TM 11-450

WAR DEPARTMENT

TECHNICAL MANUAL

TRAINING OF SIGNAL COMMUNICATION PERSONNEL

March 9, 1942

TECHNICAL MANUAL

TRAINING OF SIGNAL COMMUNICATION PERSONNEL

CHANGES No. 1

WAR DEPARTMENT,
WASHINGTON, March 1, 1943.

TM 11–450, March 9, 1942, is changed as follows:

33. General.

* * * * * * *

c. Rescinded.

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[A. G. 062.11 (2–2–43).] (C 1, 3–1–43.)

44. Other signal communication specialists.—*a.* A study of the Tables of Organization of all signal communication units and **AR 615–26 shows** that there are many other signal communication specialists not covered by the preceding paragraphs. Included in this category are—

* * * * * * *

[A. G. 062.11 (2–2–43).] (C 1, 3–1–43.)

APPENDIX I

MINIMUM TRAINING SPECIFICATIONS FOR SIGNAL COMMUNICATION SPECIALISTS

Rescinded.

[A. G. 062.11 (2–2–43).] (C 1, 3–1–43.)

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

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The Adjutant General.

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No. 11-450

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WAR DEPARTMENT,
WASHINGTON, March 9, 1942.

TRAINING OF SIGNAL COMMUNICATION PERSONNEL

Prepared under direction of the
Chief Signal Officer

SECTION I

GENERAL

1. Purpose and scope.—The purpose of this manual is to furnish a guide for officers and others who are charged with the training of signal communication personnel. While it is not intended that the material contained in this manual be followed blindly, the fundamental considerations enunciated should be used as a guide. An intelligent study of the material should result in an understanding of the scope of the training problem in general. A specific training problem should be solved by application of the doctrines and methods with

*This manual supersedes TM 2260-5, November 21, 1935.

488625°—42——1

such variations and modifications as are dictated by the requirements of the special situation. The detailed analysis of subjects required by signal communication specialists is not within the scope of this manual.

2. References.—Basic instructions for training personnel of the Army of the United States are contained in FM 21–5, which must be studied in conjunction with this manual. Signal Corps Field Manuals of the FM 11– series indicate the responsibility of unit signal officers for the training of signal communication personnel within their units. Signal Corps Mobilization Training Programs, MTP 11– series, furnish training programs for all Signal Corps units and may be used as a guide in the training of related signal communication specialists of other arms.

3. Object of training signal communication personnel.—*a.* The ultimate purpose of all military training is the assurance of success in battle. Signal communication is essential to proper coordination and effective leadership in battle operations.

b. The specific objects are as follows:

(1) To provide as many trained officers, noncommissioned officers, and specialists as possible for use in reconstituting inactive units, and otherwise assisting in carrying out a complete and immediate mobilization in an emergency.

(2) To prepare the signal communication units for prompt and efficient field service.

(3) To carry out the general training mission of the Army of the United States. See appendix I, FM 21–5.

4. Means and scope of training.—For the means and scope of training see section III, FM 21–5.

Section II

TRAINING OF SIGNAL CORPS INSTRUCTORS

5. Reference.—The mechanism and methods of instruction and training expedients are fully discussed in FM 21–5 and are shown in TF 7–295. Additional information particularly applicable to Signal Corps instruction is given in the following paragraphs.

6. Practice teaching.—Practice teaching is a major aid in training instructors. The following is a suggested method for conducting practice teaching:

a. Form the instructors into a section the first day and explain the necessity of planning instruction and be sure the proper methods of teaching are understood. Give each instructor a copy of the outline of the course.

b. Designate one of them, for example, Sergeant A, to act as instructor the following day and inform him that he is to teach the others a certain operation. Require each member of the class to submit a plan showing how he would teach the particular operation.

c. Require Sergeant A to report ahead of the class for discussion of his lesson plan with you. Criticize his plan constructively and make no changes except to correct serious errors. Note at this time any constructive criticism you may wish to make in a later class discussion of his teaching of the subject.

d. When the other instructors arrive, require the section to be reported to Sergeant A as student sections are normally reported. Require Sergeant A to proceed with the instruction and direct the other student instructors to note any errors in his teaching, for later discussion. The "Rating Sheet for Practice Teaching" which follows will serve as a convenient means for noting criticisms of instructors, and may be used both by the instructor and the student instructors. Note particularly good points as well as errors.

e. At the close of the lesson a group discussion of Sergeant A's work will be held. This discussion will serve to bring out all good points in his handling of the subject and class and also to point out any errors of commission or omission for the benefit of the rest of the class, each of whom will be required to teach a session of the class in the same manner. Advantage may be gained by having each instructor teach the subject which he will normally teach in the training program.

7. Training procedure.—The teaching process discussed in section VI, FM 21–5 and outlined in chart 1 will be used in the training of Signal Corps personnel. The developmental conference is generally most suited for the presentation step in this training. Consideration must be given to the fact that a recruit or a transferred or promoted enlisted man will pass through an orientation stage as discussed in section IV, FM 21–5.

8. Lesson planning.—Lessons will be planned in accordance with the doctrine given in section VI, FM 21–5. Examples of the instructor's lesson analysis sheet and lesson plan as applied to Signal Corps teaching problems are given in charts 2 and 3.

RATING SHEET FOR PRACTICE TEACHING

Name of instructor_____
(Instructor being checked during practice teaching)

	Yes	No
1. The student instructor made a good appearance before the class		
2. Arrangements, including material, equipment, seating plan, ventilation, etc., were complete		
3. The decision as to the means or combination of means of training was sound		
4. The time schedule was correct		
5. The step or steps of effective instruction were stressed		
6. The choice of means of conducting the various steps was correct		
7. A proper attitude was maintained toward the class		
8. Instructions were given to the class rather than to the blackboard, chart, or instrument		
9. Knowledge of the subject was thorough		
10. Thorough preparations for the instruction period had been made		
11. The class was conducted in an interesting manner		
12. If the instruction included an examination, the fundamental considerations governing tests were observed		
13. If the instruction involved discussion, the subject was summed up and clarified and logical procedure or methods pointed out		
14.		
15.		
16.		
17. In your opinion, the ability of the student-instructor, as shown by his conduct of this practice teaching class, is rated superior, excellent, satisfactory, unsatisfactory, or inferior		

- **1. PREPARATION BY THE INSTRUCTOR**
  - **Study of schedule**
    - **Subject**
      - *Mission*—Evaluation.
      - *Scope*—Breadth and depth to fulfill mission.
      - *Instructor*—Must thoroughly understand the subject.
    - **Students**
      - *Knowledge*—Technical background or occupational training.
      - *Physique*—When strenuous activity will be required.
    - **Setting**
      - *Time* of day, season of year, length of periods.
      - *Place*—Classroom, drill field, or training area.
  - **Planning lessons**
    - **Collection**
      - *Experience*—Applicable historical or other experiences.
      - *Materials*—Including training aids.
      - *Texts*—Sufficient number for students and instructors.
    - **Selection**
      - *Essential points*—Consider mission and scope.
      - *Accessory facts*—To bridge gaps between and tie in essential points.
      - *Demonstrations*—Rehearsal by personnel is imperative.
    - **Arrangement**
      - *Logical* order of presentation of essential points.
      - *Progressive*—To facilitate instruction.
- **2. EXPLANATION (LECTURE OR DIRECTED DISCUSSION)**
  - **Preparation of the student**
    - *Gain interest.*
    - *Define*—The subject; what it is and why it is taught.
  - **Exposition**
    - *Simple*
    - *Comparison* or *Contrast* with things the student knows.
  - **Illustrations**
    - *Narratives*—Concise, interest exciting, and relevant.
    - *Graphics*—Used where suitable. Training Films, Film Strips, and progressive charts are most advantageous.
- **3. DEMONSTRATION**
  - *Physical*—Employing qualified personnel, with equipment when necessary.
  - *Training films*—Used when physical demonstration is impractical or inadvisable.
  - *Film strips* or lantern slides to aid step by step instruction.

- **4. APPLICATION**
  - *Practice*—The student learns by doing.
  - *Supervision*—To insure accurate work and to answer questions.
  - *Competition*—To stimulate interest and increase skill.
- **5. EXAMINATION** (*Practical (performance tests)*; *Theoretical (information tests)* (Written or oral))
  - *Essentials*—Omit questions on accessory facts and bridging information.
  - *Recapitulative*—Includes some previously covered essential points.
  - *Suggestive*—Questions should emphasize practical applications rather than memory.
  - *Clear*—State questions so that they will be understood.
  - *Specific*—Frame questions to draw definite answers. Avoid "Discuss briefly" and "Tell all you know" types.
  - *Gradable*—Construct questions to permit uniform grading.
- **6. DISCUSSION**
  - *To clarify* doubtful points and correct misconceptions and faulty methods.

CHART 1.—Teaching process.

TRAINING OF: Switchboard operators
LESSON SUBJECT: Installation of switchboard BD–71
REFERENCE TEXT: TM 11–330

What must be done (Operating points)	What must be known (Ideas)
1. *a.* Place switchboard in position where it will be used. *b.* Turn switchboard on side, unfold and extend legs. Set up on legs, level or tilting slightly forward, so that drops will fall properly.	1. If switchboard is to be set on a table or similar support, legs need not be unfolded.
2. Open operating (front) compartment. Hook lower panel horizontally as a writing surface.	2. Upper panel may be pushed back in recess on top of case or adjusted as rain or sun shade.
3. Pull out cords and allow to hang freely	3. Plugs must not touch ground.
4. Lower spring locking bars on signal drops of circuits to be used.	4. Signal drops are locked to prevent damage during transportation, but must be unlocked before they can operate.
5. Open rear compartment and place batteries BA–30 in battery compartment.	5. *a.* Two batteries BA–30 in series in right-hand side of compartment (facing the back of switchboard) are for the operator's telephone. *b.* Two pairs of batteries BA–30 (each pair in series) in left-hand side of compartment are for the night alarm bell and lights. *c.* Any 3-volt battery may be used externally, connected positive lead to post marked + 3V and negative lead to posts marked — LT and — TR on terminal strip above battery compartment. *d.* The switches for the night alarm and lights are on the jack panel.
6. Connect operator's head and chest set *a.* Insert operator's set plug into jack panel. *b.* Operate toggle switch on chest unit to locking "on" position to close transmitter circuit.	6. Current is drawn from the transmitter battery in use only when one of the line circuit keys is operated to the talk position.
7. Connect line circuits	7. *a.* Skinning of wire is usually unnecessary, as binding posts have a pin which pierces insulation. Poor connection may require that wires be skinned. *b.* Wires of circuits which may be extended may be connected about 3 feet or more from the end, which facilitates splicing on of extension while the switchboard is still in use. *c.* Switchboard units Nos. 1 and 2 should be used for trunks, as repeating coils are built into the switchboard with these two units.
8. Enter line designations	8. *a.* Pencil may be used to write on celluloid strip just below the key. *b.* Switchboard is now ready for use.

CHART 2.—Instructor's lesson analysis sheet.

TRAINING OF: Switchboard operators.
LESSON SUBJECT: Installation of switchboard BD–71.
LESSON AIM: To install switchboard BD–71.
TIME REQUIRED: 45 minutes.

EXPLANATION—LECTURE—3 minutes.

1. This is a switchboard BD–71. It has six lines and is complete within itself, requiring no cable, terminal strip, or separate operator's telephone.
2. In this lesson the switchboard is to be set up for operation.

DEMONSTRATION—8 minutes.

1. First set switchboard on support or on ground with legs folded and then lay on side, unfold and extend legs, and set up on legs, level or tilting slightly forward.
2. Open operating (front) compartment, hooking lower panel horizontal as shelf and placing upper panel first as a rain or sun shade and then pushing it back in recess out of the way.
3. Pull out cords; allow them to hang freely but not to touch ground or floor.
4. Lower spring locking bars on signal drops of switchboard units to be used.
5. Open rear compartment and place six batteries BA–30 in battery compartment.
6. Plug in and turn on operator's set.
7. Connect one trunk circuit to line circuit number one for line extension and one local to line circuit number six.
8. Enter line designations.

APPLICATON—DIRECTED DISCUSSION AND DEMONSTRATION—14 minutes.

1. How must the switchboard be mounted to permit drops to operate?
2. What precaution is taken concerning drops?
3. When is the line designation entered?
4. Call each student to perform one or more successive operations of the installation of a switchboard.
5. Correct student's errors during the initial installation.

EXAMINATION—PERFORMANCE TEST—15 minutes.

1. Require each student to install a switchboard BD–71 without assistance.

DISCUSSION—5 minutes.

1. Comment on each completed installation with individual students after completion of their installations.

CHART 3.—Instructor's lesson plan.

SECTION III

MEASUREMENTS OF INSTRUCTION, PROGRESS, AND PROFICIENCY

9. Tests.—*a.* A test is the procedure used to determine the knowledge gained, the progress made, or the proficiency attained by the student. Tests are classified according to when they are given, and the purpose for which they are used, as instruction tests, progress tests, and proficiency tests.

b. (1) *Instruction tests.*—(*a*) These tests are given at the end of each teaching period or at the completion of each operation, and may be used for the following purposes:

1. To call special attention to those facts or processes which it is most important for the student to know.

2. To arouse the interest and curiosity of the student.

3. To build up a spirit of competition.

4. To improve the quality of the instruction. Any attempt to measure the improvement in teaching requires a frequent and regular measurement of the student's understanding of what he is being taught.

5. To adapt instruction to individual needs. Without the aid of some such device it is not easy to locate the deficiencies or difficulties of each individual student.

6. To bring immediate aid to the student who needs it.

(*b*) Instruction tests may include examinations of both—

1. Knowledge—in the sense of acquaintance with fact;

2. Skill—in the sense of ability to use knowledge effectively in execution.

(2) *Progress tests.*—(*a*) These tests are given at the end of a group of related operations for the following purposes:

1. To determine, upon completion of a group of related operations, whether or not the students are making satisfactory progress. The instructor will thus know whether or not students are ready to take up a new group of related operations.

2. To find out how accurately and quickly the students can perform specified operations, and to discover in what

particular phases of the subject students are below proficiency. An opportunity is thus provided to bring students up to the required degree of expertness.

3. To prepare students for proficiency tests.

(*b*) Progress tests should include examinations of both knowledge and skill. (See (1) (*b*) above.)

(3) *Proficiency tests.*—(*a*) These tests are given at the completion of a course by the instructor or unit commander for the following purposes:

1. To determine the suitability and thoroughness of the instruction given and the proficiency of students in the subject.

