



THE ORDNANCE SERGEANT



VOL. 3

MAY 1942

NO. 5



RESTRICTED

Published by the Ordnance School in the interest of Ordnance Sergeants

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HIGHLIGHTS

"Organization for Ammunition Supply" is featured in this issue, in a series of articles covering many of the important phases of this never-more-important subject. The series, beginning on page 362, contains some points of interest for every member of the Ordnance Department.

Don't overlook First Sergeant Pertka's short but timely discussion of "Aviation Ordnance at the Air Corps Proving Ground", on page 402. It provides an introduction to some of the added responsibilities of the Ordnance Department. Our associations with the Air Force will be covered in considerable detail in a later issue.

Another of Lt. Hettrich's picture stories on the Car, Half Track, appears on page 408. This is a worthwhile series which began last month and will continue for at least one more issue.

The Ordnance School Library sponsors in this issue a group of three indexes. Beginning on page 429, there are so reproduced that by trimming and removing from the magazine, and folding in the middle the result is a pamphlet of about 6 x 9 inches which can be inserted in suitable binder.

Lt. Simpson, on page 435, begins a couple of articles explaining the principle tools required for maintenance of the Aircraft Gun, M1 and M2. Drawings and working instructions are given. We hope you make excellent use of them, and report the results you obtain.

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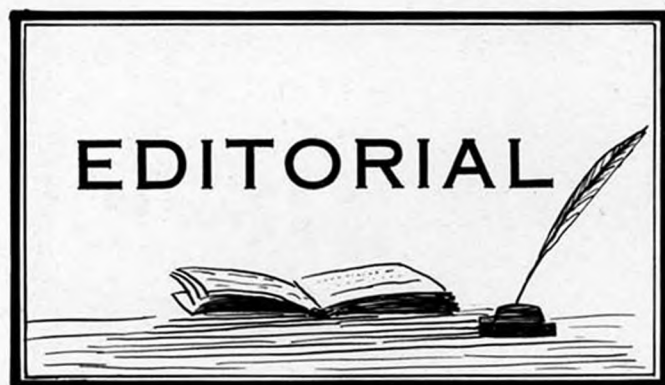
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Our cover photo this month results from the cooperation of the Ammunition and Photographic Sections of The Ordnance School.

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-IN THIS ISSUE-





*Things have
changed a lot..*

In the first grim reaction to war every other nation has made one same mistake.

The great upsurging spirit of sacrifice, such as has been ours, has made it seem RIGHT that dampers be put on many of the normal joys of living.

...Or Have They?

Then each country has painfully learned that life must go on — that there must be homes and love, recreation and even gaiety. That without these things, morale suffers. And that without morale the people perish.

So today London dances, Moscow crowds its theatres, and Chungking sips its tea with ancient ceremony.

----- New York Dress Institute



Some things have changed a lot, of course. There's no denying it. But many of the old established principles of human existence which have been proven by centuries of the past will be

equally proven by centuries yet to come. There's no denying that either.

Though costumes worn by individuals have changed, the methods of warring individuals have been modernized, and many of the current effects of war upon individuals are now being experienced for the first time in history, there are at least two characteristics of individuals which have never changed and never shall — ambition and effort. Some men have them; some men never realize their importance. And some men get to the top, while others never get more than a few steps from the bottom.

Let's use as an example something which you have in your hands as you read this. This issue of THE ORDNANCE SERGEANT contains a series of articles pertaining to Ammunition Supply. A great many men will pass them up as having no effect upon their lives. They have no intention of ever being in command of an ammunition company, or even of being an officer or a senior noncommissioned officer in an ammunition company. Probably they are right — they never will be.

But some man, maybe a junior noncom, or even a private, will read these articles and will absorb a certain conviction as to the importance of the subject. This in itself will have but little effect upon his future, but he will apply the same theory to many other subjects which other men pass by. And some day this man will find himself called upon to solve or help solve an intricate Ammunition Supply problem, or some other problem which is supposedly far above his abilities. And to the surprise of all who know him, possibly even himself, he will be successful, and will be acclaimed a hero of that day.

(Continued on page 441)





**A SERIES
OF ARTICLES**

ORGANIZATION FOR AMMUNITION SUPPLY

This series of articles is based on Ordnance School Text 9-34 (a temporary expedient pending the incorporation of the information contained herein in an approved War Department Manual.)

The ORDNANCE COMPANY Ammunition

The mission of the ammunition company is to establish and operate ammunition depots, ASP's, and other ammunition supply points, as required by higher authority, and to perform related duties in connection therewith.

An understanding of the entire system of ammunition supply is fundamental to the operation of an ammunition company. The ammunition company commander should be thoroughly familiar with the information contained in FM 9-6, "Ammunition Supply," paragraphs 1 and 2 of which contain definitions of terms peculiar to ammunition supply.* In this connection, the term "Sub-ASP", as used herein, refers to an ammunition supply point operated by a portion of an ammunition company. This is not standard terminology but has been adopted here primarily for use in this article for the purpose of distinguishing such as installation from an ASP operated by a complete ammunition company.

Ammunition companies are subject to several assignments, which normally include ammunition battalions (six companies per battalion and two battalions per field army), air forces (one company per 500 tons of ammunition per day), GHQ reserve (one company per 500 tons of ammunition per day), communications zone (one company per 15 days of supply per army), and, possibly, ammunition companies may be assigned to the support of, or attached to, task forces to supplement those assignments already mentioned.

In the fulfillment of its mission, the ammunition company is responsible that adequate plans and preparations have been made at the supply point site for the accommodation and storage of all the ammunition destined for that particular supply point, that the supply point layout is such as to facilitate the receipt and issue of such ammunition; that plans for the administrative operation of

* These definitions are reproduced on page 367.

the supply point are adequate to allow simultaneous stocking and issuing; that necessary reports are maintained, and the necessary reports are prepared, for the operation of the supply point; that any additional labor or transportation required for the operation of the supply point is anticipated and timely demand made therefor; that the ammunition, while in storage, is properly cared for (this entails inspection to discover deteriorated or damaged ammunition or containers; proper preparation of storage areas, stocking, and cover for protection against the weather, when necessary and feasible; adequate fire protection; effective camouflage; proper discipline within the magazine area); and that all authorized calls for ammunition from the using troops are promptly and accurately filled. This requires a high degree of training and careful, conscientious work on the part of company personnel. It also requires a proper system of procedure.

The organization of the ammunition company as prescribed in T/O 9-17 has been designed with a view to having within the company sufficient trained personnel to handle about 500 tons of ammunition per day. As the number and size of the depots or ASP's to be established will vary greatly, depending on the tactical situation, the organization of the company must be such as to permit consolidation with other companies to operate large depots, or division of the company for the operation of numerous small depots or ASP's

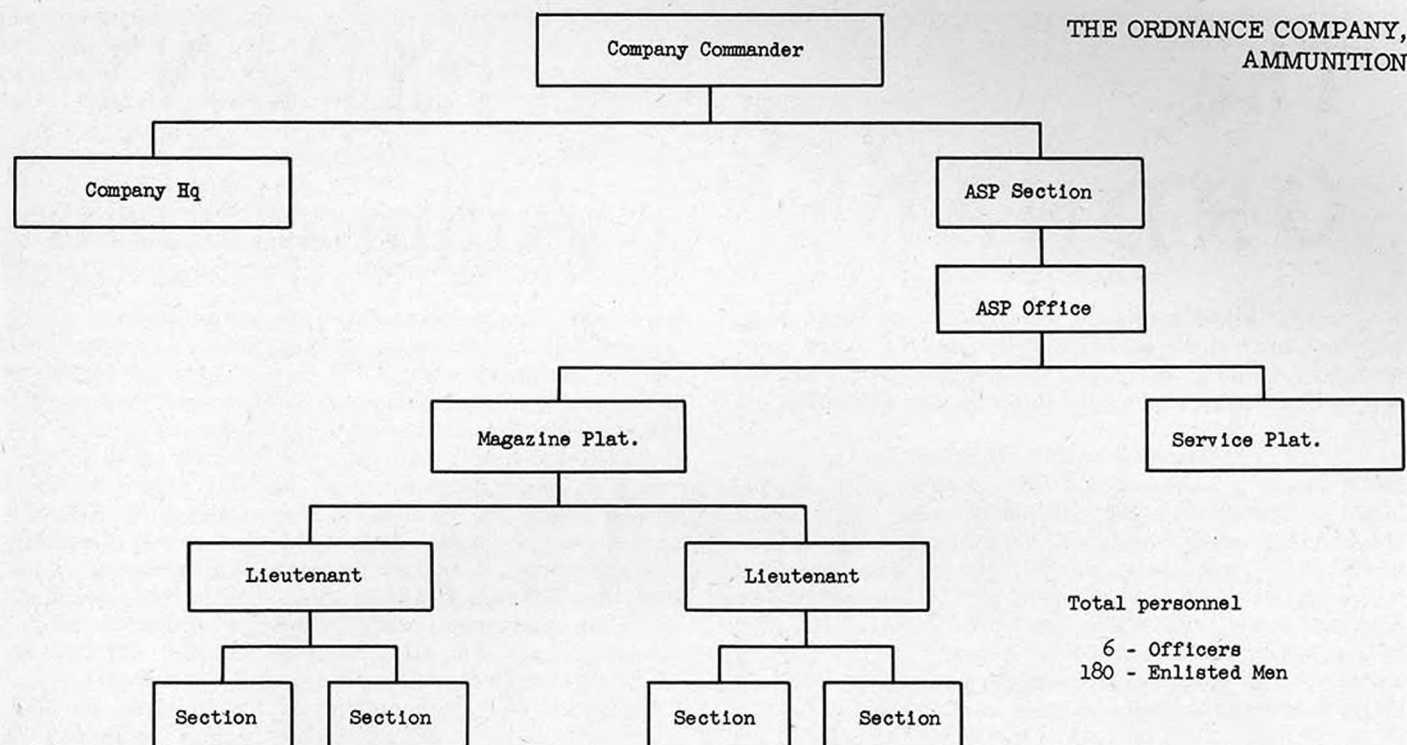
The internal organization of the ammunition company, as outlined in this group of articles and as prescribed in T/O 9-17, is not to be considered as a rigid requirement which must be adhered to under all circumstances. Changes in the strengths of sections, the assignments of duties, and the disposition of grades and ratings should be made by the company commander so as best to meet the requirements imposed by the problems confronting the company, and to use the personalities and skills available



The Army Ammunition Officer checking papers.



