approximately 6' x 8' expertly rendered landscape was noted. This representational composition shows a target area with roads, bridges, terrain features, etc. It is covered with a cellulose acetate overlay upon which the instructors and students conveniently can work out burst spotting with grease pencils in different colors. This aid is integrated with field problems. In conjunction with this scene the instructor may also use a three-foot wand with adjustable bursts affixed that demonstrates air and ground target locating. The ideas incorporated in these two aids, simple as they may appear in concept, might conceivably be of great value if knowledge of their existence was made available to other services interested in this phase of gunnery instruction.

2. Through use of a slide projector, speed rings are thrown on a chalk board to assist the instructor in his discussions of target location and lead.

3. Chalk boards are available with small holes to allow the placing of equipment, giving realism and interest to what might be otherwise a plain, dull schematic. This apparently effective idea could inspire widespread exploitation if tested, found efficient, and made known.

4. A noteworthy mock-up of the M33 system is in the process of construction. Life-size photos of the various consoles and control panels are pasted on light wood models built to scale. The actual control knobs, lights, etc. are then superimposed upon their photographic representations. The whole is made functional by appropriate wiring behind the console or panel fronts. As there are no backs, it is easy to get at the wiring. The result is a realistic, easily transportable model with all the visibly functional characteristics of the original. It is both economical to construct and easy to maintain. This construction appears to be a very meritorious project, and, if pushed to completion, will no doubt result in several excellent and highly serviceable aids. Work on it therefore should be encouraged.

5. The Skysweeper package is a complete unit of: (a) blow-ups, (b) charts, (c) venetian blinds, (d) breadboards; (e) plastic models, (f) cut-aways, and (g) lighted working enlargements of small units.

6. Approximately 160 instructional aids are used to help facilitate learning in a 176-hour course (44-OE-14). Concerning these aids, one instructor remarked: "... and each one grew out of a need. Each man who leaves Ft. Bliss should have a kit of such aids to help him implement his instructional responsibilities to his battalion."

7. In viewing a field firing problem to demonstrate the role of AAA in close support of infantry, another very efficacious training aid was observed. The spectators at this demonstration were briefed by first having pointed out to them the tactical scheme of maneuver upon an enormous conventional military map made of cloth mounted on a wooden frame that was tilted at an angle of about 45 degrees to the ground. The various symbols on this map were large enough to be clearly visible from the stands and hence were easily followed as the briefing officer's assistant accompanied his talk by pointing out locations, direction, etc. with a long wand. Once the preliminary briefing

was over and the problem had begun, the map was removed by lifting its supporting frame (divided in the middle into two parts) and setting it to one side. This action in turn revealed an excellent relief map of the identical terrain originally portrayed by the conventional map. The relief map was equipped in appropriate places with small holes into which the supports for facsimile models of weapons could be secured as these were first employed and then displaced on the field. There can be little doubt that the technique facilitated a clearer understanding of the problem than would otherwise have been possible and, consequently, augmented its instructional as well as inspirational value. The thought occurs that here in embryo was witnessed what might be developed into a highly efficient general method of teaching terrain appreciation and map reading.

8. On the day that the AAA shoot was observed, members of the survey commission were shown an economical method of launching drones by the use of self-developed centrifugal force, rather than by rocket. Further they were shown how the Gunnery Department, by the use of drone-towed targets made from salvaged materials, had greatly reduced the cost of service practice, at least for light AAA.

### III. COMMENTS AND RECOMMENDATIONS

#### 1. Facilitation of Motivation

From visits with instructors and students, it would appear that not all of the students appreciate the importance of gunnery subjects. Some additional means of motivating these students should be investigated. It is the understanding of the survey commission that under present policy the excellently organized and highly inspirational gunnery shoots are customarily shown to out-going classes. It is recommended that the possibility of showing them also to incoming classes be investigated with an eye to its potential motivating value. If such recommendation be put into practice, however, it must not be at the expense of the shoots now given for out-going classes. These latter demonstrations have instructional as well as inspirational (motivational) value. It is possible that by correct timing and by a little additional administrative effort one shoot could be made to serve both purposes.

#### 2. Reduction of Training Period

While the survey commission does not believe, in general, that shortening of the gunnery courses is at this time advisable, it does recommend that the hours in Methods of Instruction be eliminated from courses for enlisted men. In certain courses this would amount to a saving of from 12 to 39 hours. The recommendation is made in the belief that, because of the kind of instruction these enlisted men will do (i.e., man-to-man or man-to-small-group instruction on-the-job), expenditure of time for these men upon MOI is at present unwarranted.

### 3. Instructional Aids

In an attempt to teach the operation of Skysweeper in the shortest time, instructors in this subject have invoked a great variety of graphic aids. There is the danger of letting graphic aids get out of hand—that is, of using graphic aids to the extent that these aids tend to replace detailed and analytical thought without which very little technical learning takes place. This comment, while generally applicable to the use of instructional aids wherever they are employed, should not be construed as being intended to discourage the continuing construction of worthwhile aids. On the contrary it is recommended that such initiative be generally encouraged, and, specifically, that every reasonable support be made available to press to completion the construction of the M33 mock-up. It is further recommended that when some distinctively beneficial aid has been produced, an officer should be assigned the duty of ascertaining whether other interested arms and services have developed such techniques, so that help may be offered and maximum benefit accrue. For example, it should be ascertained whether those responsible for teaching map reading and terrain appreciation are utilizing the technique of simultaneous study of conventional map, relief map, and actual ground.

## Department of Tactics and Combined Arms

Observations in this department were concerned primarily with the training of future instructors, instructional methods, and materials. No attempt was made to evaluate the subject matter taught in this department. The general impression gained from visiting several classes and talking informally with various instructors was that the morale of officer-instructors was high and that they had a feeling of pride about the job they were doing.

### I. INSTRUCTION

#### 1. Training of Instructors

The procedure in this department is similar to that described for the Department of General Studies (p. 34). The prospective instructor attends the MOI class as a regular class member. At the same time he is given approximately one month's orientation in his particular section, sitting in on classes, observing, and becoming thoroughly acquainted with the subject matter he will be teaching. He then prepares one or more lessons under the supervision of his section chief and rehearses the presentation of this material. When his section chief approves, he appears before a final "murder board."

Observations of a Typical "Murder Board." The "murder board" represents a practical examination of an instructor's competence to teach a particular lesson. There may be from four to eight officers in attendance, each of them acquainted with the material in the lesson. The instructor presents the entire lesson as he would to an actual class. The observing officers attempt to establish a classroom atmosphere by playing student roles and behaving as if they were members in a typical classroom. When the prospective instructor completes his presentation, the board members give their impressions of both the content and the teaching techniques employed.

During one "murder board" that was observed, a major was on the platform presenting a lesson to three lieutenant colonels and two majors. Following the presentation of the lesson there was much discussion about the visual aids used by the instructor. There was general agreement that the charts needed redoing. One "class member" asked a question that was not handled satisfactorily by the instructor and suggestions were made as to how the question might have been answered. There was considerable attention paid to how questions should be asked and answered. Some emphasis was also placed on pronunciation of words and mannerisms during delivery.

Much of the discussion centered around what might be termed principles of learning. There were considerable differences of opinion about the nature of the learning process, how learning proceeds, and how teaching can be most effective. It seemed obvious to the member of the survey commission that an outside person, well qualified and trained in the psychology of learning and teaching could serve a very useful function as a member of such "murder boards."

## 2. Instructional Materials and Aids

### a. Development of Instructional Materials.

Generally the instructor first prepares an outline of a lesson assigned to him. This outline then must be approved in turn by the section chief and the director, either or both of whom may ask a "murder board" to react to it. When it is finally approved, it goes to Training Aids for reproduction. During this time the instructor is working on his manuscript, which is much more detailed with respect to content than the outline or lesson plan. The manuscript then goes through the same general procedure as the lesson plan, with the exception that even before final approval it may or may not be printed. At this stage the instructor develops work sheets where applicable, practical exercises, and examination questions, usually of an objective type. The work sheets may be used for home study or, toward the end of a class meeting, in the classroom setting; the practical exercise essentially is a form of homework or a study guide for use outside of class. The finally approved examination items are ultimately filed with other examination questions on the particular subject.

### b. Instructional Aids.

On a "shoot" on the range, the use of large paintings to show the tactical plans of combined operations was observed. Preceding each "live action" the particular tactical problem was discussed using the large diagrammed paintings. This exhibit was prepared in two layers. The first layer was used as a background for the discussion of the general problem. The second layer showed the deployment of equipment and the actual plan of operation. The entire problem was enacted with split-second timing, with realistic human interest notes interjected for change of pace. In discussion of this project with the Department Director later, it was learned that an entire, comprehensive scenario of every item existed as a "vault-copy" with every provision planned down to the most minute detail. It seemed that three or four motion picture crews operating on this set could capture much valuable educational footage, including close-ups of equipment in operation. Gun crews could be shown in action supporting the infantry with cut-ins of animation sequences displaying tactical theory. The existing narration could be considered as an adequate shooting script.

A complete tactical operational room is maintained wherein all functional details can be observed. This set-up allows each officer to participate in each operation and to watch others doing the job. The environment is realistic.

Dramatic skits are used to lend a "real-life" atmosphere to the learning experience. Actual problems are exposed and solved in simulated climates of anxiety and distraction.

Visual aids have been developed and are utilized almost profusely in the department. In several instances one observer gained the impression that a teaching aid had been made for its own sake, without sufficient attention being given to the learning objective and proper utilization of the aid. Perhaps this is to be expected, when one considers the emphasis that has been given to visual aids throughout the Army. It would be well to keep in mind that the

improper development and use of charts and "gadgets" can impede learning as well as aid it. This comment, of course, is not limited to the utilization of aids in the departments under discussion but is generally applicable wherever training aids are used extensively.

## II. COMMENTS AND RECOMMENDATIONS

1. Should an educational advisor to the Commandant be appointed, it is recommended that he spend some time working with the "murder boards" in this department so as to bring to them expert knowledge in the psychology of learning.

2. The scenarios now used as a basis for informal dramatic presentations should be developed into locally produced sound motion pictures to be used for instructional purposes.

3. This department gives special attention to individual students whose work may be inadequate. Such students are called in for individual counseling sessions in an attempt to determine the source of difficulty. It was reported that in most cases a joint study of the work sheets between student and counselor will generally indicate where and why the student is not achieving satisfactorily.

4. Mention should be made of classrooms Alpha and Beta which are being constructed for use in connection with the new Army Special Weapons Orientation Course. Extreme care and thoroughness is being exercised in the development of this new week-long course designed to orient senior army officers to new special weapons and the use of those already in existence. The physical facilities in the new classroom building seem to be ideal and should make for maximum learning efficiency. Comfortable office chairs, raised platforms for students, a special instruction stage with every convenience, special projection booths, light dimmers, air conditioning, parabolic microphones—these are some of the physical features that would excite the envy of any college instructor. This setting provides an opportunity to evaluate the effect upon the learning process of what would appear to be excellent physical characteristics in the teaching situation.