2. To determine the relative proficiency of students in the subject.

3. To give students a final rating in the subject as a matter of record.

(*b*) Proficiency tests should include examinations of both knowledge and skill. (See (1) (*b*) above.)

c. It will be noted from the above that instruction tests *may* include an examination of both knowledge and skill (see *b*(1)(*b*) above), while the progress and proficiency test *should* include such examination for proper measurement of progress and proficiency. Where examinations of both knowledge and skill are made, the test is conducted in two parts. Part I, the examination of knowledge, is called an information test, and part II, the examination of skill, is called a performance test.

(1) Information tests consist of a number of questions covering the subject matter concerned. The more questions used, the more accurate will be the results of the test. When the information test is used as part of a progress test, the questions should cover thoroughly the related operations for which the progress test is given. When the information test is used as part of a proficiency test, the questions used should cover thoroughly the entire subject matter of the course.

(2) Performance tests require that the student be able to *do* something (generally with apparatus, tools, or material) with a certain degree of skill under certain definite standardized conditions. They should include the performance by each student of all the vital operations covered by the progress or proficiency tests, as the case may be.

d. Tests should be so difficult that the best students in the class cannot answer all questions. This results in a good distribution of grades, allows all students to show their knowledge of the subject, and the results obtained give a good indication of the relative ability of each student.

10. Types of questions.—The questions used in tests fall under two general classifications, namely: the free answer or essay type, and the objectively scored type.

a. Free answer or essay type.—This type of question is familiar to all, as the following example will recall: "Discuss the functions of the induction coil in the telephone EE–8–A." This type of question has its advantages in tests where a limited number of questions must be used to cover a great deal of subject matter and where other types of questions would be difficult to use. It may also be used as the testing vehicle when the instructor wishes to determine whether or not the student is capable of a logical process of reasoning employing the fundamentals enunciated in previous instruction. The principal disadvantages of this type of question are:

(1) A student who has no definite knowledge of a subject may, by clever use of words, convince the instructor that he has some knowledge of the subject and thereby be credited with partial value of the question.

(2) Questions of this type cannot be answered quickly, therefore it is impractical to give a comprehensive examination composed entirely of essay type questions in a reasonable length of time.

(3) It is impossible to grade answers uniformly and the time required in the grading process is long.

b. Objectively scored type.—(1) This type of question has been designed to overcome the disadvantages of the free answer or essay type. It has the following advantages:

(*a*) It permits rapid and uniform grading.

(*b*) Very little time is required by the student to answer this type of question.

(*c*) The test can be graded by persons having no knowledge of the subject.

(2) Disadvantages of the objectively scored type of question are:

(*a*) It places undue emphasis on the student's ability to memorize isolated facts.

(*b*) It furnishes no indication of the student's ability to reason logically from one fact to another.

(*c*) A satisfactory question is most difficult to prepare; unforeseen ambiguities are frequently introduced.

(*d*) A very large number of questions must be included in any test if the test is to be an adequate measure of the student's ability.

(3) The objectively scored type of question is used in several forms. The principal forms in common use are as follows:

(*a*) *True-false question.—Example.*—Directions to the student: Following are a number of sentences. Read each carefully and if what

it states is true (correct), place a plus (+) sign on the *short line* in the right margin. If what it states is not true (incorrect), place a zero (0) sign on the *short line* in the right margin.

1. Two switchboards BD–9 connected in parallel provide switching facilities for eight circuits. +

(*b*) *Multiple-choice question.—Example.*—Directions to the student: Below are a number of questions and unfinished sentences. Following each are several words, numbers, or statements. Select the one which correctly answers the question or completes the sentence. Write the *number* of the correct word or phrase on the *line* on the margin to the right of each question. Only one of the answers given in each question is correct.

1. Two switchboards BD–9 connected in parallel provide switching facilities for—

(1) Four circuits.
(2) Eight circuits.
(3) Twenty-four circuits.
(4) Twelve circuits. (2)

(*c*) *Completion question.—Example.*—Directions to the student: Below are several sentences from which certain words have been omitted. *Each word* which has been omitted has been indicated by a short line enclosed in parentheses, thus: (_____). Fill in *each blank* with a word which will make good sense and at the same time be correct.

1. The "check" is the number of words in the (*text*) of the message.

(*d*) *Single-answer question.—Example.*—Directions to the student: The questions listed below may *each* be answered in one word, phrase, number, or symbol. Write the answer on the *short line* on the right-hand margin opposite each question.

1. What does a trunk circuit connect? Switchboards

(4) Special points to be considered in the preparation of these questions are as follows:

(*a*) *True-false form.*—The number of questions whose statements are true should be about equal to the number whose statements are false. The questions should be arranged according to relative difficulty; that is, the easiest questions first, gradually increasing in difficulty toward the last. "Determiners" such as "always," "never," etc., should not be consistently used, as such questions are nearly always false. However, they may be used occasionally. The true questions should not be placed in one group and the false questions in another,

neither should they fall in regular alternate order. They should be mixed. True-false questions must be written so as to be true without exception, or to be false without exception. Consider the example: "A square is a parallelogram whose angles are right angles." The statement is true but incomplete, and if interpreted as the definition of a square, it is false. Obviously, questions of this type must be avoided. The question becomes explicit and the answer definite when the statement is written: "A square is completely defined as a parallelogram whose angles are right angles." This statement is false without exception.

(*b*) *Multiple-choice form.*—There should be only one correct answer to each question to choose from, but all answers suggested should be plausible. Questions should be arranged in relative order of difficulty.

(*c*) *Completion form.*—These questions are probably the most difficult to prepare of the four forms mentioned. Great care must be exercised in determining what words should be omitted. Do not omit too many words or unimportant words or the test will degenerate into a puzzle. Sentences should be short, with only key words omitted. They should be arranged in relative order of difficulty, beginning with the easiest.

(*d*) *Single-answer form.*—In using this form of question it is necessary to be careful to call for answers which can be stated as far as possible by a single word, phrase, number, or symbol. Questions should be arranged in relative order of difficulty.

(5) All or any combination of the above forms of objectively scored type of questions may be employed in any one test if they are separated with proper directions given to the student in each case and the whole arranged in relative order of difficulty.

11. Methods of scoring objectively scored tests.—*a. Initial marking.*—A check (√) is used for each correct answer, a cross (×) for each incorrect answer, and a line about 1 inch in length (_____) to indicate a question not attempted. These markings should be placed in the right-hand margin, opposite the answer or answer space.

(1) *True-false question.*—In arriving at a student's raw score in a test of this type:

(*a*) Add the questions correctly answered (√).

(*b*) Add the questions incorrectly answered (×).

(*c*) Subtract the total of incorrectly answered questions from the total of correctly answered questions.

(*d*) The result is the raw score. Note that omitted questions are not counted. This discourages guessing at answers, for an unan-

swered question does not lower the score, whereas an incorrect answer does.

(2) *Multiple-choice question.*—In arriving at a student's raw score in a test of this type—

(*a*) Add the questions correctly answered (√).

(*b*) Place a value opposite each question incorrectly answered (×) which is equal to $\frac{1}{n-1}$, where n is the number of choices available in the question.

(*c*) Add the values assigned to each question incorrectly answered.

(*d*) Subtract the total obtained in (*c*) from the total obtained in (*a*).

(*e*) The result is the raw score. Note that omitted questions are not counted. This again discourages guessing at answers.

(3) *Completion question and single answer.*—Generally, tests of these types are scored by giving one point for each correct answer and nothing for an answer only partially correct or not attempted. The sum of these points is the raw score.

b. Passing score.—The passing raw score should not be determined before the test has been taken. The instructor, after the raw scores are available, should determine the passing raw score, being guided by the scores made, the class as he knows it, and the instruction he has given, rather than any preconceived idea of 75 percent or other figure as a passing score. If the test was easy, the passing score should be higher than if the test was difficult.

c. Final score.—In order that grades may be averaged or weighted, the percentage scale is used, 75 percent being the passing grade in all subjects or courses. Raw scores are converted to percent grades in some such manner as illustrated on the graph shown in chart 4.

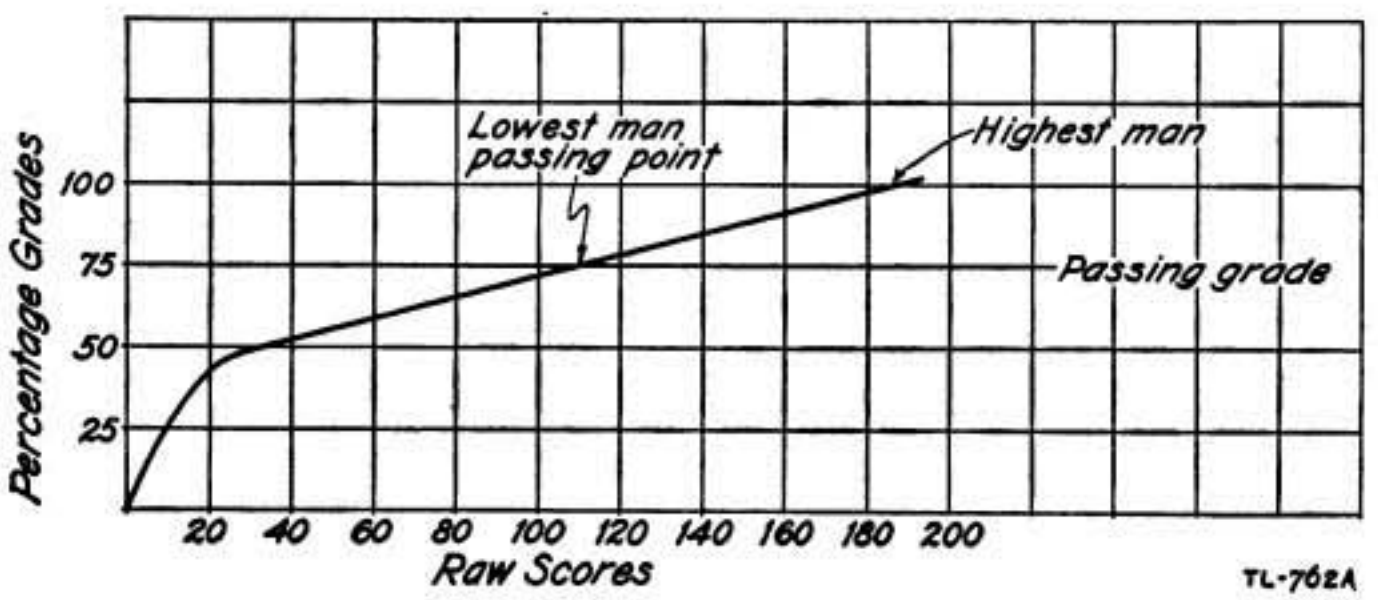

CHART 4.—Chart for converting raw scores to percentage grades.

In this graph a percent grade of 100 percent (95 percent or some other high percent grade might have been taken) is given to the raw score of the *highest man.* Similarly, a percent grade of 75 percent is given to the raw score of the lowest man whom the instructor feels has passed the test. The remaining percentage grades are found by reading from the graph determined by these two points. There is a straight line relationship between the raw scores and percentage grades except for the very low men, where it may be advisable to curve the graph so as to make the raw score zero and the percent grade zero coincide.

SECTION IV

SELECTION OF STUDENTS ON BASIS OF APTITUDE

12. General.—The desirability of selecting, before instruction is given, the personnel having the greatest aptitude to receive particular instruction is obvious. Not only do apt personnel offer the best return for the expenditure of instructional effort, but inapt personnel can be assigned early to duties which they can perform satisfactorily. The time devoted to the giving of a series of aptitude tests prior to the assignment of prospective trainees to particular specialist training is more than repaid by the time saved on the specialist phase of training. No attempt is made herein to prescribe the use of particular tests. Instructors are encouraged to develop simple tests which provide even a meager measure of aptitude for particular signal communication specialties. Aptitude tests which have been found useful are treated in subsequent paragraphs of this section.

13. War Department general classification test.—*a.* This test is designed to measure the mental ability of an individual rather than the amount of knowledge he has acquired. It includes simple arithmetic, understanding of the meaning of words, and simple thought questions. It is graded according to definite instructions. Record of enlisted man's grade in this test is on file in his unit personnel office.

b. This test furnishes accurate information as to the ability of the examinee quickly to assimilate information from the printed page. In general, men obtaining scores above 100 will probably have the mental ability to learn technical subjects quickly. The test is not

conclusive, as no measure is obtained of the industriousness of the student.

14. General electrical information test.—This test is designed to test experience rather than natural aptitude. Copies of the general electrical information test are available at the Signal Corps School. It is scored objectively in accordance with instructions which accompany the test. Many similar tests exist, and others may be devised if satisfactory ones are not available on the desired subject. Pictures, drawings, symbols, or pieces of actual equipment may be used in formulating these tests. In general, such tests furnish information as to the general experience background of the examinee in the line of work in which he is to undergo further instruction. Therefore, they are of particular value to an instructor in gaining information as to the experience level of a class which he is required to instruct. This test and similar experience tests cover the broad field of the subject by means of a number of simple questions on all phases of the general subject.

15. Radiotelegraph operator aptitude test.—This test, heretofore known as "Signal Corps code aptitude test," has been successfully used for a number of years and may be considered a standard test. Complete instructions regarding its use are included in TM 11–454. In general, each prospective radio operator will be given this test prior to the start of his training.

16. Mechanical aptitude tests.—By requiring a prospective trainee to perform one or more simple manipulations on pieces of mechanical equipment and by noting the time required for him to complete each such operation, some measure of his aptitude for mechanical work may be obtained. One test which has been used with some success is the disassembly and reassembly of a simple door lock. A screw driver is the only tool required. It has been found that prospective trainees who possess little or no mechanical ability are unable to accomplish this operation in less than 15 minutes.

17. Factors in addition to aptitude.—*a. Psychological factors.*—A trainee will habitually assimilate instruction more rapidly if assigned to instruction which he desires to receive. The most fortunate situation occurs when aptitude and choice coincide. When they do not, assignments must be made from a consideration of the aptitude shown, the requirements for trainees in certain specialties, and the desires of the trainee.

b. Industriousness.—No aptitude test furnishes a satisfactory measure of this vital factor. A conscientious, hard-working student frequently will learn quickly operations for which he has little natural aptitude,

whereas an apt student, through his laziness or lack of interest, may fail to assimilate his instruction. It is for this reason that the psychological factors mentioned above should be considered when assigning trainees to specialties.