At work in an Army Ammunition Office.



to him for the solution of those problems.

In organizing detachments for the operation of sub-ASP's, if sufficient personnel is not available within the company, timely demand will be made on the battalion commander for such assistance as is necessary.

The operations of the ammunition company will naturally vary with the assignment of the company. All operations may roughly be classified into two categories, i.e., those which are military or tactical in nature, and those which are technical in nature. In the discussions which follow, no effort has been made to establish a clear cut division into these two categories.

The ammunition company is not mobile in the sense that it can be moved in its entirety with all personnel by the organic transportation of the company. In all cases wherein it is required that the company be moved, one of several methods must be resorted to:

Additional transportation may be secured from the quartermaster for the move. In this case seven (7) additional 2 1/2-ton trucks will be required.

Transportation by rail of the excess personnel may be arranged. In this case accommodation for 163 men and officers will be required.

All motor marches made by the company, and the details of the conduct of marches, and all matters pertaining thereto, will be governed by FM 25-10, Motor Transport.*

Because of the tonnage involved, ASP's in general will not be moved. The preferred procedure contemplates the opening of a new ASP at the new site, accompanied by the depletion of stocks of the old ASP by issues to troops as required. The new ASP may be operated by one or more

* A brief discussion of motor movements will be found on page 398.

sections of the same company, or a different company may be assigned to it. It should be opened before the old ASP is entirely closed out. In an advance it may be desirable to retain the old ASP as a base installation. The procedure in this case will depend on the situation and will be defined by the army Ordnance officer. In a retirement it may not be possible to close out the old ASP. In such a situation all available transportation probably will be in use moving troops, etc., and will not be available for moving the ammunition.

The presence of enemy troops in the vicinity of the ASP, or the imminent capture of the ASP by them, does not necessarily call for the destruction of the ammunition. If the operation is only a raid, the enemy will have neither the time to accomplish complete destruction of the ammunition nor the transportation to carry it off. If the operation is a general retirement, orders for the destruction of the ammunition may be issued by the army Ordnance officer, who is in a position to know the true situation. Destruction will be undertaken only on his order.

A number of different types of duty will be required of the Ammunition Company. Several of the usual operations will be covered in the different articles of this group dealing with specific sections of the company.

While the company commander has no authority to select ASP sites, he is quite apt to be "on the ground" and in a position to furnish valuable information for the guidance of higher authority. A preliminary study may be made on the map, but whenever possible this preliminary study must be followed on actual terrain reconnaissance for the selection of suitable ASP sites, road nets, and railroad sidings.

The layout of the ASP site and its initial stockage requires comprehensive and detailed planning in advance and careful control during the stockage. This is one of the most critical operations which the company will have to perform. If it is improperly executed, unending confusion

may result, followed by a serious breakdown in the ammunition supply system.

The ultimate mission of the Ammunition Company, of course, is the issue of ammunition to ammunition trains. If the other operations of the company are properly carried out, this procedure should be routine -- simple, rapid and accurate. The maintenance of records will require some care.

If all administrative details are properly planned, the replenishment of stocks should proceed almost automatically. Provision of the required labor and transportation at the right place and time and the correct distribution of the ammunition within the ASP must be planned in advance.

Only the simplest of salvage operations will be undertaken in the forward areas. More extensive operations will be carried out in specially equipped installations in the communications zone. However, all personnel should be alerted to the desirability of the collection and shipment to the rear of serviceable components such as empty clips, machine gun belts, magazines, containers, etc. The saving in administrative work and transportation required to replace them will be of great importance.

Such work as the loading of machine gun belts, cartridge clips, etc., will not normally be required of units in forward areas, but may be required of depot personnel in the communication zone or the rear areas of the combat zone.

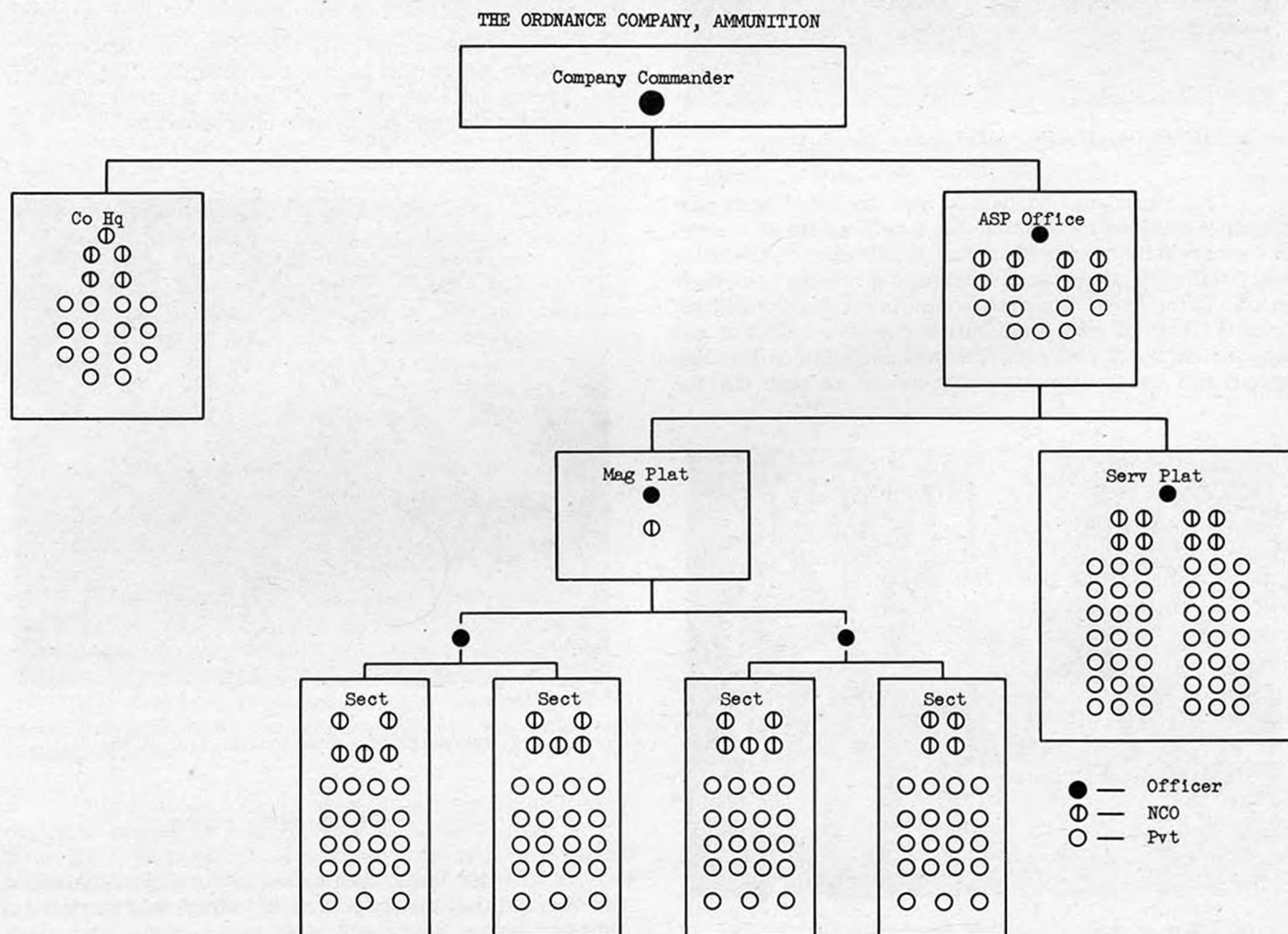
All personnel, commissioned and enlisted, should endeavor to insure continuity of policy and operations by keeping the next person in the chain of command or supervision informed of the current status of operations or of any changes of policy affecting the section in question. Standard operating procedures should be specified in every ammunition company.

Such a plan will reduce the load of minor decisions on the company commander and allow him more time for consideration of major policies and unusual situations. Every man will know exactly what to do and will become an expert in his particular duties. Every man will know who attends to other duties, and coordination will be simplified. A complete coverage of all details will be obtained, with nothing forgotten in the rush.