## Department of General Studies

## I. OBJECTIVES

The mission of this department may be summarized as follows:

1. To provide resident instruction in:
  - a. Methods of instruction.
  - b. Movement by air.
  - c. Common subjects (i.e., battery administration, military leadership, military law, biological and chemical warfare, etc.).
2. To maintain and operate a reading improvement laboratory.
3. To conduct troop and officer information programs.

## II. CURRICULUM AND INSTRUCTION

Present discussion will be limited to those aspects to which closer attention could be given in the time available. These include the courses in methods of instruction, instructor selection, and the Reading Laboratory.

1. The Course in Methods of Instruction

This course seems to be typical of similar offerings in most Army schools. It is based largely on FM 21-5. At present (August 1952), it consists of one week's work (39 hours) which includes both a didactic portion and a practicum. The formal portion includes instruction in such topics as fundamentals of teaching, effective speaking, lesson planning, chalkboard techniques, instructional aids, the conference method, and fundamentals of achievement tests. The practicum, which follows this formal instruction, involves approximately 21 hours devoted to "applicatory" presentations by the students, i.e., putting into practice what they have been learning.

a. Reaction to MOI course.

Information bearing on student and staff reactions to this course would seem particularly useful at this time since some consideration is being given to eliminating the course from the curriculum or at least decreasing the time allotted to it. Information concerning students' reactions to the course were obtained from an examination of student critique sheets and from student replies to questions posed by a member of the survey commission. With very few exceptions, students thought the course important and useful, even though some had previously taken one or more courses of a similar nature. It should be noted that these represent officer reactions exclusively, as no enlisted men's MOI classes were in session during this time.

Some officers expressed the opinion that a course of this kind was of doubtful value for enlisted personnel; others took the opposite view. It would seem that a course of this nature should be extremely valuable to anyone who has to train others. One might raise the question, however, whether the same course should be given to both officers and enlisted

personnel. There appears to be little factual basis at present for answering this question. One would need to know more about the future teaching responsibilities of the typical enlisted man going through the course. It would seem that a course for enlisted men might stress practical experiences in working with small groups rather than teaching on a platform to a large group. Over-the-shoulder coaching, proper position during demonstrations, techniques for maintaining and increasing motivation should also be emphasized in such a course.

b. Comments and Recommendations.

(1) The MOI course is one which cuts across all departments. There should be exemplified in the presentation of its subject matter the best teaching principles and practices. It is recommended that this course be retained in those curricula in which it is clear that students, after graduation, will be responsible for formal group instruction. In this connection, it may be noted that a new MOI course of 50 hours has been proposed, primarily for instructors in the school.

(2) Although a good part of the time spent in class is given to student participation, the impression was gained that the present very adequate MOI course could be further improved by increasing the amount of student participation. This point of view, it is to be noted, is not confined to the MOI course alone. It applies to those teacher training situations in all departments in which the prevalent method is for the teacher to talk (and perhaps manipulate visual aids) while the student looks and listens. The suggestion made here emphasizes not so much the use of a specific procedure, as it does the need for ingenuity by the instructor to stimulate student activity, in instances in which the subject matter does not appear to lend itself readily to much more than the direct lecture approach. For example, the lessons on achievement testing contain many suggestions pertaining to the nature of good examinations, together with points to observe in constructing test items. The usual procedure is to have the student read these suggestions before or after class. The instructor then reiterates these suggestions from the platform, emphasizing the more important points. Specifically, presentation of material on True-False items might be modified. The instructor, instead of talking about True-False items, might distribute a brief True-False test about such items. The student then would be reacting to True-False items instead of passively listening to a discussion of their good and poor points.

(3) The present point is related to the one just discussed. In connection with the practicum part of the course, each student makes two presentations before the class, taking up roughly 45 minutes. For the remaining 15 or more hours he listens to the presentations of other students. It would seem desirable to increase the number of opportunities for each student to speak to the class. This might be accomplished by dividing the class into smaller sub-groups which would permit each student to double or triple his time on the platform. It is recognized that the class of roughly 50 students has already been broken down into four or five groups and that further sub-division would increase the number of staff members necessary to monitor student performance.

## 2. Selection and Training of Instructors

Selection of instructors is somewhat of a problem in this department, as it is elsewhere in this school and other Army schools. A closely related problem is that of instructor turnover. There are both officer and civilian instructors and it is possible to exercise some selection of both. In the case of officers, there is opportunity to review their credentials and to interview them. If an officer has already been selected and is not functioning satisfactorily, he may be relieved of his teaching duties.

Of five civilian instructors who are authorized and hired through Civil Service, there are at present four. It is common practice not only to review the applications, but in most cases to have prospective instructors conduct a lesson which is evaluated by the director and his staff.

A new instructor is required to sit in as a regular member of an MOI class, whether or not he has had teacher training or a previous course in MOI. He is also assigned his first lesson in the section in which he will work, and uses this assignment in connection with his MOI practicum. In addition, he sits in on classes pertaining to the subject he is to teach. In approximately three weeks, the new instructor presents his prepared lesson before two "murder boards." The first is composed of the section head and other qualified members. If he receives the initial approval of this board, he then performs before a group consisting of the department director and any other members he may assign.

## 3. The Reading Laboratory

### a. Description of the Laboratory.

The purpose of the laboratory, as its name suggests, is to aid enlisted men and officers in the development of reading ability. Originally conceived by an officer-instructor in the department, the laboratory is now headed by a civilian staff member. At present the laboratory is operated entirely on a voluntary basis. A 30-hour course, designed to improve reading speed and comprehension, is available for those who desire it. Since it is a voluntary program, classes are usually run after hours in the late afternoon, although some officers have arranged for early morning classes. About 800 students can be accommodated in the usual three one-hour periods per week. During the week of this survey, 201 student laboratory hours had been recorded.

Before embarking upon a program of remedial instruction, the student is given a preliminary check for reading rate and comprehension. Eye movements may also be photographed and the findings used as a basis for planning the remedial program. As part of his work, a student may, in the course of an hour's meeting, divide his time as follows: First, he may work with the tachistoscope, an instrument for exposing stimulus materials for relatively short periods of time. The materials usually consist of 35-mm. slides with a series of five to nine digits. The slides may be exposed for 1/25, 1/50, or 1/100 of a second, and the student can run the machine himself and check his performance after each exposure. He may then work with a Reading Rate Controller, an instrument which permits connected material to be presented at controlled rates of speed. A wide selection of unbound books

is available so that individual pages may be inserted into the machine. Toward the end of the hour the student goes into another room where he is given a comprehensive check for reading rate and comprehension.

b. Recommendations.

The service provided by the Reading Laboratory is one which should be publicized and students should be encouraged to avail themselves of it. Thought might be given to the desirability of including work in the laboratory as a requirement. That it is possible to increase reading speed and comprehension has been demonstrated by research. With the amount of reading material found in this school and Army schools generally, it would seem highly desirable at least to encourage, and in some cases, to require students to utilize the reading laboratory facilities.

## Department of Non-resident Instruction

## I. DESCRIPTION OF MISSION

The quite different nature and objectives of this department necessitate a limited and obviously different treatment of it as compared with the departments previously considered. The department has manifold responsibilities. It prepares training literature, graphic aids, and materials for civilian components. It is responsible for photography, films, and other instructional media. Also included among its activities are the operation of reproduction facilities, editorial and typing services, and the development of extension courses. The work load and volume produced is impressive. The entire operation appears to be very well managed and the individual skills of the technicians involved seem quite high. Visits to several sections within the department left one with the impression of a fine esprit de corps. Several officers outside the department commented voluntarily on the fine cooperation they had received in their efforts to develop instructional materials and visual aids.

## II. RECOMMENDATIONS

There was some impression that more thought could and should be given to the design of all printed materials. Typography could be considered more analytically as a means of communication rather than as a means of filling up space. Tests for readability should be made of all printed materials. It is very difficult to read long lines of type. Approximately ten words make a good length of line when set in a type face big enough to read with ease. These lines, for good readability, should seldom go beyond 26 1/2 picas in width. Ten point or eleven point type on a twelve point body makes a good comfortable face in a one column format.

The family of type should be carefully considered. Bodoni, at the present time, is the most widely used Roman face, but there are many others that are practical such as Baskerville, Bookman, Garamond, and Stymie. If the vast amount of effort that flows into a reproduction instrument is valuable enough for consideration, it is valuable enough to be presented with care, good craftsmanship, and good design.

## Chapter 4

## THE GRADING AND EVALUATION SYSTEM

## I. GENERAL

1. Type of Examinations

Examinations consisting of four-alternative multiple-choice items are used extensively in most departments. In general, the format and content of the questions appeared to be of reasonably good quality. While most of the tests reviewed contained some items which emphasized problem solving ability, the majority of the items appeared to test rote memory only. Unfortunately, rote memory type items do not encourage integration of the material into usable knowledge. On the other hand, the presence of too many rote memory items in the tests is partially justified by two facts: (a) considerable rote learning is necessary in many of the courses; and (b) almost all departments make some evaluation of the student's practical application of the theory he has learned. The trend toward the grading of practical work is very commendable and should be emphasized still further throughout the school.

Almost all the examinations are objectively scorable. In general, scoring is accomplished by a template—each instructor scoring the examinations that he administers. The administration and scoring of examinations are accomplished in a reasonably efficient manner. The present system of decentralized scoring is probably superior (in this situation) to centralized machine scoring.

2. Frequency of Examinations

Examinations are given rather frequently in all departments, and consequently serve to motivate the students to keep abreast of the subject matter being presented. A number of examinations is always desirable, and the current policy of giving frequent tests should be continued.

However, unless cumulative examinations are given, such frequent testing must necessarily treat only limited segments of the material. Such limited examinations encourage learning by rote and discourage integration and long-range retention of the material. This difficulty can be overcome by inaugurating a system of final examinations. It is suggested that the students should be given final examinations on all subjects taken in a given department, or at least be given final examinations on a sub-course.

3. Procedures for Scoring and Weighting Examinations

Examinations are scored in such a way that if the student answers all the questions correctly, he will receive a score of 100. The minimum passing

score is set at 70 unless modified by Faculty Board action, and the departments try to control the difficulty of the examinations so that the mean score will be around 85. This percentage scoring system is used throughout the school. It is seen that such a scoring procedure puts a burden upon the departments to control the difficulty and quality of the examinations so that the desired results are obtained. For example, examinations must not be too difficult or else too many students will fall below the minimum passing score. On the other hand, the examinations must not be too easy or else all students will tend to get the same score. All departments must construct examinations of approximately the same level of difficulty in relation to student talent in order for the percentage scoring system to work efficiently. For example, where the subject matter is rather complex, as in the Guided Missile Department, occasionally some difficulty is experienced in maintaining a mean score of 85 on examinations.

