COMBAT RECOGNITION REQUIREMENTS

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This study was undertaken to determine the relative importance of the things which a soldier must recognize in combat and the means which men in combat actually use to detect, locate, and identify targets. Different ways in which men have been trained for recognition requirements have been evaluated and recommendations made for the improvement of training. The judgments and recommendations reported are based on interviews with combat veterans of Infantry, Airborne Infantry, Field Artillery, Armor, and Antiaircraft Artillery in World War II and Korea.

Important among the results of this survey is the finding that Army recognition training has emphasized tanks and aircraft and neglected such targets as personnel and ground weapons. Primary dependence in training has been upon vision. Training has taken little note of the other sensory clues men actually use in combat - especially sound, the tactical employment of weapons, and the disposition of personnel.

The operational requirement is often to recognize moving targets; but training aids do not usually show targets in motion.

Most of the time now alloted to recognition training is in the early part of the individual's Army career. This has three disadvantages: (1) other training demands interfere with efficient recognition training; (2) recognition training is remote from the trainee's use of it; (3) too much material is crowded into each training session and the sessions are too close together. For these three reasons, much of the training is forgotten before troops reach battle or maneuver areas.

The most important ways to improve recognition training are:

1. Place greater emphasis on personnel and ground weapons.
2. Include training in recognizing sounds of weapons.
3. Include the tactics and employment of weapons by our own and other forces.
4. Provide training aids which show targets in motion.
5. Spread recognition training throughout Army training cycles, rather than concentrating the time alloted to the early stages of training. Early training should be general and stress only major targets. Specific targets and their employment should be taught later in the training cycle and integrated with other training.

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RECOGNITION IN MILITARY COMBAT

Table of Contents

Table of Contents, cont'd — Page Number

List of Figures

List of Figures, cont'd.

INTRODUCTION AND SUMMARY

For effective performance in combat, a soldier must be able to recognize (detect, locate, and identify) a target (any enemy object or person about which a decision must be made), so that he can take appropriate action himself, or can pass along information to others which will guide them to appropriate action.

This is a report of the requirements for effective military recognition, based on:

available relevant training material

interviews with instructors in recognition training

interviews with combat-experienced enlisted men and officers

and

the judgment of investigators who are experienced in the application of psychology to learning and training.

The study was undertaken in order to evaluate recent and current Army recognition training, to find out how that training relates to the means by which soldiers actually recognize targets in combat, and to make recommendations for improvement in training.

The recommendations (Section III) are a combination of conclusions drawn from experience in combat (Section II) and the opinions of the investigators. Scientific techniques were used in gathering, analyzing, and interpreting data which has a bearing on Army recognition training. The study did not, however, extend to experimental research designed to

provide final answers to specific problems.

Recognition, in this report, is restricted to that made by direct observation without the use of mechanical aids, such as radar. It is that recognition which is possible to a man through the use of his ability to see, hear, touch and smell. One of the important conclusions of this investigation is that in spite of the increasing number of mechanical devices by which recognition can be assisted, there is a continuing vital need for the individual to be able to rely on his own capacities. Men can and have learned recognition the hard way. They have taught one another. Even when it was inefficient to pool their recognition skills, they have done so because they had to.

This study found that men need not only planned training in recognition, but a different and more extended kind of training, if combat performance is to be improved.

Men who had served in combat, with Infantry, Airborne Infantry, Field Artillery, Armored Forces, and Anti-Aircraft Artillery, in all the theatres of World War II and in Korea (Fig. 0.1), cooperated, through intensive interviews, in arriving at the operational requirements for recognition.

They were asked the following questions:

> "What are the important targets or classes of objects for the man in combat to recognize?"
>
> "What is the relative importance of these targets?"
>
> "How have you, through training and combat experience learned to recognize these targets successfully?"

Before recommendations were made for changes and improvements in recognition training, the replies obtained through these interviews were analyzed and compared with requirements recently or presently set forth in training programs. Army personnel assigned to conducting training programs were interviewed. A review was made of manuals for instructors and for enlisted men, and of manuals intended for all personnel on tanks and aircraft recognition.

The opinion of the investigators, based on the above sources, which are given in brief in the following pages, is that present training programs are inadequate. Most of them exist only on paper. Even if they were in operation, they should be altered in scope, kind and emphasis.

The number of targets covered in training should be increased; other targets than those which have been emphasized should receive major attention; teaching methods more likely to be effective should be adopted (many men did not recall having had any recognition training); training in recognition should be extended to include the use of hearing as well as sight; it should continue beyond the basic training period throughout a soldier's whole Army training, and every effort should be made to make it as realistic as possible.

Some of the conclusions and recommendations which follow will undoubtedly seem obvious to one group or another of those interested in recognition training. It will be no surprise, for instance, to the man who has seen combat, to learn that research shows that the enemy soldier, singly or in a group, is the target which soldiers consider to be by far the most important. In spite of a high degree of mechanization in warfare, the need to be able to recognize the enemy human target is still

paramount. Nor does anyone need to tell a man who has had to recognize a German machine gun he could not see, that the characteristic sound the gun makes is a "factor in recognition," and that what he hears in combat is very important. He may have had to act entirely on what he heard. Those who came over a ridge in Sicily to be shot at by machine guns the enemy had placed just over the crest, know how vital it is to recognize the tactics employed by a specific enemy in a specific locality.

Those familiar with psychological principles of learning are not surprised to discover that the attempt to give a large amount of information during a short period of training resulted, in most cases, in men's learning and retaining too little to be of use to them when they needed it.

It would appear that when recognition training programs were devised, some of the targets were overlooked through sheer familiarity. It would appear also that, on occasion, the zeal of the trainers has so far outstripped the ability of the trainees to absorb the material, that the concentration of information has produced digestion, and practically no permanent learning.

It is obvious that no matter how much and how fast and how eagerly a man learns in combat, it is wasteful, by any standards, not to have given him the sort of advance training which would have removed his necessity to depend on trial and error.

However obvious any of the factors in recognition training may seem to various groups, in this report none of them has been taken for granted, either in reporting the requirements for recognition, or in making recommendations.

In determining the requirements (Section II), it was concluded that:

> Targets may be divided, with respect to importance, into two classes, which may be regarded for purposes of discussion as either major or minor;
>
> the kinds of major targets are relatively few;
>
> personnel is the target of greatest importance;
>
> the importance of a target depends upon the type of duty which is performed by a particular unit;
>
> sounds, tactics, and sometimes smells are important characteristics of targets leading to recognition;
>
> enlisted men and officers are in substantial agreement on the main points involved in recognition;
>
> whatever training has been and is being given in recognition is inadequate;
>
> men who have been in combat recommend especially that conditions under which training takes place should resemble actual conflict as much as possible, and that this training should preferably employ simulated battle experience, including "enemy" demonstration teams, combat films, and demonstrations of enemy equipment, and that it should emphasize recognition through hearing as well as seeing.

On the basis of these findings and what is known about learning and retention, recommendations (Section III) are made for:

> a general plan for Army recognition training;
>
> the four phases of training under this plan;
>
> the targets which should be covered by each of the branches of service;
>
> the methods and devices to be used at each phase;
>
> the estimated time and material organization;
>
> those who should receive special training in recognition, and suggestions for that training.

The recommended training program begins with factors common to all Army recognition, and becomes increasingly specific both in terms of branches of service and the targets of particular importance to them, and in terms of proximity to actual combat.

The following is a brief outline:

BASIC TRAINING

Orientation on the importance of recognition training, and general training on the major targets for all Army personnel; personnel, tanks, automatic weapons and mortars, and aircraft.

Recommended method: motion pictures with sound, including combat films, combined with lecture and discussion.

Estimated time: 4 to 6 hours

UNIT TRAINING

Training dealing more specifically with those targets of particular importance to the branch of service, covering both enemy and friendly standard, basic equipment, and their customary employment.

Targets to be emphasized in decreasing order of importance, according to the branch of service:

Infantry and Airborne Infantry: personnel, automatic weapons and mortars, tanks, and aircraft.

Armored Forces: personnel, tanks and anti-tank guns, and automatic weapons and mortars.

Field Artillery: personnel, artillery, automatic weapons and mortars, and tanks.

Anti-Aircraft Units: aircraft, personnel, and tanks.

Recommended method: field training, demonstration teams, demonstrations of equipment, combat films and sound recordings, with lectures and discussion.

Estimated time: 20 to 40 one-hour periods at a rate of two periods a week, from one-half to two-thirds to be combined with other training in the field.

COMMUNICATIONS ZONE TRAINING

Training in tactics, weapons and equipment, both enemy and friendly, used in the particular theatre of operations. Refresher course on preceding training.

Recommended method for all units: Field experience and demonstration of enemy tactics and equipment. Continued use of motion pictures and sound recordings, if possible, with lectures and discussion. Provision for men to familiarize themselves with captured enemy equipment.

Estimated time: 5 to 20 hours, per 6 months in the Communications Zone, about half to be given in the field.

COMBAT ZONE

Training in the important variations in friendly and enemy tactics and equipment used in the local combat area.

Recommended method: Any consistent method which conveys the information needed about local tactics and targets.

Estimated time: 1 to 5 hours, depending on the situation.

It is recommended that men who perform such functions as the following, be given additional training during the Unit Training phase.

Infantry and Airborne Infantry

All line company and smaller unit officers, all line non-commissioned officers. Members of Intelligence and Reconnaissance platoons.

Armored Forces

Tank commanders, section leaders, and company officers

Field Artillery

All junior officers. Enlisted members of the Forward Observer's party.

Anti-Aircraft Artillery

Members of gun crews and lookouts or spotters.

Estimated time for specialists' additional training: 20 to 40 hours.

The investigators suggest the advisability of keeping in mind several pertinent considerations when recognition training programs are revised.

Recognition training, like that for other skills, should be spread throughout a soldier's career, beginning with the general and proceeding to the specific by gradual steps. Tests should be given periodically.

Motivation on the part of trainers and trainees is likely to be increased if as many as possible of the men who teach recognition have had combat experience.

In subjects of this sort, that is, those not learned simply by memorizing, recent experiments in teaching have shown that individuals best learn, understand, and retain what they learn, when teaching methods and devices create a feeling of reality, and when the individuals participate. People learn best by doing.

Audio-visual devices, such as motion pictures with sound, stimulate a feeling of actuality. (It may be feasible, before long, to use television, particularly kinescope recordings of programs which combine "live" demonstrations with interpolated film, in at least early stages of training.)

Motion pictures of combat, or simulated combat, should be of especial value.

Sound recordings also help create a feeling of reality. In addition, since much recognition takes place at night, or at such a distance that visual characteristics are not a factor, sounds are important in recognition. The most readily identified, perhaps the only distinguishing characteristic of a target, may be the sound it makes. This kind of aid should be particularly useful in aircraft and automatic weapons recognition training. It might well be extended to other important recognition sounds, such as those of tank engines and incoming and outgoing artillery projectiles.

Recognition training in combination with field exercises, is a practical way of facilitating learning through doing. This idea could be carried further to make recognition training part of simulated maneuvers with an "enemy." Although the present "Aggressor" forces may be intended for this purpose, they were criticized for using American, rather than enemy, tactics and equipment.[1] Competitive maneuvers without differing uniforms, equipment and tactics may provide a realistic combat training situation, but they have a distinct drawback so far as recognition training is concerned.

In conclusion, those who prepared this report believe that the preferred instructors, training material, and methods are those which encourage a man to imagine that he is in combat, and stimulate him to think and talk about recognition problems as being of vital importance to him and his companions in combat.

They feel that with the program they recommend, basic training in recognition will have achieved its minimum purpose if it arouses a man's

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[1] See FM 30-102 - Aggressor Military Forces
FM 30-103 - Order of Battle
FM 30-104 - Representation, Operation, and Equipment

interest in recognition and his desire to learn more, and provides him with a general understanding of how the four principal targets are involved in combat.

At each succeeding stage, he should acquire not only further facts about each of the targets, but a more definite understanding of how their use varies depending on where and how his unit and he are employed.

Finally, in combat, he should be able, through his own senses, to identify the human enemy, his equipment and tactics, and act accordingly.

II

THE SURVEY

Operational Requirements for Recognition
Methods and Devices
Suggestions Based on Training and Experience

The entire study was undertaken to determine the requirements for recognition of Army targets in combat, and having determined them, to recommend improvements in recognition training.

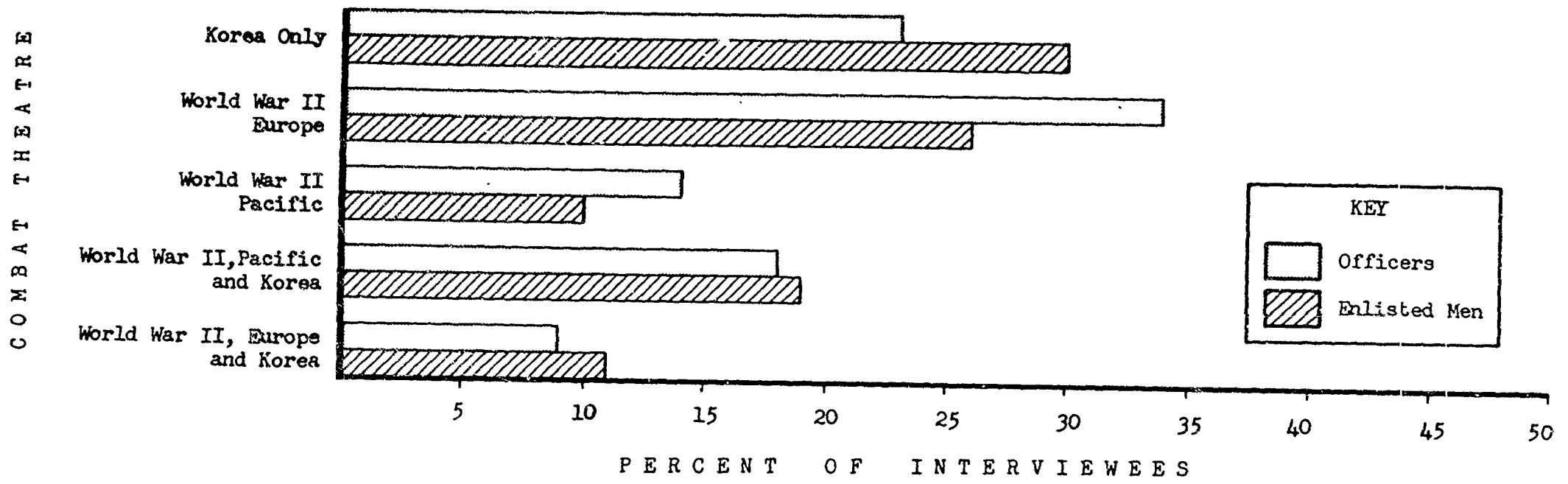
In determining the operational requirements, two kinds of information were used: that contained in relevant scientific and military research reports, and that obtained from intensive interviews.

Both officers and enlisted men who had had combat experience in either World War II, or Korea, or both, were interviewed, in order to arrive at the over-all operational requirements for recognition. One hundred and twenty-three Army officers and 155 Army enlisted men were interviewed between August 15, 1951 and November 1, 1951.

To learn what is actually being covered in current recognition training (as well as what is indicated on paper) authorities at Army, Navy and Marine installations, and from two to five instructors at each of five Army posts were also interviewed.

Three men at a time, either officers or enlisted men, but not both at once, were intensively interviewed for periods lasting from one to two hours. The sessions were recorded in their entirety by means of a

FIGURE 0.1. COMBAT BACKGROUND OF TOTAL SAMPLE.



magnetic tape recorder, and were later analyzed and classified by a specially trained team of analysts. The importance of each topic was measured by the frequency with which it was mentioned during interviews. (For a complete description of methodology, see Technical Appendix, Section IV).

Special requirements for different branches of the service were determined through the selection for interview of men who represent the following branches:

Infantry
Airborne Infantry
Armored Forces
Field Artillery
Anti-Aircraft Units

Before each session, the interviewers explained that the information resulting from the interviews was intended to help clarify recognition requirements, and was to be used in making recommendations for training. The men kept these two purposes in mind as they cooperated in supplying information and suggestions.

Words were given certain definitions, as follows, for the sake of uniformity and ready communication between those interviewing and those being interviewed:

Target:	Any object or person about which a decision must be made relative to combat action.
Recognition:	The processes of "detecting," "locating," or "identifying" any target.
Detection:	The initial awareness of a target, as yet unidentified, in a general location. "Detection" indicates an alerting function, and, in the language of the men, is "spotting."
Locating:	Specifying the position of the target in space, with or without identifying the target.

Identification: Specifying the characteristics of the target to the extent required to permit appropriate combat action. The degree of specificity may range from distinguishing friend from enemy, to indicating the structural or performance characteristics of the target in considerable detail.

The men experienced in combat were asked these questions:

"What targets were you called upon to recognize in combat?"

"What was the relative importance of these targets to you?"

"How had you, through training and experience, learned to recognize these targets successfully?"

Their replies have been grouped to provide answers relating to three main questions: 1. "What are the important targets for Army units?" and 2. "By what characteristics and through the use of what faculties are targets recognized?" and 3. "How have men been trained to recognize targets, and what are their suggestions?"

A number of general conclusions emerge from the data presented in the following pages of this section of the report. They are that:

targets may be divided, with respect to importance, into two classes which may be regarded operationally as either major or minor;

the kinds of major targets are relatively few;

the importance of a target depends upon the type of duty which is performed by a particular unit;

sounds tactics and smells are important characteristics leading to recognition;

enlisted men and officers were in substantial agreement on the main points involved in a discussion of recognition;

whatever training has been given in recognition has not been adequate;

men who have been in combat recommend especially that conditions under which training takes place should resemble actual conflict as much as possible, and that this training should preferably employ simulated battle experience, combat films, and demonstrations of enemy equipment, and that it should emphasize recognition through hearing as well as seeing.

1. <u>What are the important targets for Army units?</u>

A. Any targets which received more than 15% of the total number of mentions were classified as major. Targets receiving less were considered minor. (Any target, it must be remembered, however, may be either major or minor, depending on specific combat circumstances.)