The net result of this policy will be increased efficiency of the entire company, but sufficient rotation of duties should be practiced to provide replacements for any individual who is lost for any reason. An excellent method of crystallizing procedures and of insuring continuity of policy is the use of the Policy Book.

Although the Policy Book was discussed in the April issue of THE ORDNANCE SERGEANT, the importance of its careful use renders it worthy of repetition here.

The Policy Book is a notebook or folder, in which is recorded for the future reference of interested personnel the policies of the officer in charge of the echelon to which the book pertains on problems the solution of



Ammunition constitutes by far the greatest mass of supplies to be moved to combat troops.

which are discretionary with such officers. It should also contain a summary of the procedures adopted for handling matters not otherwise covered by authorized publications.

Such a book is most useful in maintaining a continuity of policy in operation, on changes of command, during the absence of officers, and for the training of personnel in the desires of the commander. Sections of the book should be properly titled. The authority for each entry should be shown by reference to the pertinent order; e.g., "Co. Order 34, 5/2/41," "ASP Order 64, 9/9/41," or "VOCO, 11/3/41," etc. As the book develops it should be properly indexed. If properly kept, the Policy Book will develop into a valuable source of information for the Office of the Chief of Ordnance concerning the operations of type organizations or sections.



155-mm shell being loaded into a 2½-ton truck.

All personnel concerned with the handling of ammunition destined for ammunition ASP's should be alerted to the necessity of expedition and positive action to insure early delivery of all such ammunition coming into their hands. In the event of a break-down in the supply system, or of the loss of such ammunition due to accident or enemy action, liaison between the transportation or handling agency and the Ordnance service should be such that the



Men at work in an Army Ammunition Office.

proper Ordnance office will be immediately notified. The Ordnance office so notified should take prompt action to place the ammunition again in the course of supply.



KEY TO OCCUPATIONAL CLASSIFICATION

- (014) Automobile Mechanic, general
- (050) Carpenter, General
- (052) Chief Clerk
- (055) Clerk, General
- (060) Cook
- (068) Truckmaster
- (124) Mess Sergeant
- (144) Painter, General
- (146) Painter, Sign Letterer
- (186) Receiving and Shipping Clerk
- (203) Shipping Packer
- (213) Stenographer
- (245) Truck Driver
- (247) Typist
- (521) Basic
- (539) Chief of Section
- (542) Communication Chief
- (585) First Sergeant
- (590) Laborer
- (675) Messenger
- (678) Motorcyclist-Chauffeur
- (695) Orderly
- (760) Superintendent
- (794) Watchman

The use of the classification numbers shown above will be used in several of the following articles, and the above list is intended as a convenient guide in their interpretation.



A well concealed DAO even though cover is scarce.



In order to get a complete picture of Organization for Ammunition Supply you should study every article in this series.

Ammunition Definitions



Terms Common to all Organizations

Ammunition Depot: An organized locality for the reception, classification and issue of ammunition.

Complete Round: All the necessary components required to fire a weapon once. For purposes of supply in the field, it includes such additional quantities of fuzes and primers as may be necessary or prescribed.

Credit: An allocation of a definite quantity of ammunition which is placed at the disposal of the commander of an organization for a prescribed period of time. The credit includes details as to the place at which the supplies are available.

Daily Telegram: A telegram or other message dispatched daily by divisions and larger units giving the situation of the unit as regards supplies. A strength report is included.

Distributing Point: A place, other than a depot or railhead, where supplies are issued to regiments and smaller units. Distributing points are designated by the class of supplies therein, and by the identity of the unit establishing them, such as "Ammunition distributing point 1st Infantry". (See Dump).

Dump: A temporary stockage of supplies established by a corps, division, or smaller unit. When supplies are ordered issued from dumps, the latter become distributing points. Dumps are designated by the identity of the unit establishing them and by the class of supplies therein, such as "1st Infantry ammunition dump".

Expenditure: (1) The quantity of ammunition used by an organization. For use in the preparation of ammunition reports (OFM 303) the following should be used as a basis for determining the expenditures.

(2) Upon entry into the combat area, all organizations will have their prescribed loads.

(3) Any issues of small arms ammunition to the troops by unit munitions officers may be considered as expended when issued, because it represents in fact the quantity of ammunition that has already been used. (In peace time maneuvers, the above method may not be satisfactory because of the small quantities of ammunition available, and the fact that unit loads will seldom be actually carried.

(4) For artillery ammunition, a reasonable effort should be made to accurately estimate the actual number of rounds expended.

Lot Number: The number given to each lot of ammunition when it is manufactured at an arsenal or munitions plant. It is the usual means of identification of ammunition. Care must always be exercised that the lot number of ammunition is not lost. Ammunition of the same lot number is kept together as far as practicable.

Munitions Officer: An officer designated to supervise matters pertaining to the ammunition supply of a unit. In divisions or larger organizations, this will be an Ordnance officer, or an officer designated as his agent in supervising certain phases of ammunition supply.

Railhead (truckhead) (navigation head): A supply point where loads are transferred from the particular type of transportation being employed, such as, "Ammunition Railhead, 1st and 2nd Divisions."

Regulating Station: A traffic control agency established on lines of communications, through which movements are directed and controlled by the commander of the theater of operations through the regulating officer.

Rolling Reserve: An accumulation of ammunition in excess of immediate needs for the purpose of insuring continuity of adequate supply. Kept at all times on either motor or rail transportation for immediate movement as may be required.

Reporting Period: The period intervening between successive ammunition reports. It will be established by the army commander for depots, army troops and corps, and by the corps commander for units under his control. It will be contained in administrative orders. The frequency with which the various reports will be required may vary, depending upon the situation. In general, reports on small arms ammunition will not be required as often as those covering artillery ammunition. However, in a rapidly moving situation, the reporting period will no doubt be the same for both small arms and artillery ammunition. The number of copies required in each case will be determined by the number of offices designated to receive the report.

Supply Point: A generic term used to include depots, railheads, dumps, and distributing points.

Unit of Fire: A unit fixed by the general staff for a designated organization or weapon. It is expressed in rounds or tons of ammunition, bombs, grenades, and pyrotechnics, and is fixed for simplification of ammunition computation. The number of rounds per weapon or organization will vary with the types and calibers of weapons.

Terms pertaining to the Air Force

Air Base: A command which embraces one or more landing areas and which is equipped and organized for sustaining the war operations of one or more tactical air units. The functions of an air base are, in general, analogous to those of an advanced branch depot. The air base will, as a rule, cover a considerable area, especially if the facilities must be dispersed because of terrain, security, or other considerations. The air base affords accommodations for the required operations of the several supply arms of services.

Air Base Area: The area in which is located all the Air Corps installations controlled by an Air Base. The limits of the area are designated by higher headquarters.

Airdrome: A landing field with the necessary additional installations for servicing, arming, operating and maintaining military aviation units.

(Continued on page 378)

THE COMPANY COMMAND

Although the purpose of this short article is to outline the responsibilities and duties of the company commander, a few general remarks regarding the duties of other officers and of the enlisted men of the company are deemed essential. The specific duties of the other officers and of the enlisted men will be found in the articles dealing with the sections to which they are assigned.

While the duties given for individuals will be their normal assignments, several considerations, such as sickness and losses, will indicate that all individuals may at times be given additional assignments other than those which are normal. All persons of the company should be thoroughly trained not only in the efficient performance of their specific duties, but also in the duties of related assignments. Such training should include tactical operations for the protection of the ASP, as well as technical operations.

Among the special conditions which may affect the assignment of individuals to duties which are not strictly normal will be those conditions which exist during the initial stockage of an installation. In this case, a large amount of ammunition must be moved in a short time and under conditions requiring a high degree of supervision. It is probable that, because of their training and their knowledge of the problem involved, much of the ammunition company personnel will be required in a supervisory capacity, and such additional labor as is required to handle the tonnage will be secured through the army Ordnance officer.

During the operation of a sub-ASP, too, unusual assignments may become necessary in the cases of some individuals. In this case, the necessary sections of the magazine platoon will be detached for the operation of the additional ASP's. The detached sections will be augmented by such additional personnel as is necessary and can be



spared from the ASP office and the service platoon, and it may become necessary to assign additional responsibilities and duties to any individual.



Tents placed among large trees to prevent sleeping men being run over at night.



Practicing leading trucks through a depot. Notice the camouflage netting where the natural cover is insufficient.

The company commander is responsible for:

- (1) Administration (See AR 245-5).
- (2) Tactical and technical efficiency of the company.
- (3) Preparation of all plans for the training of the company.
- (4) Selection of the ASP site within the area allotted, and immediate transmission of the details thereof to higher authority.
- (5) Preparation of plan for initial stockage of the ASP and supervision of its execution.

The mission of the commander is also the mission of each of his subordinates. Without their individual and collective success he is helpless to accomplish his mission.

ER AND HIS ASSISTANTS

(6) Preparation of schedules for issues, where necessary and when approved by higher authority.

(7) Accomplishment of administrative details of the ASP operation and of the necessary reports.

(8) Preparation of all official correspondence pertaining to the company.



Directional signs are of utmost importance in a depot.

In fact, the ultimate responsibility for all phases of the operation of the company rests on the company commander.