When the obtained mean for an examination is considerably below 85, a linear transformation is sometimes made by fitting a line to two points—one point defined by the maximum score obtainable and the other point by the obtained mean and the desired mean score of 85. This transformation helps to maintain the integrity of the percentage correct scoring system, although it generally favors poor students and penalizes good ones.

However, the problems of adjusting discrepant mean scores and guarding against too many students falling below the minimum passing score are minor compared to difficulties encountered in the process of combining several percentage grades into a composite or final grade. Sub-course grades are combined into a final grade by means of a weighting system which in the judgment of the school officials represents the relative importance of the sub-course grades in determining the final grade. In the current procedure, however, the effective weight of the various sub-courses in determining the final grade is unknown. The effective weight of any part score upon a composite score depends on two variables: (a) the numerical value by which the part score is multiplied and (b) the range or spread of the part score (speaking technically, the standard deviation of the part score). The weighting system employed by the AA and GM School only takes account of the first variable—the numerical multiplier. Therefore, the end result of the current weighting procedure is indeterminate.

For example, in the associate battery officer course, the light anti-aircraft artillery (LAAA) materiel and gunnery sub-course is weighted 250 points in 1000, or .250. In the same course tactics is weighted 120 points in 1000, or .120. If the spread of the sub-course grades in tactics were twice as large as the spread of the grades in LAAA materiel and gunnery, the effective weight of the two sub-courses in determining the final grade would be approximately equal. A simpler example would be the hypothetical case in which all students received the same grade in a sub-course. If the grades in this sub-course were combined with grades in another sub-course, the sub-course in which the students all received the same grade would have no weight in determining the relative standing of the students on the composite—no matter how many points it was weighted.

A cursory inspection of grade distributions revealed no striking examples of widely varying spreads in sub-course grades. However, such inspection was necessarily limited and no sure statement can be made.

In any case, the matter of weighting should not be left to chance. The current weighting system should be revised in order to make certain that the effective weight of the various sub-courses is determined by policy rather than by happenstance.

If the spreads of the sub-course grades do vary sufficiently to invalidate the weighting procedure, several possibilities are available which will remedy this difficulty. (Technically, one possibility is to divide each sub-course weight by the standard deviation of the sub-course grades and apply the resulting weights. Another possibility is to eliminate the percentage correct system and utilize standard scores. The use of standard scores will necessitate the determination of the minimum passing score for each course separately.)

#### 4. Reporting System

Grades on individual examinations are reported to the students in terms of St(95-100), S(70-95), and W(below 70). This system gives the student only a rough idea of where he stands in the class. Grades on examinations should be reported in the quantitative form in which they are officially recorded. This information, together with the minimum passing score and the mean score of the class, will enable the student to determine exactly how he stands in the class at all times.

In reporting grades to interested authorities the following system is utilized: For officers, grade in the course and class rank (expressed as a rank order of the student in relation to the total number of students in the class) become part of the officer's permanent file. For enlisted men, the final grade that is entered on the student's permanent record is in terms of adjectival ratings as follows: Superior (94-100), Excellent (85-94), Very Satisfactory (77-85), Satisfactory (70-77). In addition, enlisted men are rated as either skilled, semi-skilled, or unskilled in their military occupational specialty (MOS).

In general, these permanent records appear to be reported in sufficient detail so that the student who wishes to do well in the Army will be reasonably motivated and so that interested authorities can make a fairly accurate assessment of the student's school success.

#### 5. Analysis of Examinations

None of the departments make any formal analysis of their examinations as a routine procedure. There is some informal item analysis of the type in which the percentage of students passing the item is tabulated, but this is minor; no item analysis is undertaken in which the percentage of students passing in high and low scoring groups is contrasted. In addition, no reliability indices or other statistics are computed on the examinations. The quality of the examinations suggests that the examinations probably exhibit a satisfactory degree of reliability.

On the whole, the individual items appear to be satisfactory. While there is no question that the introduction of routine statistical procedures to evaluate examinations would result in improved tests, the current examinations are of sufficiently good quality that such procedures are not absolutely necessary. It appears that no change in the current policy of constructing

and evaluating examinations should be introduced unless the services of an educational advisor are secured. The present system of constructing, scoring, and evaluating examinations is decentralized and reliance is placed on hand operations. To introduce statistical procedures without adequate preparation and guidance would only result in confusion and in overwork on the part of the instructors responsible for test-construction and evaluation.

## 6. Summary

The grading and evaluation system of the AA and GM School was examined in some detail and found to be basically sound. The strong points of the system are: (a) objective examinations of good quality, (b) frequent examinations, (c) efficient administration and scoring of examinations, and (d) the evaluation of the students' practical application of the material. Some weaknesses of the system that were found are: (a) possibly too many rote memory type questions, (b) lack of final examinations, (c) reporting grades to the students in too broad units, and (d) improper weighted procedures.

## II. THE DEPARTMENTS

### 1. Electronics

Two types of examination are given the electronics department: (a) a theoretical examination, and (b) a practical examination. The typical theory examination consists of some 75 multiple-choice four-alternative items. Other theoretical examinations consist of multiple-choice, concise answer questions, and problems. On the whole, the format and organization of these examinations appear to be of generally high quality. The practical examinations are four-hour tests of the students' working knowledge of the equipment. In these examinations, typical trouble is put into the equipment; the student is carefully observed and the success of his efforts to locate the trouble is evaluated. In a typical examination period, four problems are given to each student, all students getting the same problems. Instructors are rotated on these tests in order to control any personal bias. These practical examinations are excellent evaluation procedures; they appear to come very close to evaluating the ultimate job the student is supposed to be learning. If a student does well on the practical test, he may pass the course even though his performance on the theoretical examinations is below passing.

### 2. Guided Missiles

In the basic officers' course, the examinations are mostly problem type. These examinations usually contain from 10 to 15 problems requiring basic knowledge of the material for the correct solution. In addition, some multiple-choice type examinations are given. On the whole, these examinations appear to be of high quality and are quite similar to those given in the same subject at civilian colleges and universities. In the enlisted courses both theoretical and practical examinations are given in about a 1-1 ratio.

Examination grades are combined into a sub-course grade by a weighting system based on the amount of subject material covered by each

examination. As is the case of the other departments and the school as a whole, the standard deviations of the tests are not taken into account. This makes the effective weights indeterminate.

In cases in which the mean score on an examination falls considerably below 85, a linear transformation is employed which adjusts the mean to 85 while maintaining a top score of 100. This has the effect of not raising high scores to any great extent but it does bring up low scores to a point where most students are above the minimum passing score of 70.

### 3. Gunnery

At present, the Gunnery Department employs a multiple-choice four-alternative type of examination. The typical tests usually contain about 60 questions that are partly of the rote memory type and partly of the type that require some problem solving in order to arrive at the correct answer. These examinations appear to be quite adequate from a technical point of view. The same examinations are administered over and over again to successive classes, but approximately five forms of a particular examination are available in order that successive classes do not get identical tests.

Some item analysis in the form of computing the percentage of individuals checking each alternative has been carried out. However, the examinations are not systematically item analyzed as a routine procedure.

At the present time no systematic evaluation is made of the practical phase of the students' work. However, the officials of the department realize that this is a serious omission and the new program of instruction does contain tentative plans to develop examination procedures for the practical phase of student learning. Since this is a difficult problem in the gunnery field, the suggestions of an educational advisor as to how to set up such a program would probably prove to be very helpful.

### 4. Tactics

Three general types of examinations are given in the Department of Tactics: (a) the conventional multiple-choice examination, (b) work sheets that the student fills out at home, and (c) problem-type examinations that stress the application of tactical principles. While the examinations were of good quality, some of the items appeared to be too easy; and many of the items were of the rote memory type.

For example, the following two items appear so easy that it is unlikely that they are very discriminating:

#### a. From Scd No. 199, 20 August 1951.

42. In paragraph 3 of an operation order the first subparagraphs are assigned as follows:

- a. a. c. b.
- b. c. d. b.
- c. a. b. c.
- d. b. c. d.

b. From AA ABOC 34 GPB.

19. Photographic reconnaissance aviation is best suited to accomplish reconnaissance on:

- a. fixed targets.
- b. transient targets.
- c. fleeting targets.
- d. moving targets.

It should be pointed out that the incidence of such items in the examinations reviewed was minimal, and the two cited items are extreme. However, although such items were infrequent, they should be eliminated altogether.

The problem type examinations in which the students have to work out tactical problems, appear to be of excellent value in testing the student's actual grasp of tactical principles. It was felt that as much stress as possible should be placed on this type of student evaluation.

5. General Subjects

The Department of General Subjects administers the usual multiple-choice four-alternative type of examination—with some unique variations, such as sometimes asking the student to select the incorrect answer. These examinations appear to be of good quality, although a preponderance of rote memory type items was noted. This disadvantage is offset in the MOI sub-course in which the student prepares a lesson and presents the material to the class. The student is then rated by his fellow students and the instructor on the various aspects of his delivery. The impression was gained that this procedure was carefully worked out and represented an adequate evaluation of the student's teaching ability.

## III. RECOMMENDATIONS

The following recommendations are submitted:

- (a) That either some system of cumulative type examinations be inaugurated or that final examinations be given at the conclusion of a sub-course.
- (b) That grades on examinations be reported more precisely to the students. It seems desirable to give the student an opportunity to evaluate realistically his progress in course work and to encourage competition within the student body.
- (c) That the present weighting system used to combine sub-course grades into a final grade be revised. Either a standard score system should be used, or the weighting procedure previously mentioned should be adapted.
- (d) That the current procedure for constructing and evaluating examinations be continued unless the services of an educational advisor are secured. In the latter event, the educational advisor could set more elaborate procedures for constructing and evaluating examinations.

## Chapter 5

## THE STUDENT BODY

## 1. THE SELECTION OF STUDENTS

1. Introduction

It is important to note at the outset that student selection and procurement is not a function of the AA and GM School, but necessarily must be regulated by higher authority. It is recognized that many complex factors govern student selection. The attempt here is to consider the relation of current selection procedures and factors to current and future problems.

2. Department of Electronics

Students in the fire control systems maintenance courses are selected on the basis of Aptitude Area IX scores of 110 or greater. Additional prerequisites are (a) a general background in science or a standard score of 45 or higher on the GED test, parts 3A and 5A, and (b) normal color perception. Judging from the data gathered on failure rates, the aptitude area score is the most important requirement. Since a sizable number of students have come to the school with Aptitude Area IX scores of less than 110, the Electronics Department has made a tabulation of dismissals for academic failure broken down by aptitude area scores. These figures show that for the period February 1952 to June 1952, 38 per cent of those students with Aptitude Area IX scores of less than 110 were dismissed from school because of academic deficiency. This is compared with 8 per cent dismissals in the group of students whose Aptitude Area IX scores were 110 or greater. These tentative data strongly suggest that the Aptitude Area IX requirement is very important in keeping down attrition in the electronics course. However, it should be noted that if this requirement were reduced and differentiated periods of training introduced for trainees with high and low aptitudes, there would undoubtedly be an increase in the effective number of competent graduates. Still another factor to be considered is the possibility of using an Electronic Technician Selection Test recently developed for the Navy by Thorndike and Stauffer. It is possible that some students who fall below a score of 110 might still be above the critical score on this more highly specialized test. Further research on the optimum cut-off point of the selection criteria currently in use and research on other possible selection criteria is needed.