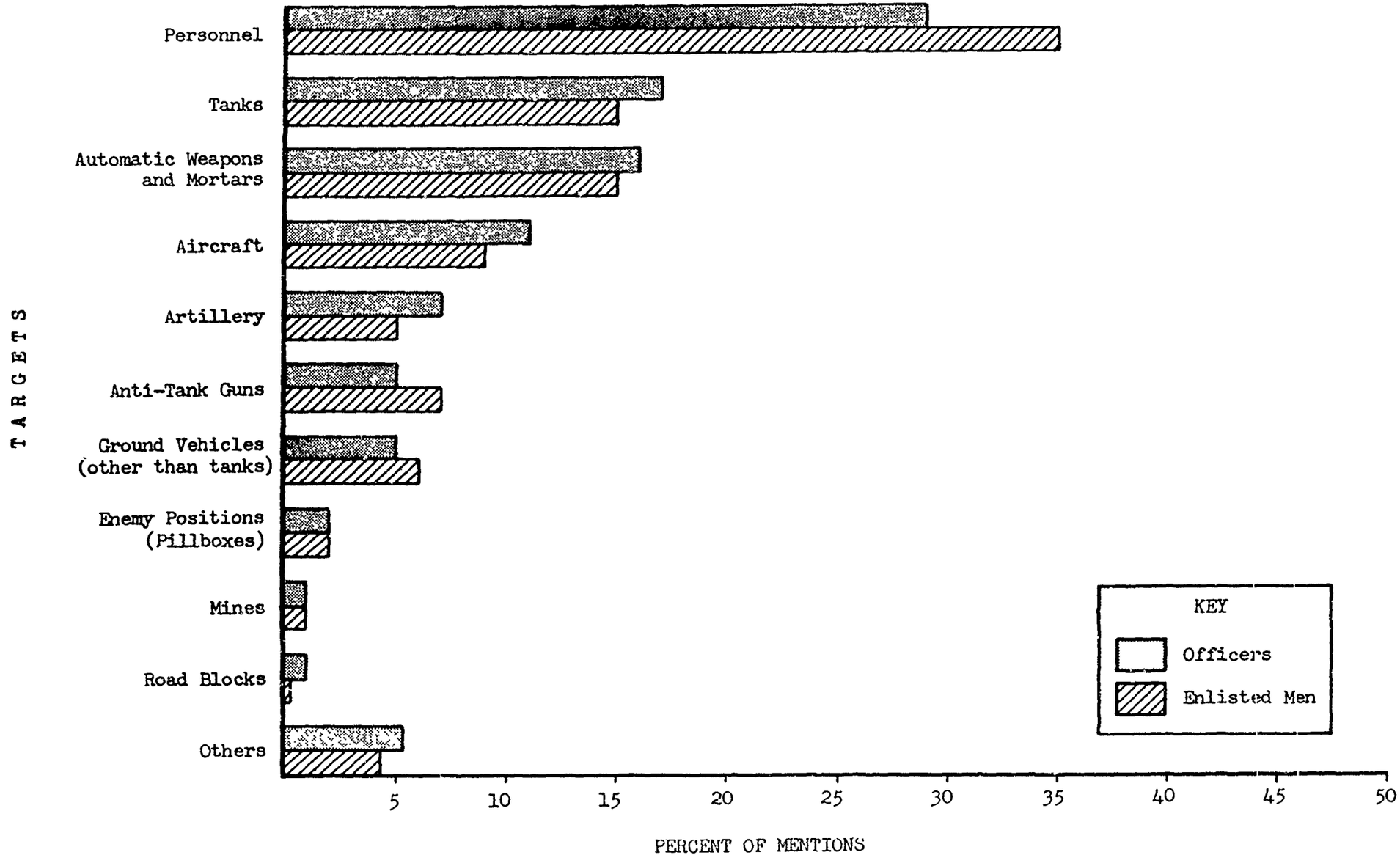
For the total Army sample, the major targets in decreasing order of importance are: personnel, tanks, mortars and automatic weapons, and aircraft (Fig. 1.0). The variation between the ranking by enlisted men and that by officers was so slight as to be negligible.

(1) <u>Personnel</u>

Personnel, as can be readily seen (Fig 1.0 and 1.1) received the largest percentage of mentions, and thus was of greatest importance for correct identification. Personnel may be one enemy soldier or a group of soldiers.

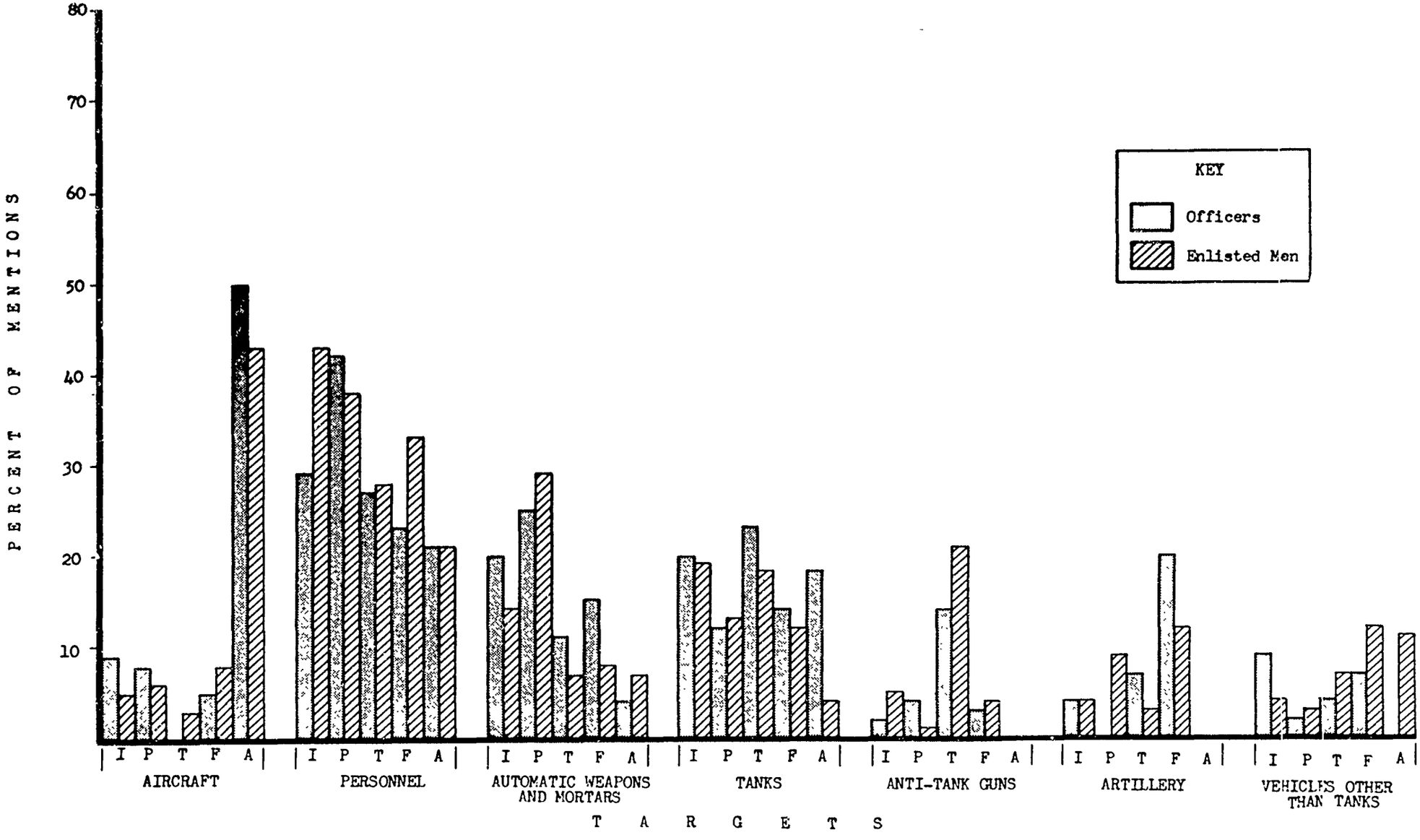
It was found that personnel was the target of first importance, regardless of the theatre of combat in World War II (whether Pacific, European or Mediterranean), and continues to be first in the Korean conflict.

FIG. 1.0. COMPARATIVE IMPORTANCE OF TARGETS. (Data combined for all units.)



PERCENT OF MENTIONS

FIG. 1.1. COMPARATIVE IMPORTANCE OF TARGETS FOR VARIOUS TYPES OF UNITS.



The fact that personnel was considered by far the most important target is considered to be one of the major findings of this study, particularly in view of the reports by the men interviewed, that whatever training they had received had emphasized planes and tanks.

(2) Tanks

Tanks ranked second. However, the difference in percentages between number of mentions of tanks and of the next class of targets, mortars and automatic weapons, is so slight as to make this an arbitrary rating.

(3) Mortars and Automatic Weapons

Mortars and automatic weapons received a higher percentage of mentions from Infantry and Airborne units than from other Army units, as might be expected.

The primary problem with respect to these weapons is that of locating rather than identifying the target, as will be seen in the next topic (II. (2)), which deals with the means by which targets are identified.

(4) Aircraft

Although aircraft ranked fourth in the general order of targets, anti-aircraft units considered aircraft to be their most important class of targets, as might also be expected. It was the frequent mention of aircraft by these units which resulted in their being included among the four major targets. For other Army units, aircraft were a minor target in terms of receiving less than 15% mention.

B. As may be inferred from the foregoing, it was found that the importance of targets varied depending on the branch of service. The data was therefore analyzed further to determine the relative importance of targets for different Army units.

(1) Infantry and Airborne Infantry

The rating of target importance by veterans who have served in these two branches of the service is so similar that, for purposes of discussion, the data obtained can be considered together.

Infantry units ranked targets in this order: (Fig. 2)

personnel
tanks
automatic weapons and mortars

Airborne Infantry ranked the targets: (Fig. 3)

personnel
automatic weapons and mortars
tanks

For neither branch does aircraft appear as a major target. This order of importance is virtually the same as the pooled frequencies of the Army as a whole (Fig. 1), and in later analysis of other Army units, Infantry and Airborne Infantry units will be used as a convenient reference for discussion and comparison.

Targets of minor importance were:

artillery, including anti-aircraft used as artillery (referring usually to the German 88 mm guns used as utility weapons in European, Mediterranean and African theatres).
anti-tank guns (when used as anti-personnel weapons).
non-armored ground vehicles (trucks, jeeps, etc.)
miscellaneous targets (anti-personnel mines, rifle grenades, bazookas, etc.).

Airborne infantry officers occasionally referred to the jump-area as a recognition problem (Table A, Appendix), because of their special responsibilities during jumps and the training they had received. Officers also rated aircraft as more important than did the enlisted men.

FIG. 2. COMPARATIVE IMPORTANCE OF TARGETS FOR INFANTRY UNITS.

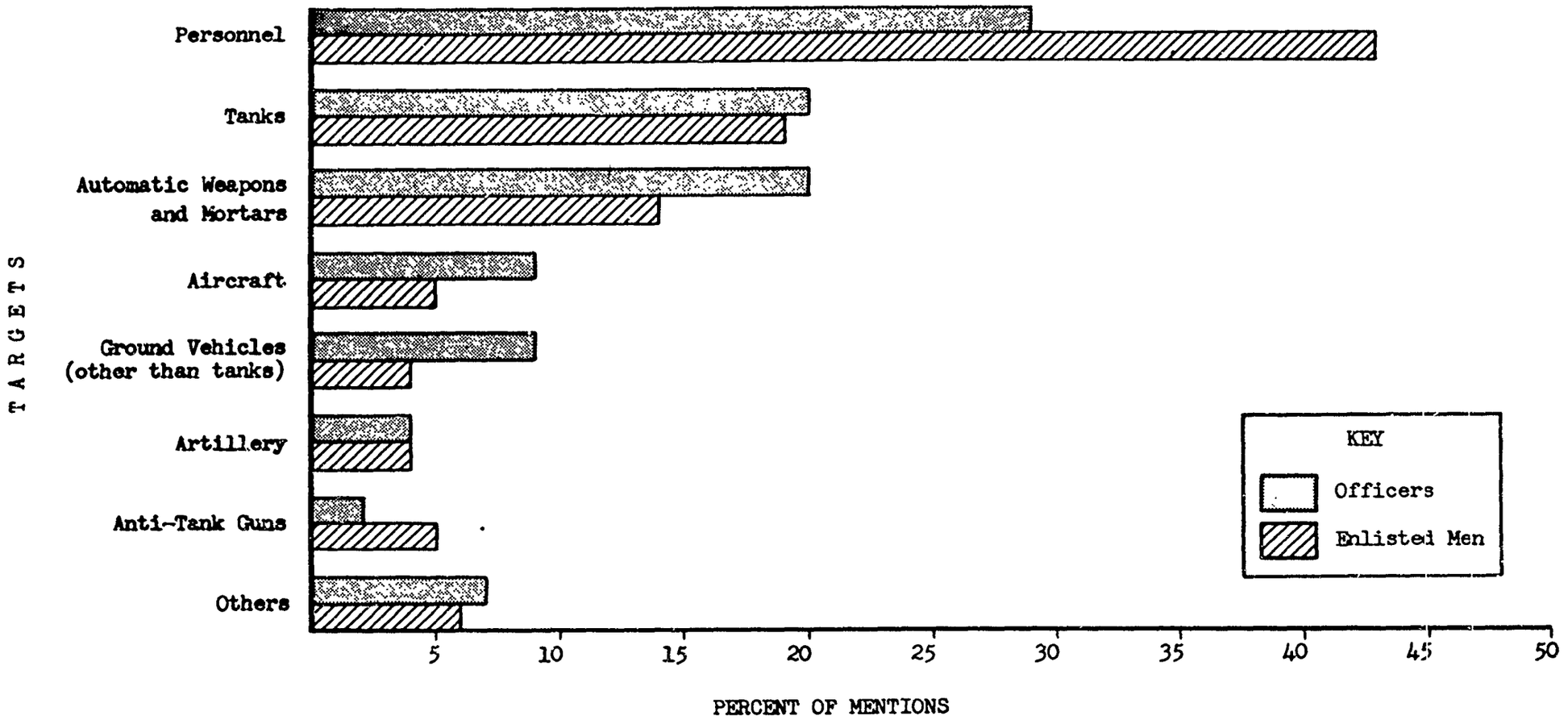
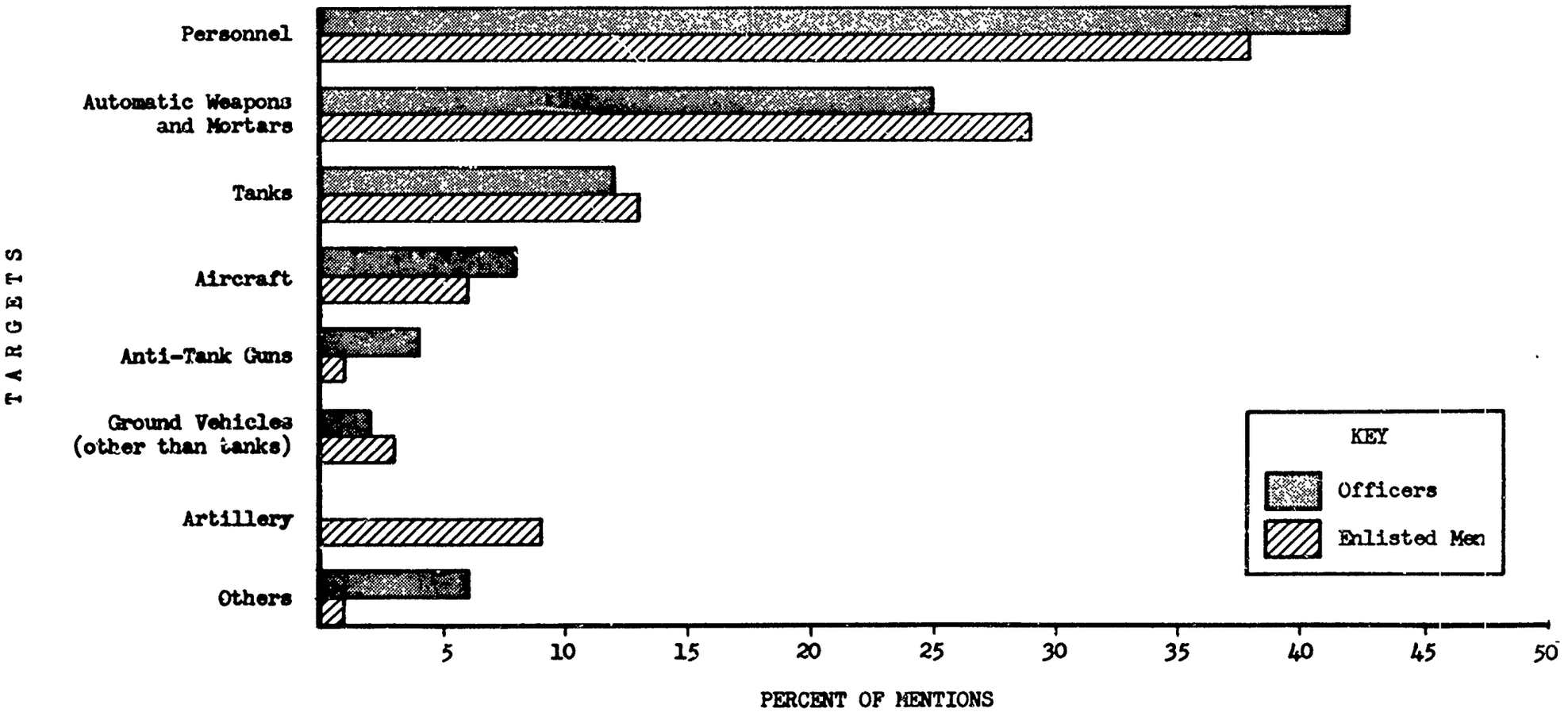


FIG. 3. COMPARATIVE IMPORTANCE OF TARGETS FOR AIR-BORNE INFANTRY UNITS.



(2) Armored Forces

Here the major targets were: (Fig. 4)

personnel
enemy tanks and anti-tank guns.

A slight reversal in rank of importance of tanks to anti-tank guns was found between officers and enlisted men.

Minor targets were:

automatic weapons and mortars (presumably because they are less effective against a tank than the major targets).
aircraft (not mentioned by officers and only occasionally by enlisted men).
non-armored ground vehicles (trucks, carriers, jeeps, etc.).

A comparison of the data for Armored Forces with that for Infantry units shows (Figs. 2 and 4) that the importance of a target depends upon the type of duty which is performed by a particular unit. What the men rated as important targets are those which threaten their personal safety in combat.

(3) Field Artillery

Major targets: (Fig. 5)

personnel
artillery
automatic weapons and mortars.

Minor targets:

tanks, with 14% mention, ranked close to automatic weapons and mortars, with 15%
non-armored ground vehicles
aircraft
anti-tank mines and anti-aircraft guns.

Officers placed more importance on enemy artillery and automatic weapons and mortars than did enlisted men. This is believed to be due to the fact that the offi-

FIG. 4. COMPARATIVE IMPORTANCE OF TARGETS FOR ARMOR UNITS.