SECTION V

TRAINING MANAGEMENT

18. Definition.—Training management is the direction and planning of training so as to make the most effective use of the means and time available to accomplish the training mission.

19. Responsibility.—Training management is a function of command, and therefore the responsibility of every unit commander.

20. Direction of training.—The direction of training is exercised through the established chain of command as prescribed in section II of FM 21–5.

21. Direction of training by signal officer.—The unit signal officer of any command is responsible to his commander for the technical supervision within limits prescribed by the commander, of training of all signal and communication personnel of units of the command. (See AR 105–5.) The supervision is effected by—

a. Preparation for training by the allocation of personnel, material, and funds to subordinate units.

b. The preparation and promulgation of such orders or instructions as are necessary to coordinate and direct signal communication training of the entire command, emphasizing the fundamentals of progressive training, training objectives, and proper training methods.

c. Frequent training inspections to insure the proper application of approved doctrine and technique.

22. Planning of training.—*a.* It is the duty of every commander to make the necessary plans for the training of his command.

b. Such plans are based on an estimate of the training situation, taking into consideration training orders and instructions from higher authority; training objectives; climate; terrain; personnel,

facilities, and time available; and other local conditions affecting training.

c. These plans are either training programs or training schedules. In the training of signal communication units, the plan of training is generally the program while the schedule is the means by which the program is placed into execution.

23. Training program.—*a.* Training programs, giving the general plan for training the entire command over the length of the training period, include the information outlined in section II of FM 21–5.

b. The division of the total training time into the phases listed below is made for the purpose of securing a training balance.

(1) *Basic military training phase.*—This phase consists of about one-third of the total training period. Experience dictates that a good training balance is obtained by making such allotment of time to this phase. An example of the subjects covered in this phase is shown in paragraph 24.

(2) *Specialist training phase.*—The assignment of time to this phase and to each subject therein is determined by the types of specialists to be developed and by the objectives for each. The subjects covered in this phase are also determined by the types of specialists to be developed. An example of the subjects for specialists of a division signal company is shown in paragraph 24. The following table (specialists common to more than one signal communication organization) is given as a guide in determining the time to be allotted to this phase:

Specialist	Minimum hours	Maximum hours	Remarks
Basic signal communication	15	50	Given to all personnel.
Lineman, telephone and telegraph.	125	300	Includes some permanent line construction.
Switchboard operator	150	300	Includes testing and station records.
Radio operator	200	300	Includes radio procedure and sets.
Telegraph printer operator	10	50	Includes procedure and equipment.
Basic electrician	75	150	Before taking radio or telephone-electrician courses.
Telephone electrician	200	300	After completing basic electrician.
Radio electrician	200	300	After completing basic electrician.
Message center clerk	100	300	Bulk of time spent on practical application.

(3) *Section or team training phase.*—This phase starts when specialists reach minimum training objectives and is continued until each section or working element has an understanding of its mission and of orders and instructions relative to its employment. In general, a good training balance is obtained by allotting to this phase about one-third of the remaining time after the specialist training phase has been completed. The subjects covered in this phase are shown in paragraph 24.

(4) *Combined training phase.*—The duration of this phase is such as to permit the working out on suitable terrain of the various tactical situations with which the command may be confronted. Balanced training requires that the time allotted to this phase should be about twice that allotted to the team training phase. The subjects covered consist of various assumed tactical situations as shown in paragraph 24. In the training of a new unit this phase is completed before the combined training of the higher command starts, since satisfactory service must be rendered by the signal communication unit during the combined training phase of the higher command.

24. Examples of training programs.—Examples of training programs are given in appendixes II and III as guides to show how the fundamental considerations of training and the essentials of training management are applied. It must be borne in mind that any training program is dependent on several variable factors, such as time available, directives of higher authority, and efficiency of personnel. Appendix II shows a training program covering a period of peacetime training for 1 year. Appendix III shows a mobilization training program covering a period of 90 days. MTP–11–1, which includes a 90-day mobilization training program for each type of Signal Corps unit, may be referred to for additional examples.

25. Weekly training schedule.—The weekly training schedule gives detailed instructions for the conduct of training. It is issued by the signal communication unit commander and is the means by which he places the master training schedule into execution. It contains specific instructions for each day's training covering the following points: text reference (if any), data on daily training periods (what, where, when, and by whom executed), and equipment required. If the weekly training schedule is complete, no additional information is required for training during the period covered by the schedule. (See chart 5.)

26. Records of progress.—Records of progress are kept on all individual instruction conducted during the basic military and spe-

cialist training phases and on collective instruction conducted during the team training phase. The progress chart prescribed for marksmanship training, modified to fit the subjects covered under the basic military and specialist phases, meets the requirements of an individual progress chart, and its use is recommended. (See chart 6 which is a guide only.) The record of progress for team training should make comparative ratings between the working teams under general headings common to all teams, as, for example, promptness, care of equipment, initiative in technical duties, etc. This stimulates competition between working teams as well as it indicates their progress toward objectives. (See chart 7.)

27. Reports.—Throughout the training cycle periodical reports of progress are required by higher authority. These reports are brief; they are rendered in letter form and show the number of hours allotted to the subjects covered during the period for which the report is rendered; whether or not all allotted instruction hours were completed; the reason therefor if all allotted hours are not completed; whether or not the subjects completed were satisfactory, and if not, what readjustment of the training program is to be made to bring the instruction in that particular phase up to a satisfactory standard.

28. Inclement weather programs.—An inclement weather program is required, for weather conditions will interfere with the conduct of the regular program. Such a program must of a necessity be very general for the reason that its operation depends upon the weather, and the subjects covered depend upon deficiencies developed during the conduct of the regular program. Inclement weather instruction ordinarily will be individual instruction. By consulting the individual progress chart (chart 6), it will be found that some individuals are not up to the standard desired in a certain subject, and opportunity is presented to raise that standard during inclement

Training Schedule · Hq_____
(Unit)

From_____to_____
(Station) (Date)

Day and date	Hours		Personnel participating	Character of training	Place	Officer or noncommissioned officer	Text reference if any including paragraphs	Remarks
	From	To						

CHART 5.—Form for a training schedule.

weather. Proficiency tests as prescribed in manuals listed on the program, if they are such as can be given indoors, may well be conducted during inclement weather for those subjects that are completed. The individual progress chart will readily suggest the subjects that should be covered in this instruction. The hours transferred from the regular program to the inclement weather program are reported on periodical progress reports. (See par. 27.)

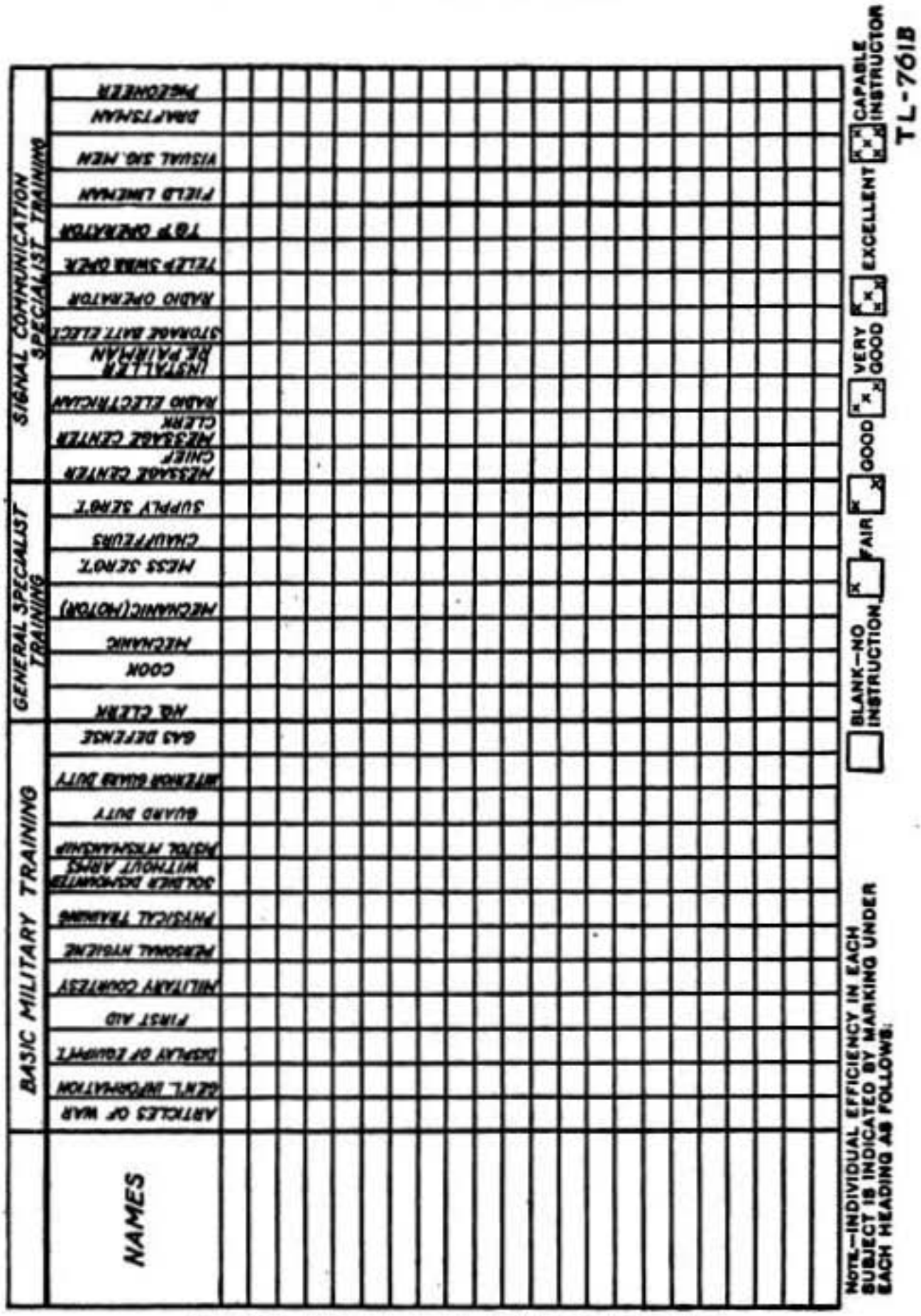

CHART 6.—Progress chart—individual instruction.

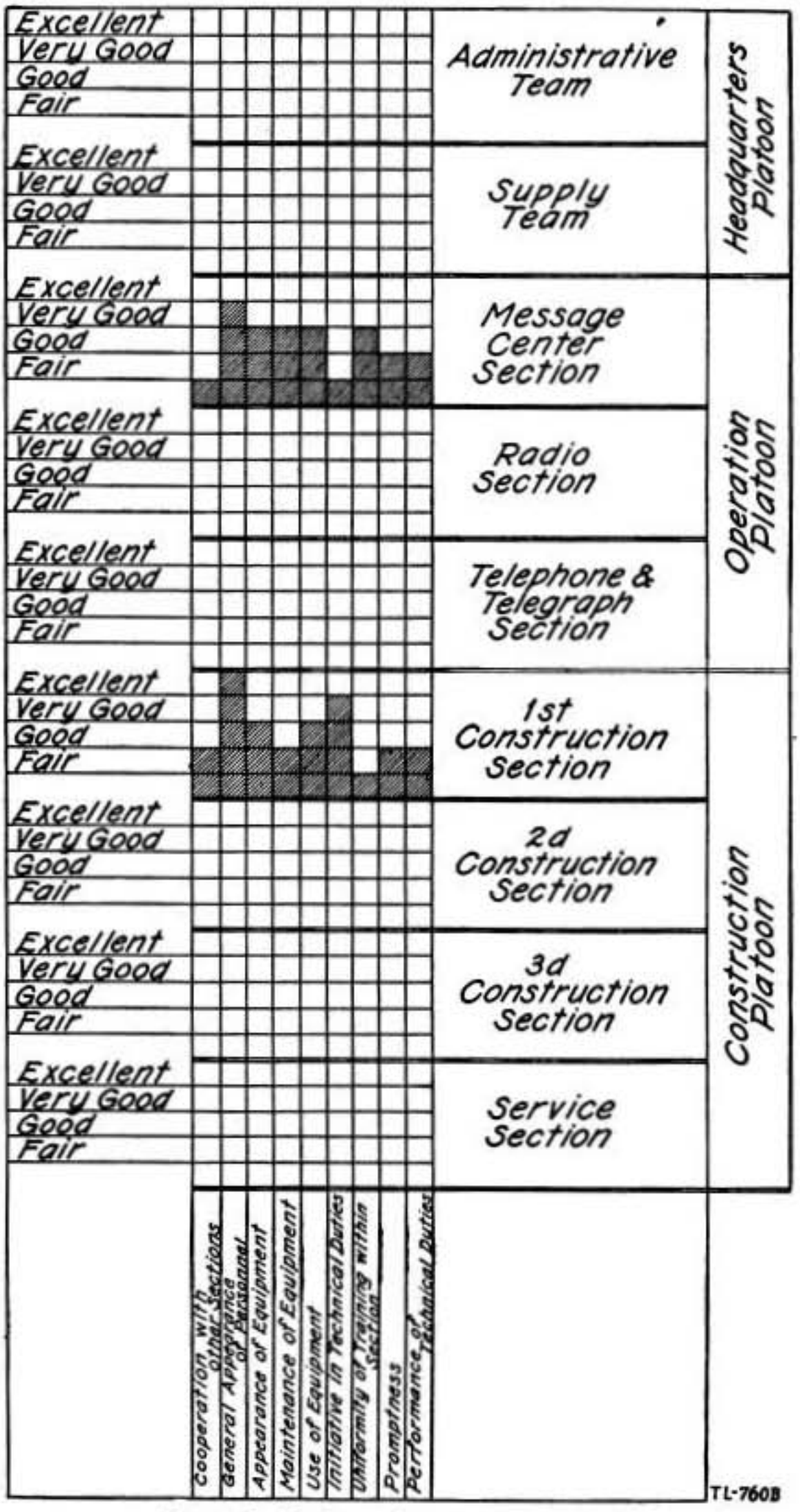

CHART 7.—Section and team progress chart.

SECTION VI

SPECIALISTS COMMON TO ALL ARMS

29. Definition.—For the purpose of distinguishing between those specialists trained for some signal communication function and those whose duties are directly connected with the interior economy of the organization of which they are a part, the first group is called "signal communication specialists" and the latter, "common specialists." The term "common specialists" includes chauffeurs, clerks, cooks, mechanics, etc.