Obviously, the company commander cannot personally accomplish all the activities for which he is responsible. He must, therefore, depend to a considerable extent upon his subordinates, and a considerable degree of cooperation is necessary to a high state of efficiency within the company. Although certain of the responsibilities of the company commander cannot be delegated by him, he should require all heads of sections who are designated in these articles as responsible directly to him to keep him informed at all times of any changes in the status of matters pertaining to the operation of the company or ASP's. He should, without interfering unduly in the internal administration of particular sections, establish major policies and routines of procedure governing the operation of the company. He should support his subordinates, but in matters pertaining to the administration of disciplinary punishment he should allow no one to commit him to a course of action. He is solely responsible for the administration of disciplinary punishment under the 104th Article of War and cannot delegate his authority. Accountability for the property of the company lies with the company commander and may not be delegated. The responsibility for the performance of specific duties should be delegated to the proper subordinate, and that subordinate held strictly accountable for the results.

All personnel should strive to make the task of the combat units as light as possible.

The company personnel constitutes one large family, all the members of which work toward the same objective -- the proper functioning of the company in its most efficient manner.

Planning and supervision are two very important functions of the company commander. At all times he should be alert for improvements in methods of operation. He should make the fullest use of the experience and imagination of his subordinates and should, whenever possible, be accessible to them for consultation. In general, major changes of policy should not be made until after all interested parties have been consulted and all phases of the subject considered.

The company commander should, at all times, consider the probable future activities of the company and prepare plans and take such steps as may be necessary to meet future requirements. The preparation of specific plans of the various sections of the company should be delegated to the responsible person.

In cooperation with the company commander, all company personnel must be constantly alert to anticipate



Depot office well concealed but so located in depot that all incoming trains must pass near it. Notice presence of guides to lead trucks to proper stacks.

future requirements and to make such requirements known to him. Future requirements may include such items as:

(1) Transportation for moving the company, or detachments of the company, from one site to another.

(2) Transportation and labor, beyond the capabilities of the company, for moving ammunition. (Plans for these may have been made by higher authority).

(3) Class I supplies for additional labor and Class III supplies for additional transportation, furnished in accordance with (1) and (2) above.

(4) Desirability of moving the ASP to a new site, due to:

(a) Change in tactical situation. (This will usually be foreseen by higher authority.

(b) Traffic situation.

(c) Shortage of suitable magazine areas.

(d) Discovery by the enemy.

(5) Desirability of higher stockage level. (This will usually be foreseen by higher authority.

(6) Desirability of reducing stockage level in anticipation of a movement of the ASP. (This will usually be taken care of by higher headquarters.)



Shadows on the ground indicate ample natural overhead coverage for an Ammunition Depot or ASP.

The company commander should move about in the camp and the ASP, observing the manner in which duties are being performed and orders and policies are being carried out. Periodical formal inspections should be held of men, equipment, and stocks of ammunition. The highest state of efficiency consistent with conditions of service and state of training should be required. Neatness, orderliness, and cleanliness should be stressed at all times.

In matters pertaining to personnel, the company commander should be tolerant, fair, and coolheaded. He should endeavor to know as well as possible all the men in the company. He should have an estimate of the personality and capabilities of every man. He should, from time to time, reassign the officer and noncommissioned officer personnel in the company to different sections or duties. Such a practice will assist in preparing the company to meet emergencies.

The company commander should endeavor to insure continuity of policy within the company by requiring the maintenance of Policy Books within all sections. *

To assist the company commander, in general, the senior lieutenant of the company will be designated as the

* The policy book is described in the first article of this series, beginning on page 363.

company executive. He will, in addition to the performance of his normally assigned duties, keep himself informed of the status of matters affecting the entire company, and will be prepared to function for the company commander in the latter's absence.

The duties of all individuals, as outlined in these articles for various individuals, are intended merely as a guide to the company commander. He should make such reassignments of duties and responsibilities, and assignments of additional duties and responsibilities, as the situation may demand. It will be found that certain duties within the company, e. g., recorder for the company fund, have not been assigned. There will be many odd duties in connection with the company administration which should be apportioned among the junior officers of the company.

In performing all their various duties, all individuals are directly responsible to the section chief, or to such other person as may be specifically designated to control or supervise that individual. In discharging this responsibility, men will:

(1) On routine matters, take such action as will insure the most efficient and satisfactory performance of the duties of their section and of the company as a whole.

(2) On problems not of a routine nature, and in the absence of specific instructions, work out a satisfactory solution and check with their immediate superior for



A ground bald-spot broken up by placing brush over it.

approval. In the absence of the immediate superior or of any one else competent to approve, proceed with the job to the best of their ability.

(3) Be alert to the possibility for the development of methods which will expedite and simplify operations of a routine nature. (In this connection, such methods must not be too elaborate and should not require action by higher authority; the whole idea here is to simplify and expedite matters, and not to become involved in complications which will defeat the basic idea of simplification and expedition.)

(4) Sign for and be responsible for all tools specifically assigned to them for use.

(Continued on page 379)

The COMPANY HEADQUARTERS

The company headquarters consists of the company commander and nineteen enlisted men. The organization shown on the next page may be used as a guide by the company commander in organizing this section.

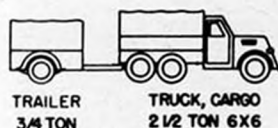
The vehicles assigned to the company headquarters include the following:



Truck, 1/4-ton, 4 x 4. - This vehicle is used primarily for contacting higher and lower echelons and for general messenger service.



Truck, 3/4-ton, command and reconnaissance. - This truck is usually assigned to the company commander for his use or as he may direct for reconnaissance purposes.



Truck, 2-1/2-ton, cargo. - This vehicle is used as the kitchen truck. It carries the range, ice box, and all the kitchen utensils.

For cooking while on the march, the three range units may be linked together and chained in position in the truck body. Cooking on the march is usually difficult, because of the crowded condition of the truck and high heat under the canvas. The truck bows must be raised 14" to permit standing upright, and additional transportation must be secured for equipment normally carried on the kitchen truck, for which there is no room while cooking is in progress.

Trailer, 1-ton. - This trailer is used for the purpose of carrying rations. It is attached to the kitchen truck so that a supply of rations will always be available. The installation of shelving with removable slotted fronts greatly facilitates the loading of this vehicle.



Trailer, one-ton, water, 250-gallon. - This vehicle is used for the transportation of water for the use of the company. In general, economy in the use of this water must be exercised. An average daily figure for water requirements is five gallons per man for all purposes, including cooking, washing, and drinking. The water trailer should be filled at every opportunity.

The responsibilities governing the operation of the various subsections of the headquarters section and the duties of the personnel in these subsections are listed below.

COMPANY OFFICE

This section is responsible for the training and administration of the company, including:

(1) The maintenance of personnel records, including Service Records, Morning Reports, Sick Reports,



Duty Rosters, and routine reports required by higher headquarters.

(2) The maintenance of the company council book.

(3) The preparation of training programs and schedules for the military training of the company.

(4) The preparation of training programs and schedules, in conjunction with the ASP office, for the technical training of the company.

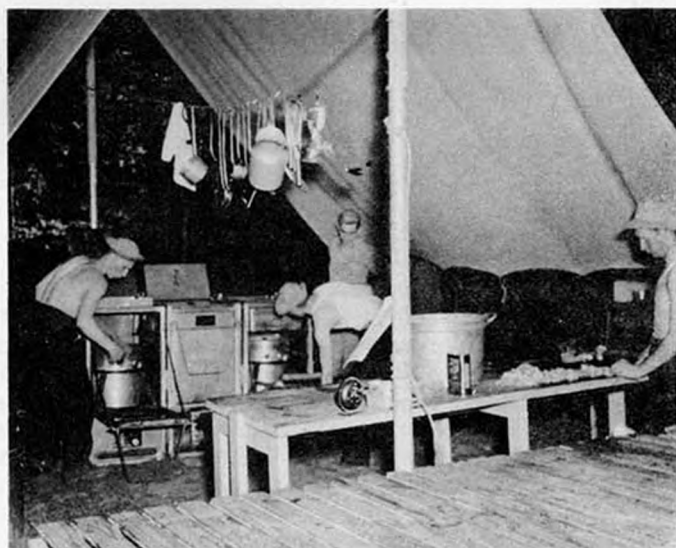
(5) The supervision of training within the company.

(6) The maintenance of correspondence files and of the correspondence book.

(7) The preparation of plans in connection with changes in the location of the company. Such plans will be initiated by the battalion headquarters at the direction of the army Ordnance officer, who will specify the principal requirements and arrange for the necessary additional facilities. (Some of these arrangements may be delegated to the battalion commander). Much detailed planning will devolve upon the company headquarters, such as messing arrangements, truck loading schedules, police of old bivouac, selection and preparation of exact location of new bivouac, conduct of motor march, etc. Such plans will be coordinated, when necessary, with the ASP office.

(8) The conduct of scheduled and unscheduled inspections of all phases of the activities of the company.