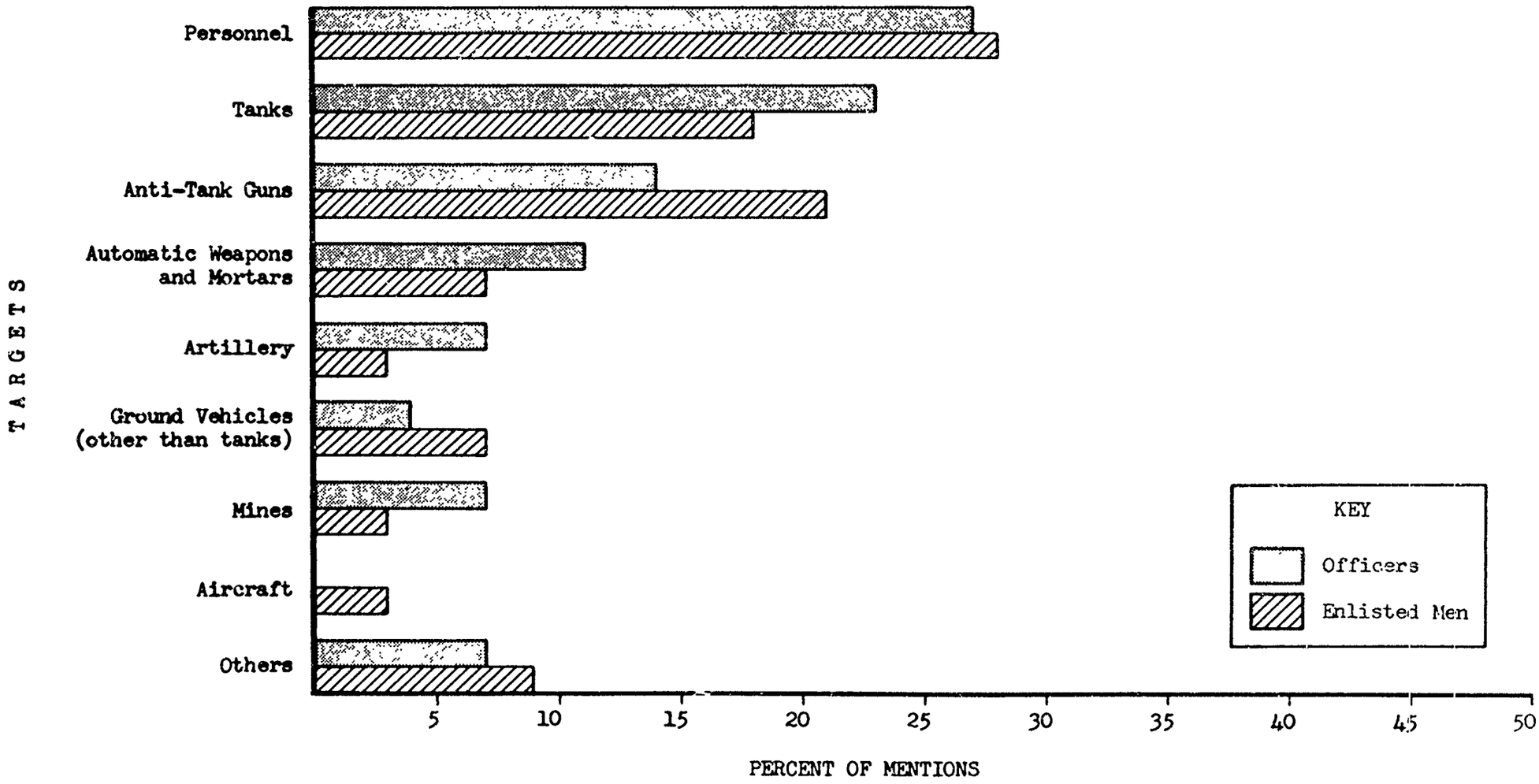
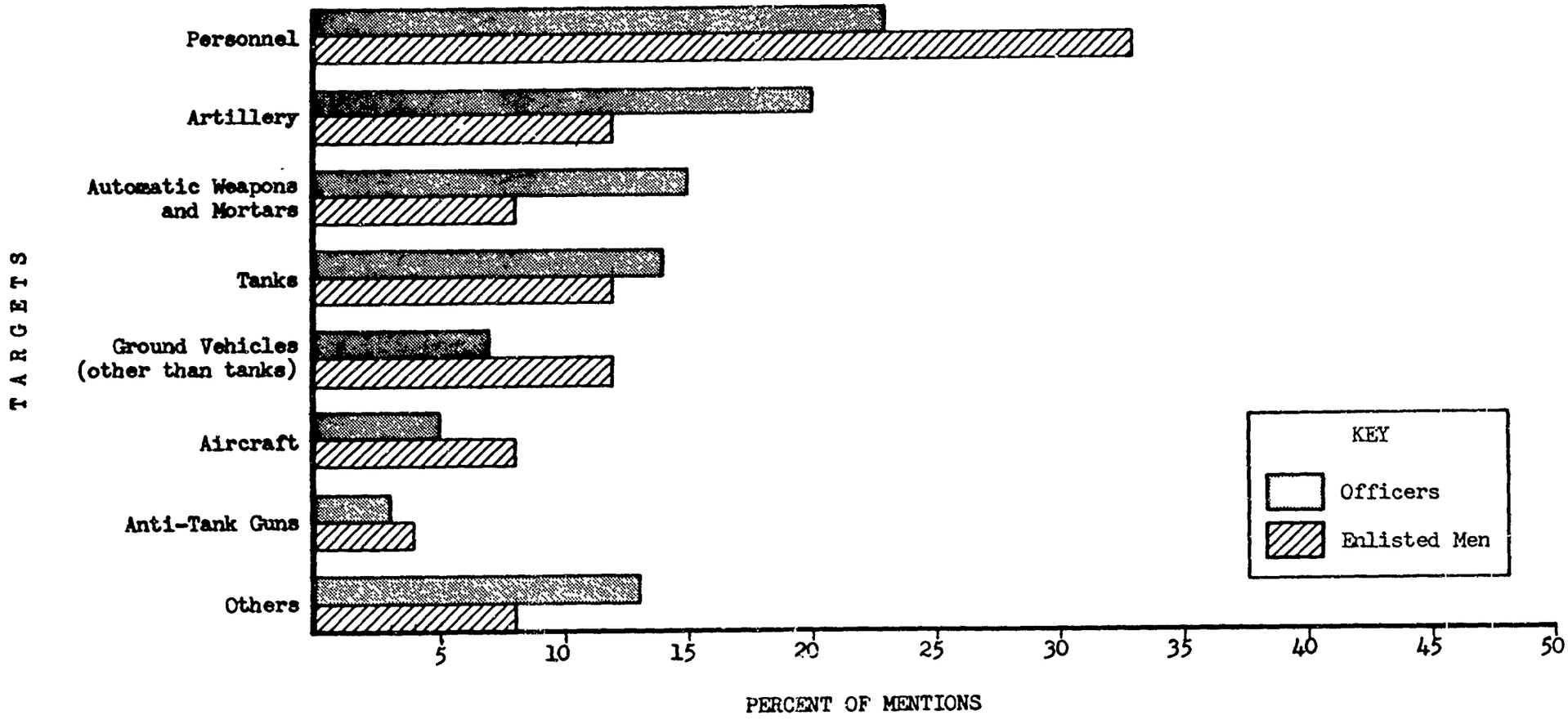


FIG. 5. COMPARATIVE IMPORTANCE OF TARGETS FOR FIELD ARTILLERY UNITS.



cers interviewed had been forward observers or air observers, and the enlisted men had been members of gun crews who had not had the infantry-like experience of the forward observers.

Once again, the targets rated as important are related to the kind of duty involved. The artilleryman quite naturally regards artillery as a major target, whereas the infantryman does not.

(4) Anti-Aircraft Units

Major targets: (Fig. 6)

aircraft
personnel
tanks (officers).

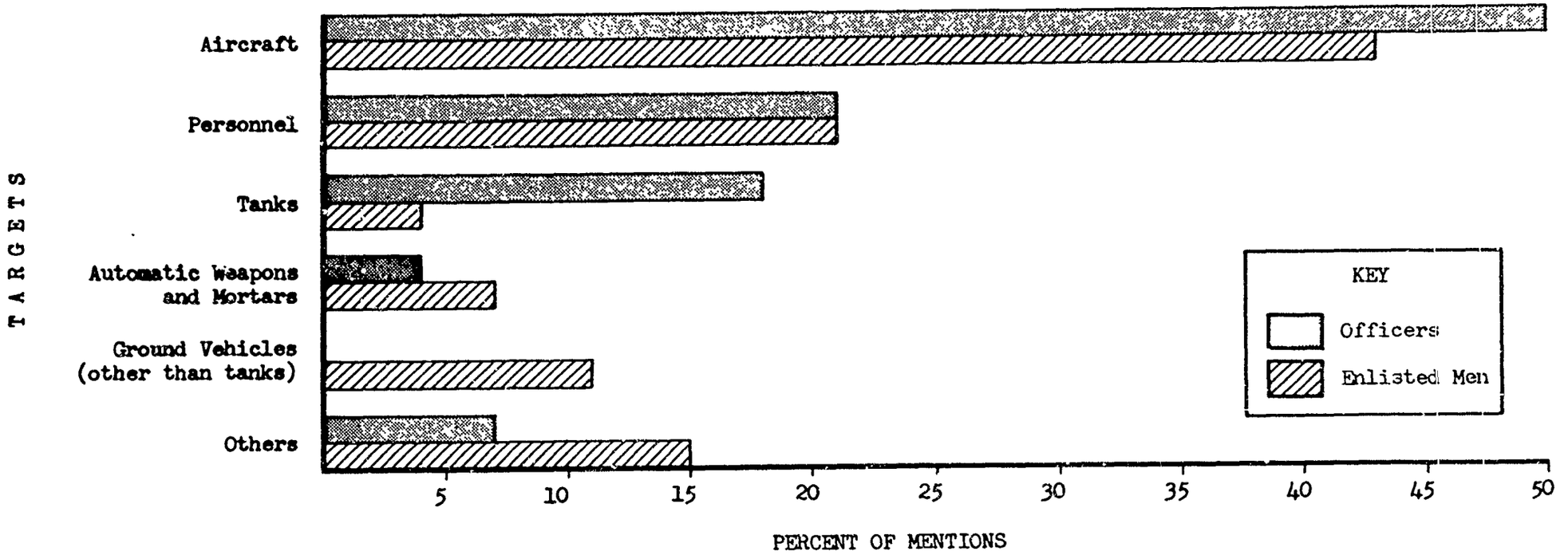
Minor targets:

non-armored ground vehicles (11%) came close to being a major target for enlisted men.
automatic weapons and mortars (except when firing regular artillery missions).
tanks (enlisted men).
enemy beach defenses)
ammunition dumps)---These probably relate
naval craft) to a specific combat theatre. (Appendix, Table A)

2. What are the means by which targets are recognized?

The following discussion will be in terms of the targets rather than in terms of the branches of service, since the means by which each of the targets was identified were common to practically all branches. Any exceptions will be noted in the analysis of the principal recognition characteristics of each of the major targets. (For details concerning less important targets and infrequently mentioned target characteristics, see Appendix, Table C.)

FIG. 6. COMPARATIVE IMPORTANCE OF TARGETS FOR ANTI-AIRCRAFT UNITS.



The order of discussion of the targets is in terms of the frequency of mention of their recognition characteristics, (Figs. 7 - 12). There are, therefore, slight discrepancies in the order of target importance between this type of data (Table C, Appendix), and that discussed in the preceding pages (Section II, (1) based on Table A, Appendix, and Figs. 1 - 6).

A. PERSONNEL

(1) Uniforms

Distinguishing features of the uniforms worn by enemy soldiers were the usual means by which a man identified his human target (See Fig. 7). The most frequently used characteristic was the general shape or design, such as the long German overcoat, or the distinctive silhouette of the Chinese and Korean winter uniforms, rather than any specific detail of the uniform. Sometimes the color, such as the light mustard color of Japanese and Korean uniforms, was the important factor. Only very seldom were such details as insignia mentioned as having been useful.

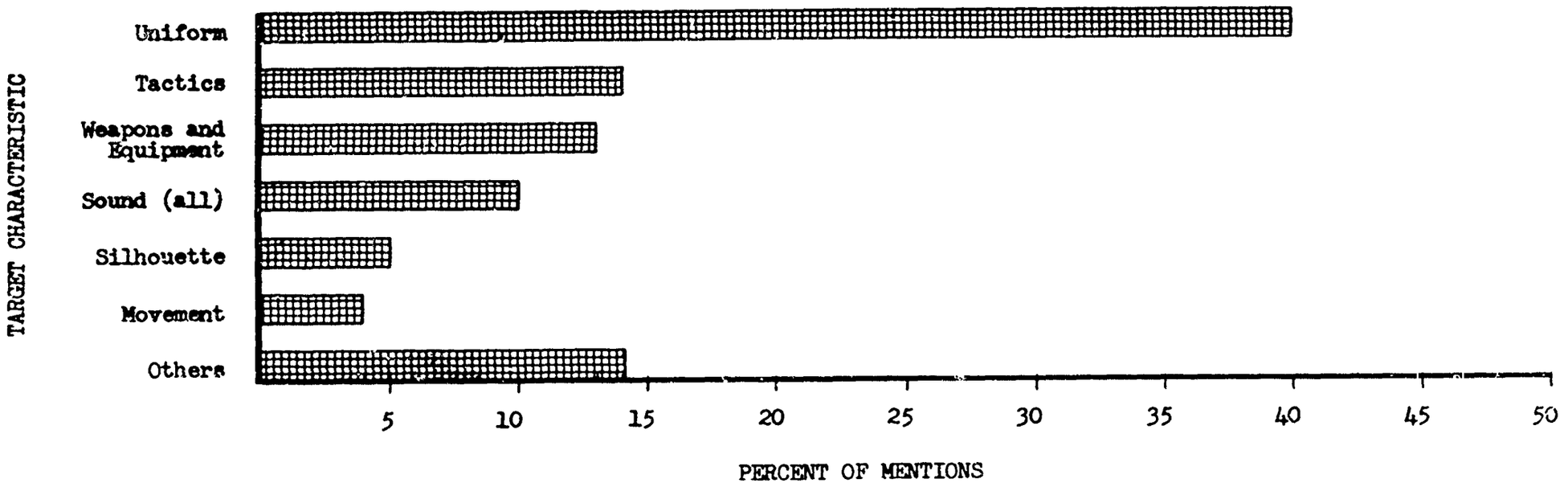
(2) Tactics

This was the next most frequently mentioned characteristic by which personnel were identified. These included such features of combat behavior as typical attack formations, and the kind of positions or places occupied by individuals. Mentioned as examples were the mass or mob formations of attacking North Koreans, and the small unit formations and typical rushing and falling advances of German troops.

Some of these identifying features can become outdated, however. The men interviewed pointed out that although "if you see him on a ridge or silhouetted against the sky, he's an American" may have been a useful concept but it is not necessarily so now in Korea where many enemy troops are recognized silhouetted against the sky.

Other examples of tactics by which men identified the enemy were given in such statements as these:

FIG. 7. CHARACTERISITCS BY WHICH PERSONNEL WERE IDENTIFIED.



"Unless you're given special warning, anyone in front of you when you're in the line is an enemy," and, "Anyone who is not in a foxhole after dark is an enemy."

(3) Weapons and Equipment

The third most important means by which personnel were identified were weapons and equipment. The sound of rifles was the most frequently mentioned characteristic. Identification of the firing characteristics of the equipment usually gave inferential identification as to the person using the equipment. Mentions were made of the fact that enemy rifles had a sharper, more cracking sound than ours, and that in some cases the sound they made seemed not to be as loud. The men regarded the sound of enemy weapons as such an important means of identification that they rarely made use of captured equipment because it resulted in their being fired upon by friendly troops.

The appearance of weapons, or the way personnel had of carrying them was next most frequently mentioned. The barrel of rifles and fixed bayonets were referred to as factors in visual discrimination of Japanese and Koreans. When they carried their rifles slung, the barrel projected above the individuals' heads. The Japanese also frequently carried their rifles with the bayonet fixed, which lengthened the silhouette of the weapons. German troops carried their weapons at the trail, hanging at the left side, while Americans carried theirs at port arms or slung from the shoulder.

The relative lack of smoke made when enemy rifles were fired was so often mentioned that the investigators recommend that recognition training should take this factor into consideration. Training which demonstrates why enemy weapons are perceived as having less "smoke" than American, would improve combat morale and efficiency.

(4) Movement

Movement as an aid in recognition of personnel included both general movement and the manner in which individuals in a nationality group walk, either because of habit or training. For example, the shuffling gait of Asiatics - due to their having worn sandals from an early age — combined with their shorter stature, results in a short, quick step sometimes described as

a "jog trot." It has made possible identification of the enemy at considerable distances, even when details of uniforms or equipment were not clearly visible. North Koreans have also often been identified by the way they have of moving into the open, standing up, and congregating into small groups in apparent disregard of American troops, or because of a fatalistic attitude about whether or not they are observed and shot at. German troops crouched over when moving in order to keep from projecting a tall silhouette.

When the line of combat was so clearly drawn that those who were in front of the observer could definitely be assumed to be enemy, any movement at all gave a clue to their location.

(5) Sounds of Voices and Personal Equipment

The characteristic guttural sounds of German soldiers and the sing-song, highpitched voices of Orientals shouting commands or talking among themselves on patrol or as they moved about, form one group of identifying sounds. Men also quickly learned to distinguish the rattling of the German soldier's gas mask cannister and the sound made by his hobnail boots from sounds made by their own equipment. Through merely listening to the noises made by mess gear, bayonets in scabbards, and of rifles and other equipment being brushed against trees or rocks, men have been able to accomplish all the processes of recognition.

It is to be stressed that these identifying characteristics were entirely dependent on hearing and that sight played no part in such instances of recognition. Furthermore, the men had learned to make use of the sounds made by personnel and equipment without ever having had formal instruction in this aspect of recognition.

(6) Smells

Smells helped identify both an area, such as an outpost position where troops had been living, and the people who had been occupying it. The odors of the food they ate, the mosquito lotions they used, and other personal smell-producing factors helped identify which people they were. Smells also alerted

men on patrol to the near presence of the enemy. The characteristic smells of Japanese, German and Korean troops were mentioned frequently enough to be worth consideration. A smell of fish and garlic, for instance, was associated with Orientals, and of leather, with Germans.

The men interviewed had been given no training in recognition through smell.

B. TANKS

The most useful means of identifying tanks was found to have been by the sound of their engines. Next in frequency of mention was the sound of their tracks (See Fig. 8).

The most frequently mentioned visual characteristic was the overall shape when seen in motion in silhouette. Differences in the shapes of particular parts, such as the hull, the gun, and the gun turret, and the presence of the muzzle brake on the barrel of the gun,* were also clues to identification.

Tracks left on the ground by the tank-tracks helped locate the area in which a tank had been operating, and also aided in identifying the tank as enemy or friendly.

Numerals, identifying insignia, and panel markers being used in Korea were also mentioned as helpful visual characteristics.

C. AIRCRAFT

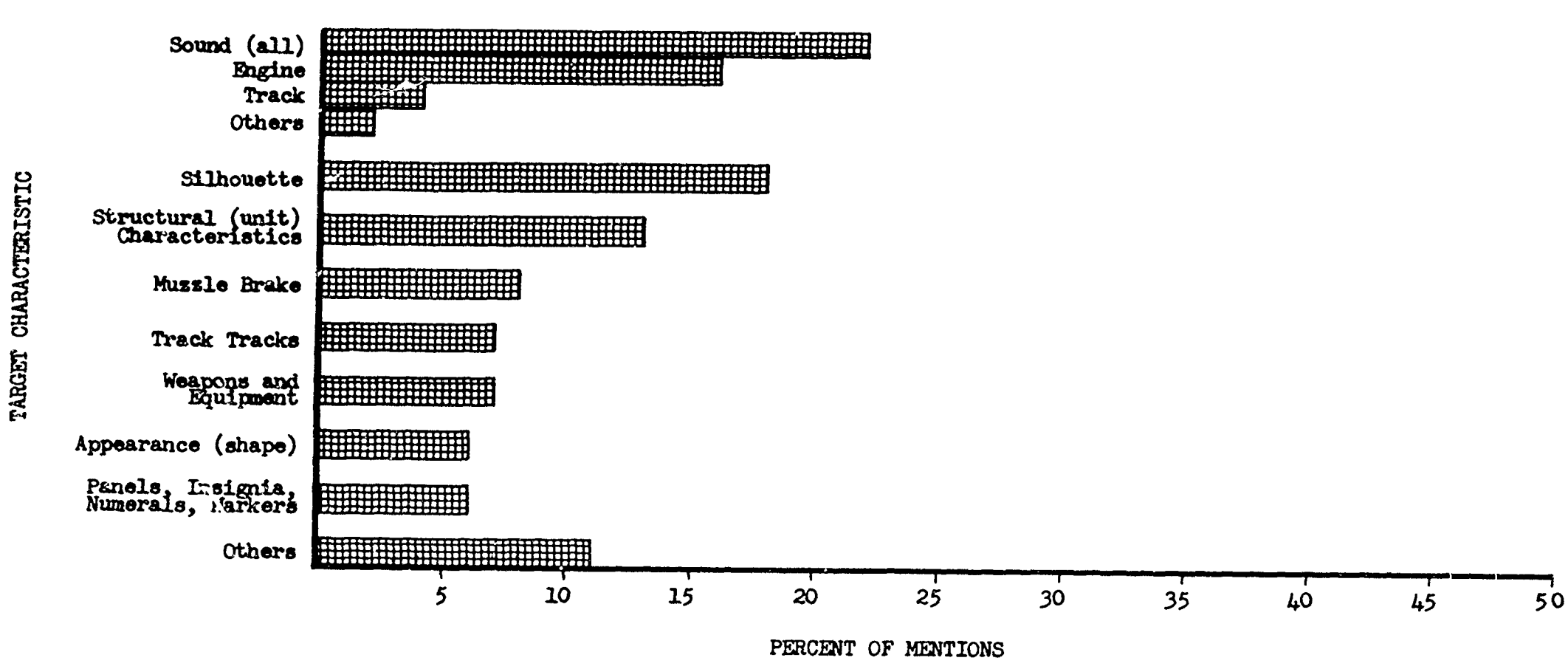
The sound of the engine of a particular aircraft was mentioned most frequently as the major identifying characteristic (Fig. 9). Lack of synchronization of engines, as in Japanese and German aircraft, produced a beating or pulsing sound which was readily detectable. Identification was also made on the basis of differences in sound produced by the number of revolutions per minute of the engine, or by the number of blades and propellers, or by the number of engines.