The Personnel Research Section, Personnel Research and Procedures Branch, the Adjutant General's Office, is conducting an extensive program of research under the school selection program. Under this program the relationship is being studied between the aptitude area scores and success in the

several Army schools and on-the-job proficiency. At the present time no study has been carried out specifically on the relationship between aptitude area scores and success in the radar mechanics courses of the AA and GM school. Such a study will probably eventually be made, since the program plan calls for the validation of the aptitude areas in these service schools where this is feasible.

However, the immediate problem of determining the exact quantitative relationship between Aptitude Area IX scores and grades in the electronics course remains. This information is necessary in order to determine the expected rate of attrition at various cut-off scores—information essential for a policy decision on the optimal cut-off score. Two research possibilities are open. A research project could be undertaken immediately, but such a project could not be expected to provide an answer to the relevant questions in less than one year. The second possibility lies in the fact that the Personnel Research Section has a project underway as part of the school selection program designed to determine the relationship between aptitude area scores and success as a radar mechanic at the Ordnance School. The results from this study will be forthcoming in considerably less than a year and might be used to provide the necessary data for a policy decision.

A second important problem is the selection of students with exceptional background preparation. SR 615-25-38 provides that technically qualified individuals in the field of electronics and radar be sent to Signal and Ordnance training installations. Very few reach the AA and GM School. This suggests that the distribution of such personnel should be re-examined to assure that the AA and GM School receives its proper share of these individuals. The impression was gained that with very little additional training these individuals could be converted into instructors. It is felt that such personnel would help to ensure continued high quality of instructor personnel and consequent high levels of proficiency.

One final problem results from the fact that most of the students being trained in the maintenance of fire control equipment are in the Army for a period of only two years. The assumption made in training these short-time personnel is that they will form a backlog of skilled technicians after they leave the Army. Since some evidence exists of deterioration in technical skills and knowledge with lack of use, it might be useful to give greater weight in the selection procedure to (a) the amount of future Army service, (b) the likelihood that the individual will engage in the related activities in civilian life.

The following recommendations are submitted:

- (a) That the Aptitude Area IX score of 110 or greater prerequisite for the fire control maintenance courses be retained until research evidence can be brought to bear on the problem.
- (b) That research be directed toward the problem of the optimum selection requirements and toward the possibility of having two levels of trainees that proceed through the curriculum at different rates.

### 3. Department of Guided Missiles

The prerequisites for the Officer Guided Missile Course include the equivalent of an engineering degree with work in calculus and differential equations. Although a mathematics and physics test is administered prior to training, very few are eliminated on the basis of scores on this test. There is no objective evidence as to whether the criteria for selection are appropriate. Since, in the main, only Regular Army officers are selected for this course, there is no problem with respect to usefulness to the Army of the training.

The enlisted students are selected on the basis of Aptitude Areas IX, VII, and III scores of 110 or greater. Not all students meet these requirements and there is some question whether this cut-off score is optimal. There is obvious need for research on the optimal selection requirements. As in the officer course, the enlisted students are predominantly Regular Army.

The following recommendation is submitted:

That research be directed toward the problem of optimum selection requirements for the Guided Missiles courses.

### 4. Department of Gunnery

The prerequisites for the AA and GM gunnery control course include the following: (a) credit for one year of algebra and one year of geometry or an average score of 45 or higher on the GED test with no score less than 25 on any one test; (b) normal color perception; and (c) standard score of 100 or more on Aptitude Area II. The presence in the course of students not meeting these requirements is not unusual. No objective evidence is available as to the relation between the specified requirements and failure rate.

However, there is some question as to the necessity of the requirement of credit for one year of algebra and geometry. Assuming that the necessary understanding of these subjects can be given in a fairly short time, some good possibilities may be rejected or overlooked because of lack of (a) specific training in algebra and geometry or (b) the educational background that is reflected in the GED.

The following recommendation is submitted:

That research be directed toward the problem of optimum selection requirements for the gunnery courses with special emphasis on the reduction of the formal mathematical requirement.

## II. MORALE AND MOTIVATIONAL CONSIDERATIONS

### 1. Introduction

Good morale among the students is in a large measure dependent upon good selection, so that the trainees are qualified to undertake their studies with reasonable prospects of success, and upon a program of instruction and a methodology which challenges their curiosity and stimulates a desire to master the objectives of the program. Morale is also affected, however, by living conditions, length of work week, recreational facilities, and other environmental factors. This is particularly true in a period of defense

preparation like the present when we are not engaged in an all-out war and when the civilian population is enjoying life in a normal fashion. The school has taken cognizance of the importance of these environmental factors and has made an effort to provide desirable messes and quarters, provisions for recreation, and other services for students in their off-duty hours. The survey commission is of the opinion that the following circumstances stand in the way of better morale and increased student performance.

## 2. Factors Affecting Morale and Motivation

### a. Length of school week.

The members of the survey team were unanimously of the opinion that the length of time, 39 hours, spent in the classroom and laboratory by the students was too long for efficient learning. In the typical engineering college, the student spends 20 to 25 hours in class and laboratory, plus outside study, and in the typical sub-college technical school, the school week is 30 hours plus outside study. While there is no available experimental evidence to indicate the optimum number of hours of formal classroom-laboratory work in this particular area, related psychological studies on optimum work-rest periods suggest that the present schedule is too long. The students—enlisted men, OCS candidates, and officers—expressed the opinion that they were very ineffective in the late afternoon hours, and observation confirmed this. Experimentation should be initiated with a view to ascertaining the optimum amount of class time; there is good reason to believe that 30-35 hours would be just as effective as the present arrangement.

It is possible, of course, that for administrative or other reasons no reduction in the student day can be effected, even on an experimental basis. If such is the case, research efforts should be directed toward evaluation of techniques designed for making a long day more tolerable. That the course content is highly homogeneous is a factor that would contribute to lowered efficiency. It has been established that variation of the material being learned helps to avoid monotony and maintain motivation, thus facilitating learning. The concurrent scheduling of several different subjects, the lengthening of between-class breaks, etc., might be examined for their potential effectiveness in reducing boredom and thus benefiting learning.

The following recommendation is submitted:

That experimentation be instituted with a view to determining the optimum length of formal class-laboratory time.

### b. Counseling

The system by which a student may be dropped from school is equitable; action is taken only after a sincere effort to get at the facts, giving due consideration both to the equities of the individual and to the best interest of the Service. During this process, the student is counseled and advised concerning the problems that confront him. Prior to such action, however, the counsel available to students is relatively unsystematic. It is left to the initiative of the student to contact his instructor. More systematic counsel or informal talks with students concerning their progress would

locate many problems before they became too serious and would let the student know that the school is deeply interested in his making good. Experience in civilian schools has shown that many students who need help will not ask for assistance unless there are periodic interviews with the faculty adviser or counselor.

The following recommendation is submitted:

That a system of qualified faculty advisors be established and that all students, both officer and enlisted, be interviewed periodically in regard to their educational progress and related problems.

c. Class Composition.

Some consideration should be given to the possibility of assigning students to classes in such manner as to make any given class more homogeneous in ability and background. Educational research in the past has indicated that use of homogeneous classes results in quicker and more effective training for all levels of ability.

The following recommendation is submitted:

That the instructional classes be made more homogeneous in terms of background and ability.

d. Knowledge of Standing.

The students would prefer knowing their standing on the various tests more precisely than is connoted by S (satisfactory) and U (unsatisfactory). Learning would be facilitated and the students would be better satisfied if they were given their percentile grades. In higher echelon schools there may be valid reasons for camouflaging exact grades, but it is believed these reasons do not exist at Fort Bliss.

The following recommendation is submitted:

That the present system of reporting test performances to students in terms of U (unsatisfactory) and S (satisfactory) be replaced by reports in terms of numerical grades.

e. Study Guidance.

Experience in civilian educational institutions has shown that much is gained by giving newly arrived students some orientation and instruction in how to study. The need for such assistance is particularly acute when the students have been out of school for some time. Such a program might well include such topics as: how to read more effectively, how to listen to a lecture, how to take notes, how to budget one's time, how to prepare for an examination, how to write reports, etc. From three to five hours spent on "how to study," accompanied by some practical exercises, would pay good dividends in more effective learning.

The following recommendation is submitted:

That the orientation program for new students include a short unit on "How to Study."

## Chapter 6

## OFFICER CANDIDATE SCHOOL (OCS)

## I. MISSION

The mission of the Antiaircraft Officer Candidate School is:

- (a) To prepare selected individuals for duty as officers in the Army of the United States.
- (b) To produce graduates who are prepared to serve as junior officers in AA.
- (c) To produce graduates who will be prepared with a minimum of additional training to serve as infantry platoon leaders.

## II. PROGRAM OF INSTRUCTION

The program of instruction in effect in August 1952 is in keeping with this multiple mission and is distributed as follows:

|                             | <u>Hours</u> |
|-----------------------------|--------------|
| Common Subjects             | 524          |
| Communications and Radar    | 57           |
| Guided Missiles             | 8            |
| Gunnery and Materiel        | 322          |
| Tactics and Combined Arms   | 109          |
| Reserved for the Commandant | <u>36</u>    |
|                             | 1056         |

## III. SELECTION OF STUDENTS

1. General Policy

Throughout the Army, OCS students are selected by means of criteria developed from OCS selection research conducted by the Personnel Research Section of the Adjutant General's Office.

2. Present Specific Requirements

The following requirements have been established for all OCS candidates:

- a. An Aptitude Area I score of 110 or greater
- b. A score on the Officer Candidate Test of 115 or greater

c. A critical composite leadership score based upon a biographical information blank, an evaluation report, and a board interview. Students are assigned to a particular branch by means of a system of branch classification weights determined by the board. A continuous program of research is being carried out under the OCS selection program designed to further improve the OCS selection instruments.

### 3. Attrition Rate

The rate of attrition at the AA and GM School is 40 per cent, or about the same as the over-all attrition in all OCS schools. The principal problem appears to be the reduction of the rate of attrition while maintaining high quality among OCS graduates.

#### a. "Motivational" attrition.

According to school authorities, approximately 25 per cent of the attrition is classified as due to "motivational factors." It is hard to know what this means, since the phrase "motivational factors" is sufficiently ambiguous to cover many reasons for failure. If there is a substantial number of leadership or academic failures included under this classification, then as the OCS selection techniques are improved, over-all attrition should go down and attrition presently classified as due to motivational factors should also decrease.