30. Responsibility for development.—The company, troop, or battery commander is responsible for developing the required number of common specialists for his unit.

31. How and where trained.—The training orders of corps or divisions may provide for the training of these specialists, for all organizations within their jurisdiction, in schools centrally established for this purpose. These schools usually are in continuous operation and prior to the beginning of each new class, organization commanders concerned are required to designate certain men to take certain courses therein or to certify that they have sufficient common specialists for the needs of their organization for the current period. The apprenticeship or understudy method of training should also be used in developing these specialists where unforeseen circumstances preclude taking advantage of schools.

32. Relation of training of common specialist to efficiency of command.—*a.* The readiness of equipment, material, and transportation for field service, the morale of the organization, and the smooth functioning of its administrative activities are directly proportional to the proficiency of the common specialists of the unit. Good messes are an important factor in high morale, and good messes require good cooks. Serviceable transportation requires good mechanics, chauffeurs, or wagoners. Prompt and accurate handling of the paper work of an organization affects morale and reflects upon the efficiency of the organization. Such promptness and accuracy require good clerks.

b. The development of the common specialist is equally important to that of the signal communication specialist and his training should

be given the necessary consideration when training orders are issued or training programs planned.

c. The conduct and scope of the training of the common specialist are covered in Field and Technical Manuals.

SECTION VII

INDIVIDUAL TRAINING OF SIGNAL COMMUNICATION SPECIALIST

33. General.—*a.* If the training of the signal communication specialists is conducted in troop schools, the unit commander is responsible for the planning and preparation of the outline of each specialist course.

b. The time allotted to each specialist course is shown by the training program of the unit concerned.

c. The minimum training specifications of each signal communication specialist are listed in appendix I.

d. In planning and preparing an outline for any signal communication specialist course, the responsible officer takes the following into consideration:

(1) Selection and designation of the personnel to take the course.
(2) The equipment and facilities available.
(3) The texts to be used.
(4) Special features of instruction peculiar to each course.
(5) The grouping of students for instruction.

e. The selection and designation of personnel to take certain courses should always be made by the unit commander, who is responsible for the development of the necessary specialists and there-

fore should select such men for particular courses as he deems advisable. In training new units, tests such as the War Department general classification test and the general electrical information test used at the Signal Corps School are helpful in selecting personnel for the various specialties. (See sec. IV.)

f. Official War Department Field Manuals, Technical Manuals, Training Films, and Film Strips furnish the authorized doctrine for the employment and maintenance of Signal Corps matériel.

g. Instruction in all signal communication specialist courses is pyramided upon instruction in basic signal communication.

34. Basic signal communication.—*a.* Certain technical subjects as listed under minimum training specifications, basic private, appendix I, are as basic to the private of a signal communication unit, regardless of his arm or service, as the care and use of the rifle are to the private of Infantry. Training in these subjects is called training in basic signal communication. This training precedes signal communication specialist training.

b. The equipment available depends to some extent upon the size of the unit which conducts the training. Troop schools will have available such items as are authorized in Tables of Allowances and Tables of Basic Allowances supplemented, particularly in large units, with training material purchased from training funds. All needed equipment in the quantities necessary should be available.

c. Portions of FM 24–5 and FM 11–5 cover the principal subject matter of the basic signal communication course and should be used as texts. Any other available pertinent Field Manuals and Training Films or Film Strips should be used.

d. The special features of the conduct of instruction in this course are as follows:

(1) The basic signal communication course is generally looked upon as too elementary to be given serious thought by the majority of signal communication personnel. This idea may be overcome by impressing upon the class that it is a refresher course necessary to be covered before taking up more advanced subjects, and by proving to those who think the subject too easy that their knowledge is yet lacking in some essential details. A careful check of knowledge of individual students will reveal lack of knowledge in some details which may be used as proof of the value of the course.

(2) Wire splicing is one of the most important subjects covered in this basic course, and it takes more time to attain proficiency and speed in this than in any other subject covered by the prescribed text. Instruction in this subject may be handled in several entire

consecutive periods, or the equivalent time in short periods may be utilized. It is always possible to point out imperfections in the first few splices made. The objectives are proficiency and speed, and are obtained through practice. After the preliminary instruction in splicing, interest is maintained by developing competition between students as to time taken in making satisfactory splices in each type of wire.

(3) Instruction in army organization and conventional symbols should, of course, follow the latest teaching on this subject.

e. The grouping of students should be such that each student, in the time allowed, is given an opportunity to perform each operation with his own hands. Grouping is generally governed by the equipment, material, and instructors available. Shortage of equipment and instructors should not influence the grouping where proper rotation of equipment and instructors will compensate for such shortage.

35. Example of outline.—The following is a problem in outlining a course in basic signal communication under conditions as given:

(*a.*) You, as First Lieutenant Smith of the 18th Signal Company, have been detailed to conduct a course in Basic Signal Communication for 15 enlisted men recently assigned to your company.

(*b.*) The course is to be conducted in troop schools within your organization.

(*c.*) The time allowed for the course consists of 16 periods of 1 hour each.

(*d.*) The subject matter to be covered as approved by your company commander will be found in the following texts and tables of which one copy each is available:

FM 24–5, Signal Communication.
FM 11–5, Mission, Functions, and Signal Communication in General.
FM 21–30, Conventional Signs, Military Symbols, and Abbrevations.
TM 11–333, Signal Corps Telephone EE–8–A.
TM 11–454, The Radio Operator.
TF 11–177, Field Wire Splices.
TF 11–178, Field Wire Ties.
FS 11–1, Basic Signal Communication.

OUTLINE OF COURSE IN BASIC SIGNAL COMMUNICATION

Period	Time allotment	Subject	Text reference	Instruction methods
1	1 hr.	Introduction	Ch. 1, FM 24-5; ch. 2, FM 11-5.	Informational directed discussion. Knowledge test.
2	1 hr.	Agencies of signal communication.	Ch. 1, FM 24-5; ch. 8, FM 11-5.	Informational directed discussion. Knowledge test.
3	1 hr.	Lettering	Sec. III, TM 11-454; ch. 2, FM 24-5; FS 11-1.	Developmental directed discussion. Demonstration. Application. Performance test.
4	1 hr.	General topographic symbols.	Par. 3, FM 21-30	Developmental directed discussion. Demonstration. Application. Instruction test.
5	1 hr.	Basic military symbols.	Par. 4, FM 21-30; FS 11-1.	Developmental directed discussion. Demonstration. Application. Instruction test.
6	1 hr.	Abbreviations	Par. 7, FM 21-30; FS 11-1.	Developmental directed discussion. Demonstration. Application. Instruction test.
7	1 hr.	Tools and materials used in making the field wire splice.	Ch. 8, FM 24-5; FS 11-1.	Developmental directed discussion. Demonstration. Application. Instruction test.
8	1 hr.	Field wire splice	Ch. 8, FM 24-5; TF 11-177; FS 11-1.	Developmental directed discussion. Demonstration. Application. Performance test.

Period	Time allotment	Subject	Text reference	Instruction methods
9	1 hr.	Tying and tagging field wire.	Ch. 8, FM 24–5; TF 11–178.	Developmental directed discussion. Demonstration. Application. Performance test.
10	1 hr.	Dry cell batteries. Identification, testing, and connection.	Ch. 8, FM 24–5; FS 11–1.	Developmental directed discussion. Demonstration. Application. Instruction test.
11	1 hr.	Telephone EE–8–A_ _	TM 11–333; FS 11–1.	Developmental directed discussion. Demonstration. Application. Instruction test.
12	1 hr.	Telephone directory_ _	Chs. 2 and 8, FM 24–5.	Informational directed discussion. Instruction test.
13	1 hr.	Phonetic alphabet and pronunciation of numerals.	Ch. 8, FM 24–5; FS 11–1.	Developmental directed discussion. Demonstration. Application. Performance test.
14	1 hr.	How to use a telephone.	TM 11–333_ _ _ _ _ _	Developmental directed discussion. Demonstration. Application. Performance test.
15	1 hr.	Proficiency test (performance).	All text assignments.	Performance test. Discussion.
16	1 hr.	Proficiency test (knowledge).	All text assignments.	Knowledge test. Discussion.

(Authentication)

36. Field lineman.—*a.* (1) In general, the personnel of the various signal communication units who take this course consists of the following:

(*a*) Wire construction or maintenance personnel of all Signal Corps units.

(*b*) Linemen and miscellaneous privates of the wire section of all infantry signal communication units.

(*c*) Linemen of all field artillery headquarters batteries.

(*d*) Miscellaneous privates of the wire sections of cavalry signal communication units.

(2) Any of the above personnel who have completed previous training cycles in this course who are proficient therein, and are not needed as instructors, may be selected to take training in other specialist courses.

b. The equipment available for this instruction in troop schools is as listed in the Tables of Allowances and Tables of Basic Allowances of the unit concerned. Other specialist courses will be running concurrently with this course, and all courses must be so planned that the equipment available can be rotated among them. For example, telephones are required in the training of field linemen and of telephone switchboard operators, and the training of these specialists should be so planned that telephones can be rotated between the two.

c. Portions of FM 24–5 cover the subject matter of this course and should be used as a text.

d. The special features of the conduct of instruction in this course are as follows:

(1) Skill in pole climbing is a result of proper initial instruction and practice. It is hard physical labor and should be conducted for short periods over an appreciable time.

(2) Where instruction is conducted with wire-laying vehicles, the assignment of students to such vehicles should conform to that prescribed in the Field Manuals of the arm concerned.

(3) Proficiency in map reading to the extent necessary to properly read and construct line route maps is desirable for all linemen. Noncommissioned officers should be thoroughly trained in this subject.

(4) The course should be terminated with several periods of wire net installation in which field linemen work in conjunction with switchboard operators.

e. Except where instruction in wire laying is conducted with definitely prescribed personnel for each type of vehicle, grouping of students should follow the same procedure as specified in paragraph 34*e*.

37. Telephone switchboard operator.—*a.* In general, the personnel of the various signal communication units who take this course consists of the following:

(1) Noncommissioned officers and privates listed as telephone switchboard operators in Tables of Organization of all signal communication units.

(2) Selected miscellaneous privates in each signal communication unit to supplement the above to provide for 24-hour service for the unit concerned.

b. The equipment available is determined by the conditions noted in paragraph 34*b*.

c. Portions of FM 24–5 cover this subject matter and should be used as a text.

d. The special features of instruction in this course are as follows:

(1) In the early stages of instruction the preparation of switchboards for operation and methods of transporting them in the field are emphasized.

(2) Neatness in all installations must be insisted upon throughout the course.

(3) After the technique of handling calls and the proper phraseology are mastered, proficiency, confidence, and speed are attained by continued practice. Methods of conducting this practice are outlined in FM 24–5. The traffic load should be increased as proficiency and speed are obtained.

(4) Indoor or reduced distance nets are used for the above practice. Simultaneously, the keeping of records (station log and test and trouble record) and the preparation and use of traffic diagrams are introduced in the instruction and their use insisted upon thereafter.

(5) The use of the voice and employment of the phonetic alphabet should be emphasized when indoor net operation is started. The general tendency is to treat these two subjects as being nonessential. The properly trained operator is able to instill a feeling of assurance in the users of the telephone. This assurance originates with the operator from his confidence in himself and in the system he operates. It is communicated to the user by voice inflection. The necessity of the phonetic alphabet is readily shown by pointing out the errors in messages handled without it.

e. Grouping of students for this instruction follows the procedure noted in paragraph 34*e*.

38. Radio operator.—*a.* In general, the personnel of the various signal communition units who take this course consist of the following:

(1) Noncommissioned officers and privates listed as radio operators in Tables of Organization of the unit concerned.

(2) Selected miscellaneous privates in each signal communication unit to supplement the above to provide for 24-hour service on each type of set with which the unit concerned is equipped.

(3) The number of men to be trained in this specialty having been decided upon, those men who can be expected to develop into operators in a reasonable time are selected by using the radiotelegraph operator aptitude test as indicated in TM 11-454.

b. The equipment available is determined by the conditions as noted in paragraph 34*b*. In general, organization equipment is ample for the conduct of this course in troop schools.

c. TM 11-454 has been designed to meet the requirements for a text in this course. Technical Manuals and instruction books covering radio equipment should be used to supplement the text.

d. Special features of instruction in this course are as follows:

(1) Code practice should not exceed periods of 45 minutes or an hour at any one sitting. Two or more periods may be conducted daily by introducing other instruction between periods.

(2) Instruction in sending is started and conducted simultaneously with instruction in receiving after a student has attained a receiving speed of seven words per minute. Sending practice requires close individual coaching to prevent students from forming harmful habits in transmission.

(3) Instruction in radio procedure to the extent of familiarizing students with procedure signals is started as soon as the student can receive and distinguish characters. As code speed progresses, message forms, traffic, log, and number sheets are introduced, gradually combining instruction in code and radio procedure.

(4) Instruction on the various types of sets, including nomenclature, composition, methods of installing, methods of transporting, characteristics, and technical design, together with such fundamental electrical studies as are necessary, should begin when the course starts, alternating periods of this instruction with code practice periods.

(5) Each operator within the signal communication unit should be capable of operating any set with which the unit is equipped. The instruction should, therefore, cover thoroughly all types of sets used by the unit.

e. The grouping of students in this course follows the procedure noted in paragraph 34*e* for all laboratory instruction. In instruction in the operation of sets in this course, it is desirable to have only a key and a log operator with each set. Key and log operators should interchange duties frequently.

39. Message center clerk, messenger, and telegraph printer operator.—*a.* The training of message center clerks, messengers, and telegraph printer operators is efficiently conducted by grouping all these specialists for the technical phase of their training. Each of these specialists should be able to perform the duties of any other, and the duties of all are closely allied. Both message center clerks and messengers are required to have a general knowledge of the methods of operation of all signal communication agencies, a thorough knowledge of the staff organization of their own unit, and a general knowledge of the organization of all other units with which they may handle traffic. Telegraph printer installations are frequently made in the unit message center, and any message center clerk of a unit supplied with telegraph printer equipment should be trained in the operation thereof.

b. If telegraph printers are not available in the quantity desired, typewriters MC–88 may be used by students in gaining familiarity with touch typing.

c. Portions of the following publications cover the subject matter required for the technical training of these specialists.

(1) Field Manuals of the FM 11–series.
(2) FM 24–5.
(3) FM 21–25.
(4) FM 101–5.

d. The special features of instruction in this course are as follows:

(1) Not more than one-fifth of the time allotted to the course should be taken to familiarize the students with telegraph printer operation.