The first sergeant is responsible for the efficient operation of the company office, and, as such, is the

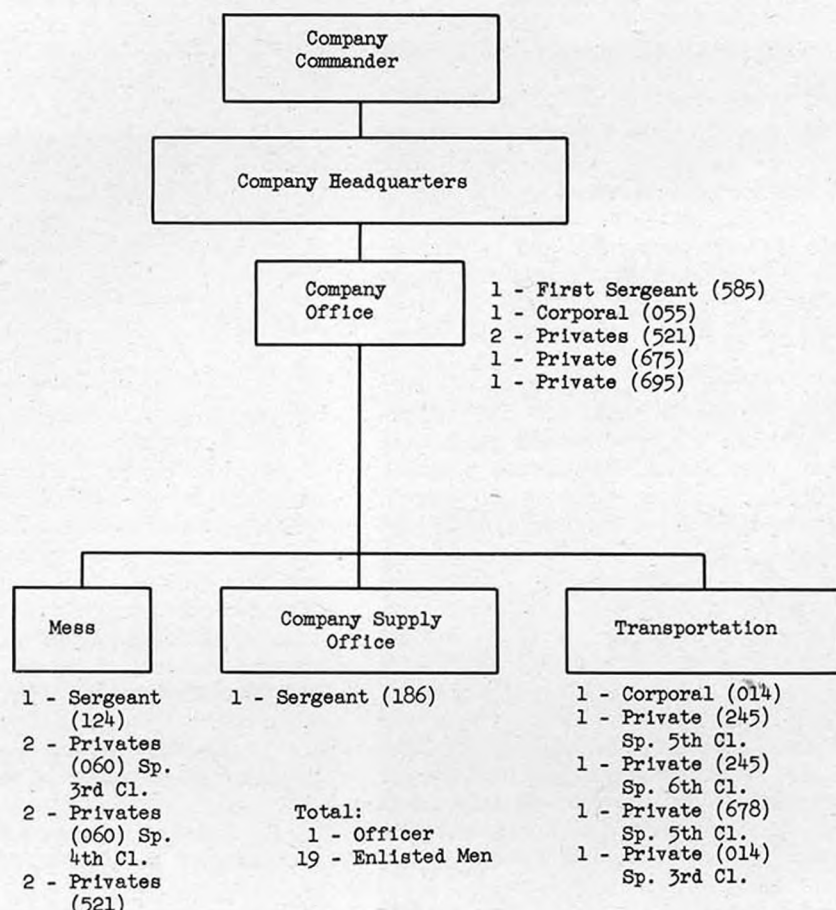


Preparing a meal in a well hidden field kitchen.

company commander's senior enlisted representative in matters pertaining to company administration. The relationship between the company commander and the first sergeant should be one of mutual understanding and confidence. For maximum efficiency they must work as a closely coordinated team. The first sergeant should make a point of understanding and carrying out the policies of the company commander in all matters over which he has direct supervision.

The first sergeant is responsible to the company commander for the efficient operation of the company of-

ORGANIZATION OF THE COMPANY HEADQUARTERS



fice, including the enforcement of discipline; the preparation and issuing of company orders as directed by the company commander; the preparation of collection sheets for the company fund; the preparation of routine correspondence; the preparation of daily strength, ration, gasoline, and oil returns; and the supervision of all formations.

The first sergeant should be thoroughly familiar with all matters pertaining to company administration, including, whenever possible, matters concerning mess and supply. He should be thoroughly familiar with all drills which the company is required to perform. He should conduct himself with dignity, fairness, and force. Whenever conflicts appear in matters pertaining to both the ASP and company administration, he should confer with the chief clerk with a view to arriving at a solution suitable to both ASP and company requirements.

The company clerk is responsible to the first sergeant for the typing of all necessary correspondence for the company office and the maintenance of the necessary

files and records kept by that office. He will, when necessary, assist in the unit personnel section of battalion headquarters in the maintenance of the personnel records of the company.

COMPANY SUPPLY OFFICE

This section is responsible for the maintenance of the stock record covering all company property; the maintenance of all records of individual equipment and of files of memorandum receipts of property held by members of the company; the maintenance of all necessary

files of vouchers to the Stock Record account; the preparation of Requisitions for organizational equipment required by the company; and for the preparation of all property forms, such as Reports of Survey, Statements of Charges, Inventory and Inspection Reports, Over, Short and Damaged Reports, etc., required in the property administration of the company.

The supply sergeant is responsible to the supply officer for the efficient operation of the company supply office, including the completeness of the organizational and individual equipment of the company; the security of all property not out on memorandum receipt or in the hands of the ASP section; the neatness, cleanliness, preservation, serviceability, and accessibility of all property for which he is responsible; the completeness of, and preparation for, all inventories of property for which he is responsible; the preparation of property location charts, where necessary and desirable, for property in his possession; and the preparation of statements of clothing settlements when required.

The supply sergeant is directly responsible for the security, serviceability, and proper storage of many thousands of dollars worth of equipment. He should understand thoroughly all property regulations, the use of standard nomenclature lists, equipment charts, and all form papers pertaining to property. He must keep accurate and complete records and inventories. He must keep abreast of, and thoroughly familiar with, all changes in matters pertaining to the handling of property. He should be a congenial, enterprising, industrious person with energy, initiative, and imagination.

THE MESS

This section is responsible for:

- (1) The securing, transportation, preparation, and serving of rations, including those for attached personnel



Looking upward through camouflage netting.

and visitors. Some consideration of messing arrangements will be required in the event company personnel are required for the operation of more than one ASP. The method utilized will depend upon circumstances. The following are suggested methods of procedure:

- (a) All ASP's may be rationed from a central field kitchen by transporting hot food in insulated food containers. The availability of transportation, distances to be covered, and difficulties of the journey should be taken into consideration.
- (b) The units of the field range and proportionate shares of kitchen personnel and equipment may be divided among the ASP's for use at the ASP locations. The delivery of rations and fuel to the ASP's will require consideration of factors similar to those given in sub-paragraph (1) above.
- (c) The personnel of the ASP's may be attached for rationing to a nearby organization which is operating a mess. The probable permanency of the messing organization should be considered, as well as transportation requirements.
- (d) The personnel of the ASP's may be fed in relays at the parent ASP kitchen by using motor transportation. The availability of time for making the journey

should be considered, as well as transportation requirements.

- (e) Any combination of the four methods of procedure cited above may be utilized.

- (2) The preparation of all menus whenever the variety of the ration will permit.

The mess sergeant is responsible to the mess officer for the efficient operation of the company mess, including: The preparation of all menus; the preparation and serving of all meals; the operation of all mess personnel; the drawing, storing, and transportation of all rations; the issuance of all rations, cooked or uncooked; the maintenance of ration accounts, including records of boarders; the maintenance of the Inventory of Rations (Form 86); the police and maintenance of sanitary conditions in all matters pertaining to personnel, equipment, and service of the mess; the care and maintenance of all mess equipment; and the preparation of rations for inventory whenever required.

TRANSPORTATION SECTION

This section is responsible for: The maintenance of all records and motor books pertaining to the motor vehicles of the company; the transportation of baggage and company equipment, whenever necessary; the coordination of transportation requirements between the ASP and the headquarters and supply section; the dispatch of all organic vehicles from the company bivouac area; and the repair and maintenance of the automotive vehicles assigned to the company to the limit of the tools, time, labor, and skill available. Such repairs will consist primarily of first and second echelon maintenance, though some small jobs may fall into the third echelon category.

The motor corporal is responsible to the transportation officer for the efficient operation of the transportation section. In the execution of his duties, he will maintain all the motor vehicle records for organic transportation, except the small notebook kept in each vehicle; periodically check the condition of these latter books to determine that drivers are properly recording the mileages and the gas and oil consumed; prepare monthly consolidations of data in the motor books for signature by the transportation officer; and act as dispatcher for all organic transportation.

The motor corporal is directly responsible to the transportation officer for the good order and readiness to function of the transportation assigned to the headquarters and supply section. He is responsible for the training of motor vehicle operators.

During halts when the company is on a march, the motor corporal will check with all vehicle operators to determine whether or not any difficulties are being experienced, and will take appropriate action to correct such difficulties. He will supervise gassing operations and the issue of oil as necessary. At the end of each day's march, he will supervise the checking of oil levels, battery water levels, and tire pressures. He will check the operation of all lights and horns and, in general, insure that all necessary steps have been taken to prepare the vehicles of the company for the continuation of the march. He will familiarize himself with the pertinent parts of FM 25-10, which he will use as a guide in performing his duties.

NOTE: Another article of this series gives a brief discussion of motor movements. See page 398.



The organization of the ASP office should be designed to accomplish the following duties:

- (1) To prepare such plans as may be necessary in connection with issues, replenishments, initial stockage, and related duties.
- (2) To keep such records and prepare such reports as are prescribed or deemed necessary for the efficient operation of the ASP.
- (3) To supervise and coordinate the work of the magazine and service platoons.

The personnel of the office consists of one officer and fifteen enlisted men. The chart shown below may be used by the company commander in organizing the office.

As the requirements for an ASP cover an extremely wide range, the organization must be very flexible. It may be necessary to increase, decrease, or consolidate sections, either for a considerable period of time or tem-



porarily for a particular operation. This requires that all men be trained in a number of rotated duties. All clerks, whether stock record, receiving, shipping, or general, must be able to perform any of the clerical duties involved in the operation of the office.