Because of aircraft structure, the sound of an engine might be muffled or amplified, and such variation also gave a clue to identification.

---

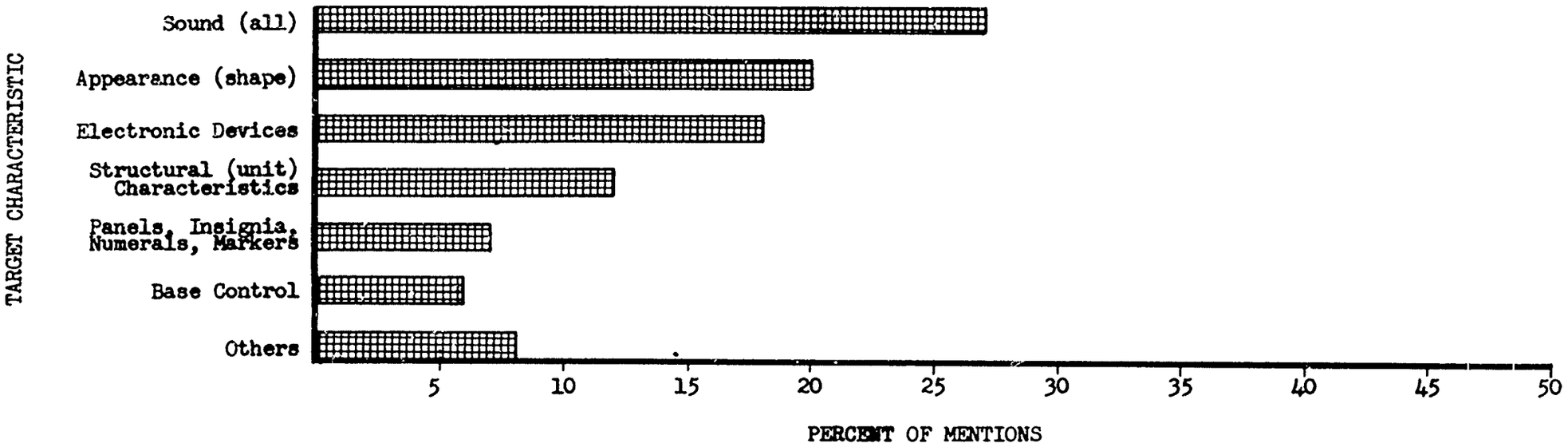
* When American tanks with muzzle brakes first appeared in Europe, many were destroyed because no warning had been given that they were being introduced, and they were mistaken for German tanks which had been the only ones with that feature.

FIG. 8. CHARACTERISTICS BY WHICH TANKS WERE IDENTIFIED.



PERCENT OF MENTIONS

FIG. 9. CHARACTERISTICS BY WHICH AIRCRAFT WERE IDENTIFIED.



General appearance - the over-all three-dimensional shape, not necessarily the silhouette - was the second most frequently mentioned identifying characteristic. Differences in structural parts, such as the shape of the engines, cowling, projection of the nose and tail structure, were also mentioned as leading to identification. Some mention was made of markings, such as numerals and insignia and the panel markers used in the Normandy invasion.

Tactics were less frequently mentioned, but are worthy of being reported here. The difference between an "open-and-above-board" approach and an attack approach was such as to give an observer a notion as to whether the plane was friendly or enemy.

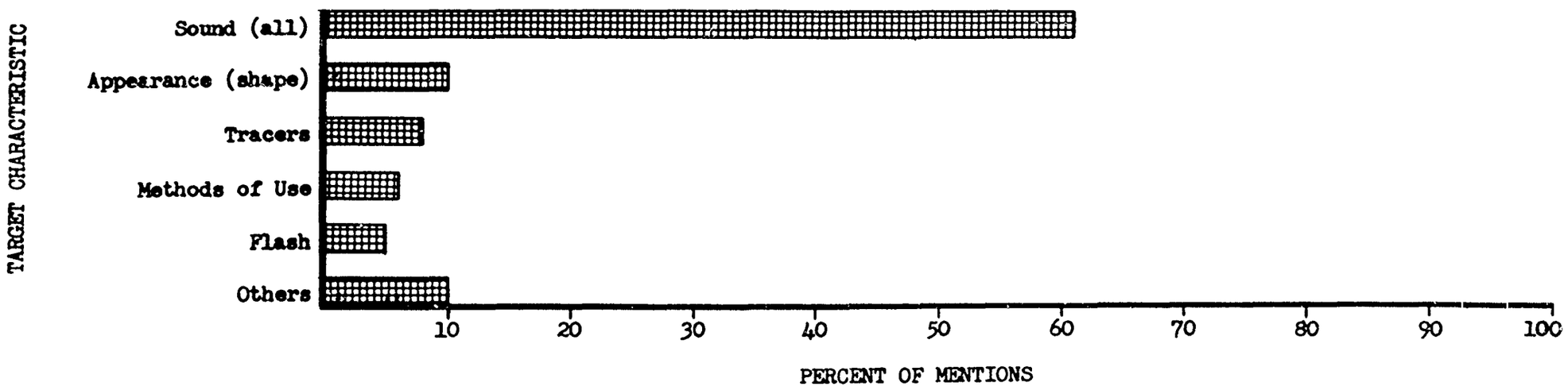
D. MACHINE GUNS

The sound made by the gun was by far the most frequently mentioned identifying characteristic (Fig. 10). The difference between the cyclic rates of fire of American and enemy machine guns was readily discerned and provided the most easily identifiable characteristic. The MG-34 and MG-42 used by the Germans, and Japanese machine guns were cited as examples. Differences in sound resulting from the method of firing were also mentioned as being helpful. Because of their training, our troops fired in a series of short bursts, whereas North Koreans fire for a considerable length of time. After Chinese troops entered the conflict, this sound clue was not too reliable, since many of them, having been trained by Americans, used the same method of firing in short bursts. In most cases, the experienced men had little difficulty in identifying the weapon in spite of the similar method of firing.

Identification by such variations in the sound of machine guns was nearly always learned in combat, and many men deplored the necessity for and expense of learning under those conditions.

Visual means of identification were less frequently mentioned than audible (Fig. 10). The characteristic shapes of machine guns were useful only at relatively short ranges. The difference in color of tracers fired from enemy and American weapons was mentioned from time to time, but descriptions of the colors varied among interviewees. As in the discussion of recognition of personnel through weapons and equipment (A., (3)), mention was made of flash and smoke, in the belief that our weapons made much more smoke. The men consistently volunteered comments on this, and almost all of them appeared to be considerably concerned about it.

FIG. 10. CHARACTERISTICS BY WHICH MACHINE GUNS WERE IDENTIFIED.



E. ARTILLERY

References to this target applied to both artillery weapons and artillery projectiles. The men who were interviewed made no great distinction between the sound of the weapon and the sound of the projectile.

Sound was by far the most important identifying characteristic (Fig. 11). Most soldiers claimed to have had to learn to discriminate between the sound made by an incoming projectile and the sound made by an outgoing one. Observation of the time of flight and the pitch with which an incoming or an outgoing projectile travels was added to listening to the sounds in learning to identify a projectile as enemy or friendly. It took several exposures over a period of time before most "green" troops were able to tell the difference between them.

Other identifying characteristics were mentioned comparatively infrequently. The shape of an artillery piece when seen at relatively close range, was mentioned, but most often by air observers. They also mentioned that when they were making observations from the air, the flash of an artillery piece when fired helped locate and identify it.

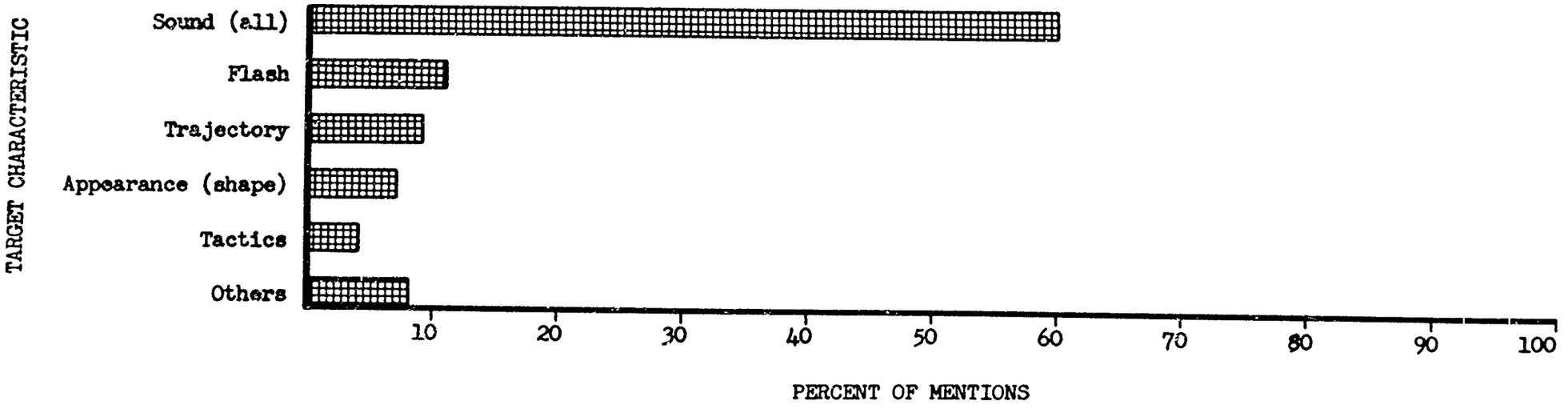
F. MORTARS

The sound of the mortar, or of the explosion of the mortar round itself when it landed, was not only the major but practically the only characteristic by which mortars were identified. The sound of the discharge gave information about the size of the mortar and also an idea of the distance and direction of the mortar from the observer. Only rarely was a direct and close view of the mortar possible (Table C, Appendix).

G. MINES

Surface indications on the ground where a mind had been concealed were most frequently mentioned as the means by which mines were located. Armored force men said that in the morning when the sun had just begun to dry off the surface of the ground, it was not too difficult to find the place where a mine had been laid. Because the disturbed dirt over the mine dried up more quickly in the sun than did other portions of the ground, it left a distinctive surface which indicated where a mine could be found.

FIG. 11. CHARACTERISTICS BY WHICH ARTILLERY WAS IDENTIFIED.



The next most frequently mentioned locating characteristic of a mine was its detonation when a vehicle had run over it - an undesirable and hardly appropriate means of detection.

Mine-detectors as a means of identification were mentioned a few times.

Deciding what action to take in relation to the probable presence of mines was often made by inferences to be drawn from the type of terrain. If the area was one through which vehicles would have to pass, was it likely that mines had been concealed there? Did the terrain offer tactically excellent opportunities for the distribution of anti-personnel mines?

H. ANTI-TANK GUNS

Their tactical employment was the most frequently mentioned distinguishing feature in detecting anti-tank guns (Table C, Appendix). Logical expectation of where to look for an anti-tank gun usually helped in locating one. For example, one might expect to find a gun covering a roadblock, or in a terrain where it would have a good field of fire against a tank.

Visual features, such as the silhouette of the gun, or the presence or absence of a shield were also mentioned.

An occasional mention was made of the speed of the projectile. Identification in this case was made on the basis that the projectiles of foreign, particularly European, weapons and anti-tank guns were of considerably higher velocity than American.

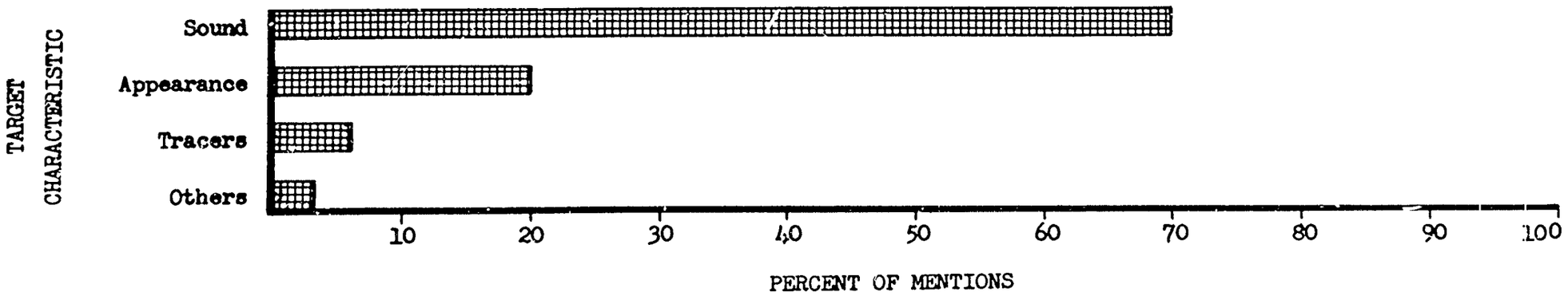
I. NON-ARMORED VEHICLES

The usual means of discrimination was the general appearance, based on familiarity with American vehicles (Table C, Appendix). Any unfamiliar vehicle was usually regarded as belonging to the enemy. Tracks left on the road by a vehicle were used in identification. Sound was mentioned, particularly the sound of the engine, but the sound of horse-drawn equipment was also helpful.

J. WEAPONS, UNSPECIFIED

A number of mentions were made to weapons without specification as to whether they were rifles, machines guns, or what. The characteristic mentioned more than twice as often as all of the other means of recognition combined, was sound. Shape, tracers, flash and other characteristics were referred to, but only infrequently (Fig. 12).

FIG. 12. CHARACTERISTICS BY WHICH WEAPONS (UNSPECIFIED) WERE IDENTIFIED.



3. How have men been trained to recognize targets, and what are their suggestions?

During World War II, Army recognition training was confined principally to training related to two targets: aircraft and tanks. There was little emphasis on training in recognition of personnel. Formal training was largely concerned with aircraft and tanks, and recognition of personnel was a matter of self-training through the use of charts and other representations of human targets (Fig. 13).

A substantial number of the men interviewed did not recall having received any formal recognition training. The majority of those who remembered having had such training reported that it had been given during their basic training (Fig. 14).

Since World War II, there has been practically no consistent recognition training. Where it has been available, Army recognition training has followed the same pattern as during the war.

With very few exceptions, the methods and devices being used currently are no different than those used in World War II. However, fewer of the devices and fewer of the methods are being used at all. The present study has found that the recognition training of the Army ground forces is one that exists largely on paper, and not one that is functioning in the field today. Many of the commands visited could show documented training plans for recognition, including regular periods set aside for recognition training. In actuality, very few of the commands were able to produce more than one or two officers or enlisted men who had as part of their duties the conducting of recognition training.

FIG. 13. TARGETS EMPHASIZED IN TRAINING. (All training methods and stages of training combined.)

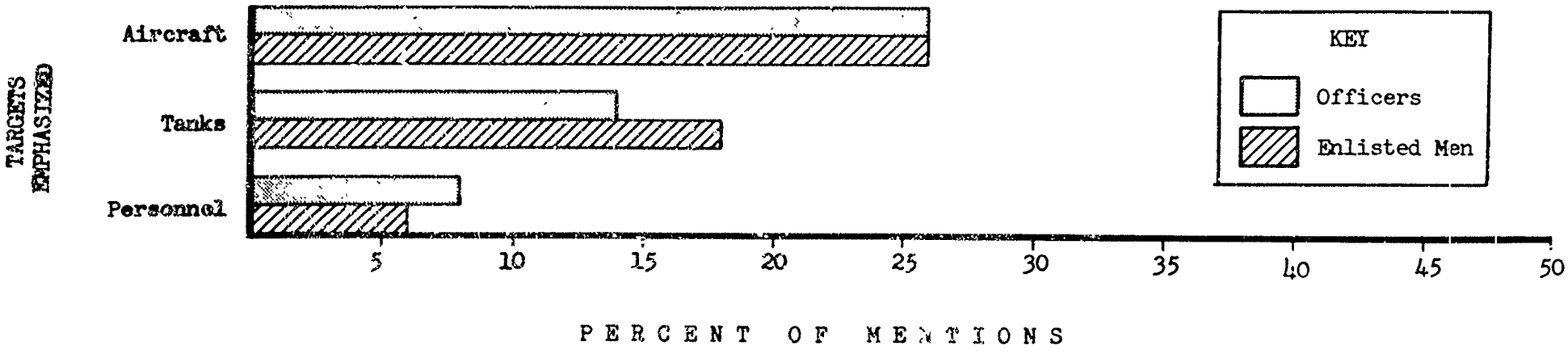
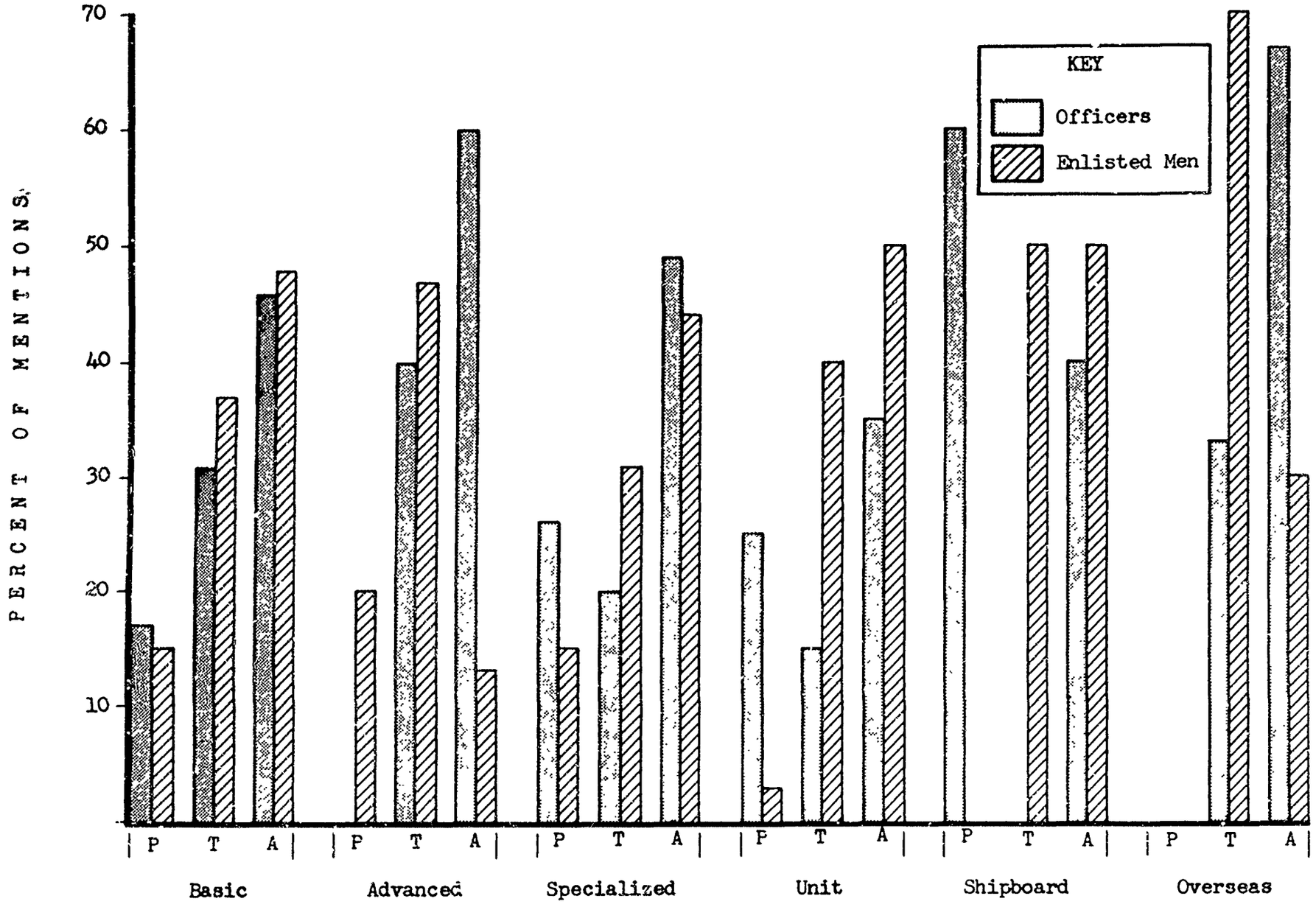


FIG. 14. COMPARATIVE TARGET EMPHASIS DURING VARIOUS STAGES OF TRAINING.