(2) Not more than one-third of the time allotted to this course should be taken to familiarize the student with the various forms used in message center and messenger operations. The bulk of the time should be utilized in handling traffic during actual operations of organized message centers. Individuals should be rotated in all the various duties of message center personnel, including messenger and telegraph printer operator. Their work is put to practical application in handling traffic with various other signal agencies established by the signal communication unit at the earliest possible moment.

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40. Pigeoneer.—*a.* Those specialists listed in Tables of Organization as pigeoneers are trained in this course. Organizations whose tables do not list such specialists but to which pigeons may be allotted for signal communication purposes may also train two or more men in this specialty.

b. Equipment available in a signal pigeon company is adequate for the conduct of this training in troop schools. Even when pigeons are not available, some instruction in their use is feasible.

c. This course is divided into two parts, the first part, for which FM 24–5 is used as a text, being given to pigeoneers and also to those men from organizations not having pigeoneers but to which pigeons are allotted. This portion of the course concerns the handling, attaching messages to, and releasing of pigeons. The second part, for which TM 11–410 is used as a text, is given to the pigeoneers only, and concerns the breeding, care, and distribution of homing pigeons.

d. The grouping of students in this course follows the procedure as noted in paragraph 34*e*.

41. Plotter.—*a.* Those specialists listed as plotters in Tables of Organization of Signal Corps units are trained in this course. Selected miscellaneous privates may also be trained to supplement the above to provide for 24-hour service on each plotting board which the unit may be required to operate.

b. In general, organizational equipment is ample for the conduct of this course in troop schools.

c. Portions of FM 21–25 and FM 11–20 cover the subject matter of this course and should be used as texts.

d. Only about one-third of the course should be devoted to familiarizing the student with the plotting system and equipment. The remainder of the time should be devoted to practice in plotting and computing answers from the separate plots if required. Accuracy and speed are emphasized.

e. The grouping of students in this course follows the procedure noted in paragraph 34*e*.

42. Operator, aircraft warning.—*a.* Men listed in Tables of Organization of signal companies, aircraft warning, as operators, aircraft warning, are given training in this course. Additional personnel may be assigned to this training to insure that the company is capable of 24-hour operation.

b. Organizational equipment is required for the conduct of this training, and training is conducted satisfactorily only in troop schools.

c. Instruction books on the technical equipment of the organization are used as texts for this training.

d. The special feature of this course is the requirement that the bulk of the instruction be conducted on actual equipment under actual operating conditions.

e. Initial instruction should be given in small groups. For practical application, work is by individuals, although other students may observe.

43. Photographic specialist.—*a.* No basic photographic training is required if proper men have been selected. Each photographic specialist in signal photographic companies and in signal photographic laboratories requires training, however, in the application of his technical specialty within the military service.

b. No equipment handicap exists in the conduct of the training indicated above. Training is conducted satisfactorily in troop schools.

c. Portions of FM 11–5, FM 11–20, and FM 21–50, and of TM 1–219, cover the subject matter of this course and should be used as texts.

d. Special features of instruction in this course are as follows:

(1) Technical instruction in photography is not envisaged.

(2) Slightly less than half of the instruction is devoted to Army and staff organization, military procedure and approach, and a check of qualifications.

(3) The remainder of the training period is devoted to general military photography.

44. Other signal communication specialists.—*a.* A study of the Tables of Organization of all signal communication units and appendix I will show that there are many other signal communication specialists not covered by the preceding paragraphs. Included in this category are—

(1) Installer-repairman.
(2) Repeaterman.
(3) Line foreman.
(4) Radio electrician and radio repairman.
(5) Chief radio operator.
(6) Frameman.
(7) Powerman, telephone and telegraph.
(8) Instrument repairman.
(9) Telephone electrician.
(10) Storage battery electrician.

(11) Insideman.
(12) Draftsman.
(13) Wire chief, telephone and telegraph.
(14) Cable splicer.
(15) Telegraph-printer installer-repairman.
(16) Tellers, filterers, and associated aircraft warning service specialists.

b. The technical skill and knowledge required of the specialists listed in *a* above suggest that group training of these specialists be conducted at schools of higher units or at the Signal Corps School. This should not be inferred to mean that troop training in any of the above specialties is impossible. Individuals may be assigned as apprentices to qualified specialists in the unit and the qualified specialist held responsible for the training of the apprentice. Group training of these skilled specialists is seldom feasible in small units due to a lack of suitable equipment.

c. Since most of the specialists listed in *a* above fall under a general classification of either radio electrician or telephone electrician, it is feasible to conduct in troop schools the following courses of training as a technical background for additional training in related specialties:
(1) Basic electrician.
(2) Radio electrician.
(3) Telephone and telegraph electrician.

45. Basic electrician.—*a.* In general, the personnel of the various signal communication units selected to take the basic electricians' course consist of the men intended to receive additional training as radio, telephone, telegraph, and storage-battery electricians. Each man selected for the radio electricians' course should have completed at least one previous training cycle as a radio operator. Each man selected for the telephone electricians' course should have completed at least one previous training cycle as a switchboard operator.

b. Signal Corps organizations and Air Corps signal communication units may satisfactorily conduct this course within small units. In signal communication units of other arms the conduct of the course by and within small units is extremely difficult due to lack of equipment. To assure adequate equipment it is highly desirable to conduct this instruction in division or corps schools or to assign selected personnel to the appropriate special service school.

c. Signal Corps School instructional pamphlets or standard commercial publications on elementary electricity may be used for texts in this course to supplement TM 1–455 and TM 11–455.

d. The special features of instruction in this course are as follows:

(1) Where possible, the instruction should be so planned that periods devoted to theory of electricity and magnetism should be immediately followed by the application of such theory in shop work periods.

(2) The instruction should be cumulative, in that the student, having been properly instructed in the use of a certain tool, gains expertness in its use by application in subsequent operations.

e. The grouping of students in this course follows the same procedure as noted in paragraph 34*e*.

46. Radio electrician.—*a.* Those specialists listed in Tables of Organization as radio electricians or radio repairers are trained in this course. Organizations whose tables do not list such specialists but who have radio equipment should also train two or more men in this specialty. This course is pyramided upon instruction in the basic electricians' course. (See par. 45.)

b. It is highly desirable to conduct this course in division, corps, army, or similar unit schools because the equipment available within small signal communication units limits the instruction to a great extent. Even Signal Corps and Army Air Force signal communication units have barely enough equipment allowed to conduct this instruction within the unit, and more satisfactory results can be obtained where ample equipment is provided.

c. Text material should be obtained for this course from Technical Manuals or instruction books covering radio sets on which instruction is to be conducted, and from TM 11–455.

d. The special features of instruction in this course are as follows:

(1) After the general considerations have been thoroughly covered, instruction is limited to the types of sets with which the unit is equipped.

(2) The ability to repair and keep in a serviceable condition all radio equipment with which the student's unit is equipped is the objective for this course. Practical work, therefore, should predominate in instruction methods.

e. The grouping of students in this course follows the procedures as noted in paragraph 34*e*.

47. Telephone electrician.—*a.* Those specialists listed in Tables of Organization as telephone electricians; wire chiefs, telephone and telegraph; installer-repairmen, telephone and telegraph; repeatermen; and line foremen, are trained in this course. Organizations whose tables do not list such specialists but whose signal communication functions involve the installation, operation, and maintenance of

command or fire control wire nets should train at least two men in this specialty. This course is pyramided upon instruction in the basic electricians' course. (See par. 45.)

b. The conduct of this course in troop schools is governed by the same limitations as noted for the radio electricians' course in paragraph 46.

c. Text material for this course should be obtained from Technical Manuals or instruction books covering each item of telephone equipment, and from such portions of FM 24–5 and FM 11–5 as apply.

d. The special features of instruction in this course are as follows:

(1) The fundamentals should be thoroughly covered and thereafter instruction should be confined to those items with which the unit is equipped.

(2) Ability to repair the various items of telephone equipment used is the objective of this course; therefore the method of instruction most consistently used should be practical work.

e. The grouping of students for this course follows the procedures noted in paragraph 34*e*.

Section VIII

SECTION AND TEAM TRAINING

48. Definition of section training.—*a.* The merging of individual and specialist training so as to secure teamwork in the working unit constitutes section training. The training of the various sections is conducted at the same time and accomplished by the full utilization of officers and noncommissioned officers in charge of sections or platoons.

b. Section training should be conducted only as long as is necessary to obtain teamwork within the section and to give each individual a general understanding of the mission of the section and the orders relative thereto. Teamwork within sections and between sections is perfected during the combined training of the unit. As a general guide, the section phase should not exceed one-half of the time devoted to the combined training, which is the most important.

Monotony will develop if section training is continued beyond the time when teamwork is obtained, so section training must be stopped as soon as possible and combined training begun.

49. Factors.—*a.* Section training starts immediately after the minimum standard of proficiency is obtained in individual training. As individual training tapers off, section training is gradually increased. The conception that individual training never ends but is continued through the training of teams and units also applies to the section after section training has been stopped. Just as the work of the individual or specialists is reviewed and brought up to a high standard during section training, the work of the section as a team is perfected during the training of the unit as a whole. It will be seen that individual training is not broken off abruptly and section training started where individual training stopped; neither is section training broken off abruptly for platoon and company training. Each new phase of training is started as soon as a minimum standard of proficiency is obtained in the preceding phase.

b. It cannot be too strongly emphasized that the working unit in all signal communication organizations is the team. In some cases a team may comprise an entire section; in other cases, two or more teams may be included in a single section. The teams of a division signal company will be discussed as an example. The sections are grouped into platoons in the division signal company merely for administrative purposes. These platoons perform no function in combat. The company organization in Signal Corps units and the communication platoon headquarters of other arms exercise a very important coordinating function, but the signal communication team still remains the basic working unit.

c. In the section and team training period, teams of all types are taught the proper measures for passive defense of their installations against air and mechanized attack, and for active measures against parachute and air landing troops and against aircraft for those equipped with suitable weapons for this purpose. Natural concealment should be employed wherever possible, and, in its absence, artificial concealment should be made to blend with the terrain. All weapons, within their capabilities, may be employed against parachute and air landing troops. Carbines and machine guns should be employed against aircraft as even a few holes may keep a plane under repair for several days.

50. Wire sections.—*a.* The wire section must be carefully drilled in the installations of centrals and the construction and maintenance

of lines. The primary purpose of this phase of training is to establish a mechanism for the installation of centrals and the laying of lines, to give the section a thorough understanding of this mechanism, and to repeat operations involved until accurate installations, rapidly made, become routine. The section must be drilled until a simple command such as "The command post will be in this building; put the switchboard in that room; this circuit diagram and line route map govern the wire system," will start the entire section to work without further orders. Since it is the mechanism of installation we wish to perfect, nothing is to be gained in early training by laying long lines. In fact, short lines are to be preferred in early training, as they keep the personnel together and under the instructor's direction and supervision.

b. The frequent moves of command posts introduce most of the difficulties into the maintenance of signal communication. Therefore, after the first few days' training, starting with miniature distance installations, simulated moves should be a part of every day's drill. This is effected by breaking the section into teams for echelonment. The forward central must be installed while the rear one continues to operate. Routine procedure is essential. The first echelon team of a section not thoroughly practiced in the mechanism of displacement generally finds itself several miles from the source of supply and short some essential item of equipment.

c. As distances are extended, the use of line route maps and circuit diagrams is emphasized. Deficiencies in map reading among noncommissioned officers will be brought to light and the opportunity presented for correcting such deficiencies.

d. Responsibility must be fixed and noncommissioned officers pushed to the utmost to develop initiative in the exercise of their functions. Errors made by individuals are corrected as they are observed. Each installation or problem is followed by a short critique in which the work is discussed and errors pointed out and corrected. Competition is developed between working teams, and commendation or criticism given where it will have the best effect.

e. As deficiencies in certain phases of training are discovered, more time and emphasis are placed upon those particular phases in the next week's schedule.

f. The standard of training is such that—

(1) The wire section grasps the entire wire plan from a few simple orders and instructions.

(2) The wire section has the ability to carry the plan into effect in the shortest possible time consistent with good workmanship.

(3) The subdivisions of the section are so organized and trained that the echelonment for movement of command posts is obtained by simple instructions and without interruption of the wire system.

(4) Maintenance is automatic by close cooperation of all wire communication personnel.

(5) Noncommissioned officers have the initiative and ability to make decisions if unforeseen circumstances require such decisions; for example, the changing of the route of wire lines if, upon arrival on the ground, a better route is found.

51. Radio and panel sections.—*a.* In order to give a radio section proper training it is necessary to arrange with the signal or communication officers of superior or subordinate units for the establishment of their stations at the same time. This is generally easily effected as the training program of the superior unit prescribes the same period for this type of training for the whole command.

b. During the early periods of training the radio section, it is good practice to put the stations a few hundred yards apart and connect them by telephone, or, as their training will be conducted simultaneously with the wire section, use the wire system installed by that section. This will save a considerable amount of time in adjusting initial operation difficulties. As soon as the radio net can function and the individual qualifications of specialists are expanded to grasp the situation, the telephone is discontinued and the radio station takes its regular function in the scheme of signal communication.

c. Stations are later separated by approximately the normal distances; this again can be coordinated with the training of the wire section.

d. A traffic load should be prepared each day, and this traffic load should be utilized not only to train the operators in handling traffic but by means of the addresses to train them further in the organization of their own, superior, and subordinate units. As training is advanced, this traffic load should be handled in the prescribed manner through the message center, and the very important point of cooperation between radio station and message center developed.

e. In the division signal company, forward movement by echelon must be repeatedly practiced. In the movement of command posts of subordinate divisional units, reporting out of the net, movement of the station, and reporting back into the net must be a daily occurrence in training. The signal units of organizations larger than a battalion or squadron are usually equipped with more than one type of set. The personnel of the radio section should be trained to operate each type of set equally well and to work in the superior net as well as in

the net of their own unit. The radio section of a division signal company is organized into teams for the operation of the stations in the corps and division nets and the air-ground station.

f. Log sheets must be kept, and carefully checked at the end of the problem or exercise *with the assembled operators.* Errors in operating procedure are pointed out and corrected.

g. The operating speed of the net must be carefully watched and developed. Faster operators must be kept down to a reasonable working speed. Operators should continually bear in mind that more traffic is handled and better results obtained if they keep in mind the receiving speed of other operators.

h. Care of equipment should always be stressed. More radio sets fail to function when needed because of improper care than for any other reason.

i. The radio section should be trained early in using such signal operation instructions as are applicable to the section so that when the time comes for combined training, the students will not be confused by having something thrust upon them that they do not understand.

j. The radio section must be well schooled in the use of panels. Noncommissioned officers should be taught the fundamentals covering the displaying of panels and the selection of panel and dropping grounds. All members of the section should be familiar with the panel code and thoroughly practiced in its use. As will frequently be the case, it may not be possible to train with the Army Air Force, but the nature of panel signaling is such that this feature can be stimulated with good results.

k. The standard of training is such that—

(1) It is only necessary for the signal or communication officer to designate the place and time a station or stations are to be opened to secure prompt results in the establishment of stations.