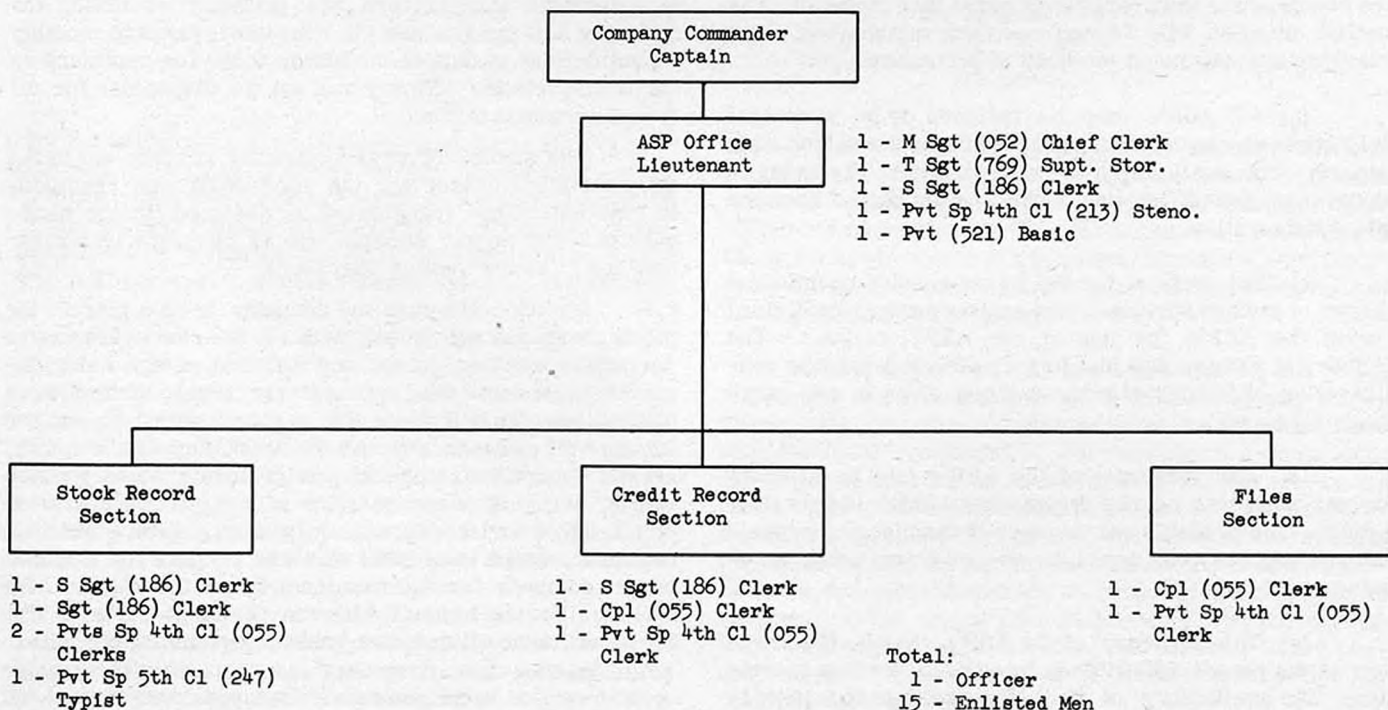
As the company may be required to operate more than one ASP, the organization must be designed to permit detachments for this purpose. The chart on the next page shows a suggested detachment for this purpose.

No equipment is specifically assigned to the ASP office. Transportation will be furnished by the service platoon. Sufficient office equipment is allotted the company under T/BA 9 to supply its requirements for these items. Communications within the ASP are greatly facilitated by an eight-station telephone system.

Although the general duties of the ASP office have already been outlined, certain supplementary duties are also of some importance.

Continuing studies should be made to improve the training of personnel, both to increase their efficiency in their normal work and to provide suitable substitutes

ORGANIZATION OF ASP OFFICE

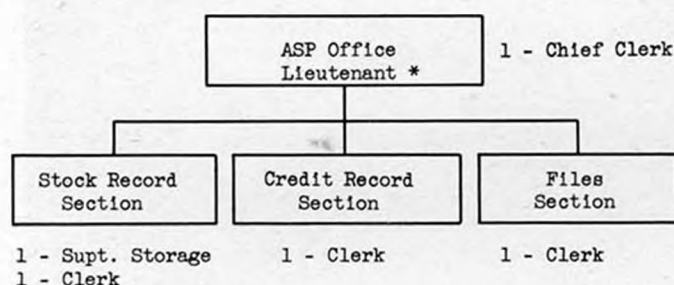


when required.

Continuing studies should be made to develop new or to improve old methods of handling ammunition and of other phases of the work.

Continuing studies should be made with the view of improving the service rendered by the company to the using troops. Primary considerations involve better ASP sites and road nets. Secondary considerations involve more suitable rail sidings for replenishments. As the tactical situation changes, frequent reconnaissance should be made to discover possible or more suitable locations, roads, and sidings, in order that prompt information or recommendations may be furnished higher headquarters. Both present and contemplated future operations must be taken into account. The best method of evaluating such information is by the maintenance of a situation map.

ORGANIZATION OF A SUB-ASP OFFICE DETACHMENT



* From Magazine Platoon

GENERAL PROCEDURE

ISSUES

The ammunition train commander presents his Transportation Order to the chief clerk or his assistant. The chief clerk reviews the Transportation Order for sufficiency of information and accuracy. Any deficiencies in the Transportation Order should be corrected by consultation with the train commander, or otherwise if necessary.

The Transportation Order is checked against the drawing unit's credits in the Credit Record. If the unit has not sufficient credits to cover the Transportation Order, the division Ordnance officer, or other appropriate Ordnance officer, should be contacted immediately. Every effort should be made to supply the ammunition desired. The Transportation Order should be initialed by the Credit Record clerk to indicate that credits are satisfactory.

The Transportation Order is checked against the location and lot (separate loading ammunition) records when necessary to determine from which section of the magazine area the issue will be made. A tally-out will be prepared for each truck showing the code, number of containers, and lot (where applicable) of each kind of ammunition, and the section from which it will be drawn. The Transportation Order number should be placed on each tally slip. The Transportation Order is placed in a temporary file.

The tallies, after review and authentication by the chief clerk, are given the train commander for distribution

to the various truck drivers. While these papers have been in preparation, the chief clerk has given the train commander any instructions and information necessary, assigned a guide (if necessary), and arranged for the required labor.

The train is loaded as required by the tallies. If, for any reason, the ammunition loaded is less than that called for by the tallies, the latter are corrected. The train commander or the individual truck drivers receipt the tallies. The train then leaves the ASP by the proper exit. The guide returns the tallies to the ASP office. The labor returns to the ASP office or to the next section where needed, as ordered by the ASP office.

At the ASP office the tallies are attached to the Transportation Order and the Credit Record is posted. The Location Record is posted. The Lot Record is posted (if required). The Stock Record is posted. The Transportation Order and tallies are then placed in files. As each record is posted, notation showing the posting should be made on either the Transportation Order or the tally. All records should be posted as the issues are made.

REPLENISHMENTS BY RAIL

A copy of the Requisition for ammunition issued by the Army Ordnance officer against a communications zone depot (or other depot) is received. It is reviewed for information and temporarily filed.

Copies of orders for the supply of any additional labor and transportation required for the movement are received. They are reviewed for information and temporarily filed with the requisition for the ammunition.

A copy of the bill of lading or other papers covering the shipment are received. Such papers will show the loading of each railroad car by code. The labor and transporta-



Loaded trucks assembled ready to return to the using troops.

tion requirements for the movement are computed and checked against the orders for these items and any deficiencies are reported immediately to the company commander, who will call the matter to the attention of the battalion commander. Note that if the number of loading points (normally railroad cars) can be determined before receipt of the bill of lading, this check can be made as

soon as such information is available. In the event that no information is received to indicate that additional labor and transportation will be furnished, the requirements, if any, will be immediately transmitted to the battalion commander. The Bill of Lading is temporarily filed with the Requisition for the ammunition.

The plan for the stockage is prepared. The Plan should preferably show the loading of each truckload of ammunition and its destination in the ASP. The destination may be shown down to and including stacks, if desired. It should be shown down to and including sections in any case. (In this event, the distribution to the stacks is made by the magazine section supervisor in accordance with the ASP layout). A tally-in is prepared in duplicate for each truckload, showing railroad car number, magazine section designation, stack number (if desired), code, lot number, and number of containers in the load. The magazine section and stack number are determined from a survey of the Location Record. The originals of the tallies are sent to the service platoon, the duplicates to the magazine platoon.

The operations of the ASP office generally are carried out before and after the actual movement of the ammunition. In order to get a connected and complete picture of the situation, the following outline is given, though the ASP office is not directly employed in the operations described.

The service platoon supervises and carries on the work at the railroad siding. It takes charge of the transportation and its share of the labor, organizes and instructs the party, furnishes guides, traffic control, and liaison, as needed.

The magazine platoon takes charge of its share of the labor and sees that the ammunition is properly and expeditiously unloaded and stacked. Any trucks which go to the wrong magazine section are instructed as to their proper destination.

ASP office personnel render any assistance possible and endeavor to prevent any miscarriage of the stockage plan.