Training in recognition of the three targets, aircraft, tanks and personnel varied so little from one branch of the Army to another that the discussion of training methods will be in terms of the targets dealt with and the training aids reported as having been used during and after World War II (Fig. 15 and 16.0).

A. AIRCRAFT

Charts depicting the various features of aircraft were the training device most used during World War II (Fig. 16.1). They served as illustrations for lectures and also as a device permitting individual study. For this purpose they were hung in dayrooms, mess-and recreation halls, and in barracks.

Slides, accompanied by lectures, were next most frequently used. Pictures of aircraft were flashed upon the screen and studied by and explained to those who were being trained. The result was unfortunately not that expected: the men tended to learn to identify the slide in order to pass a test, rather than to learn to identify the object shown on the slide.

Some attempt was made to use the Renshaw Recognition System. In this, a number of slides, each picturing some friendly or enemy target, are flashed on a screen for very short time intervals. A slide-projector with a camera shutter permits varying the viewing time. Dr. Renshaw, the planner, advocated careful gradations of the length of time of presentation, usually between one second and 1/50 of a second. This system is predicated upon specialized training in how to perceive at very short time intervals. Effective training under this system requires a minimum of 20 class periods. In practically no case, however, has the method been made use of in the recommended manner. Slides were flashed for from two to four seconds, and the system was used more for testing than for training. (The phrase "modified Renshaw system" in Figs. 15 to 16.3 refers to these variations from the original plan of the system.)

Motion pictures were used about as widely as were attempts at the Renshaw system. They were more interesting to the men than charts or slides, but their effectiveness was limited for two reasons. First, the films were not changed often enough to be up to date, so that what they learned from them was often of no practical value when they reached combat. Second, there were relatively few motion pictures especially

FIG. 15. TYPES OF TRAINING AIDS USED. (Data combined for all targets.)

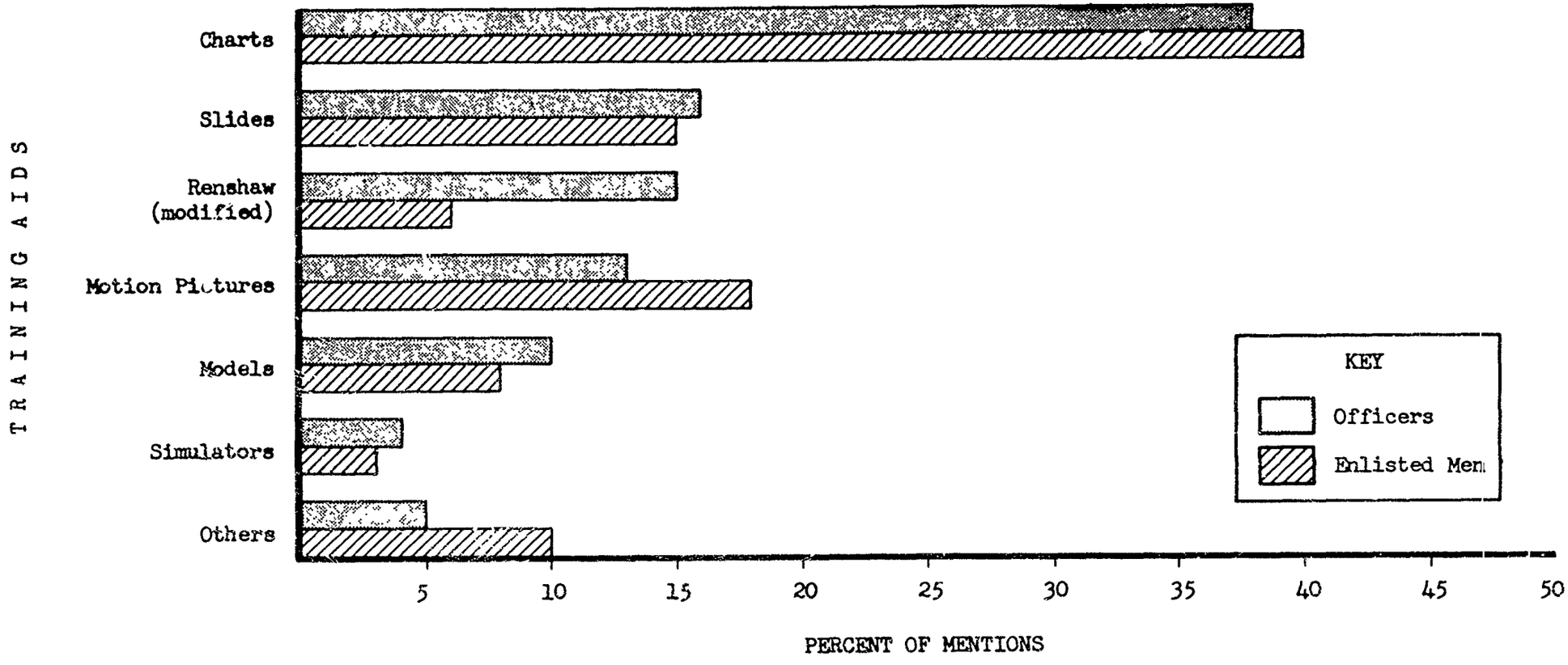


FIG. 16. TRAINING AIDS USED IN TEACHING IDENTIFICATION OF SPECIFIC TARGETS.

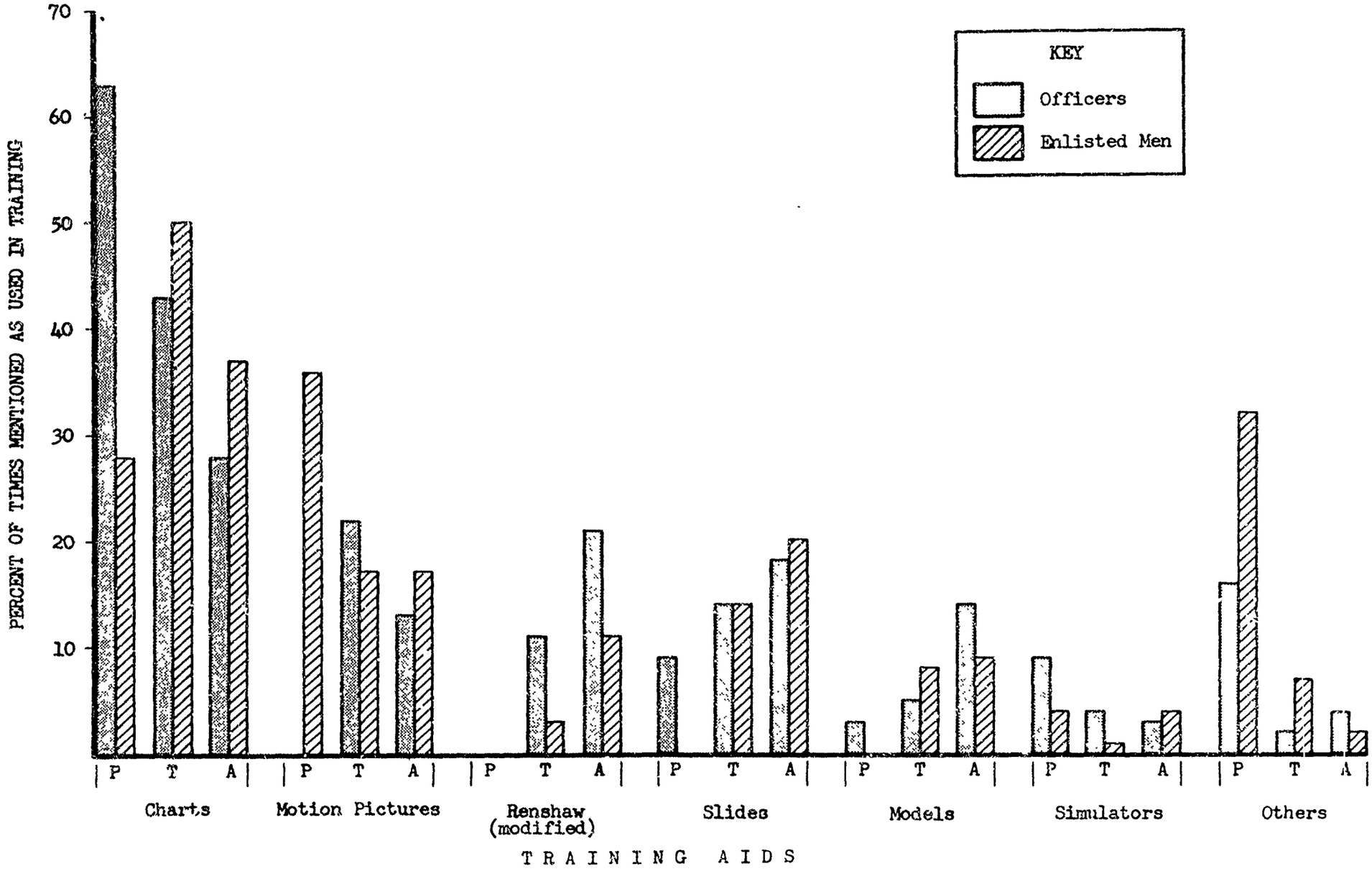
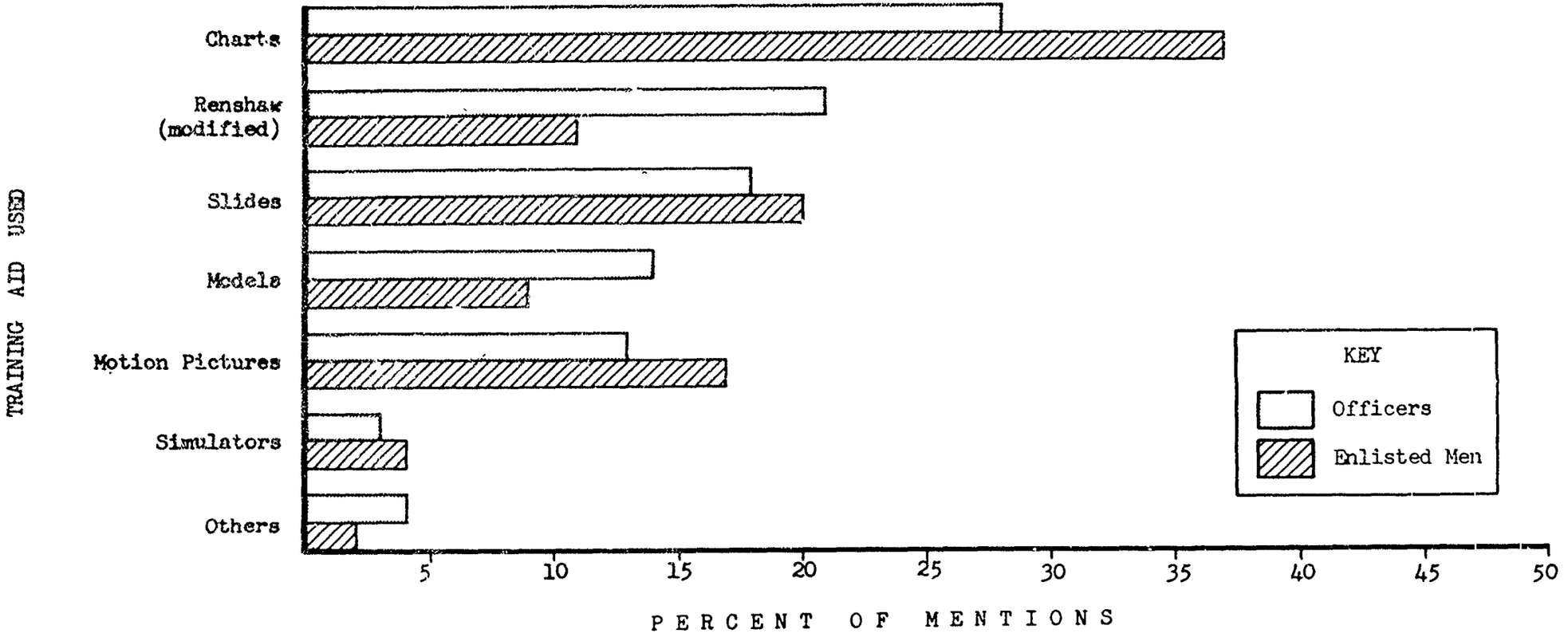


FIG. 16.1. TRAINING AIDS USED IN TEACHING RECOGNITION OF AIRCRAFT.



intended to teach aircraft recognition, and repeated showing resulted not in better learning, but in loss of interest on the part of those being trained.

Models of aircraft were used in a number of ways. The most common was to hang them in day-rooms, and mess-and recreation halls so that they were available for examination, and presumably, study and discussion. Models were also used to illustrate classroom lectures. The instructor customarily held up a model, pointed out its various features and discussed them with the class. The fault with this procedure was that the models were much too small. Models were also used to simulate the flight of actual aircraft. This was usually done by projecting the silhouette of an ordinary aircraft model upon a translucent screen.

B. TANKS

The second most frequently mentioned target for which recognition training was given was tanks. Here again the principal training method involved the use of charts (Fig. 16.2), both with lectures, and independently, through display where men off duty could examine them. The same, or similar charts were used for both purposes.

Motion pictures were used next most frequently, primarily in a series on defense against mechanized attack. The movies were stereotyped "training films," often showing silhouettes, and were very dull. The British films were more interesting to the trainees.

Lecture and discussion sessions at which slides were shown to illustrate distinguishing features of various tanks were the third most used form of training. Some attempt was made to test a man's ability to identify under difficult situations by exposing the slides only briefly.

Although models of tanks were reported as having been used, the number of mentions of such use was very small.

C. PERSONNEL

Training in recognition of the human target was largely left to the individual.

Charts were posted in places where they might be expected to be seen regularly by the men during their training period (Fig. 16.3). The men reported that they had seen very few

FIG. 16.2. TRAINING AIDS USED IN TEACHING RECOGNITION OF TANKS.

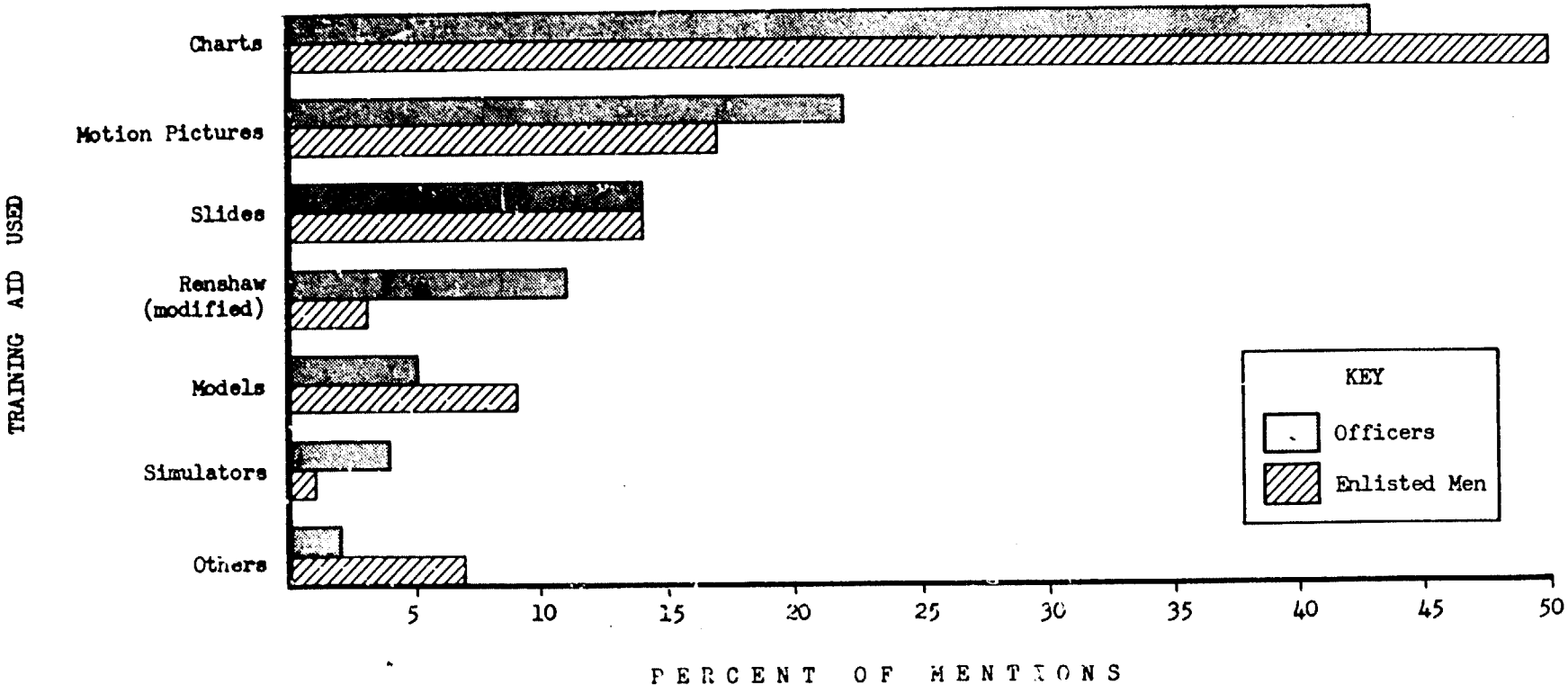
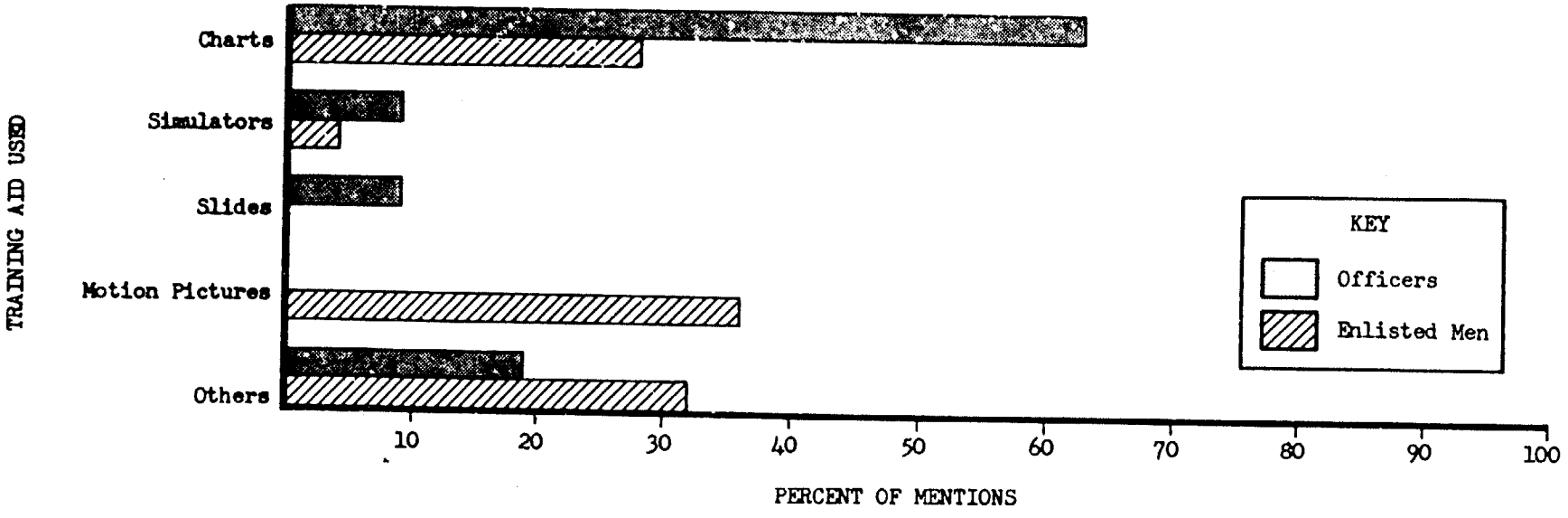


FIG. 16.3. TRAINING AIDS USED IN TEACHING RECOGNITION OF PERSONNEL.



demonstrations of enemy equipment, particularly uniforms. When this kind of training was given, it consisted of the display of an enemy uniform worn by an American, accompanied by a short lecture. Very few lectures were given on enemy personal equipment. A typical chart presented a great many details about the enemy soldier: his uniform, unit designation, unit insignia, insignia of rank, and special variations in the uniform for special troop purposes. A characteristic comment made by a considerable number of the men interviewed was, "These charts didn't help me learn anything, but they may have helped someone else." The relative unanimity of this opinion is worth noting.