#### b. Attrition de rigueur.

An important aspect of the problem of reducing the attrition rate is the ever-present danger that the 40 per cent attrition will come to be regarded as de rigueur by school officials irrespective of the quality of incoming students. This is not to suggest that such a situation exists at the AA and GM OCS. On the contrary, school authorities seemed to appreciate qualitative differences in incoming classes. However, the order of merit type of student evaluation lends itself to this kind of error.

#### c. Attrition dependent upon academic background.

Another aspect of the problem of attrition is the report that students with college experience stand a much better chance of succeeding than students who have no college experience. According to OCS officials, about 78 per cent of college students are successful, while only 45 per cent of high school graduates are able to complete the course. Again the question arises of what is involved in these data. Does college experience apply only to academic work or is it involved in some way in leadership success?

#### d. Attrition dependent upon physical condition.

There is evidence that some students are eliminated from the school for physical deficiencies which existed at the time they were selected for OCS. This situation should be corrected.

#### IV. ACADEMIC EVALUATION

##### 1. Type of Examination

For the most part the OCS Department employs the usual multiple-choice type of examination. The quality of these examinations is reasonably good, although as in some of the other departments a few of the items appear to be too easy.

##### 2. Grade Records

The OCS is unique among departments in that it keeps its own complete grade records and computes the student's final grade. The procedures used to compute the student's final grade differ from those utilized by the AA and GM School as a whole in that the OCS makes more extensive use of rank order techniques. Final academic grades are obtained by a weighting system very similar to that used by the school as a whole except that the weights add up to 500. Final academic grades are converted to ranks and combined with the order of merit rankings and physical proficiency ranking to arrive at over-all class standing. Academic rankings are weighted 500, leadership rankings 400, and physical proficiency 100 points.

#### V. LEADERSHIP EVALUATION

##### 1. Weight

The evaluation of leadership ability is regarded as one of the most important activities of the OCS school. A great deal of thought and effort has gone into the present leadership evaluation system and on the whole it appears to be sound.

##### 2. Responsibility

Each incoming OCS class is assigned to an instructor team consisting of several officers. These officers remain in charge of the class throughout the training and are responsible for the leadership evaluations on that class. Each class is broken down into platoons with one officer in charge of each platoon.

##### 3. Mechanics

After 4 weeks of training the platoon officer rates the candidates on the following five traits:

- a. Attitude
- b. Attention to duty
- c. Command presence
- d. Leadership and force
- e. Judgment.

These ratings are averaged and converted in order of merit. At the same time each candidate is rated by every other candidate in his platoon in terms of his relative order of merit on leadership ability. These peer ratings appear to be a very valuable part of the evaluation system, being weighted 40 per cent in the final order of merit on leadership.

#### 4. Periodicity

The above ratings and rankings are made at the end of 4, 10, 16, and 20 weeks. The officers of the instructor team are rotated among the platoons in such a way that each student is rated once by every officer. It is seen that the frequency of the ratings ensures that each student is rated a sufficient number of times. However, there may be some question about the independence of the ratings. In general the platoon officers should exert every effort to make independent ratings. They should not consult the candidate rankings or previous order of merit in making their evaluations.

#### 5. Instructor Reaction—and a Problem

The interest and enthusiasm for their work shown by OCS instructors was impressive. The feeling was repeatedly expressed by the OCS officers interviewed that the present evaluation system was just about the best obtainable. This high degree of interest and enthusiasm may, however, have created one problem which is very difficult to put into words. The problem seems to be the unwillingness on the part of the OCS instructor to tolerate the essential ambiguity of leadership evaluations. The impression was gained that the officers tended to "make up their minds" too quickly about a candidate's leadership potential. Also, it appeared that a premium was being placed upon agreement among raters. All of these tendencies are natural and serve to reduce the ambiguity of the situation. It is suggested that an attitude of "provisional judgment" be cultivated so that a candidate will not be judged deficient by one or two dramatic incidents.

### VI. GENERAL OBSERVATIONS AND IMPRESSIONS

The school gives the impression of being a conventional OCS of the better type with much emphasis upon disciplinary values and the acquisition of a mass of knowledge deemed essential for a junior officer. Half the time is spent on common subjects and half on AA doctrine. The amount of material covered in the 48-hour school week is prodigious and in view of the rote nature of much of this material, it is hard to estimate how much is retained by the officer six months after graduation. There is little emphasis upon originality of thinking and creativity of mind, qualities which may in the future determine the success or failure of antiaircraft artillery and guided missile weapon systems. The emphasis is largely upon turning out a well disciplined officer of the Army of the United States with a knowledge of antiaircraft and guided missiles equivalent to that of the Associate Basic Officers' Course.

Most of the materials of instruction are adapted from official military publications and lesson plans available from other schools and involve little research on the part of the instructor or use of library reference materials. There is no library in OCS other than a collection of official military publications. All lesson plans are reviewed by the Office of the Coordinator of Instruction before being approved for presentation. Extensive use is made of visual aids and it was reported that the Department of Non-resident Instruction, which supplies such materials, is most cooperative in enabling OCS to meet the deadlines imposed by the newness of the program.

The school has made commendable efforts to benefit from a wide survey of practices in other officer candidate schools and has devoted much time and effort to develop a system of evaluating the leadership potentialities of its candidates. It has developed an officer candidate board plan which makes every effort to protect the equity of the candidate who is being considered for possible dismissal and at the same time to give due concern to the needs of the Service.

The school has made a real effort to make effective use of the officer instructors assigned to it, most of whom have had no previous teaching experience or particular qualifications for instructional duties. They are given the minimum training in preparation of materials and methods of instruction before facing a class. The rapid turnover of instructors, the average length of duty to date being five months, interferes seriously with the maintenance of high standards of instruction. About the time a teacher begins to be competent, he is replaced by a new instructor who has to start from scratch. This may be inevitable under present conditions but its seriousness cannot be minimized. To complicate matters further, to date there has been relatively little supervision of classroom instruction although it is planned to view an instructor's performance in its entirety each month. The teaching load of 15 hours per week is excessive for inexperienced instructors.

A questionnaire follow-up of the graduates of three classes that have been out of school at least four or five months has been completed in an effort to ascertain what the graduates think of the training which they received in OCS. Comments and suggestions were solicited as a guide to future planning. It is planned to supplement this questionnaire study by sending teams to interview recent graduates and their commanding officers and thus obtain further insight into how well the school is preparing its graduates to perform their duties as officers. This approach is a commendable one and should result in a continuous improvement in the program. This research attitude is further evidenced by cooperation with the Army Field Forces Human Research Unit No. 2, Ft. Ord, California (which is part of the HumRRO program), on studies of student attitude and morale. One study recently completed showed that of the officer candidates who did not specify AA and GM as a first or second choice of OCS school, 70 per cent were satisfied with being at the school, 20 per cent were mildly disappointed, and 10 per cent were definitely disappointed.

The progressive attitude of the school is reflected in such recent developments as the following:

1. Use of civilian guest speakers to broaden the scope of the curriculum.
2. Trips to White Sands Proving Ground for purposes of observation.
3. Further exploration of concurrent scheduling as a means of promoting more effective learning.
4. Use of diagnostic test in mathematics preliminary to instruction in this field.
5. Consideration of the possibility of homogeneous grouping so that more capable sections could have an enriched program of instruction.

## VII. RECOMMENDATIONS

- (a) That the tour of duty as instructor be increased from the present average of five months to at least the duration of a class and preferably to the length of two classes.
- (b) That the Coordinator of Instruction be allotted additional qualified personnel, that there may be more adequate supervision of actual classroom situations.
- (c) That students at time of admission be carefully screened for compliance with established admission criteria and that any failure to meet these standards be reported promptly.
- (d) That the present interest of the school in pre-testing prior to the teaching of mathematics be extended to other areas and that an attempt be made to section on the basis of past knowledge and learnability.
- (e) That the school be commended for its follow-up studies of its graduates and that such studies be continued and expanded.
- (f) That the system of academic evaluation now in effect be continued until the modifications suggested in Chapter V for the AA and GM Branch of the Artillery School be put into effect.
- (g) That the commendable system of leadership evaluation now in effect be improved by greater effort to secure independent ratings and to regard early ratings as but tentative until confirmed by subsequent observations.
- (h) That in view of the present crowded curriculum, continuous effort be made to eliminate or reduce non-functional material, that there may be more time for applicatory exercises in basic knowledge.

**Appendix A**  
**AUTHORIZATION**

Copy

OFFICE, CHIEF OF ARMY FIELD FORCES  
Fort Monroe, VirginiaSUSPENSE  
DATE: 20 Apr 52

ATTNG-32 352

SUBJECT: School Survey by Civilian Educators and Technicians

TO: Assistant Commandant  
The Artillery School  
Antiaircraft and Guided Missile Branch  
Fort Bliss, Texas

1. This Office has information that the Department of the Army can provide a special survey team composed of highly qualified civilian educators and technicians to visit Army Service Schools. Recent surveys have been made with excellent results at the Command and General Staff College and the Provost Marshal General's School. These surveys yielded suggestions and advice regarding length of various courses, improvement in current teaching methods, and adequacy and reduction of non-essential instruction.

2. Such a survey can be conducted at the Antiaircraft and Guided Missile Branch of The Artillery School and it is expected that it will produce results similar to previous surveys mentioned above. It is anticipated that by this means research requirements of Army Service Schools can be identified and assigned to various research and development agencies of the Department of the Army for implementation. Considering the complexity of antiaircraft fire control equipment and the advent of guided missiles in the Army, it is believed that such a survey would be most fruitful and of considerable assistance to the school. It is requested that this Office be informed by 20 April, whether a requirement exists for such a survey. Dates for the visit, convenient to the addressee, composition of the survey team by specialty and other appropriate recommendations should be indicated.

FOR THE CHIEF OF ARMY FIELD FORCES:

W. H. MELHORN  
Lt Col, AGC  
Asst Adj Gen

Copy

AKBAADI-2 352 (2 Apr 52) 1st Ind  
 SUBJECT: School Survey by Civilian Educators and Technicians

Antiaircraft and Guided Missiles Branch, The Artillery School, Fort Bliss, Texas.

TO: Chief, Army Field Forces, Fort Monroe, Virginia

1. It is felt that a survey team such as that described in par 1, basic letter could be of considerable service to this school.

2. It is recommended that the team contain as a minimum the following type personnel:

- 1 Vocational Education Expert - General
- 1 Vocational Education Expert in Electronics Training
- 1 Expert in Tests and Measurements
- 1 Expert in Teaching Methods
- 1 Expert in the preparation and use of graphic aids

3. It is suggested that this team, if available, plan to visit this school between 1 June 1952 and 31 July 1952. If these dates cannot be met any other dates will be satisfactory, provided they are made known to the school 30 days in advance of the visit.