At the ASP entrance, a guide will direct the truck driver to the proper section for the unloading of his truck. The load is checked against the tally-in described above. When the shipment is by rail, the checker at the railroad car is given the tallies pertaining to the car. The tally is checked as the truck is loaded and is given to the truck driver. Unless the tally specifically indicates the section of the ASP in which the truck is to be unloaded, the driver will show it to the guide at the entrance of the ASP, who will direct him to the proper section. Since the tallies do not specify the order of loading, that ammunition which is nearest to the door may be loaded first, or in such order as is most convenient, except that in the case of separate loading ammunition all loads will consist of complete rounds.

At the magazine section, the driver gives the tally to the supervisor, who directs him to the proper stack and gives the tally to the checker. As the truck is unloaded, the checker checks the containers against the tally, makes

As the requirements for an ASP cover an extremely wide range, the organization must be very flexible.

any corrections necessary, and initials the tally. At the conclusion of the operation, all tallies are transmitted to the ASP office, duplicates being destroyed. The truck returns to the loading point for the next load.

In the ASP office, after the ammunition movement is completed, the tallies are consolidated and entered in the Stock Record and Location Card. They are then attached to the Ammunition Requisition, and all papers pertaining to the transaction are sent to file.

REPLENISHMENTS BY TRUCK

In the case of replenishments by truck, much of the planning described in the preceding section may be omitted. The following procedure is the basis for replenishments of this type:



Placing logs in a ditch to give an additional inlet to an Ammunition Depot.

A copy of the Transportation Order for ammunition issued by the army Ordnance officer against a rear ammunition depot is received. It is reviewed for information and temporarily filed.

Copies of orders for the supply of any additional labor and transportation required for the movement are received. They are reviewed for information, checked against requirements (battalion commander notified of discrepancies), and temporarily filed with the Transportation Order for the ammunition.

The plan for the stockage is prepared, using the Location Record as a guide in determining the amount and types of ammunition that are to be placed in each section. Placement tallies are drawn up for each code number, specifying the number of containers to be placed in each section of the ASP.

During the ammunition movement, the service platoon furnishes the required number of guides, institutes the necessary traffic control, maintains liaison, and supplies checkers and labor as required.

The magazine section takes charge of the unloading operation. Normally all the Ordnance personnel will be required to serve in the capacity of supervisors, guides,

and checkers. The magazine section is responsible that the ammunition is properly and expeditiously unloaded, and properly stacked.

At the ASP entrance each truck will be met, the tally for its load examined, the placement tally consulted and posted, and the directions given as to the proper section for the unloading of the truck.

At the magazine section, the driver gives the tallies to the supervisor, who directs him to the proper stack and gives the tallies to the checker. As the truck is unloaded the checker checks the containers against the tally, makes any corrections necessary, and initials the tally. One copy of the corrected tally is given to the truck driver to be returned to the shipping depot; the other copy is taken to the ASP office at the end of the operation.



Making use of the additional inlet.

At the ASP office the tallies are consolidated and entered in the Stock Record and Location Record. They are then attached to the Transportation Order that directed the operation, and all papers pertaining to the transaction are sent to file.

OTHER OPERATIONS

During other operations the ASP office will also be concerned with posting allocations to the Credit Record and Stock Record. Care must be used to post also the reversions when allocations expire.

Two situation maps should be maintained in the ASP office. One should show the present location of the ASP, the division ammunition office (or other appropriate office), and the tactical units served by the ASP. The other would show the present location of the ASP, its railroad sidings, if any, and other suitable locations for the ASP and railroad sidings. This latter map should show complete information, such as car capacities of railroad sidings, cover available at different sites, etc. Both maps should show complete road net information. Obviously these maps should not be allowed to fall into hostile hands.

DUTIES OF PERSONNEL

The ASP officer is responsible to the company com-

mander for all phases of the operation of the ASP and for its protection against the hazards peculiar to ammunition. He has direct supervision over the ASP office. He exercises general supervision over the service platoon, the magazine platoon, and the activities of the sub-ASP's.

He will prepare the necessary plans for future requirements of the ASP for trained personnel, equipment, and material. He will supervise the plans of the chief clerk for additional labor and transportation, and the plans of the superintendent of storage for the ASP layout. He will supervise all technical plans for the establishment of sub-ASP's.

He will coordinate the requirements of the sections of the magazine platoon for assistance from the service platoon with the requirements of the sub-ASP's for personnel and transportation.

He will make such scheduled and unscheduled inspections as may be necessary to insure the safety of the ASP and the readiness of all sections to function efficiently.

He will hold the officers and noncommissioned officer in charge of sections responsible for the efficiency of their sections.

The chief clerk is responsible to the ASP officer for all administrative work of the ASP in connection with the receipt and issue of ammunition. This extends to the supervision of the operation of clerical staffs in ASP's. He also prepares such plans as are outlined here or assigned to him by the ASP officer. To accomplish these duties he is free to move about the ASP or to visit sub-ASP's as may be required.

The chief clerk prepares the Status of Stocks and any other reports required by higher headquarters. In addition he prepares any special reports required by the ASP officer. He will not hesitate to recommend to the ASP officer the submission of such special reports as he deems advisable. He will supervise the training of all clerical personnel of the ASP, not only in their normal duties, but also in related clerical duties. He will be constantly alert to devise improved administrative procedures for the ASP. All important errors discovered will be brought to his attention immediately. He will take immediate corrective steps or refer the matter to the ASP officer for his decision. He is the ASP officer's principal noncommissioned assistant. In the absence of the ASP officer he is in charge of the ASP office. He will make such decisions as are necessary for the continuous functioning of the ASP, in accordance with the known policies of the ASP officer or his own best judgment.

The assistant to the chief clerk performs any clerical work required by the chief clerk. His regular duties include the following:

Check all Transportation Orders received from ammunition trains for completeness of information and obvious errors. In case of deficiencies, he will take immediate steps to secure complete and correct information. In no case will an ammunition train be unnecessarily detained. He will give train commanders any information or instructions necessary. This includes provision of a guide and labor (when necessary). He checks copies of Requisitions for ammunition received from higher headquarters. (Prepares such Requisitions when required). He checks

copies of plans for additional labor and transportation received from higher headquarters against the requirements as computed by the chief clerk.

The stenographer is the ASP officer's stenographer and does such typing and related work as is required in the office. When not otherwise occupied, he will do any clerical work required by the chief clerk.

The superintendent of storage is responsible to the ASP officer for all matters pertaining to the storage of ammunition. This extends to general supervision over storage conditions, including sub-ASP's, and direct supervision and planning in connection with disposition of the ammunition within the ASP. He will exercise only general supervision over the disposition of ammunition in sub-ASP's.

As referred to above, storage conditions include such matters as:

Proper segregation of certain kinds of ammunition, such as pyrotechnics, as provided by the "Ordnance Safety Manual"; proper segregation of lots; proper grouping for complete rounds; proper stacking and cover, when necessary, for protection from weather; proper stacking to prevent damage to the ammunition in handling.

Within the ASP, disposition of ammunition includes such matters as:

Location of the stacks with relation to the road and the terrain, in order to facilitate handling; quantities and kinds to be placed in each stack to comply with safety regulations; and quantities and kinds to be placed in each stack to facilitate issues to ammunition trains.



Water for the men should be conveniently located.

The superintendent of storage will be constantly alert to devise improved methods for the storage of ammunition. He will prepare that part of the plan for replenishment or initial stockage of the ASP which shows the quantity of each lot and kind of ammunition to be placed in each magazine area. He will render any assistance required in connection with the work at the ASP during replenishment.

The stock record clerk is the senior clerk in the

stock record section, and has the following duties:

Keep the Stock Record account, the Location Record, and the Lot Record; check Transportation Orders against these records; and prepare tally-out forms.

The credit record section clerk keeps the Credit Record, and checks Transportation Orders against the Credit Record.

The file section clerk is responsible for main-



Sanitation cannot be overstressed. Here we see a method of garbage disposal.

taining the office files. His duties include the following:

He should devise and install a suitable system for classifying, recording and storing all office papers, as approved by the chief clerk; he should obtain suitable — not necessarily elaborate — equipment for storing and protecting the papers; he should insure that all papers not in current use are properly filed; he should be able to find quickly any paper required; and he should be sure that any other office personnel can find any required paper in a reasonable time.



AMMUNITION DEFINITIONS

(Continued from page 367)

Ammunition Expenditure Credit (AMXC): Also sometimes called Ammunition Expenditure Authority (AMXA). A credit issued by higher headquarters to a lower tactical unit, authorizing the expenditure, during a limited period of time, of definite quantities of certain kinds of ammunition to be procured from a specified ammunition supply point. Credits cannot be made effective until the ammunition in question is actually on hand at the supply points designated, and must not exceed stockages at these points. A copy of each AMXC must be sent to each supply point concerned.

Ammunition Supply Credit (AMSC): Sometimes called ammunition supply authority (AMSA). This is a credit issued by a headquarters to a lower headquarters authorizing that headquarters to requisition upon certain supply points, during a specified period of time, for definite quantities of different types of ammunition. It is an

authority for the lower headquarters to stock its supply points.

Airdrome Distributing Point (Adrm. D. P.): A place at which supplies are requisitioned and issued to combat troops. Normally a distributing point is established at each occupied airdrome by the base commander concerned. The ammunition section of each D. P. is operated by a platoon of the Ordnance company (Avn) (Bombardment or Pursuit) assigned to the D. P.