Those who had had training with Infantry or Airborne Infantry during World War II, referred a number of times to the use of motion pictures. They were virtually the only units, however, who mentioned them as a training aid in recognition of personnel. Slides were mentioned only a few times.

The difference between current training in recognition and that given during World War II is more a matter of degree than of kind. The same methods and devices are being used, when any are used. It is unusual to find any more training than that afforded by wall charts, or the occasional use of slides. At one installation, full size silhouette figures of various friendly and enemy tanks have been erected along the side of the road to provide field like glimpses. But they are considered by the men at that post to constitute more of a traffic hazard than a training aid in recognition.

The "Aggressor" Force used in our present training program was criticized as a recognition training method on the ground that the opposing groups do not think strongly enough in terms of being faced by an enemy. They receive no real recognition practice because there are so many factors which are the same on both sides: weapons, organization, tactics and equipment, (with the exception of the helmet and the color of the uniform), and also because in such maneuvers the recognition

aspects of combat performance are not stressed. The value of the "Aggressor" Force therefore tends to become more strategic than tactical.

Although recognition training in general has gone backward since World War II, there are one or two exceptions. Several battalion training officers with airborne units have been showing combat films after hours with considerable success, at least as far as arousing interest is concerned. (One battalion S-2 reported that after merely announcing that he was showing combat film taken in Korea, after duty hours, in the dayroom, he had 90% attendance of the members of his command.)

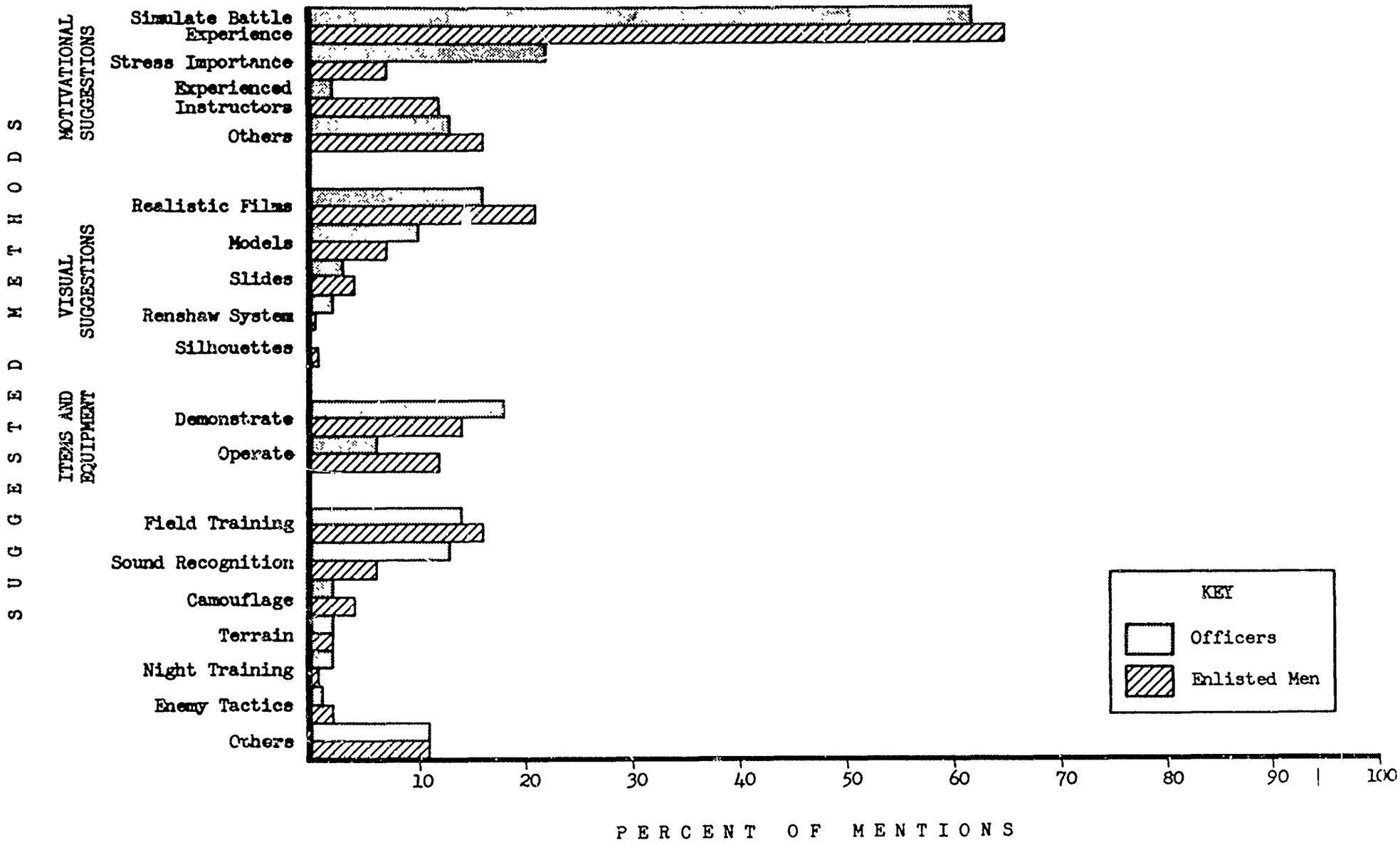
D. SUGGESTED IMPROVEMENTS

The suggestions made by combat experienced personnel and personnel appointed to conduct present-day recognition training are grouped below into three classes, those having to do with motivation, those having to do with subject matter, and those having to do with methods and training aids (Fig. 17).

(1) Motivation

The most effective way to increase motivation in recognition is believed to be through creating a situation which resembles reality. Simulated battle experience was recommended most often as a desirable training situation. Suggestions about simulating battle realities were made three times as often as any other kind of suggestion related to arousing and sustaining interest. Typical suggestions included: the use of specially trained demonstration teams to operate within an Army area, or within a training center, and the use of combat film. The teams should be large enough to demonstrate small unit tactics, be armed and equipped with enemy equipment, should imitate enemy speech sounds, gait, and habits of movement, both individual and collective. The combat film should be clipped to point up recognition problems most likely to be encountered in actual combat.

FIG. 17. INTERVIEWEE'S SUGGESTIONS FOR TRAINING.



Such kinds of training, it is believed, are not only of high interest in themselves but also foster a feeling of actuality.

They would, in all likelihood, also contribute to building up a sense of the importance of being able to recognize various targets in combat, about which the second largest number of suggestions toward improved motivation were made. Verbal exhortations are one way of accomplishing this, but in themselves are not sufficient. Such matters as the time of day during which recognition training is given should be taken into consideration. After lunch, for instance, is a poor time, in this respect. Much can be accomplished toward greater appreciation of the value of recognition training by the attitude the Army takes toward such training.

The third most frequent suggestion for increasing trainee motivation was that suitable instructors be appointed. They should be men who know from experience how necessary it is to be able to recognize targets, and who are interested in helping others learn before, rather than during, combat. It is worth noting that this suggestion was most frequently made by infantry enlisted men.

It was also suggested that ways be found to spur competition in class, to train the individual in what to look for in combat and what to expect, and to make instruction of such a nature that it becomes a habit for men to look for recognition clues in any field exercises.

(2) Subject Matter

The most frequently made suggestion was that training be given in recognition by means of characteristic sounds, as well as characteristic visual features (Figs. 7 and 12). The point was made many times that recognition through sight was often impossible and that men in combat were largely limited to recognition by means of the sounds they heard. These included the sound of equipment, of vehicles, of the engines of vehicles, of weapons being fired, etc., (see Section II, 2). In many cases, the men reported, the target was readily identified and the principal recognition problem was that of locating it.

It was suggested a number of times by both officers and enlisted men that more attention be given to training in detecting camouflaged positions. Those who had combat experience felt that they had been inadequately prepared to deal with recognition involving camouflage.

Another important, although less often mentioned, suggestion was that training be given in terrain appreciation, to enable a man to make inferences about likely enemy positions.

A number of officers recommended that night training be extended to cover recognition by means of sounds. Night training in recognition now consists of standard demonstrations at training centers of how far the light of a match or the glow of a cigarette can be seen in the dark.

(3) Methods and Training Aids

Combat films, or those that show simulated combat, were suggested more than any other training aid. Of the two, films taken in actual combat were far preferred to specially prepared training films, both for interest value and for learning. The suggestion that realistic motion pictures be used was made 115 times.

The suggestion that demonstrations of enemy equipment be given was made 100 times. It was proposed that these be given either by the troop's own command, or by specially trained teams, with captured enemy equipment, which would tour Army areas periodically. More than 50 times it was suggested that the men be allowed to operate the equipment to see how it worked. This suggestion has to do as much with maintaining interest in recognition as it has with learning target characteristics, although in some Korean commands where captured equipment was displayed, the men felt better prepared for solving recognition problems.

The men frequently recommended that wherever it was practicable, instruction should be taken out of the classroom and put into the more realistic field situation. The men tend to feel that in the field the instruction is "practical," whereas in the classroom they feel that the instruction is "theoretical." It was in view of this that the concept of integration of recognition instruction with regular field training was developed.

Next most frequently mentioned was the use of models larger than those used up to now. Officers suggested this as an improvement more often than enlisted men.

Slides and printed recognition training instructions were suggested about the same number of times — only about 1/5 as often as realistic films. Very few of the suggestions for slides came from Infantry or Airborne units. They

were usually made by men from Anti-Aircraft and Field Artillery units in connection with aircraft recognition. Although the use of the Renshaw Aircraft Recognition System, which utilizes slides, was seldom recommended, this is believed to be due to the fact that most of the men interviewed had never heard of it, rather than to the fact that they disapproved of it. Those who recommended it were usually officers in Anti-Aircraft units who had heard of its being used to train recognition officers in the Navy.

Only two recommendations were made for the use of silhouettes, either cut-out or printed.

III

RECOMMENDATIONS FOR ARMY RECOGNITION TRAINING

The General Plan
The Four Phases of Training
Recognition Specialists
Answers to Army Questions

The recommendations made in this section are based in the data obtained through the survey, which has been presented in the preceding section, and on a review of pertinent scientific and military studies. They are not based on the results of a series of experiments specifically designed to provide definitive answers. Rather, they represent the combined best judgment of those who have been trained in theory and those who have been trained by experience.

1. The General Plan

It is recommended that training in recognition be so arranged as to become more and more specific as the individual progresses from basic training to combat, and that to do this, it be divided into four phases: Basic Training, Unit Training, Communications Zone Training and Combat Zone Training.

In general, as much recognition training as possible should involve factors which suggest real combat and cause the trainee to imagine himself in actual conflict. It should use such devices in the classroom as combat films, and put the material learned through them into effect during exercises in the field.

It should be given at regular intervals, in a number of short sessions of instruction, rather than be compressed into two- or three-hour periods. It should be continuous and make use of repetition and refresher work in order to prevent forgetting. One of the principal causes of failure in past training has been the attempt to cover too much material at each training period (not to mention the fact that whatever training was given was offered far too long in advance of the time when a soldier needed it and knew that he needed it). The almost inevitable result was that the trainee was more confused than informed while the training was taking place. It is far better for a man to have a good grasp of a few recognition principles than it is for him to have a bewildered feeling about many. If recognition training is spread over a longer period of time, integrated with other Army training, and if the content is directed from the general to the specific, several desirable objectives are more likely to be attained.

> The soldier will be able to parallel the increasing specificity of his recognition training with his constantly increasing state of Army training and knowledge. This will improve the efficiency with which he learns.
>
> More efficient learning will result in a saving in the total time necessary to achieve a satisfactory level of recognition skill.
>
> The soldier will be aided in retaining the material until it is needed in combat.
>
> The details that he will need most in combat will be those most recently learned and most up to date.

Any estimate of the amount of time necessary to achieve a satisfactory level of recognition performance under the training plan proposed here must consider a number of unknown factors. Three of the

most important are these:

> Combat criterion. The percentage level of efficiency of recognition necessary in combat is unknown. (Should the man recognize 15% or 85% of the "recognizable" targets in combat in order to be able to operate effectively?)
>
> Forgetting criterion. The percentage of the targets covered by present recognition training that the average trainee can recognize one, two, or three months after this training is completed is unknown. (How rapidly does he forget what he has learned?)
>
> Learning criterion. The measured efficiencies of various methods of recognition training in producing proficiency in average Army trainees is unknown. (Even the Army Air Forces' studies supply only inferential information here because they dealt with aircraft recognition and with a group of trainees who were highly selected in terms of intelligence and interest.)

The estimates of training time made in connection with each of the four phases of training are based on the following assumptions about the above three factors.

> It is conservatively estimated that, at present, the soldier recognizes less than one-third of the "recognizable" targets he meets in combat. (Whatever level of effectiveness is achieved is the result of the contribution of recognition by individuals to the group, with the result that too great dependence is placed upon the group.)
>
> It is estimated that a man remembers about half of the targets covered in his recognition training two months after this training is completed.
>
> It is believed that the recommendations contained in this report, if adopted, would result in appreciable improvement in combat recognition proficiency, possibly to recognition of more than half of the "recognizable" targets in combat.

2. The Four Phases of Training (see Chart A.)

A. BASIC TRAINING

During the basic training period, all Army personnel should be given a general, comparatively short course in recognition. The recommended initial course has two main purposes. The first is to arouse interest in target recognition, realization of the importance of being able to recognize targets in actual combat, and a desire to learn more. The second aim is to provide general information about targets and the means of recognizing them.

This phase should cover the four major classes of targets: personnel, tanks, automatic weapons and mortars, and aircraft (Section II, 1., A.), without going into great detail about either their physical characteristics or the characteristics by which each is identified in combat. It should include instruction in general tactical employment of the major targets.

Personnel

Training should be given on the principles of personal recognition. It should enable a man to make a general distinction between friendly and enemy soldiers, rather than provide him with information about such details as insignia, or the specific characteristics by which recognition is made under specific circumstances.

Tanks

Information should be given about types of tanks, and the ways in which they are usually employed in combat, to give the trainee a general understanding of armored equipment.

Automatic Weapons and Mortars

Information should be given the trainee on machine pistols, automatic rifles or light machine guns, and heavy machine guns as to enable him to grasp the general purposes for which they are used in combat. Similar orientation should be given relating to mortars.

CHART A

Recommendations Outline

Training Phase	Hours	Tasks	Proportion of Time Per Sub-Task	Concurrent Training
1. Basic Training	4-6	Recognition Training Orientation.	30% General Indoctrination. 70% General characteristics and employment of major targets.	
2. Unit Training	20-40	Recognition Training by Branch.	30%-Major Target of Branch. 50%-Other Major Targets. 20%-Minor Targets.	Field Training.
3. Communications Zone	5-20	Recognition Training for a given theater.	33%-Review of Previous Training. 33%-Major Targets. 33%-Minor Targets.	Field Demonstrating and field training.
4. Combat Zone	1-5	Recognition Training for a region within a theater.	Orientation on local enemy tactics and equipment.	

Aircraft

Such information should be given the trainee as will enable him to identify various types of aircraft in terms of the purposes for which they are used, for example, bombers, fighters, transport planes.

Motion pictures with sound, including films taken in combat, are recommended for this phase of training, as they are for succeeding stages. Their use should be combined with lectures and discussion. Lectures illustrated by slides and charts are an adequate form of training but only when the quality of the lecture and the motivation of the lecturer are high. Least useful are charts or silhouettes without an accompanying lecture, lectures given by a man who has no training aids at all, and lectures given by a man whose interest in recognition is low.

Estimated training time: 4 to 6 hours, with emphasis divided approximately as follows:

30% on general indoctrination
70% on major recognition targets and their employment

B. UNIT TRAINING

Training in this phase should be more specific in terms of the function of the unit to which a man has been assigned after completing basic training. The targets emphasized should be those of major importance to the branch of service. Although minor targets should be included, considerably less attention need be paid them.

The targets of importance to each branch of service (Section II, 1, B) are:

Infantry

personnel
tanks
automatic weapons and mortars

Airborne Infantry

personnel
automatic weapons and mortars
tanks

Armored Forces

personnel
tanks and anti-tank guns
automatic weapons and mortars

Field Artillery

personnel
artillery
automatic weapons and mortars
tanks

Anti-Aircraft Units

aircraft
personnel
tanks

Training should cover those kinds of standard, basic equipment whose design is not likely to be changed often. (For example, the Browning Automatic Rifle, and the Browning heavy machine gun - .30 caliber - are basic U. S. designs and have been changed very little over a period of many years.)

Since it is usually impossible to specify in advance the theatre of operations to which a unit will be committed, recognition training should cover the standard equipment of all potential enemies, as well as our own. (Experimentation might show that training is necessary only for friendly equipment, or only for enemy equipment, but this possibility is not known to be a fact.) Trainees should be given every opportunity possible, in familiarizing themselves with our own standard equipment, to handle various weapons, etc., which belong to the class of major targets for their type of unit.

Recognition training in this phase, particularly for personnel, for mortars and machine guns, and for camouflage, should be combined as far as possible with regular field training. Interest would be immediately heightened, and furthermore, some of the time spent in classrooms would be saved.

Specially trained demonstration teams are highly recommended as an aid in training in recognition of both personnel and equipment. It is suggested that these teams be of about platoon size, and be used to demonstrate enemy weapons and equipment and small unit tactics. They should be trained to the point where they can give a good simulation of the enemy they are supposed to represent. They should imitate enemy speech, gait, posture, and method of organization and operation in the field. They should be equipped with enemy uniforms, weapons, and equipment. The simulation might be carried to the point of having the "enemy" troops bivouac in the area. Such teams could tour an Army, or smaller, geographical area, so that members of line units training in that area would have an adequate chance of getting a realistic idea of the kinds of troops they would be likely to be facing in the future.

The use of films of actual combat (Section II, D) should be begun, or if they have been used in previous training, continued. This aid has so much inherent interest that, as experience has shown, most men will attend showings during their off-duty hours (Section II, 3). A commentator, preferably one who has been in combat, should point out the recognition problems which appear in the course of the pictures.

Training in recognition through sounds should be begun at this phase, and for this purpose sound recordings are recommended in addition to training in sounds during field exercises. As was brought out in Section II, 2, of this report, sounds are an important kind of recognition information. Training of this sort should cover a number of different kinds of sounds, some of which will occur only in combat. Here recordings can be especially helpful. It is not impossible to make recordings of particular combat sounds, for use in classroom instruction. Recordings could also be made of the sounds of particular enemy equipment, using captured weapons, etc., for this purpose. Recordings should include the kinds of sounds which have been found to be valuable in recognition in actual combat, and have been discussed in detail in Section II, 2.