FOR THE ASSISTANT COMMANDANT:

KENNETH A EDDY  
 Lt Col Arty  
 Secretary

ATTNG-31 352 (2 Apr 52) 2nd Ind

Office, Chief of Army Field Forces, Fort Monroe, Virginia

TO: Assistant Chief of Staff, G1, Department of the Army, Washington 25, D.C. ATTN: Human Relations and Research Branch

1. Attention is invited to preceding Indorsement.
2. This Office concurs in the composition of the team as recommended in paragraph 2, 1st Indorsement to basic letter.

Copy

ATTNG-31 352 (2 Apr 52) 2nd Ind (Cont'd)  
SUBJECT: School Survey by Civilian Educators and Technicians

3. Subject to the availability of the team, it is requested that this Office be informed as soon as practicable as to what dates the team will visit the Antiaircraft and Guided Missile Branch, The Artillery School at Fort Bliss, Texas.

FOR THE CHIEF OF ARMY FIELD FORCES:

P.C. CASPERSON  
Major, AGC  
Ass't Adj Gen

G1 061.2 Arty Sch ( 26 Apr 52) 3d Ind  
SUBJECT: School Survey by Civilian Educators and Technicians

Office, ACoS, G-1, Department of the Army, Washington 25, D. C.

TO: Director, Human Resources Research Office, Box 3596, Washington, D.C.

Request that, in conjunction with the Personnel Research Section, AGO, you explore the subject school survey described in the preceding correspondence and submit a plan of implementation.

FOR THE ASSISTANT CHIEF OF STAFF, G-1:

CHARLES W. HILL  
Colonel, GS  
Chief, Human Relations & Research Br.

Copy

SN: 4181  
 Dr. Braun/74928/ac  
 Typed: 1 May 1952

G1 061.2 Arty Sch  
 (26 Apr 52)

School Survey by Civilian Educators  
 and Technicians

TAG  
 ATTN: PR&P Br.

ACofS, G-1

Dr. Braun/74928/ac

1. Reference is made to informal discussions between representatives of your Office, the Human Resources Research Office, and this Office regarding a survey of Army Service Schools by civilian educators and technicians, to provide these Schools with suggestions and advice if needed, and to identify research requirements for implementation by appropriate Department of the Army agencies.

2. Office, Chief of Army Field Forces and The Artillery School have indicated a requirement for such a survey, and the correspondence has been forwarded by this Office to the Human Resources Research Office.

3. It is requested that in conjunction with the Human Resources Research Office you explore the requirements and submit a plan of implementation.

FOR THE ASSISTANT CHIEF OF STAFF, G-1

CHARLES W. HILL, Colonel, GS  
 Chief, Human Relations & Research Br.

#### MEMORANDUM FOR RECORD:

1. Background:

a. Ltr frm OCAFF to Arty Sch, subj. as above, dtd 2 Apr 52, file ATTNG-32 352, stating that D/A can supply team of civilian educators and technicians to visit Army Service Schools for advisory purposes and to identify research requirements. Further inquiring whether requirement exists for survey.

b. 1st Ind frm Arty Sch to OCAFF, subj. as above, dtd 16 Apr 52, file AKBAADI-2 352 (2 Apr 52) stating requirement for subject Survey, making recommendations regarding composition of team, and indicating preferable dates of visit.

## Copy

c. 2d Ind frm OCAFF to G-1, subj. as above, dtd 26 Apr 52, file ATTNG-31, 352 (2 Apr 52) concurring in composition of team and requesting info on dates of visit.

2. Discussion:

DF to TAG requesting them to submit plan of implementation in conjunction with HumRRO. Cy this action furnished HumRRO.

3. Coordination: None required.

4. Copy not required for ALTERNATE HEADQUARTERS.

Appendix B

**PROFESSIONAL QUALIFICATIONS  
OF MEMBERS OF THE SURVEY COMMISSION**

**Mitchell Drees**

B.S., M.A., Ph.D., Columbia University

*Present Positions*

The George Washington University: Dean, College of General Studies;  
 Professor, Educational Psychology  
 Department of the Army: Consultant  
 Department of the Navy: Consultant  
 The United States Employment Service: Consultant

*Previous Positions*

Grinnell College, Iowa: Director of Personnel  
 Works' Progress Administration: Consultant  
 Owen D. Young's Committee on War-Time Requirements for Specialized  
 Personnel: Consultant; Sub-Committee on Organization of the War  
 Manpower Commission: Chairman  
 Federal Council of Personnel Administration: Consultant  
 Fort Leavenworth, Kansas; Camp Lee, Virginia; and the Air University:  
 Member of survey commissions conducting educational surveys  
 American Council on Education: Consultant  
 Veteran's Administration College Counseling Centers: Study Director  
 U.S. Office of Education: Consultant  
 War Department General Staff, Research and Development Division:  
 Consultant  
 International Institute for German Educators, Weilburg/Lahn, Germany:  
 Chairman

*Professional Activities*

American Psychological Association  
 Diplomate in Counseling and Guidance  
 President of Division of Counseling and Guidance  
 American Educational Research Association  
 Southern Society for Psychology and Philosophy  
 American College Personnel Association  
 National Vocational Guidance Association  
 American Association of University Professors  
 Phi Delta Kappa, Omicron Delta Kappa

Judson S. Brown

B.A., Redlands; M.A., University of California at Los Angeles; Ph.D.,  
Yale University

*Present Position*

State University of Iowa: Professor, Department of Psychology

*Previous Positions*

Harvard University: Instructor

Yale University: Instructor

AAF School of Aviation Medicine: Aviation Psychologist

*Professional Activities*

American Psychological Association

Midwestern Psychological Association

Society of Experimental Psychologists

Sigma Xi

**George F. Corcoran**

B.S., South Dakota State College; M.S., University of Minnesota

*Present Position*

University of Maryland: Professor and Chairman, Electrical Engineering  
Department

*Previous Positions*

Kansas State College: Assistant Professor, Electrical Engineering  
The State University of Iowa: Professor, Electrical Engineering

*Professional Activities*

American Institute of Electrical Engineers  
Institute of Radio Engineers  
American Society for Engineering Education  
American Association of University Professors  
Sigma Xi, Tau Beta Pi, Eta Kappa Nu, Sigma Tau

**William J. Micheels**

B.S., The Stout Institute; M.A., Ph.D., University of Minnesota

*Present Positions*

University of Minnesota: Professor, Industrial Education  
Office of Naval Research: Advisory Panel on Personnel Training  
National Standard Parts Association, Chicago: Consultant

*Previous Positions*

Department of the Army and Department of State: Visiting Expert to Germany  
Office of Defense Transportation: Assistant Director, Manpower Division;  
Chief, Program Planning Section; Chief, Personnel Training Section  
Fort Knox, Kentucky: Assistant Director, Instructor Training Department  
Public Schools of Montana and Minnesota: Teacher

*Professional Activities*

American Vocational Association  
National Education Association  
National Association of Industrial Teacher Educators  
National Society for the Study of Education  
Phi Delta Kappa

**Robert G. Osburn**

**B.S., Ph.D., University of Michigan**

*Present Position*

**Department of the Army: Research Psychologist, Personnel Research  
Section, AGO**

*Previous Positions*

**Veterans' Administration Hospital, Ft. Custer, Michigan: Clinical  
Psychology Trainee**

**Detroit Mental Hygiene Clinic, Detroit, Michigan: Clinical Psychology Trainee**

**University of Michigan Counseling Center, Ann Arbor, Michigan: Student  
Counselor**

*Professional Activities*

**American Psychological Association  
Sigma Xi**

**Donald J. Lewis**

**B.A., M.A., University of California at Los Angeles; Ph.D., University of Southern California**

*Present Position*

**Northwestern University: Assistant Professor, Psychology Department**

*Previous Positions*

**The George Washington University, Human Resources Research Office:  
Research Scientist**

**Department of the Navy: Research Psychologist**

**Northwestern University: Carnegie Teaching Associate**

**Psychological Research Center: Assistant Project Director**

*Professional Activities*

**American Psychological Association**

**Western Psychological Association**

**W. Wilson Taylor**

University of South Carolina; Southern College; Eastport Art School; Ennis Art School; New York School of Fine and Applied Art; American University

*Present Positions*

Creative Arts Studio, Inc., Washington  
Department of Defense: Designer, Producer, Writer of Instructional Aids  
Abbott Art School, Washington: Instructor

*Previous Positions*

Free Lance Designer, New York  
Lit Brothers Advertising Department, Philadelphia  
Washington Daily News, Washington  
Vocafilm Corporation, New York  
Jim Handy Organization, Detroit

*Professional Activities*

American Institute of Graphic Arts  
Washington Film Council

## Appendix C

**THE STUDENT QUESTIONNAIRE**

The actual format of the questionnaire (with the exception of code numbers) given to a sample of students in the Department of Electronics is presented in this appendix. The figures in the blank spaces represent the percentage of students checking each answer. The total percentages for each question may vary from 99 to 101 due to rounding. The results are discussed in Appendix D.

## QUESTIONNAIRE FOR STUDENTS

FT. BLISS, TEXAS

WHAT WE WANT YOU TO DO

1. THIS IS NOT A TEST . . . Your answer to most of these questions is just a matter of giving your own opinion. In these questions there are no "right" or "wrong" answers—the only answer to give is the one you think is best.
2. Do not sign your name to this questionnaire. We don't want to know who you are. We do want to know what you think.
3. Read each question carefully to make sure you understand it before giving your answer. If you do not understand it, ask the man in charge to explain it.
4. Be sure to mark some answer to every question. It is important that you do not skip any of the questions.

How to Answer These Questions

Most of these questions have several different answers printed right after the question. In front of each answer is a line like this: \_\_\_\_\_. Read all the answers under the question, then put a check mark, like this   ✓   in front of the answer you pick.

DEPARTMENT OF THE ARMY  
HUMAN RESOURCES RESEARCH OFFICE  
WASHINGTON, D.C.

SURVEY 401-A

1. How many months have you been continuously in the Army this time?

\_\_\_\_\_ months.

2. How did you come into the Army this time? (check one)

61 Drafted.  
30 Volunteered.  
6 In the National Guard.  
2 Voluntary recall from the Reserves.  
1 Involuntary recall from the Reserves.

3. Before you came to this school, how did you like being in the Army?  
 (check one)

13 I liked it a lot.  
28 I liked it all right.  
31 I did not like it very much.  
28 I do not like it at all.

4. How do you like being in the Army now? (check one)

12 I like it a lot.  
40 I like it all right.  
30 I do not like it very much.  
18 I do not like it at all.

- 4a. Why do you feel this way about being in the Army? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

5. How long have you been going to classes at this school? (check one)

1 Less than two weeks.  
22 From two weeks to two months.  
43 From two to six months.  
34 More than six months.

6. When you came to this school, what kind of outfit did you come from?  
 (check one)

64 From basic training.  
33 From an organized unit.  
1 From another school (which one? \_\_\_\_\_)  
2 From somewhere else (where? \_\_\_\_\_)

7. Before you came here to school, did any of your officers or non-coms tell you anything about the school? (check one)

67 Yes, someone told me about it.  
30 No, no one told me about it.  
3 I don't remember.

8. Did you want to come to this school? (check one)

48 Yes, very much.  
34 Yes, quite a bit.  
13 It didn't make much difference to me.  
2 No, not very much.  
2 No, not at all.