(2) The closest cooperation exists between radio stations and the message center.

52. Message center sections.—*a.* Message center sections must be carefully trained during the section training period. A traffic load must be prepared in advance for each day's instruction. This traffic load can be utilized to familiarize the personnel with unit and staff organization by addressing messages to the commanders and staff officers of their own, superior, and subordinate units.

b. A part of the time should be devoted to training in the operation of the message center in echelon. The mechanism of organizing teams for echelonment and simulating the movement of the command

post must be thoroughly understood by the entire section. The simulated moves must be repeated many times until they can be accomplished without loss of time or confusion. The exact equipment an echelon takes forward with it on a move must be made routine and thoroughly known by the entire personnel. In some organizations the section has been permanently subdivided into echelon teams and trained as such. This practice has many advantages.

c. During the individual training of the message center specialist he should have been trained in the duties of all members of the message center. This should continue by a rotation of personnel during the section period. Since the message center must operate continuously during active operations, it seldom has all the section available for duty at any one time. Message center teams should, therefore, be practiced in operating with only one, two, or three men as well as with the entire team.

d. Speed and *accuracy* on the part of message center clerks are developed through constant training and practice. Accuracy, both in printing messages and in registering them, must be kept up to a high standard, and that standard should not be lowered to develop speed.

e. The message center is the fountain head of communication for the unit which it serves. If a message center is to function smoothly and satisfactorily, its personnel must know the organization of the unit in which it serves and the general scheme for wire and radio communication. This means that the message center chief must know what wire and radio systems are to be established and be able to gain this knowledge from the instructions issued to wire and radio section chiefs.

f. The message center can be established in a few minutes, while it takes some time for the installation of the complete wire and radio systems. Some wire channels and radio channels will be available before the complete systems are in and working smoothly. The message center chief, to use these channels as soon as they are established, must keep in close touch with the wire chief and with the radio traffic chief (or personnel who perform like duties). The message center chief should never be allowed to make the excuse, "I didn't know we had wire (or radio) to that organization."

g. Each training problem or exercise should be concluded by a critique in which all records are gone over and errors brought to the attention of the personnel. After a few days' training, teamwork will be in evidence and at this time the training of the message center section should be combined with the training of other sections.

h. The message center section training includes messenger training. The training of a messenger should include the proper use of the delivery list, following a designated route on the map, repetition of short verbal messages, organization to include the division, and titles and names of all commanders and staff officers in his own unit.

i. The standard of training is such that—

(1) The simplest instructions, such as, "Establish the message center here; operation normal; be in readiness for a move of command post," assure the establishment and proper operation of the message center and its readiness to reopen at a new location when necessary.

(2) The message center and the various agencies of signal communication cooperate in every way to expedite the handling of traffic.

Section IX

COMBINED TRAINING OF SIGNAL COMMUNICATION UNIT

53. General.—Following the attainment of proficiency of operation within the section, combined training, wherein all sections of the organization work together, is initiated. An effective way to accomplish this is to arrange with superior and subordinate signal officers to conduct simultaneous coordinated training. The training program of the superior unit should plan for this coordinated training. When training with superior and subordinate units cannot be arranged, the command posts of these units are simulated by skeletonized elements of the unit concerned.

54. Miniature systems.—Signal systems which are established during the combined training phase should at first be in miniature with about 150 yards separating command posts. As a first step in training signal units, the miniature system has many advantages. It holds the organization together where errors can be quickly detected and corrected; it creates in the minds of the men a mental picture of the entire system; and it saves much time which would otherwise be spent in getting into position. However, it must be

remembered that the miniature lay-out is only a step, and the unit must not be permitted to spend too much time on it. Three or four complete installations of this nature should be sufficient to qualify the unit for advancement to the next step.

55. Medium distance installations.—The next step is to extend the distance between command posts to about half normal distances and put them in locations where they will not be visible to one another. This step is recommended because the unit will probably still be slow in installing the system, and the reduced distances will somewhat compensate for the lack of speed. As soon as a reasonable amount of time has been allowed for the completion of installations, the company or platoon commander should start an inspection of the work of his unit. These inspections should be as minute as it is possible to make them. A detailed list of the points which are to be covered in these inspections should be carefully prepared in advance, and they should be so minute that the personnel will soon gain the impression that any defects of installation, operation, or maintenance will be discovered. These inspections are in the nature of proficiency tests and will keep the organization commander informed in detail as to the proficiency of his unit. It is good practice to publish the result of these inspections.

56. Normal distance installations.—After a few days have been spent at medium distances, the systems should be extended to normal distances. The majority of the time devoted to the training of the unit as a whole should be at normal distances. Inspections should continue, but daily inspections during this phase are not necessary. Signal systems should be installed for many assumed tactical situations and for all possible formations of the command. Generally, half-day periods are insufficient for this phase, and arrangements should be made for continuous training throughout the entire day.

57. Movements and defense of command posts.—*a.* In all training of the unit as a whole the procedure for a move of the command post must be constantly practiced. Most of the problems should be those involving an advance and, during all-day problems, the command posts should be moved several times.

b. In all command post installations, care must be taken to see that air and mechanized defense measures of the separate teams are properly integrated and that they conform to the plans of the officer responsible for the defense of the entire command post. Constant practice of these measures in training is essential to their proper accomplishment in battle.

58. Traffic loads.—It is necessary in all miniature, medium distance, and normal distance problems to provide a traffic load for the system. This must be prepared in advance, and here the weekly schedule brings to the attention of those responsible for preparation, the things that must be done *before* the hour for training starts. Responsibility for these preparations must be fixed at the beginning of the combined training period.

59. Functions during tactical training.—After the organization of which the signal communication unit forms a part starts its tactical training, the instruction of the signal communication unit is broadened by actual performance of its function in serving the organization. Service is demanded of the signal communication unit during this phase of training.

APPENDIX I

MINIMUM TRAINING SPECIFICATIONS FOR SIGNAL COMMUNICATION SPECIALISTS

The following list of signal communication specialists (pars. 1 to 66, incl.) is compiled as a guide in assignment, training, tests, and inspections. The minimum specifications in skill, knowledge, and personal qualifications are listed. Related civilian occupations are listed as an aid in making assignments. A large amount of the material in this appendix is extracted from AR 615–26.

Abbreviations.

(S) Skill (ability to use knowledge effectively in execution).
(K) Knowledge (acquaintance with fact).
(PQ) Minimum personal qualifications.
(RCO) Related civilian occupations.

1. Basic private.

(S) Read, write, and speak English; school of the soldier; assemble, adjust, and display personal field equipment; pitch shelter tents; pitch and fold pyramidal tents; march 10 miles under proper march discipline with full field equipment; score 50 at 15 yards slow fire with automatic pistol; use and care for electrician's knife, screw driver, and pliers; test dry cells; connect batteries; make proper splices; connect, use, and test field telephone; lay a ground return and a metallic circuit between two telephones; use gas mask.

(K) Gas defense measures; antiaircraft and antitank measures for the individual and small unit; sanitation, hygiene, and first aid; Articles of War and regulations pertaining to soldier; military courtesy; uniform regulations for soldier; how to distinguish officers and noncommissioned officers; care and preservation of uniform and equipment; duties of private of the guard.

2. Basic corporal.

(S) Basic private, plus ability to instruct and command at drill, fatigue, and other duties of unit commensurate with rank; noncommissioned officer in charge of quarters; use compass; read maps sufficiently to follow routes and locate points by coordinates.

(K) Basic private; plus elementary conventional military and topographic signs; duties of corporal of the guard.

(PQ) Demonstrate qualities of leadership and ability to instill discipline, loyalty, patriotism, and sense of duty in the men.

3. Basic sergeant.

(S) Basic corporal, plus ability to instruct and command at drill, fatigue, or other duties of a unit commensurate with his rank; read maps.

(K) Basic corporal, plus conventional military and topographic signs; duties of sergeant and commander of the guard.

(PQ) Qualifications of corporal but to higher degree.

4. Cable splicer.

(S) Make random and test splices, cable transfers, and section throws; wipe joints; test, locate and clear telephone cable trouble.

(K) Understand cable construction and installations; read and understand a cut sheet; read circuit diagram and line route map.

(RCO) Cable splicer, telephone company.

5. Camera repairman.

(S) Make repairs, adjustments, and modifications to still-picture cameras and related equipment.

(K) Principles of optics and photography to such extent as to enable him to make adjustments listed above.

(RCO) Camera repairman in photographic supply house, in camera manufacturing plants, etc.

6. Cameraman, motion-picture.

(S) Operate professional motion-picture cameras and accessories, arrange lighting of scenes where necessary, and select camera angles.

(K) Use of professional motion-picture camera equipment and fundamentals of lighting and composition.

(RCO) Cameraman or assistant cameraman in motion picture production organizations.

7. Cameraman, motion-picture, animation.

(S) Do photographic work in connection with making animated type of motion pictures.

(K) Operative technique used in making animated type of motion pictures; use of professional animation camera equipment.

(RCO) Cameraman or assistant cameraman in animated cartoon studio.

8. Chemist, motion-picture laboratory.

(S) Mix chemicals and replenishers for continuous developing machines.

(K) Photographic chemistry.

(RCO) Chemist, motion-picture research or production laboratory.

9. Clerk, basic.

(S) Copy records legibly; spell words in common use; add, subtract, multiply, and divide integers, decimals, and fractions.

(K) Elementary grammar pertaining to sentence structure and punctuation.

10. Clerk, code.

(S) Basic private; plus basic clerk; plus print legibly and accurately at a rate of at least 75 letters per minute; encode and decode and encipher and decipher messages using ordinary types of government codes and ciphers at rates indicated in FM 11–5.

(K) Basic private; plus basic clerk; plus general methods employed in codes and ciphers; phonetic alphabet; methods of translating garbled code groups; military organization, to include the staff of the unit his message center serves and of the next superior and subordinate units.

11. Clerk, message center.

(S) Basic private; plus basic clerk; plus make proper records on messages and message center forms; attach messages to and release homing pigeons.

(K) Basic private; plus basic clerk; plus message center organization and procedure; phonetic alphabet; military organization including the staff of the unit his message center serves and of the next superior and subordinate units.

12. Draftsman, telephone and telegraph.

(S) Use and care for drafting instruments and materials; make simple scale drawings and tracings; do single-stroke lettering; compute and plot notes essential in military maps and superpose drawings on topographic maps.

(K) Wire plant and engineering drafting; symbols and conventional signs used in making wire communication system drawings in the commercial and military systems.

(RCO) Draftsman, telephone, telegraph, or electrical power companies.

13. Draftsman, topographic.

(S) Drafting, correcting, and compiling topographical maps from any original source, such as surveying notes, topographical photographs, or other maps.

(K) All conventional signs and designations used in plotting a survey or map; general knowledge of land surveying instruments; use of trigonometric and logarithmic tables.

(RCO) Surveying draftsman, railway survey draftsman, map cartographer.

14. Editor, motion-picture.—*See* Motion-picture cutter.

15. Electrician, basic.

(S) Basic private; plus soldering; use pliers and wire gages; use files and hacksaws; use drills, brace, and bits; use taps and dies; use speed indicator; use and care for electrical measuring instruments.

(K) Basic private; plus magnetism and properties of magnets; circuit electricity; test for polarity; circuit and wiring diagrams; Ohm's law and its application; fall of potential; series and parallel circuits; electromagnetism; resistance; insulation; construction and operation of voltmeters and ammeters; watt meters; primary cells; secondary batteries; charging sets; induced currents; dynamos and motors; alternating current.

16. Electrician, telegraph.

(S) Basic electrician; plus telegraph operator; plus assemble and disassemble all types of telegraph instruments except printers, and make necessary tests to determine their condition; repair ordinary types of field telegraph equipment; make small parts from brass and copper; read and follow wiring diagrams of telegraph instrument and of simple installations; install all types of telegraph instruments, including switchboards, with which his organization is equipped.

(K) Basic electrician; plus care and maintenance of batteries used in telegraph installations; fundamental principles of telegraphy; ordinary types of line-testing instruments and standard practice in the upkeep of simple telegraph systems; different types of telegraph equipment furnished by the Signal Corps and capabilities and limitations of each.

17. Electrician, telephone.

(S) Basic electrician; plus installation of ordinary types of telephones and switchboards; make small parts from brass and copper; dismantle and assemble telephone and switchboard equipment; read and follow wiring diagrams of telephone and switchboard equipment and blueprints of simple installations; repair all types of telephone equipment with which his organization is equipped.

(K) Basic electrician; plus fundamental principles of telephony, including switchboards; different types of telephone equipment furnished by the Signal Corps and capabilities and limitations of each.

18. Electrician, motion-picture.

(S) Operation of portable lighting equipments used in motion-picture production.

(K) Operation of gas-electric generating equipment; use of various types of lights for motion-picture photography.

(RCO) Electrician, motion-picture production organization.

19. Electrician, radio.

(S) Radio operator; plus basic electrician; plus test and repair field radio sets; make small parts from brass and copper; dismantle and assemble field radio equipment; charge and maintain standard types of storage batteries; operate and make minor repairs to dynamotors used with field radio sets.

(K) Radio operator; plus basic electrician; plus principles of radiotelegraphy and radiotelephony and their application to ordinary types of radio equipment; fundamentals and operation of vacuum tubes.

(RCO) Radio repairman.

20. Electrician, storage battery.

(S) Basic electrician; plus test, charge, and care for storage batteries in use within his organization; make minor repairs of storage batteries; set up, operate, adjust, and make minor repairs on field charging sets; mix electrolyte, both acid and alkaline; keep battery-charging and maintenance records.

(K) Basic electrician; plus thorough knowledge of storage-battery practice; working knowledge of the theory of storage batteries.