Classroom training might also include models of equipment large enough so that details can be distinguished by any member of the class; demonstrations of enemy equipment in conjunction with films dealing with automatic weapons and mortars, and instruction in those aspects of camouflage which would be of use in detecting enemy camouflage. Least useful devices are charts without lectures, wherever they may be displayed, and books and silhouettes as they are currently used. Few targets in actual combat remain stationary, and it is important to introduce the element of motion into training devices. It is especially important in aircraft training, for which charts and silhouettes, as they have been used, are of little value.

In this, and in the other three stages, those who conduct training should preferably be men who have had combat experience, or at least have a marked appreciation of the importance of recognition.

Estimated training time: One hour periods at a rate of two periods a week, with the emphasis divided approximately as follows:

30% on the major recognition target of the branch of service.
50% on the remaining major targets
20% on the minor and incident targets

From one-half to two-thirds of this training time is to take place in the field, integrated with other kinds of training.

C. COMMUNICATIONS ZONE TRAINING

By this phase, the trainees have not only been assigned to a branch of the service, but are also in a combat theatre. Training for the first time can be focussed on particular kinds of enemy and friendly equipment and tactics -- those used in the combat zone to which the troops will be sent. At some time, a concentrated refresher course on previous recognition training should be given.

Training could be given in common to Infantry, Airborne Infantry, and Armored Forces, since three of the major targets are of importance to all of them.

Training could also be given in common to both Field Artillery and Anti-Aircraft Artillery if, as is expected, the present tendency to use Anti-Aircraft Artillery in firing field artillery missions continues. Here again the major targets for each branch would be of importance to both. Anti-Aircraft Artillery would of course receive

more training on aircraft recognition than would the Field Artillery.

Again, as far as possible, recognition training should be integrated with field training and demonstrations of enemy tactics and equipment (by trained teams and by opportunities for the men to examine captured enemy equipment, which should be fairly readily available). Training on the tactics employed by the enemy in the particular region should be intensive. More specific training in the use of sounds for identifying and locating is possible, through using captured equipment, and should be given.

If facilities permit the showing of motion pictures, films of combat in this theatre should be shown, accompanied by lectures. If the use of recordings of important recognition sounds likely to be encountered in the region is possible, it also should be continued. It may be necessary at this stage to depend more on lectures for many aspects of recognition training. If that is the case, they should be illustrated at least with charts, not only of targets, but also of tactics. The quality of the lecture is of great importance.

The most desirable devices, such as motion pictures and sound recordings, are preferred to others, particularly for aircraft recognition training. But at this point, a man's whereabouts in relation to combat can be counted on to stimulate his interest in getting as much applicable information as he can from whatever form of instruction he is given.

Estimated training time: 5 to 20 hours per 6 months in the communication zone depending on the situation and the branch of service, with emphasis divided approximately:

1/3 review of previous training
1/3 on major targets in the combat area
1/3 on minor targets in the combat area

D. COMBAT ZONE TRAINING

In the combat zone there will probably be very little time for additional training. What is to be emphasized are the important variations in friendly and enemy tactics and equipment within a fairly limited combat area, such as that covered by the geographic spread of a division or a regiment. When there is relatively little variation over a larger area, the geographic spread might be that of a corps. Whatever the case may be, it is suggested that training be handled by the G-2 and G-3 sections of the appropriate command. Ordinarily such training would probably be most practical at the divisional level.

Training for members of Anti-Aircraft Artillery can be limited to factors involved in aircraft recognition, unless their artillery also serves as utility field artillery. In that event, the Anti-Aircraft Artillery training can be combined with that of Field Artillery.

Practically any consistent method of training should be effective when the motivation to learn to recognize targets is as high as it is in the combat zone.

Estimated training time: 1 to 5 hours depending on the situation, emphasis on local tactics and tactical employment of equipment.

3. Recognition Specialists

These individuals in each of the branches of Army service discussed in this report who are assigned to duties which require a higher level of recognition skill than that needed by the average soldier, should be given specialized training.

The following list of needed specialists may be incomplete.

Infantry and Airborne Infantry

All line company and smaller unit officers, all line non-commissioned officers.

Members of Intelligence and Reconnaissance platoons.

The training given officers and non-commissioned officers should fit them to carry on effective field training of the men in their units during unit training, and to act later as unit "experts" on recognition problems in combat.

Armor

Tank commanders, section leaders, gunners, and company officers.

Field Artillery

All junior officers. These are the men who are usually appointed to serve as Forward Observers.

Enlisted members of the Forward Observer's part and Survey Team personnel should also receive special training if assignment to such duties can be predicted far enough in advance of combat to permit this training.

Anti-Aircraft Artillery

Members of gun crews and others who may act as aircraft warning spotters. (Although there is increasing use of radar equipment for aircraft spotting, no anti-aircraft unit will feel comfortable in the near future without human spotters also functioning.)

It is recommended that recognition specialist training start during the Unit Training phase suggested in Section III, 2, and be continued through the next phase, insofar as that is possible. Each training cen-

ter (where units are trained) should establish a school equipped and staffed to train these specialists. It should be possible, by staggering class times, to train large numbers of men with a fairly small number of trainers. Like other recognition training, this additional course for specialists should be spread over a period of time. If it should be found desirable to give training through the Renshaw Recognition System, in addition to other training, at least twenty sessions should be set aside for this purpose.

Estimated training time: One hour at a time, once or twice a week.

4. Answers to Army Questions

The findings of this report (Section III), however illuminating and suggestive of possible improvements in recognition training they may be, do not provide exact answers to seven specific questions asked by the Army.* Such answers would be possible only as a result of a series of carefully designed experiments, to which this study did not extend.

The answers below, like the recommendations already given (Section III), represent a combination of analysis and interpretation of the data obtained with the judgment of investigators who are experienced in the application of psychology to learning and training.

1. "Exactly how effective are Motion Pictures, Graphics, and Models in aircraft and in vehicle recognition training?"

* Letter of 22 January 1951 (Ser 2943) from Lt. Col. N. M. Matzger, AAF Office, Army Field Forces, Ft. Monroe, Va., to Adjutant General, Department of the Army.

Motion pictures, especially of combat, are ranked first in effectiveness and interest as a training aid for any target.

Graphic aids, that is charts, posters and drawings, such as those customarily hung in day-rooms and mess halls, are low in interest and effectiveness for any target.

Models of aircraft and tanks, when used with groups which are small enough to permit opportunity for each individual to observe and study the models, are recommended. With large groups, the models must be big enough so that the men in the rear row can distinguish the important recognition details. Models of aircraft are effective when silhouetted in motion on a screen.
(See Section II, 3)

2. "Is the tachistoscope flash image method effective in training the ground combat soldier to recognize aircraft and/or the slower moving armored vehicle?"

Since no man interviewed had had sufficient training in the tachistoscopic (Renshaw) flash image method for any target to have achieved even a minimum degree of skill with this method, no conclusions can be drawn based on Army experience (Section II, 3, A). When used by the Navy, according to Renshaw's recommendations, his method has been effective in producing aircraft recognition skill. It is not recommended for use in the Basic Training phase suggested for recognition training for all Army personnel (Section III, 2). Evaluation of this method for training in armored vehicle recognition is a specific research problem.

3. "How valuable are silhouette-type figures in recognizing armored vehicles (seldom seen against the sky) and aircraft?"

While no direct information is available on this point, indirect information leads to the conclusion that silhouette-type figures would be moderately useful in tank recognition training, provided that the silhouettes could be shown in motion (Section II, 3, B). Full size silhouette figures of tanks mounted alongside a road were considered to be traffic hazards rather than training aids.

Although combat personnel mentioned silhouettes as the most useful visual characteristic, they rated audible characteristics as far more important in the recognition of tanks.
(Section II, 2, B)

In aircraft recognition training, silhouettes on slides or charts were used so predominately that no useful comparisons with other methods are possible. (See answers to Question 1 above and Question 4 below.)
(Section II, 3, and D, (3))

4. "How effective are "flash cards," slides, charts, posters, photo-illustrations in books in recognition training?"

No pictorial methods are sufficient by themselves when the important element of motion is missing.
(Section II, 3)

During the Communications Zone and Combat Zone training phases suggested in Section III, 2, it may be necessary to rely on such devices in conjunction with lectures, but it is assumed however, that by this stage, personnel have already had training with other methods and devices.

5. "Should the British system of recognition training, which stresses differences in structural design and the student's ability to sketch the aircraft or vehicle, be adopted in whole or part?"

In the case of both classes of targets, recognition based on vision is accomplished most often by means of the over-all silhouette (Section II, 2). Learning the total shape of a plane, plus emphasis on particular distinguishing structural characteristics of a given type of plane, produced the most effective training results, according to the research in recognition training by the Army Air Forces in World War II (Army Air Forces, Aviation Psychology Program Research Report #7, Motion Picture Testing and Research, Edit. J. J. Gibson, Washington, U. S. Government Printing Office, 1947).

It is not recommended that the average soldier be given training which requires him to sketch aircraft, since this would involve too much time in proportion to the value in combat of his knowing detailed structural differences.

6. "What is the optimum method and time required to train the combat soldier adequately to recognize aircraft and vehicles?"

The recommended form of recognition training is a graduated process making use of aids which suggest reality, and is carried from classroom instruction into training in the field. (Section III, 1 and 2) No accurate estimate (Section III, 1) can be made of the time required to attain combat proficiency in recognition of any target on the basis of what is now known.

It is to be noted that the two targets about which this question is asked, although of importance to particular Army units,

are no major targets for the majority of Army personnel (Section II, 1).

Combat film and lectures are the recommended form of recognition training for aircraft. Experiments show that the Renshaw method is also likely to be effective when properly used. Sound recordings and silhouettes in motion are recommended for tank recognition.

7. "What is the minimum list of training aids for recognition training of combat soldiers?"

If training aids must be kept to a minimum, those recommended would vary according to the phase of training (Section III, 2) at which recognition instruction is being given, and according to the targets with which the instruction is concerned.

In general, these aids are considered desirable in a minimum list:

Selected combat films, accompanied by appropriate sound track commentary.

Recordings of sounds useful in recognition.

Collections of friendly and enemy equipment with which recognition by vision and hearing can be practiced.

APPENDIX A

APPENDIX A

METHODOLOGY

1. Review of the Literature

The first step for this investigation was to conduct a survey of the literature. This survey covered areas thought to be relevant to to problems of recognition and recognition training, such as color vision, photopic and scotopic vision, depth perception, military training manuals in recognition, training methods, and World War II research studies dealing specifically with recognition and recognition training.

2. Preliminary Interviews and Questionnaires

The second step consisted of a series of interviews at various military installations, in order to help define the critical questions for which practical answers should be sought. These interviews were conducted with individuals selected on the basis of their familiarity with recognition and recognition training. From the information gathered from these first two steps, a series of questionnaires was developed from which it was believed relevant data on combat recognition requirements could be obtained. Preliminary studies were conducted using these questionnaires with military personnel. Revisions of these questionnaires indicated that the type of data obtained was inadequate to satisfy the purposes of the study. These preliminary questionnaires served to point up the fact that a far greater amount of information was obtained in a comparatively unstructured situation;

conversely, it was found that highly specific questionnaire items tended to elicit superficial answers. When questionnaires were individually administered, it was found that a good deal of the information was obtained during the discussion of the questionnaire rather than from the answers recorded on the questionnaire. The differences in this information seemed to lie in the extent of detail and personal involvment obtainable in the interview. Interviews conducted with these experimental questionnaires, varying from relatively structured to relatively unstructured, were administered both individually and to groups of varying sizes. It was found advantageous to interview a small number of men simultaneously since each of the men took over some of the interviewer's functions in stimulating discussion

Based on these experiences, it was determined that the best way to conduct the survey of combat recognition requirements was to hold interviews with groups composed of three men. In order to insure no loss of information and interview time, tape-recordings were made of the interview sessions. With two-man groups, the presence of the interviewer tended to restrict the responsiveness of the interviewees; with groups of more than 3 men, it tended to be more difficult for the interviewer to guide the discussion. The interviews usually required about one to one and one-half hours for completion.

3. Subjects

In order to secure information as germane to combat experience as possible, only combat experienced personnel were interviewed.

Since it was felt that recognition requirements would probably

vary as a function of the kind of duty performed by the individual concerned, an effort was made to interview a sample representing each of the Army combat arms.

Inasmuch as their duties frequently tended to differ, groups of officers and groups of enlisted men were included in the sample from each unit. In order to obtain as broad a base of combat experience as possible, personnel from all theatres of World War II and from Korea were interviewed. Preliminary interviews indicated that approximately 6 to 8 groups of officers and 10 to 12 groups of enlisted men were sufficient to secure the necessary information. In order to obtain reasonable representatives of the samples of men interviewed, these figures were varied according to both the specificity of the recognition duties required in the various units and the discretion of the chief interviewers.

For units (such as infantry) which dealt with a large variety of targets, a larger sample of men would be needed to insure reasonable accurate coverage and the samples were selected accordingly.

A total of 123 Army officers and 155 Army enlisted men were interviewed. Table H indicates the composition of the various groups interviewed at various installations.

4. Data Analysis

The basic data for analyzing the results of this survey were obtained from the tape-recordings of the interviews. A specially trained team of record analysts classified and tabulated the material in the recordings.

The fundamental unit of the classification was the "mention" a statement of specific nature about a factor in recognition or recognition training. There are certain obvious drawbacks to "frequency of mention" as a single criterion of importance. Frequency alone forms only a sort of "popularity index" with respect to a given specific point, and tends to suppress the contributions of the rarer individuals who possess unusual insight into recognition problems. However, both the interviewer and the analyst were required to note any mentions thought to be unusually significant. It was found that most items which were noted as being umusually significant in the analysis of early interviews tended to be substantiated by the criterion of frequency of mention as the later interviews were analyzed.

In general, frequency of mention was found to be the most practical unit of analysis, particularly in view of the material obtained in group interviews. In view of the richness of data obtained in the group interviews, it is believed worthwhile to sacrifice the statistical elegance obtainable with the less fruitful questionnaire techniques.

5. Development of the Recommendations

The recommendations presented in Section II of this report represent the expert opinions of the investigators based on both the interviews and the relevant psychological and military literature.

APPENDIX B

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APPENDIX C

APPENDIX TABLES

TABLE A

IMPORTANCE OF TARGETS
(TOTAL ARMY)

TARGETS	OFFICER FREQUENCY OF MENTION	PER CENT	ENLISTED MEN FREQUENCY OF MENTION	PER CENT
Personnel	69	29	95	35
Tanks	41	17	41	15
Automatic Weapons and Mortars	39	16	41	15
Aircraft	26	11	24	09
Artillery	18	07	14	05
Anti-Tank Guns	11	05	20	07
Ground Vehicles other than Tanks	13	05	16	06
Enemy Positions (Pillboxes)	5	02	6	02
Mines	3	01	2	01
Road Blocks	3	01	1	00.4
Others	7	03	8	03
Surface Naval	0	—	2	01
Anti-Aircraft Guns	2	01	0	—
Beach Defences	2	01	0	—
Jump Area	1	00.4	0	—
Submerged Naval Craft	0	--	1	00.4
TOTAL OFFICERS:	240			
TOTAL ENLISTED MEN:			271	
GRAND TOTAL, OFFICERS AND ENLISTED MEN			511	

TABLE B

IMPORTANCE OF TARGETS TO VARIOUS TYPES OF UNITS
ALL DATA IN PER CENT

TARGET	UNIT									
	INFANTRY		AIR-BORNE INFANTRY		ARMOR		FIELD ARTILLERY		ANTI-AIRCRAFT	
	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM
Aircraft	09	05	08	06	00	03	05	08	05	43
Personnel	29	43	42	38	27	28	23	33	21	21
Automatic Weapons and Mortars	20	14	25	29	11	07	15	08	04	07
Tanks	20	19	12	13	23	18	14	12	18	04
Anti-Tank Guns	02	05	04	01	14	21	03	04		
Artillery	04	04		09	07	03	20	12		
Ground Vehicles other than Tanks	09	04	02	03	04	07	07	12		11
Others	07	06		01			05	08		
Jump Area			02							
Enemy Positions			04		07	09				
Road Blocks and Ammo Dumps							05			04
Surface Naval Craft										07
Submerged Naval Craft										04
Anti-Aircraft Guns							03			
Beach Defences									07	
Mines					07	03				
NUMBER OF MENTIONS:	55	83	48	69	44	67	65	24	28	28

TABLE 6

CHARACTERISTICS USED TO IDENTIFY TARGETS (TOTAL ARMY)
(All data in percent)

Target Characteristics	Targets					
	Personnel	Artillery	Tanks	Machine Guns	Mortars	Aircraft
Number of Mentions	N=606	N=111	N=448	*N=250	* N=63	N=280
Uniform	40					
Tactics	14	04	03	02	11	02
Weapons and Equipment	13		07			
Movement	04					
Sound (All)	10	60	(22)	61	71	27
Engine			16			
Track			04			
Others			02		**10	
Flash		11	01	05	02	
Trajectory		09				
Appearance (Shape)		07	06	10	04	20
Panels, Insignia, Numerals, Markers			06			07
Silhouette	05		18			01
Muzzle Brake		02	08			
Track Tracks			07			
Track Suspension			02			
Cyclic Rate of Fire				01		
Tracers				08		
Methods of Use				06		
Structural (Unit) Characteristics			13			12
Base Control	00.1		01			06
Electronic Devices						18
Gait	02					
Others	12	06	04	07	02	05

* Less Anti-Aircraft Unit Mentions
** Projectile making no sound in flight

TABLE C (continued)

CHARACTERISTICS USED TO IDENTIFY TARGETS (TOTAL ARMY)
(All data in percent)

Target Characteristics	Targets							
	Machine Guns and Mortars	Vehicles	Mines	Anti-Tank Guns	Unspecified Weapons	Bazooka	Naval Vessels Surface	Gun Emplacement
Number of Mentions	N=326	N=30	N=48	N=38	N=30	N=9	N=4	N=5
Tactics	04			21		11		
Sound	*63	13		08	70	11	17	
Flash	05			03	03			60
Appearance	08	37	06	08	20	33	33	
Silhouette	01			08				
Rate of Fire	00.6							
Tracers	06				06			
Method of Use	05							
Structural (Unit) Characteristics	00.3			05		22		
Markers, Insignia		07						
Tracks		20						
Surface Indication			54					
Detonation by Passing Vehicle			31					
Mine Detector			04					
Inference - Terrain			04					
Trajectory				05				
Muzzle Brake				08				
Velocity of Shell				08				
Electronic							17	
Hull Shape							33	
Others	06	23		26		22		40

* Lack of sound

TABLE C1. CHARACTERISTICS USED BY INFANTRY TO IDENTIFY TARGETS

Target Characteristics	Targets									
	Personnel* N=214	Machine Guns N=100	Mortars N=27	Artillery N=30	Anti-Tank Guns N=6	Tanks N=148	Land Mines N=8	Airplanes N=22	Weapons N=20	Vehicles N=9
Uniform	42**									
Tactics-tactical Employment	14	01	22	07		04				
Sounds	14	66	78	77	17	Eng.-22 Track-03		64	80	33
Weapons & Equip.	09					04				
Silhouette	07				1	26				
Other	15	07			33	03				
Appearance-Size & Shape		10		03	17	09		36	10	45
Methods of Use		08								
Flash		02		07						
Tracers		06							10	
Trajectory				07	17					
Structural Characteristics units					17	16				
Muzzle-brake-lack of						07				
Track Tracks						05				22
Markings (Insignia-panels)						02				
Surface indications							50			
Detonation by preceding vehicle							37			
Inference from terrain							13			

* Data in terms of number of times mentioned
** Data in terms of percentage of mentions