- 8a. Why did you feel this way?

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

9. Did you yourself do anything to try to get the assignment to this school? (check one)

63 Yes, I did.  
37 No, I did not.

10. When you first found out you were coming here, how did you feel about it? (check one)

75 Pretty good.  
2 Not so good.  
21 In some ways good, in other ways not so good.  
2 It didn't make much difference to me.

11. At that time, would you have preferred a different assignment in the Army? (check one)

24 Yes, I would have preferred a different assignment.  
 (What? \_\_\_\_\_)  
72 No, I would not have preferred a different assignment.  
4 I do not remember.

12. Before you began classes, you probably heard some talk about the school. What kind of place did it sound like? (check one)

|           |                                           |
|-----------|-------------------------------------------|
| <u>28</u> | Very good.                                |
| <u>39</u> | Good.                                     |
| <u>21</u> | About fifty-fifty.                        |
| <u>4</u>  | Not so good.                              |
| <u>1</u>  | Pretty bad.                               |
| <u>7</u>  | I didn't hear anything about this school. |

13. Now that you have been here for a while, how do you feel about the school? (check one)

|            |                         |
|------------|-------------------------|
| <u>31</u>  | I like it very much.    |
| <u>56</u>  | I like it all right.    |
| <u>12</u>  | I don't like it much.   |
| <u>- 2</u> | I don't like it at all. |

14. When do you expect to finish your training at the school? (Your best guess will be all right.)

In \_\_\_\_\_ weeks.

15. What are you most likely to do after you finish your training here? (check one)

|           |                                                          |
|-----------|----------------------------------------------------------|
| <u>20</u> | Go back to my old outfit.                                |
| <u>63</u> | Go to some organized outfit, but I don't know which one. |
| <u>2</u>  | Go to another Army training school.                      |
| <u>1</u>  | Go to OCS.                                               |
| <u>3</u>  | Stay here as an instructor.                              |
| <u>11</u> | Something else (What? _____)                             |

16. Is the job you are being trained for the best job in the Antiaircraft for you? (check one)

|           |                                                              |
|-----------|--------------------------------------------------------------|
| <u>72</u> | It is probably the best one for me.                          |
| <u>21</u> | It is not the best, but better than most for me.             |
| <u>6</u>  | It is not the worst, but many others would be better for me. |
| <u>1</u>  | It is probably the worst one for me.                         |

17. If you had a choice, would you prefer the job you are being trained for now or some other job in the Antiaircraft? (check one)

|           |                                                                           |
|-----------|---------------------------------------------------------------------------|
| <u>74</u> | I would prefer the one I have now.                                        |
| <u>11</u> | I would prefer a different job in the Antiaircraft.<br>(Which one? _____) |
| <u>15</u> | I don't know.                                                             |

17a. What is there about that job that makes you prefer it? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

18. Before you came here, did you have any technical knowledge of the kind you are being taught here? (check one)

- 6 I had a lot of technical knowledge.
- 37 I had a little technical knowledge.
- 57 I had no technical knowledge.

19. Before you came into the Army, were you interested in the kind of work you are now being trained to do? (check one)

- 39 I never thought about it.
- 23 I was very interested.
- 25 I was a little interested.
- 13 I was not interested.

20. Do you think your previous civilian training and experience will be useful in the work you will have to do in your Army job? (check one)

- 38 I had no civilian training or experience that would be useful in my Army job.
- 11 Yes, very useful.
- 18 Yes, somewhat useful.
- 15 Yes, slightly useful.
- 12 No, not useful at all.
- 6 I don't know.

21. After you graduate from this school, do you think your next assignment will be in the job for which you are being trained here? (check one)

- 17 I am sure it will be.
- 57 I think it will be, but I am not sure.
- 5 I think it will not be.
- 2 I am sure it will not be.
- 20 I have no idea.

26. Has your experience at this school so far helped you decide what you are going to do after your time is up? (check one)

56 Yes, it has helped me decide.  
44 No, it has not helped me decide.

27. Do you think the training you have had here will be of any real practical value to you in the work you expect to do after you get out of the Army? (check one)

44 Great practical value.  
23 A little practical value.  
10 No practical value.  
24 I don't know yet.

28. Do you think you had enough schooling before you came to this school to be able to handle the work here? (check one)

53 Yes, I had enough schooling.  
32 No, I did not have enough schooling.  
15 I am not sure.

29. In general, how would you rate most of the courses you have had at this school, so far? (check one)

1 Very easy.  
20 Fairly easy.  
67 Fairly hard.  
11 Very hard.

30. How much of your own free time, on the average, do you spend in studying or going over your work with other students? (check one)

39 A lot.  
56 A little.  
5 None.

31. In your opinion, how many of the students at this school seem to be really interested in getting the training here? (check one)

27 Almost all of them.  
44 Over half of them.  
22 Less than half of them.  
7 Only a few of them.

32. What about yourself? How interested are you in getting the training here? (check one)

- 60 Very much interested.
- 32 Fairly well interested.
- 6 Only a little interested.
- 2 Not at all interested.

33. Would you say that you are the type of person who likes studying and going to school? (check one)

- 26 Yes, very much so.
- 53 Yes, somewhat.
- 17 No, not very much.
- 3 No, not at all.
- 1 I don't know.

34. Do you think the training you are getting at this school will help you get ahead in the Army? (check one)

- 49 It will probably help me a lot to get ahead in the Army.
- 32 It will probably help me a little to get ahead in the Army.
- 4 It will probably not help me at all to get ahead in the Army.
- 13 I have no idea whether it will help me or not.
- 2 It will probably hold me back in the Army.

35. Compared to the grades the others have been getting, on the average, what kind of grades have you been getting? (check one)

- 12 Among the highest.
- 27 Fairly high.
- 49 About average.
- 10 Somewhat low.
- 1 Very low.

36. Do you enjoy working out practical problems, for example, trouble-shooting on equipment, etc.? (check one)

- 67 Yes, very much.
- 25 Yes, a little.
- 4 No, not much.
- 2 No, not at all.
- 2 Don't know.

37. A student coming to this school has to do a number of things, some of them hard and some of them easy. What about you? What things have you found hard, what things easy? Look at each item on the list below and show with a check mark how much trouble it has given you.

a. Learning how to study all over again. (check one)

25 A lot of trouble.  
44 A little trouble.  
31 No trouble.

b. Reading (check one)

6 A lot of trouble.  
28 A little trouble.  
66 No trouble.

c. Understanding theory. (check one)

25 A lot of trouble.  
54 A little trouble.  
21 No trouble.

d. Learning from lectures. (check one)

10 A lot of trouble.  
55 A little trouble.  
35 No trouble.

e. Mathematics. (check one)

17 A lot of trouble.  
32 A little trouble.  
51 No trouble.

f. Learning technical terms. (check one)

10 A lot of trouble.  
42 A little trouble.  
49 No trouble.

g. Staying awake in class. (check one)

17 A lot of trouble.  
39 A little trouble.  
44 No trouble.

h. Studying electronics without any scientific or technical background. (check one)

32 A lot of trouble.  
48 A little trouble.  
19 No trouble.

(Continued in next column)

- i. If you have any comments about anything else that has given you trouble, write them here: \_\_\_\_\_

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38. Do you enjoy working out theoretical problems, for example, mathematical problems, etc.? (check one)

44 Yes, very much.  
36 Yes, a little.  
16 No, not much.  
3 No, not at all.  
0 Don't know.

39. In the course you have had thus far at this school, would you say you have been able to learn more from the labs or more from the lectures? (check one)

32 More from the labs.  
34 More from the lectures.  
32 About the same from both.  
1 Don't know.

40. You probably feel that if some changes were made in the school you would be learning more and doing better work here. Look at each of the four things listed below and check whether you think it needs a lot of improvement, some improvement, or no improvement at all. Be sure and check something for each one.

a. The lectures (check one)

14 Need a lot of improvement.  
74 Need some improvement.  
11 Need no improvement.

b. The laboratories (check one)

25 Need a lot of improvement.  
61 Need some improvement.  
14 Need no improvement.

c. The instructors (check one)

16 Need a lot of improvement.  
70 Need some improvement.  
14 Need no improvement.

d. The training manuals (check one)

34 Need a lot improvement.  
51 Need some improvement.  
15 Need no improvement.

41. In general, how do you feel about the lectures or conferences in the courses here? Read each of the questions below and check the comment that is most nearly like your own opinion on the matter. Be sure and check some answer for each question.

a. Are the lectures usually interesting? (check one)

52 Almost always.  
46 Only sometimes.  
2 Almost never.

b. Do the lectures usually cover the subject thoroughly? (check one)

6 Too thoroughly.  
61 About right.  
32 Not thoroughly enough.

c. Do the lectures usually cover the subject at the right speed? (check one)

66 Usually too fast.  
31 Usually about right.  
2 Usually not fast enough.

d. Do the lectures usually seem to be well organized? (check one)

26 Very well organized.  
69 Fairly well organized.  
4 Not well organized.

e. How much theory is there in the lectures? (check one)

32 Too much.  
58 About the right amount.  
9 Not enough.

f. Is there enough student participation and discussion? (check one)

35 Not enough.  
62 About the right amount.  
3 Too much.

g. Are there enough demonstrations? (check one)

1 Too many.  
52 About right.  
47 Not enough.

h. Are the demonstrations usually helpful? (check one)

60 Very helpful.  
37 Somewhat helpful.  
2 Not helpful.

(Continued in next column)

i. If you have any comments of your own about the lectures, write them here: \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

42. From your experience so far, how do you feel about the laboratory periods at the school? Read the questions below and check for each one the comment which is most like your own opinion on the matter. Be sure and check something for each one.

a. Is enough of the course-time spent in laboratory work? (check one)

- 36 More of the time should be spent in labs.  
57 About the right amount of time is spent in labs.  
7 Too much time is spent in labs.

b. Are your laboratory classes too large? (check one)

- 48 They are too large.  
51 They are about right.  
1 They are too small.

c. How much of the laboratory equipment is so beat up that you cannot learn much from it? (check one)

- 5 Almost all of it.  
47 Some of it.  
48 Very little of it.

d. How much of the time does it seem that the laboratory exercises are not tied in with the lectures? (check one)

- 4 Most of the time.  
26 Some of the time.  
70 Very little of the time.

e. How much material is covered in the average laboratory session? (check one)

- 12 Too much.  
69 About the right amount.  
19 Not enough.

f. If you have any comments of your own about the laboratories, write them here: \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

43. Have you had the course in basic electronics at this school? (check one)

80 Yes.  
20 No.

44. If you have had the course in basic electronics at this school, do you think it contained: (check one)

20 Too much theory?  
52 The right amount of theory?  
12 Not enough theory?  
16 I did not have this course.

45. If you have had the course in basic electronics, do you think it was good preparation for the courses you have had since then? (check one)

31 Very good.  
34 Pretty good.  
8 Just good enough.  
4 Not good.  
0 Very poor.

23 I did not have this course.

46. Why do you feel this way about the course in basic electronics?

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

47. Are there any parts of the course in basic electronics that, in your opinion, were unnecessary or could have been left out?