(RCO) Batteryman; automobile mechanic.

21. Frameman, telephone and telegraph.

(S) Basic electrician; plus execution of service orders pertaining to the distributing frames, including telephone, trunk, tie lines, and private lines; battery and generator supply; long line and PBX supervising equipment; repeater equipment and vacant line grouping; replace heat coils and carbons.

(K) Basic electrician; plus thorough knowledge of the wiring and of cross-connecting systems on all distributing frames; knowledge of simplex and phantom circuits.

(RCO) Frameman of commercial telephone company.

22. Insideman, telephone and telegraph.

(S) Basic electrician; plus maintenance of all manual telephone central office equipment except power and distributing frame equipment; adjustment of telephone relays and keys.

(K) Basic electrician; plus "A" board circuits; "B" board circuits; miscellaneous circuits, including trouble operator's telephone, voltmeter cord, plugging-up cords, verifying trunks, service observing trunks, and test-desk circuits.

(RCO) Insideman or central office repairman of large telephone and telegraph systems.

23. Installer, telephone and telegraph.

(S) Lineman, telephone and telegraph; plus drop and block wiring, including cable terminals, pole inspections, testing cable pairs, and cable protection; aerial construction, including temporary guying, transposing; station protection, installation, including mounting, grounding, auxiliary fusing, multiple installation; station installation, including party lines, simple wiring plans, auxiliary equipment, clearing trouble in magneto, dial, and common battery areas.

(K) Lineman, telephone and telegraph; plus general knowledge of current commercial practices insofar as pertains to the work involved.

(RCO) Station installer, large telephone and telegraph systems.

24. Installer-repairman, telephone and telegraph.

(S) Installer, telephone and telegraph, plus continued maintenance of installed plant.

(K) Installer, telephone and telegraph, plus trouble testing.

(RCO) Station installer or station repairman of large telephone and telegraph systems.

25. Installer, switchboard, telephone and telegraph.

(S) Basic private; plus installation, testing, and placing in service of all manual telephone and telegraph switchboards and associated equipment.

(K) Basic private; plus current commercial practices covering telephone and telegraph switchboard installation.

(RCO) Switchboard installer of large telephone and telegraph systems.

26. Instrument repairer.

(S) Basic private; plus repair various types of scientific and engineering instruments; use precision measuring instruments; use precision lathe, bench lathe, milling machine, sensitive drill, and all bench and hand tools.

(K) Basic private; plus operating principles and construction of various types of physical, electrical, and surveying instruments.

(RCO) Toolmaker; model maker.

27. Laboratory equipment engineer, motion-picture.—See motion-picture equipment repairman and sound-recording equipment repairman.

28. Laboratory supervisor, motion-picture.

(S) Supervision of complete motion-picture laboratory.

(K) All operations of developing negative and positive film, printing, edge numbering, sensitometric control of development, and negative cutting of motion-picture film.

(PQ) Basic sergeant, ability to handle men.

(RCO) Supervisors, assistant supervisors, and sensitometric control supervisors in motion-picture laboratory organizations.

29. Lineman, telephone and telegraph.

(S) Basic private; plus locate line faults and troubles and remove the same; make ordinary line tests with equipment furnished; interpret and follow circuit diagrams and line-route maps; construct all types of field lines used in his organization; install, operate, and remove test stations and test points; use climbers and lineman's safety belt; distinguish different types of field wire.

(K) Basic private, plus wire systems of his unit, use of telephone codes; conventional symbols for units within the division.

(RCO) Lineman, commercial telephone, telegraph, or power system.

30. Message center chief.

(S) Basic sergeant, plus code clerk, plus message center clerk.

(K) Basic sergeant; plus code clerk; plus message center clerk; plus the traffic capacity of all the various means of signal communication available at the headquarters served; relative speed and accuracy of the various signal agencies; general knowledge of the organization of the Army and detailed knowledge of the staff organization of the unit served; care and handling of pigeons.

(PQ) Basic sergeant.

31. Motion-picture camera department supervisor.

(S) Cameraman, motion-picture.

(K) Cameraman, motion-picture.

(PQ) Basic sergeant, ability to handle men.

(RCO) Head cameraman, motion-picture production organization.

32. Motion-picture actor.

(S) Act in motion-picture productions; assist in cutting and direction of motion-picture films.

(K) Photographic requirements in connection with motion-picture acting.

(PQ) Soldierly bearing and appearance.

(RCO) Motion-picture actor.

33. Motion-picture cutter.

(S) Cut, match, and edit motion-picture film.

(K) Arrangement of continuity; selection of scenes; editing of motion-picture subject.

(RCO) Motion-picture cutters and assistants in motion-picture production organizations.

34. Motion-picture director.

(S) Direct or act as assistant to director of film production unit.

(K) Coordination of all agencies contributing to the production of a motion picture; direction of entertainment or industrial motion pictures.

(RCO) Director or assistant director of motion-picture studios.

35. Motion-picture equipment repairman.

(S) Maintain and repair motion-picture cameras and accessories.

(K) Optics and motion-picture camera technique sufficient to enable the individual to do the work above.

(RCO) Machinist in camera, projector, or other motion-picture equipment manufacturing organization, or in repair shops of motion-picture production organizations.

36. Motion-picture sound editor.

(S) Edit sound track film; cut, match, and edit sound track film.

(K) Sound recording and re-recording technique; matching and synchronizing sound and picture print and negative.

(RCO) Sound editor or assistant editor of motion-picture studio or newsreel studio.

37. Motion-picture writer.

(S) Write motion-picture scenarios from rough outlines and objectives; and to translate such material into scene descriptions.

(K) Writing of scenarios for motion pictures; camera technique.

(RCO) Scenario writer for motion-picture studio.

38. Negative cutter and assembler.—*See* Motion-picture cutter.

39. Operator, telegraph.

(S) Basic private; plus transmit and receive in International Morse Code at a rate of 15 messages clear text (28.5 words of 6 characters each) per hour; set up and operate manual field telegraph equipment.

(K) Basic private; plus elementary theory of telegraph circuits; military radio procedure.

(RCO) Amateur or commercial radio operator.

40. Operator, telegraph printer.

(S) Basic private; plus operation direct keyboard transmission, sending and receiving alternately, at the rate of 30 average messages per hour (28.5 words of 6 characters each); direct keyboard transmission, sending only, at the rate of 40 average messages per hour; perforate for tape transmission at the rate of 50 average messages per hour; touch typing.

(K) Basic private; plus telegraph printer operating procedure.

(RCO) Telegraph printer or teletypewriter operators of commercial companies; expert typist.

41. Operator, telephone switchboard.

(S) Basic private; plus install portable switchboards; install small field distributing frames; lace cable and make connections with portable switchboards; operate properly and rapidly all types of switchboards with which his unit is equipped.

(K) General theory of portable switchboards; phonetic alphabet; organization of the division (corps, army, or air force, if in such units) and names of different staff sections at the headquarters he is serving; circuit and traffic diagrams.

42. Operator, radio.

(S) Basic private; plus transmit and receive in International Morse Code at a rate of 15 code groups of 5 letters each per minute for 3 minutes, transcribing received signals with pen or pencil in printed characters with a maximum of 6 erroneous letters; set up and make necessary connections for operation of field radio sets; adjust and care for field radio sets; test and care for storage batteries.

(K) Basic private; plus different parts of transmitting and receiving apparatus of field radio sets; batteries used with field radio sets; military radio procedure.

(RCO) Amateur or commercial radio operator.

43. Pigeoneer.

(S) Basic private; plus care for and properly feed homing pigeons; properly hold, attach messages to, and release homing pigeons with and without message carriers; instruct others in the above.

(K) Basic private; plus thorough knowledge of capabilities, limitations, and habits of homing pigeons.

(RCO) Pigeon fancier.

44. Plotter.

(S) Basic private; plus use drafting and plotting instruments and materials; do single stroke lettering; compute and plot notes essential to particular data plotted.

(K) Basic private; plus knowledge of symbols and conventional signs; map reading.

45. Photographer, still camera.

(S) Make news and record photographs, both indoors and outdoors.

(K) Practical photography of general subjects.

(RCO) Commercial or news photographer.

46. Photographer, copy cameraman.

(S) Duplicate drawings and photographs by photographic methods.

(K) Methods of duplicating by photographic methods.

(RCO) Commercial photographer.

47. Photographer, portrait.

(S) Do portrait photography.

(K) Portrait studio technique.

(RCO) Commercial studio photographer.

48. Photographer, developer.

(S) Prepare developing solutions and develop photographic films and papers.

(K) Chemistry of photographic solutions and their use in the development of photographic films and papers.

(RCO) Commercial photographer; darkroom man.

49. Photographer, printer.

(S) Make contact and projection prints from photographic negatives.

(K) Technique of making contact and projection prints.

(RCO) Commercial photographer; darkroom man.

50. Photographic laboratory supervisor.

(S) Supervise still-picture laboratory.

(K) Technique of still-picture production, including portraiture.

(PQ) Basic sergeant; ability to handle men.

(RCO) Photographic supervisors in news syndicates, commercial photographic organizations, etc.

51. Power plant attendant.

(S) Operation of small and medium-sized steam, gasoline, or oil engine-driven electric generating outfits up to 200-kilowatt output, either portable or stationary.

(K) Understanding of boilers, their operation and upkeep, including auxiliary equipment; steam engines, oil engines, and gasoline engines; electrical generating machinery associated with the power plants used; switchboards and metering equipment; storage batteries and their maintenance.

(RCO) Isolated plant engineer, factory electrician.

52. Powerman, telephone and telegraph.

(S) Basic electrician; plus maintenance of telephone or telegraph central office batteries; maintenance and operation of battery-charging and other power equipment.

(K) Basic electrician, plus general theory of primary and secondary cells; battery-charging methods and their application; meth-

ods of performing routine tests; theory of motor generator sets; gas and gasoline engine-driven generator sets, mercury arc, vacuum tube, and copper oxide rectifiers.

(RCO) Powerman, large telephone and telegraph systems.

53. Repairman, telephone and telegraph.—*See* Electrician, telephone, and electrician, telegraph.

54. Repairman, motion-picture equipment.—*See* Motion-picture equipment repairman.

55. Repeaterman, telephone and telegraph.

(S) Basic electrician; plus maintenance of toll, repeater, composite, and simplex central office equipment; make transmission, noise, resistance, impedance, and frequency measurements and cross-talk tests; adjust a-c and d-c relays; test with repairman on outside plant troubles.

(K) Basic electrician plus telegraph operator.

(RCO) Telegraph repeater attendant, Bell Telephone System.

56. Sound recordist, motion-picture.

(S) Operate and adjust sound-recording equipment for motion pictures.

(K) Technique of operation of sound film recording equipment; methods of dubbing and scoring sound effects.

(RCO) Recordist in sound department of motion-picture production organization.

57. Sound recordist supervisor.

(S) Supervise the sound-recording department of a motion-picture production unit.

(K) Technique of operation of sound film recording equipment; methods of dubbing and scoring sound effect.

(PQ) Basic sergeant, ability to handle men.

(RCO) Recordist supervisor in sound department of motion-picture production organization.

58. Sound recording engineer.—*See* Sound recordist.

59. Sound recording equipment repairman.

(S) Make repairs, alterations, and installations of sound-recording equipment.

(K) Optical, mechanical, and photographic details of sound-recording equipment.

(RCO) Maintenance operators, repairmen, and supervisors of sound-recording equipment and circuits.

60. Sound re-recordist.—*See* Sound recordist.

61. Salvage man.

(S) Separate and classify salvageable supplies and equipment from waste materials.

(K) Ferrous and nonferrous metals; separation of leather, metal, and cloth articles.

(RCO) Owner of or foreman in junk shop, in charge of salvage materials around railroad shops and yards, etc.

62. Retouching artist.

(S) Retouch still pictures and negatives.

(K) Technique and materials used in retouching work.

(RCO) Photograph retoucher in portrait studio or commercial photographic organization.

63. Technician, motion-picture laboratory.

(S) Do one or more of the following: Operate motion-picture timing and sensitometric control equipment; develop motion-picture film, negative or positive, by the rack and tank method; operate motion-picture developing machines; prepare various solutions for motion-picture processing; operate special effects printers; negative handling and preparation for printing; film inspection to catch defects of production; operation of polishing, edge numbering, and similar simple equipment; print and prepare title cards for motion-picture use.

(K) Technique of above operations done by individual.

(RCO) Laboratory technician engaged in similar duties in motion-picture laboratories.

64. Telegraph printer maintenance man.

(S) Install and maintain all telegraph printers, wiring, and station equipment at and in the area of a central or exchange.

(K) Wiring, including drop, block, inside wires, and station protector; station equipment, including keyboard, distributor, receiving units, motor generators and rectifiers, relays, remote-control equipment and automatic sending equipment, and telegraph printer switchboards; mechanical features of the various telegraph printers.

(RCO) Teletypewriter repairman of Bell Telephone System; telegraphic typewriter repairman of the Western Union Telegraph Company.

65. Transmitter and rectifier attendant.

(S) Install and maintain radio equipment.

(K) Installation, maintenance, and testing of radio equipment, including power apparatus.

(RCO) Electrical tester or radio repairman of commercial radio companies.

66. Wire chief, telephone and telegraph.

(S) Basic sergeant; plus make and interpret wiring diagrams, circuit and traffic diagrams, and line-route maps; make tests for grounds, short and open circuits, and other troubles on telephone and telegraph lines; test and locate troubles in central office equipment; install, maintain, and operate all types of telephone equipment issued to his organization.

(K) Basic sergeant; plus circuits of telephone switchboards and instruments; theory and use of test sets and measuring instruments; inside wiring and cabling; operating procedure.

(PQ) Basic sergeant.

(RCO) Wire chief, commercial telephone system.

APPENDIX II

ANNUAL TRAINING PROGRAM; OBJECTIVES

_____ Signal Company, _____ Division

July 1, 1940 to June 30, 1941

1. Training programs.—This program is based on a training year of 1,152 hours and accounts for morning periods only. The division training order has set aside 1⅔ months (156 hours) for combined divisional training at the end of the training year, leaving 996 hours to be accounted for on this program. The assignment of hours on the weekly training schedules will be so arranged as to complete the hours assigned each subject.