TABLE C2. CHARACTERISTICS USED BY ARTILLERY TO IDENTIFY TARGETS

Target Characteristics	Targets							
	Personnel* N=71	Artillery N=34	Tanks N=50	Machine Guns N=12	Mortars N=8	Vehicles N=18	Airplanes N=33	Mines N=4
Uniform	34**							
Movement	20							
Tactics-tactical Employment	10	06	10		12			
Weapons and Equipment	08							
Silhouette	06		12					
Other	14	18	20		12	28		
Sound	04	35	02	42	64		40	
Flash		29		17	12			
Trajectory		12						
Lack of Muzzle Break			12					
Markings (Numerals Panels Insignia)			16			11	09	
Structural Characteristics Units			20				18	
Cyclic rate				17				
Tracers				07				
Ground-hitting characteristics				17				
Shape						28	24	
Track-Tracks			08			22		
Color						11	09	
Surface indications								50
Detonation by preceding vehicle								25
Mine detector								25

* Data in terms of number of times mentioned
** Data in terms of percentage of mentions

TABLE C_3

CHARACTERISTICS USED BY AIRBORNE INFANTRY TO IDENTIFY TARGETS

Target Characteristics	Targets								
	Personnel	Machine Guns	Mortars	Bazooka	Artillery	Anti-Tank Guns	Tanks	Land Mines	Airplanes
Number of Times Target Mentioned	N=168	N=91	N=14	N=6	N=22	N=3	N=98	N=4	N=31
Uniform	40								
Weapons and Equipment	20						12		
Sounds	10	65	93		68		15-E* 03-T*		52
Tactics	08				05				
Others	17	09		33	05		03		
Tracers		10							
Appearances		10	07	67	17		08		26
Color of Flash		06							
Trajectory					05				
Velocity of Shell						100			
Silhouette	05						23		06
Lack of Muzzle Break							10		
Markings (Panels, Numerals, etc.)							08		16
Track Tracks							07		
Tracks (Suspension, etc.)							10		
Surface Indications								25	
Detonation								25	
Inference from Terrain								25	
Mine Detector								25	

* E - Engine
T - Track

TABLE C_4

CHARACTERISTICS USED BY ARMOR TO IDENTIFY TARGETS

Target Characteristics	Targets										
	Personnel	Tanks	Anti-Tank Guns	Land Mines	Machine Guns	Mortars	Artillery	Airplanes	Bazooka	Gen. Weapons	Gen. Vehicles
Number of Times Target Mentioned	N-118	N-121	N-29	N-32	N-47	N-14	N-25	N-21	N-4	N-10	N-3
Uniform	34										
Tactics - Tactical Employment	20	03	28		09			14	25		
Weapons and Equipment	14	12									
Movement	12										
Sounds	07	10* 21**	07		49	43*** 43	68	52	25	50	33
Gait	09										
Silhouette	02	14	10								
Other	02		28								
Structural (Units) Characteristics		10	03						50		
Lack of Muzzle Break		10	10				08				
Track Tracks		10									
Insignia (Panels, Numerals)		06									
Shape - Appearance		04	07	09	11	14	12	34		40	67
Flash		01	03		06					10	
Trajectory			03				12				
Surface Indications				59							
Detonation by preceding vehicles				32							
Method of use					1?						
Tracers					08						

* Track
** Engine
*** Lack of Sound

TABLE C_5

CHARACTERISTICS USED BY ANTI-AIRCRAFT
TO IDENTIFY TARGETS

TARGET CHARACTERISTICS	TARGETS					
	AIRCRAFT-FLIGHT	PERSONNEL	TANKS	AUTOMATIC WEAPONS & MORTARS	SURFACE NAVAL CRAFT	GUN EMPLACEMENTS
Number of Times Target Mentioned	N-173	N-35	N-31	N-13	N-6	N-5
Electronic Devices	30					
Structure and Character of Units	16		45	08		
Shape - Appearance	15		03		66	
Sound	13		16	54	17	
Base Control	11	03	10		17	
Insignia	07		10			
Tactics	02	14				
Other	06	09				
Uniforms		57				
Silhouette		11		23		
Weapons and Equipment		06	03			
Smoke and Flash			06	15		60
Camouflage-Object						40
Track			06			

TABLE D

TRAINING AIDS USED IN TEACHING TARGET IDENTIFICATION

(ALL ARMY)
ALL DATA IN PER CENT

TRAINING AID	TARGETS													
	PERSONNEL		TANKS		PLANES		MACHINE GUN		MORTARS		UNSPECIFIED WEAPONS		ALL TARGETS	
	% of Mentions		% of Mentions		% of Mentions		% of Mentions		% of Mentions		% of Mentions		% of Mentions	
	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM
CHARTS	63	28	43	50	28	37						100	38	40
MOTION PICTURES	00	36	22	17	13	17							13	18
FLASH	00	00	11	03	21	11							15	06
SLIDES	09	00	14	14	18	20							16	15
MODELS	03	00	05	09	14	09							10	08
SIMULATORS	09	04	04	01	03	04							04	03
OTHERS	16	32	02	07	04	02		100		100			05	10
No. of Mentions	N=32	N=25	N=56	N=70	N=111	N=100	N=0	N=2	N=0	N=2	N=0	N=1	N=199	N=200

TABLE D_1

TRAINING AIDS USED IN INFANTRY UNITS
(FREQUENCY DATA ONLY-NUMBER OF MENTIONS)

INFANTRY TRAINING AID	TARGETS								TOTAL NUMBER OF MENTIONS	
	PERSONNEL		TANKS		PLANES		UNSPECIFIED WEAPONS			
	OFF.	EM	OFF.	EM	OFF.	EM	OFF.	EM	OFF.	EM
CHARTS	6	3		7	4	5		1	10	16
SLIDES	2			1					2	1
FLASH			1	1	2	4			3	5
MODELS				3	2	3			2	6
MOTION PICTURES		4	6	4		6			6	14
SIMULATORS									0	0
OTHERS	3			1	4				7	1
N	11	7	7	17	12	18	0	1	30	43

TABLE D_2

TRAINING AIDS USED IN ARTILLERY UNITS
(FREQUENCY DATA ONLY-NUMBER OF MENTIONS)

ARTILLERY TRAINING AID	TARGETS						TOTAL NUMBER OF MENTIONS	
	PERSONNEL		TANKS		PLANES			
	OFF.	EM	OFF.	EM	OFF.	EM	OFF.	EM
CHARTS	1		5	1	6	4	12	5
SLIDES	1		6		9		16	0
FLASH			1		4		5	0
MODELS			1		3	1	4	1
MOTION PICTURES			5	1	5		10	1
SIMULATORS				1			0	1
OTHERS	2						2	0
N	4		18	3	27	5	49	8

TABLE D_3

TRAINING AIDS USED IN AIRBORNE UNITS
(FREQUENCY DATA ONLY-NUMBER OF MENTIONS)

AIRBORNE TRAINING AID	TARGETS										TOTAL NUMBER OF MENTIONS	
	PERSONNEL		TANKS		PLANES		MACHINE GUNS		MORTARS			
	OFF.	EM	OFF.	EM	OFF.	EM	OFF.	EM	OFF.	EM	OFF.	EM
CHARTS	11	4	8	8	9	11					28	23
SLIDES				2	2	2					2	4
FLASH					4						4	0
MODELS	1		1		4	1					6	1
MOTION PICTURES		5		2		2					0	9
SIMULATORS	3		2		3	3					8	3
OTHERS		5						2		2	0	9
N	15	14	11	12	22	19		2		2	48	49

TABLE D_4

TRAINING AIDS USED IN ARMOR UNITS
FREQUENCY DATA ONLY

ARMOR TRAINING AID	TARGETS						TOTAL NUMBER OF MENTIONS	
	PERSONNEL		TANKS		PLANES			
	OFF.	EM	OFF.	EM	OFF.	EM	OFF.	EM
CHARTS	2		8	17		10	10	27
SLIDES			2	3	3	7	5	10
MODELS			1	1	1	1	2	2
MOTION PICTURES			1	5		7	1	12
FLASH			2	1	3	2	5	3
SIMULATORS		1				1	0	2
OTHERS		3	1	3		2	1	8
N	2	4	15	30	7	30	24	64

TABLE D_5

TRAINING AIDS USED IN ANTI-AIRCRAFT FOR TEACHING TARGET IDENTIFICATION

ANTI-AIRCRAFT TRAINING AID	TARGETS						TOTAL NUMBER OF MENTIONS	
	PERSONNEL		TANKS		PLANES			
	OFF.	EM	OFF.	EM	OFF.	EM	OFF.	EM
CHARTS			3	2	12	7	15	9
SLIDES				3	6	12	6	15
FLASH			2		10	5	12	5
MODELS				2	6	3	6	5
MOTION PICTURES					9	1	9	1
SIMULATORS								
OTHERS				1				1
N			5	8	43	28	48	36

TABLE E

TARGET RECOGNITION TRAINING DURING VARIOUS STAGES OF TRAINING
(TOTAL ARMY)

(All data in percent)

Targets Studied	Phase of Training													
	Basic		Officer Training		Advanced		Special-ized		Unit		Overseas		Ship-board	
	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM
No. of Mentions	N=71	N=98	N=16	N=0	N=10	N=15	N=35	N=39	N=32	N=28	N=12	N=10	N=5	N=8
Personnel	17	15	06	0	0	20	26	15	25	03			60	0
Machine Guns	01	0	0	0	0	0	3	0	0	07				
Mortars	01	0	0	0	0	0	0	02.5	0	0				
Artillery	01	0	0	0	0	0	0	02.5	0	0				
Anti-Tank Guns	01	0	0	0	0	0	0	02.5	0	0				
Tanks	31	37	31	0	40	47	20	31	15	40	33	70	0	50
Land Mines	0	0	0	0	0	0	0	02.5	0	0				
Planes	46	48	63	0	60	13	49	44	35	50	67	30	40	50
Unspecified Weapons	0	0	0	0	0	20	03	0	25	0	0	0	0	0

TABLE E_1

TARGET RECOGNITION DURING VARIOUS STAGES OF INFANTRY TRAINING
(Frequency data only - No. of Mentions)

TARGET Infantry	Phase of Training													
	BASIC		OFFICER TRAINING		ADVANCED		SPECIAL-IZED		UNIT		OVER-SEAS		SHIP-BOARD	
	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM
Personnel	1	5	—	—	—	3	6	3	—	—	—	—	—	—
Machine Guns	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Mortars	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Artillery	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Anti-Tank Guns	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Tanks	5	11	2	—	1	3	2	3	—	3	—	—	—	—
Planes	4	15	2	—	4	—	3	5	—	3	—	—	—	1
Gen. Weapons	—	—	—	—	—	3	—	—	8	—	—	—	—	—
N	14	31	4	0	5	9	11	11	8	6	0	0	0	1

TABLE E_2

TARGET RECOGNITION DURING VARIOUS STAGES OF ARTILLERY TRAINING
(Frequency Data Only)

TARGET Artillery	Phase of Training													
	BASIC		OFFICER TRAINING		ADVANCED		SPECIAL-IZED		UNIT		OVER-SEAS		SHIP-BOARD	
	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM
Personnel	4	2	—	—	—	—	—	—	6	0	—	—	—	—
Tanks	6	5	2	—	—	—	0	1	5	0	1	3	—	—
Planes	10	3	2	—	—	—	4	0	5	0	3	0	—	—
N	20	10	4	0	0	0	4	1	16	0	4	3	0	(

TABLE E_3

TARGET RECOGNITION TRAINING DURING VARIOUS STAGES OF AIR-BORNE TRAINING
(Frequency data only)

TARGET Air-borne	Phase of Training													
	BASIC		OFFICER TRAINING		ADVANCED		SPECIAL-IZED		UNIT		OVER-SEAS		SHIP-BOARD	
	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM
Personnel	3	5	-	-	-	-	3	3	-	-	-	-	-	-
Tanks	5	8	-	-	1	1	-	6	-	3	2	3	-	-
Planes	8	18	1	-	2	1	2	8	-	-	3	3	-	-
Machine Guns	-	-	-	-	-	-	1	0	-	2	-	-	-	-
Mortars	-	-	-	-	-	-	-	0	-	2	-	-	-	-
Artillery	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Anti-Tank	-	-	-	-	-	-	-	1	-	-	-	-	-	-
General Weapons	-	-	-	-	-	-	1	-	-	-	-	-	-	-
N	16	31	1	0	3	2	7	20	0	5	5	6	0	0

TABLE E_4

TARGET RECOGNITION TRAINING DURING VARIOUS STAGES OF ARMOR TRAINING
(Frequency Data only)

TARGET Armor	Phase of Training													
	BASIC		OFFICER TRAINING		ADVANCED		SPECIAL-IZED		UNIT		OVER-SEAS		SHIP-BOARD	
	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM
Personnel	4	3	1	-	-	-	-	-	2	1	-	-	3	-
Tanks	5	6	-	-	2	1	4	2	-	2	-	-	-	4
Planes	5	3	2	-	-	-	6	4	1	2	-	-	2	3
Land Mines	-	-	-	-	-	-	-	1	-	-	-	-	-	-
N	14	12	3	0	2	1	10	7	3	5	0	0	5	7

TABLE E_5

TARGET RECOGNITION TRAINING DURING
VARIOUS STAGES OF ANTI-AIRCRAFT TRAINING
(Frequency Data only)

TARGET Anti-Aircraft	Phase of Training													
	BASIC		OFFICER TRAINING		ADVANCED		SPECIAL-IZED		UNIT		OVER-SEAS		SHIP-BOARD	
	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM
Tanks	1	6	1	-	-	2	1	-	-	3	1	1	-	-
Planes	6	8	3	-	-	1	2	-	5	9	2	-	-	-
N =	7	14	4	0	0	3	3	0	5	12	3	1	0	0

TABLE V

INTERVIEWEES' SUGGESTIONS FOR TRAINING
(PERCENT OF MENTIONS BY INTERVIEWEES)

MOTIVATIONAL SUGGESTIONS	UNIT										TOTAL	
	INFANTRY		ARTILLERY		AIR-BORNE		ARMOR		ANTI-AIRCRAFT			
	*N=12	N=37	N=13	N=4	N=13	N=8	N=13	N=15	N=2	N=5	N=53	N=69
	Off	EM	Off	EM	Off	EM	Off	EM	Off	EM	Off	EM
Simulate Battle Experience	83	68	62	50	69	63	46	66	-	60	62	65
Stress Importance	08	03	16	-	8	-	54	26	50	-	62	65
Experienced Instructors	-	22	08	-	-	-	-	-	-	-	02	12
Others	08	08	16	50	23	38	-	06	50	40	13	16
VISUAL SUGGESTIONS	Off	EM	Off	EM	Off	EM	Off	EM	Off	EM	Off	EM
	*N=79	N=128	N=79	N=23	N=87	N=68	N=61	N=33	N=52	N=45	N=358	N=297
Realistic Films	22	16	18	31	15	22	02	36	23	13	16	21
Slides	-	02	09	04	-	-	-	-	06	16	03	04
Renshaw System	-	01	-	-	-	-	05	-	12	-	02	00.3
Silhouettes	-	-	-	-	-	-	-	-	-	04	-	00.7
Models	08	02	09	22	08	03	10	09	15	18	10	07
ITEMS AND EQUIPMENT												
Demonstrate	26	25	10	-	18	01	12	09	23	16	18	14
Operate	04	12	20	-	07	30	-	-	-	-	06	12
Field Training	05	16	05	26	22	12	26	18	12	20	14	16
Sound Recognition	15	06	16	-	14	09	15	12	04	02	13	06
Camouflage	05	07	02	-	-	02	05	-	-	02	02	04
Night Training	04	02	-	-	02	-	05	-	-	-	02	00.7
Terrain	-	02	05	-	-	02	05	-	-	02	02	02
Enemy Tactics	-	01	02	-	-	06	-	-	-	-	01	02
Others	13	08	05	18	14	15	16	15	04	07	11	11

* "N" = number of mentions.

TABLE G

THEATER OF COMBAT EXPERIENCE OF MEN INTERVIEWED
(All data in per cent)

COMBAT THEATRE	UNIT											
	INFANTRY		ARMOR		ARTILLERY		ANTI-AIRCRAFT		AIRBORNE		TOTAL	
	N=31	N=46	N=18	N=31	N=26	N=11	N=19	N=21	N=26	N=38	N=123*	N=153*
	Off	EM	Off	EM	Off	EM	Off	EM	Off	EM	Off	EM
Korea (only)	26	50	72	39	04	36	05	34	19	-	23	30
World War II (only) Pacific	16	02	-	06	04	09	42	34	15	10	14	10
European	35	11	-	26	42	-	53	14	35	63	34	26
World War II and Korea - Pacific and Korea	10	18	06	06	19	36	-	04	08	05	09	11
European and Korea	13	19	22	23	31	18	-	14	23	22	18	19
*Unidentified											02	05

* Three officers and eight enlisted men's records were not identified as to area.

TABLE H

NUMBER OF MEN INTERVIEWED FROM DIFFERENT UNITS

TYPE OF UNIT	OFFICERS	ENLISTED MEN	TOTAL
Infantry	32	50	82
Airborne Infantry	27	40	67
Armor	18	31	49
Field Artillery	28	12	40
Anti-Aircraft	18	22	40
TOTALS	123	155	278

TABLE I

COMPOSITION OF SAMPLE BY DUTIES PERFORMED, AND BY UNIT

	UNIT											
	ARMOR		INFANTRY		A/B INFANTRY		ANTI-AIRCRAFT		ARTILLERY		TOTAL	
N = No. of Men	N=19	N=30	N=30	N=50	N=27	N=39	N=18	N=21	N=27	N=13	N=121	N=153
MOS	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM	OFF	EM
Platoon Leader	12	-	20	-	15	-	6	-	-	-	53	-
Unit C. O.	4	-	3	-	5	-	9	-	6	-	27	-
Army Aviator	-	-	-	-	-	-	-	-	9	-	9	-
Forward Observer	-	-	1	-	-	-	-	-	6	2	7	2
Recon. Leader, Scout	-	1	2	1	1	-	-	-	-	-	3	2
Platoon Sergeant	-	9	-	11	1	14	-	6	-	3	1	43
Tank Commander	-	8	-	-	-	-	-	-	-	-	-	8
Tank Driver	-	5	-	1	-	1	-	1	-	-	-	8
Squad Leader	-	2	1	10	-	6	-	1	-	-	1	19
Rifleman	-	-	-	14	1	7	-	-	-	-	1	21
Gunner	-	-	1	-	-	-	-	8	-	-	-	9
Machine Gunner	-	-	1	2	-	7	-	-	-	-	1	9
Survey Chief	-	-	-	-	-	-	-	-	-	2	-	2
Mortarman	-	-	-	4	-	1	-	-	-	-	-	5
Bazooka Man	-	-	-	3	-	1	-	-	-	-	-	4
Radio Operator	-	-	-	-	-	-	-	2	1	-	-	3
Other	3	4	2	4	4	2	3	3	6	5	18	18
UNIDENTIFIED												
Total Officer	19	-	30	-	27	-	18	-	27	-	123*	
Total Enlisted Men	-	30	-	50	-	39	-	21	-	13	-	155*

23/5 STI-ATI-208 231 UNCLASSIFIED

Richardson, Bellows, Henry and Co, Inc, New York, N. Y.
COMBAT RECOGNITION REQUIREMENTS, by Raymond A. Katzell, Kenneth F. Thomson, Sheldon S. Zalkind, and others. 15 Apr 52 (Human Eng Rpt SDC 383-6-1).
(Contract N7onr-38306)

DIV: Personnel & Training (23)
SEC: Military Training & Indoctrination (5)

SUBJECT HEADINGS
Training, Military
Tracking - Psychological aspects

(Copies obtainable from ASTIA-DSC)

UNCLASSIFIED