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

48. As a student at the school, have you been taught so far mostly by enlisted instructors or mostly by civilian instructors? (check one)

1 Only by enlisted instructors.  
7 Mostly by enlisted instructors, some by civilians.  
24 About the same by both.  
65 Mostly by civilian instructors, some by enlisted.  
3 Only by civilian instructors.

49. Do you, in general, prefer enlisted instructors or civilian instructors?  
(check one)

- 3 I have not been here long enough to have any preference.  
6 I prefer enlisted instructors.  
63 I prefer civilian instructors.  
29 I have no preference one way or the other.

50. In your experience, do the civilian instructors know their subject?  
(check one)

- 32 All of them do.  
64 Most of them do.  
4 A few of them do.  
0 None of them do.  
0 Cannot say.

51. In your experience, do the enlisted instructors know their subject?  
(check one)

- 18 All of them do.  
53 Most of them do.  
25 A few of them do.  
0 None of them do.  
4 Cannot say.

52. If you have any other comments about the instructors at this school,  
write them here:

---



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---



---

53. In general, have you found that the Training Manuals used here are  
helpful? (check one)

- 30 Very helpful.  
47 Fairly helpful.  
20 Slightly helpful.  
3 Not helpful at all.

54. How could the Training Manuals be improved to make them more helpful?

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55. From your experience so far in the school, how confident are you that you will be able to handle the work of your job after you graduate? (check one)

|           |                       |
|-----------|-----------------------|
| <u>19</u> | Very confident.       |
| <u>62</u> | Fairly confident.     |
| <u>12</u> | Not confident at all. |
| <u>6</u>  | Don't know.           |

56. Have you been asked many of these same questions in a personal face-to-face interview any time in the last three months? (check one)

|           |             |
|-----------|-------------|
| <u>7</u>  | Yes.        |
| <u>91</u> | No.         |
| <u>1</u>  | Don't know. |

57. If you have any other comments or criticisms of this school, write them here: \_\_\_\_\_

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Appendix D

DISCUSSION OF STUDENT QUESTIONNAIRE DATA

## STUDENT QUESTIONNAIRE

### I. ADMINISTRATION

In order to gain a better insight into student attitudes, satisfactions, and dissatisfactions toward the school, a student attitude questionnaire was prepared by HumRRO for administration at Fort Bliss. The questionnaire contained both multiple-choice items and direct questions which the students were free to answer. This questionnaire was given to one-third of all of the enlisted students in the Integrated Fire Control System Maintenance Courses in the Department of Electronics. These students were selected at random from the total group of 1,342 enlisted students enrolled in the classes listed below:

- Artillery Fire Control System Maintenance (Scope A)  
No. 6, 7, 8, 9, 10, 11, and 13
- Artillery Fire Control System Maintenance (Scope B)  
No. 6, 7, 8, 9, 10, 11, 12, 13, and 14
- Artillery Fire Control System Maintenance (Scope C)  
No. 6, 7, 8, 9, 10, 11, 12, and 13
- Artillery Fire Control System Maintenance (Scope D) Counter Mortar Radar  
No. 4, 5, and 6
- Guided Missile Fire Control System Maintenance, NIKE  
No. 1, 2, 3, and 4
- Guided Missile Fire Control System Maintenance, CORPORAL  
No. 2, 3, 4, 5, and 6
- Guided Missile Integrated Fire Control System Maintenance, TERRIER-  
No. 2

The instructions given by the test administrators to the students stressed: (a) that no one at the school would see the individual answers, and (b) that the various comments and evaluations that the students gave in filling out the questionnaire would very likely bring about changes in the school. In order to emphasize the anonymous nature of the questionnaire, the students were specifically told not to put their names anywhere on the questionnaire.

For administrative reasons ten different testing sessions were necessary. Several students who were unable to attend the regular testing sessions completed the questionnaire later. Owing to cooperation on the part of the personnel of the school, 417 of the 445 students, or 94 per cent of those that had been selected, completed the questionnaire. The large percentage of participation by the selected population ensured that the responses on the questionnaire adequately reflected student attitudes.

### II. RESULTS AND DISCUSSION

#### 1. General

The student attitude questionnaire was designed to obtain information about several general areas. These were: (a) previous interest and knowledge of field, (b) desire for assignment to antiaircraft school and present

feeling of assignment adequacy, (c) major individual difficulties in learning, (d) criticisms of school procedure and equipment, (e) civilian usefulness of training.

In order to analyze the spontaneous (written-in) responses to the direct questions, 100 questionnaires were randomly selected from the total number representing the Radar Scope Courses. Control was exercised only to ensure that the number of questionnaires representing each Scope course was roughly in proportion to the number of students enrolled in each course. Forty student questionnaires were selected in a similar fashion from the Guided Missile group. These were considered separately because most of them were Regular Army men, whereas most of the radar maintenance students were draftees.

## 2. Previous Interest (Questionnaire Items 19, 20)

Over 50 per cent of the group either had not thought of or were not interested, during civilian life, in the work that they are now doing. Thirty-nine per cent had not thought of it and 13 per cent were definitely not interested. About 50 per cent had no civilian experience or training useful to them in the work that they will have to do in their military specialty.

## 3. Assignment Satisfaction (Items 8, 11, 13)

Approximately 25 per cent of the students reported that they would have preferred a different assignment when they were informed that they were going to the Antiaircraft School. On the other hand, only 17 per cent were either indifferent or did not want to come to the school. Only about 14 per cent still appear to be dissatisfied with the school.

## 4. Major Individual Difficulties (Items 37a, c, e, f, g)

Twenty-five per cent of the group reported great difficulty in learning to study again, with only 30 per cent reporting no trouble. This suggests that some hints on how to study might be useful to the students at the beginning of the course. Twenty-five per cent of the students also reported great difficulty in understanding theory, with only 21 per cent reporting no trouble. On the other hand, approximately 50 per cent of the students reported no trouble with mathematics or in learning technical terms.

More than half the students reported difficulty in staying awake in class. This might be related to the long work day or to the lack of airconditioning and consequent high temperatures in class. About 10 per cent of the Scope students spontaneously reported difficulty with the high temperatures.

## 5. Criticisms of the School

### a. Classroom conditions (Items 41c, 42e, 41h, 41g, 42b).

Sixty-six per cent of the students reported that the lectures covered the subject matter too quickly. On the other hand, almost all of them felt that about the right amount of material was covered in the average laboratory session. In the write-in remarks, 27 per cent of the Scope students reported

that the course was too rapid, and almost 50 per cent of the Guided Missile students agreed with this. Almost all of the students regarded demonstrations as being helpful and about half of them believed there should be more demonstrations.

With respect to the laboratories, about half the students believed their classes too large and about five per cent of the Scope students wrote in complaints about crowded laboratories. Ten per cent of the Scope students requested more trouble-shooting in the laboratory. Complaints by the Guided Missile students in this respect were too infrequent to be of any significance.

b. Training Manuals (Item 40d).

Thirty-five per cent of the students indicated that the Training Manuals needed considerable improvement and 50 per cent, in addition, asked for some improvement. Twenty-seven per cent of the Radar Scope students spontaneously indicated that the Training Manuals were too complicated and too technical—that is, the Manuals assume that the student has a background in electronics before he reads them. About 12 per cent of the Guided Missile students reported the same difficulty. Twelve per cent of the Radar students complained of typographical errors and mistakes.

The following recommendation is submitted:

That a simplified training manual be prepared and that the effect on the course grade of using this manual be evaluated.

c. Instructors (Items 50, 51, 49).

Twenty-eight per cent of the Scope students and about 15 per cent of the Guided Missile students made comments to the effect that the instructors were inadequate. The general tenor of the written comments seemed to indicate that a small number of civilian instructors were regarded as being inadequate because they talked over the heads of some of the students, whereas a larger number of the enlisted instructors were judged to be inadequate because they did not know their subject. When asked to state a preference between enlisted instructors and civilian instructors, 64 per cent of the students preferred civilian instructors.

d. Interruptions in training.

About once every two or three weeks the students devote an entire day to either KP or guard duty. Fourteen per cent of the Scope and Guided Missile students spontaneously complained of interruptions of this sort. They claimed that losing a day while the class goes on lowers their grades and severely limits the amount of material they learn during the week. A number of students suggested that some arrangement be made whereby an entire class would serve KP or guard duty at the same time.

The following recommendations are submitted:

- (1) That the grade records be inspected to determine whether the students are correct in their view that grades drop following interruptions.
- (2) That serious consideration be given to rectification of this problem if objective evidence confirms the students' opinion.

#### 6. Civilian Usefulness (Item 27)

In the past, concern has been expressed in various quarters regarding the desirability of giving lengthy training in electronics to short term military personnel. As has been discussed elsewhere in this report (Chapter 3), the rationale for such lengthy training is that a pool of trained technicians is being built up. Some information related to this problem has been obtained from the questionnaire. About 45 per cent of the students said that their present training would have great practical value to them in the work that they expect to do after they get out of the Army. Twenty-three per cent indicated that it will be of "a little practical value." Approximately 25 per cent were uncertain as to the practicality of their training. Only 10 per cent reported that it will be of no practical value.

It should be noted, however, that this evidence is only suggestive. To determine the relationship between Army electronics training and the accumulation of a reserve electronic technician pool would require a follow-up study. This study would investigate the problem of how many men trained at this school go into the electronics industry and how much electronics skill is lost by those who do not continue in electronics after leaving the Army.

#### 7. Comparison of Results with Another Study

At the request of the Signal Corps, the Human Resources Research Office administered a student questionnaire, similar to the Fort Bliss questionnaire, to students at Fort Monmouth. A high degree of agreement has been found between the answers of the Fort Monmouth and Fort Bliss students.

For example, about 25 per cent of the Signal Corps students would have preferred a different assignment in the Army. Also, approximately 50 per cent of the Signal Corps students had no previous interest in the work they are now doing and had had no relevant civilian training or experience. (It will be recalled that the same percentage of Fort Bliss students responded in like manner.) This close agreement is typical of that found between the responses of both student groups to the majority of the questions.

Complaints about the speed of coverage of material, about the complicated nature of the Training Manuals, and about interruptions of training due to KP or guard duty were given frequently by Fort Monmouth students. Another major area of agreement between the two student bodies was the preference for civilian instructors as opposed to enlisted instructors.

Thus it can be seen that the problems and difficulties reported by the students at Fort Bliss are not specific to that school but point to Army-wide problems related to technical training.

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