Subject	Text	Hours	Remarks
Basic training			
Articles of War	MCM	4	To all personnel. In two 2-hour periods.
General information and organization history.	FM 21–100	4	To all personnel. For morale building early in training cycle.
Packs, shelter tents, and display of equipment.	FM 21–15	12	All personnel. To be emphasized in connection with inspections and field exercises throughout the training cycle.
First aid	FM 21–10; TF 8–33 and 8–150.	4	All personnel. Given by surgeon, if practicable.
Military courtesy	FM 21–50; TF 11–157.	10	All personnel. Intensified in early training.
Personal hygiene	FM 21–10; TF 8–154 and 8–155.	6	All personnel. Early in training cycle.
School of the soldier	FM 22–5; TF 7–248 and 7–249.	20	All personnel. Emphasize in early training.
Physical training	FM 21–20; TF 11–184.	31	All personnel. Ten minutes per day for 31 weeks.
Drill of squad, platoon, and company.	FM 22–5; TF 7–143 and 7–144.	103	All personnel. One hour per day for the first 4 weeks and 30 minutes per day for the next 27 weeks. To insure precision and alertness in marching and in ceremonies.
Carbine instruction	FM 23–5; FS 7–1, 7–2, and 7–3.	4	All personnel. Early in training cycle.

Subject	Text	Hours	Remarks
Basic training—Con.			
Carbine marksmanship	FM 23–5	56	All personnel.
Guard mounting	FM 26–5	6	All personnel.
Interior guard duty	FM 26–5	10	All personnel.
Gas defense	FM 21–40; TF 3–216, 3–217, 3–218, and 3–219.	9	All personnel. Throughout training cycle. Emphasize in connection with later exercises.
Ceremonies and inspections.	FM 22–5	60	All personnel. Throughout training cycle.
Defense against attack by mechanized forces and air forces including parachute and air landing troops.	FM 21–45 and 100–5; TF 7–109 and 7–110.	4	All personnel. Basic instruction early in training cycle. Emphasize in connection with later exercises.
Basic signal communication.	FM 24–5; TF 11–177 and 11–178; FS 11–1.	65	To all personnel just prior to starting specialists' training.
Subtotal		408	
Individual specialist training			
Automobile electrician	TM 10–510, 10–515, 10–545, and 10–580; FS 10–33.	209	To personnel who will maintain electrical equipment on motor vehicles, including time spent in maintenance. Trained in conjunction with automobile mechanics.
Automobile mechanic	TM 10–510, 10–540, 10–545, 10–550, 10–560, 10–565, 10–570, and 10–585; TF 10–166; FS 10–34, 10–35, 10–36, 10–39, 10–42, 10–43, and 10–44.	209	To personnel who will maintain motor vehicles, including time spent in maintenance.
Chauffeur	FM 25–10; TF 11–228.	221	To all chauffeurs of organization, including time spent driving in connection with company management.
Vehicle operation	TM 10–510; FM 25–10; TF 11–228.	12	To all personnel other than chauffeurs to acquaint them with motor vehicle operation and 1st echelon maintenance.

Subject	Text	Hours	Remarks
Individual specialist training—Continued			
Clerks, message center	FM 24–5	209	To personnel being trained in message center operation. At least 150 hours actual operation.
Clerks, supply	AR's as apply; T/BA No. 11.	209	Company and division signal supply, to personnel engaged in signal supply.
Installer-repairman, telephone and telegraph.	TM's as apply	209	To personnel engaged in wire communication not being trained as operators or linemen.
Lineman, telephone and telegraph.	FM 24–5 and 11–5; TF 11–177 and 11–178.	181	To personnel who will perform the duties of construction and maintenance of wire lines.
Carbine (or rifle) caliber .30, M1, instruction and target practice.	FM 23–5; TF 7–108; FS 7–1, 7–2, and 7–3.	28	To personnel so armed. Instruction will include firing at aerial targets.
Submachine gun, caliber .45, Thompson, M1928A1, instruction and target practice.	FM 23–40; FS 17–2.	20	To regularly assigned drivers and assistant drivers of each motor vehicle. The time necessary will be subtracted from the specialist training time of each individual concerned.
Radio electrician	TM's as apply	209	To personnel engaged in radio communication already trained as operators.
Radio operator	TM 11–454; FM 24–6.	209	To personnel who are expected to perform duty as radio operators.
Telegraph and telegraph printer operator.	TM 11–454 and 11–353; FM 11–5; TF 1–206.	209	To personnel who are expected to perform duty as telegraph and telegraph printer operators.
Telegraph printer maintenance man.	TM 11–353	209	To personnel who will install and maintain telegraph printer equipment.
Telephone switchboard operator.	FM 24–5; TM's as apply.	209	To personnel who will perform duty as telephone switchboard operators.
Map reading, map substitutes, and sketching.	FM 21–25; TF 5–12.	100	For noncommissioned officer personnel not being used as instructors.

Subject	Text	Hours	Remarks
Individual specialist training—Continued			
Duties of Signal Corps noncommissioned officers.	FM 21–50	109	For noncommissioned officer personnel not being used as instructors.
Subtotal		221	
Section and team training			
Section field problems involving the mechanism of installation and maintenance of field lines, movement of command posts, and extension of wire system.	FM 24–5, 11–5, and 11–10.	102	To personnel being trained in the construction of wire lines. Reduced distance nets should be installed at first. Distances extended as proficiency increases. Signal orders, signal operation instructions, and care of equipment will be stressed.
Section problems in installation and operation of field centrals and operation in echelon.	FM 24–5, 11–5, and 11–10.	102	To telephone operation and telephone installation personnel. Movement of command post to be constantly practiced. Signal plans and orders which affect wire system and care of equipment will be stressed. Reduced distances at first, then advance to normal distances. Work in conjunction with personnel engaged in wire line construction.
Section problems involving the establishment and operation of field radio nets, panels, cooperation with message centers, and delivery, collection, and charging of storage batteries.	FM 24–5, 11–5, and 11–10.	102	To personnel being trained in radio communication. Radio procedure will be emphasized from the start. Signal plans and orders which affect radio personnel will be used in daily situations. Care of equipment will be stressed. Traffic loads will be prepared daily. Reduced distance nets for the first few days. Distances extended as proficiency increases. Training should be performed in conjunction with that of message center personnel.

Subject	Text	Hours	Remarks
Section and team training—Continued			
Section problems in operation of field message centers. Operation in echelon.	FM 24–5, 11–5, and 11–10.	102	To message center personnel. Signal plans and orders will be stressed. Cooperation with all agencies, care of equipment, and preparation of traffic loads will be emphasized.
Signal supply in the field; the signal distributing point and care of equipment.	FM 24–5, 11–5, and 11–10.	102	To personnel engaged in supply duties. Signal plans and orders affecting signal supply and use of transportation will be stressed.
Administrative functions of the company in the field in connection with signal activities.	FM 24–5, 11–5, and 11–10.	102	To administrative personnel. Messing and records pertaining to signal activities to be stressed.
Convoy operation	FM 25–10; TF 11–228.	102	To transportation sections to acquaint them with convoy operation. Emphasize in connection with later exercises.
Subtotal		102	
Combined training of the company			
Tactical problems in the functions of the company to include marches and march discipline, and bivouacs.	FM 24–5, 11–5, and 11–10.	229	Coordination and cooperation of all agencies. Knowledge of division organization and functions of units will be stressed. All problems will be based on assumed tactical situations.
Subtotal		229	Problems will be so arranged that all previous training will be automatically emphasized and refreshed.
Lost time		36	
Grand total		996	

NOTE.—See FM 21–6 for complete list of Training Films and Film Strips.

2. Objectives.—*a. Training objectives.*—(1) *Basic training.*—To be completed at end of the twelfth week. Individuals to have a thorough understanding of the subjects presented in this period. These subjects are to be emphasized during later instruction.

(2) *Individual specialist training.*—Individuals to have sufficient knowledge and skill in the signal communication specialty in which they have been trained to enable them to set up and operate the equipment related to their particular specialties. Individuals armed with special weapons to be able to use these weapons effectively in emergency in defense of themselves, their equipment, and installations.

(3) *Section and team training.*—To be started not later than the beginning of the twenty-sixth week. Individuals to be trained to work together as a team. They are to have an understanding of the capabilities of the equipment they use and a thorough training in combat loading of their section equipment on vehicles. Each section to be trained to take full advantage of all natural means to shield its installations from air and ground observations and to use camouflage materials to blend with the terrain.

(4) *Combined training.*—To be started not later than the beginning of the thirty-second week. Individuals to be competent in their own specialties. Teams to function rapidly and efficiently. The company to have a thorough knowledge of the capabilities of its own equipment and be able to install, maintain, and operate the agencies of signal communications for a division as prescribed in AR 105–15 under field conditions.

b. Final objective.—At the close of the training period the company to be prepared to take the field and perform its mission effectively in battle.

APPENDIX III

DETAILED PROGRAM, UNIT TRAINING CENTER

SIGNAL AVIATION COMPANY

Subject	Text reference	Total hours	Hours per week												
			Recruit period		Specialist's period						Section period		Company period		
			1	2	3	4	5	6	7	8	9	10	11	12	13
Basic															
Entire company:															
Physical training	FM 21-20; TF 11-184	20	2½	2½	2½	2½	2½	2½	2½	2½					
Dismounted drill	FM 22-5; TF 7-143, 7-144, 7-248, and 7-249.	37	10	10	5	2½	2½	2½	2½	2					
Articles of War	MCM	3	1½	1½											
Military sanitation and first aid.	TF 8-33, 8-150, 8-154, and 8-155; FM 21-10.	4	2	2											
Military courtesy	FM 21-50; TF 11-157	3	3												
Equipment, clothing and tent pitching.	FM 21-15	4	4												
Interior guard duty	FM 26-5	4		4											
Defense against chemical attack.	FM 21-40; TF 3-216, 3-217, 3-218, and 3-219.	8	4	4											
Carbine marksmanship	FM 23-5; TF 7-108; FS 7-1, 7-2, and 7-3.	32	10	10	12										
Antiaircraft security	TF 7-109 and 7-110; FM 100-5.	2		2											

Organization of Air Force Combat Command.	T/O series; FM 1-45 and 11-30.	4	----	----	4	----	----	----	----	----	----	----	----	----	----
Basic signal communication.	FM 24-5; TM 11-333; FS 11-1; TF 11-177 and 11-178.	16	5	6	5	----	----	----	----	----	----	----	----	----	----
Inspections	FM 22-5	16	2	2	2	2	2	2	2	2	----	----	----	----	----
Total basic		153	44	44	30½	7	7	7	7	6½	----	----	----	----	----
Technical															
Radio operators: [14]															
Individual specialist training.	FM 24-5, 11-5, 11-20, and 24-6; SOI; TM's.	181	----	----	13½	37	33	31	31	25½	5	5	----	----	----
Radio nets	FM 11-5, and 24-5	98	----	----	----	----	4	6	6	12	35	35	----	----	----
Subtotal		279	----	----	13½	37	37	37	37	37½	40	40	----	----	----
Message center, messenger and telegraph printer operators: [14]															
Individual specialist training.	FM 11-5, 11-20, 21-25, and 24-5; TM's.	199	----	----	13½	37	37	37	37	37½	----	----	----	----	----
Message center operation	FM 11-5, 11-20, 24-5, and 101-5.	80	----	----	----	----	----	----	----	----	40	40	----	----	----
Subtotal		279	----	----	13½	37	37	37	37	37½	40	40	----	----	----

See footnotes at end of table.

DETAILED PROGRAM, UNIT TRAINING CENTER—Continued

SIGNAL AVIATION COMPANY—Continued

Subject	Text reference	Total hours	Hours per week												
			Recruit period		Specialist's period						Section period		Company period		
			1	2	3	4	5	6	7	8	9	10	11	12	13
Technical—Continued															
Automobile mechanics and drivers: [1 4 5]															
Individual specialist training.	FM 25-10; TF 10-166, 25-68, and 11-228; FS 10-33, 10-34, 10-35, 10-36, 10-39, 10-42, 10-43, and 10-44; TM 10-510, 10-540, 10-550, 10-560, 10-565, 10-570, 10-580, and 10-585.	199	----	----	13½	37	37	37	37	37½	----	----	----	----	----
Motor transport	FM 25-10; TF 6-104, 6-105, and 6-106.	80	----	----	----	----	----	----	----	----	40	40	----	----	----
Subtotal		279	----	----	13½	37	37	37	37	37½	40	40	----	----	----
Telephone switchboard operator: [1 4]															
Individual specialist training.	FM 11-5 and 24-5; TM's	199	----	----	13½	37	37	37	37	37½	----	----	----	----	----
Telephone central operation.	FM 11-5 and 24-5	80	----	----	----	----	----	----	----	----	40	40	----	----	----
Subtotal		279	----	----	13½	37	37	37	37	37½	40	40	----	----	----

Lineman: [1] [4]															
Individual specialist training.	FM 11–15 and 24–5; Sig. C. School pamphlet No. 10 "Pole line construction."	199	----	----	13½	37	37	37	37	37½	----	----	----	----	----
Wire net construction	FM 11–5 and 24–5; Sig. C. School pamphlet No. 10 "Pole line construction."	80	----	----	----	----	----	----	----	----	40	40	----	----	----
Subtotal		279	----	----	13½	37	37	37	37	37½	40	40	----	----	----
Installer repairman: [2] [3]															
Repeaterman: [2] [3]															
Switchboard installer: [2] [3]															
Tactical															
Entire company:															
Service of equipment	TM's and IB's	20	----	----	----	----	----	----	----	----	4	4	4	4	4
Installation, operation, and maintenance of communication for wing headquarters.	All above texts	96	----	----	----	----	----	----	----	----	----	----	28	32	36
March and bivouac	FM 25–10 and 100–5	8	----	----	----	----	----	----	----	----	----	----	8	----	----
Night operation	FM 100–5	8	----	----	----	----	----	----	----	----	----	----	----	8	----
Field inspections		8	----	----	----	----	----	----	----	----	----	----	4	----	4
Total tactical		140	----	----	----	----	----	----	----	----	4	4	44	44	44
Grand total		572	44	44	44	44	44	44	44	44	44	44	44	44	44

[1] Men mobilized with unit are trained by unit.
[2] Men mobilized with unit are trained by Signal Corps School or by vocational schools under the jurisdiction of the chief signal officer.
[3] Replacements for unit are trained by Signal Corps School or by vocational schools under the jurisdiction of the chief signal officer.
[4] Replacements for unit are trained by enlisted replacement training center.
[5] Men in this specialty selected from corresponding civilian occupational specialty.

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BY ORDER OF THE SECRETARY OF WAR:

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(For explanation of symbols see FM 21–6.)

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