Dispersed Airdrome: One of several airdromes operating under the administrative control of an Air Base. Such an airdrome may serve one or more squadrons. As the requirement for dispersion increases, more airdromes are established until there are ultimately one per squadron.



THE COMPANY COMMANDER

(Continued from
page 370)

(5) Clean and properly store or cover all tools or other equipment used.

Thus it is seen that the company personnel constitutes one large family, all members of which work toward the same objective — the proper functioning of the company in its most efficient manner. While a great deal of cooperation and mutual assistance will be required to accomplish this result, there must always remain a definite chain of responsibility. As far as may be practicable, the responsibility for each duty should be placed squarely upon the shoulders of the individual required to perform



Unloading 155-mm shell.

that duty. Such individual should not be unduly interfered with, but should be required and expected to solve his own problems and to perform the tasks connected with his duty.



All office personnel should notice the Library of this issue. It's worth keeping within easy reach.

NEW AMMUNITION IDEAS

Faster, cheaper production of high explosive bombs and shells is claimed as a possibility through the invention of a new type of projectile, on which a patent has just been awarded to Walter O. Snelling, of Allentown, Pa.

The essential point of Snelling's invention is the use of a cast-iron shell lined with a shock-absorbing



Training men to operate a depot during gas attacks.

material such as Portland cement or plaster of Paris. This lining reduces the initial jar of the explosion, which would ordinarily blast the brittle cast iron into fragments too small to have any value in attacks on infantry.

The ideal size of shell fragments for action against enemy troops is about as big as the end of a man's finger. Modern high explosives are so violent in their action that only shells made from expensive steel forgings will burst into such pieces. By damping the explosion just slightly, Snelling's shell liner makes suitable fragmentation possible with cast iron, and thereby makes projectile manufacture much cheaper.

Another patent on an invention which may affect the effectiveness of ammunition was recently issued to F. A. Joseph, whose address was Hongkong, China. It pertains to a device for setting time fuzes on artillery shells. Mr. Joseph applied for his patent in August, 1940, but his present whereabouts are unknown to the Patent Office. Even in his absence his idea may be of value.

While American housewives are accustoming themselves to the current sugar rationing program, it is interesting to note that, according to a bulletin of the National Geographic Society, "War never fails to upset the sugar balance. It affects both demand and supply. A nation at war has a multiplied demand for sugar — first, as the source of industrial alcohol needed for making explosives; second, as an energy-giving food for its workers and fighters."

In connection with the first of these it is interesting that today's large aerial bombs, submarine torpedoes, and artillery shells are ravenous consumers of sugar. Powder to fill five 16-inch shells requires alcohol from as much sugar as an acre of finest Cuban sugar land can produce.



The magazine platoon is the functioning part of the ammunition company. All other units of the company operate toward the end that the magazine platoon will efficiently accomplish its mission of receiving, storing, and issuing ammunition.

The magazine platoon is divided into four sections, three of which are identical and the fourth modified. This facilitates the detachment of one or more sections for the operation of sub-ASP's. The operating strength of the magazine section will depend on its assignment. There are normally two ammunition companies assigned to each of the base depots, or a total of eight magazine platoon sections. In the operation of an ASP serving corps troops and some divisional artillery, there may be only one company, or four magazine platoon sections. An infantry ASP serving the infantry units of a single division may require only one magazine platoon section, with the remaining three sections assigned to the artillery ASP serving the same division.

An infantry regimental train has 13 1-1/2-ton trucks, and an artillery battalion train has 12 2-1/2-ton trucks and 12 1-ton trailers. The magazine platoon has sufficient labor to load these trucks with approximately 1/2 unit of fire during one night, if the ASP is within an easy turn-around distance from the using troops. In cases where this daily restocking will not be sufficient to supply the troops with the required ammunition, either more labor will have to be assigned to the magazine platoon by higher headquarters, or more trucks will have to be assigned to the ammunition trains, or both. When the magazine platoon is divided between an infantry ASP and an artillery ASP, it will generally be found more practicable to use all the labor available to load one ammunition train at a time. This would suggest a judicious scheduling of the time of issues to the various ammunition trains expected each night, and such a procedure is recommended wherever feasible.

The chart shown here may be used as a guide for the organization of the sections of the magazine platoon.

When one or more sections of the magazine platoon are detached for the operation of a sub-ASP, an officer from the platoon will be in command and will also perform the duties of the ASP officer. Subject to the approval of the company commander, he will organize the sub-ASP so as best to fulfill its mission. In addition to magazine platoon personnel, he will have in his command some personnel from the ASP office and probably some from the service platoon. The organization may require the assignment of some magazine platoon personnel to the sub-ASP office.

The magazine platoon has no organic vehicles. Transportation for the platoon is furnished by the service platoon. The telephone system connects the different sections with each other and with the ASP office, the service platoon, and the company headquarters. The platoon has

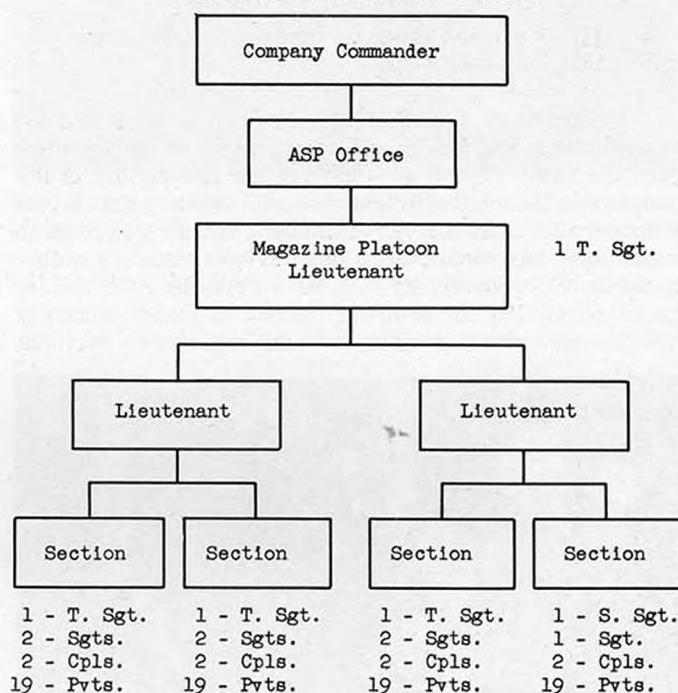
The first requirement for any ammunition depot is certainty of supply.

a number of paulins for covering ammunition, and 100 10-foot lengths of roller conveyor for the movement of ammunition.

The following paragraphs outline some of the operations of the magazine platoon in carrying out its general functions of receipt, storage, and issue of ammunition.

In the establishment of a new ASP, a stocking plan must be prepared before the arrival of the ammunition. The location of the stacks, and amount and kinds of ammunition to be placed in each stack, will be determined by personnel of the ASP office. In the preparation of the stocking plan the following considerations are of importance.

ORGANIZATION OF MAGAZINE PLATOON



As far as may be possible brush or other features of the landscape will not be disturbed. Advantage will be taken of rocks and brush to blend stacks into the surroundings. Trucks will be driven around and over bushes and rocks, and every effort will be made to use the ground exactly as it is, without any change which will be apparent to aerial observation.

It may occasionally be necessary to level the ground somewhat, but locations of stacks will ordinarily be made so as to avoid the necessity of this.

Dunnage should be placed under the ammunition, when necessary, to prevent damage by water or to facilitate the stacking.

Shallow ditches around the stacks and into the natural drainage of the land will assist materially in protection of the ammunition from dampness. Ditching should

NE PLATOON



not be extensive and all ditches should be camouflaged.

During the initial stockage of the ASP, magazine personnel will be concerned with supervision and checking. They will see that the proper ammunition is placed in the stack and that the stacks are properly sub-divided as to kinds of ammunition, components for separately loaded



ammunition, lots, etc. They will see that the ammunition is properly handled to prevent damage and the stack is properly built up to correct proportions. They will cause the trucks to be unloaded promptly and will supervise the use of such labor saving devices as may be practicable under the circumstances.

At all times, and especially during stockage, magazine platoon personnel will be on the alert for damaged containers, dented shell cases and any other types of defects in ammunition. All such defective ammunition will be reported at once to the ASP office, which will notify the service platoon to call for same. The service platoon will effect the necessary repair and return the ammunition to the magazine, or will send it to the rear for repair or salvage, notifying the ASP office of the action taken. The ASP office, when appropriate, will requisition replacements.

Immediately after its receipt, ammunition will, where necessary, be covered with paulins or be protected from the weather by such other means as are necessary and possible.

Effective camouflage measures will be undertaken under the direction of the camouflage sergeant promptly after the receipt of the ammunition.*

Operations of the magazine platoon during storage will consist primarily of maintenance of the measures outlined in the preceding paragraphs for the protection of the ammunition, and of insuring a complete readiness to make prompt issues. Emphasis will be placed on alertness to discover fires and extinguish fires in brush and grass, and in maintenance of camouflage.

* Camouflage is discussed briefly in an article on page 400.

The sections of the magazine platoon will not hesitate to notify the depot ASP of any assistance needed in extinguishing fires, maintenance of satisfactory conditions in the magazine area, or the making of prompt issues. Such calls for assistance, where possible, should be made in advance.

The lieutenant in charge of the platoon is responsible to the ASP officer for the organization of his platoon, the training of its personnel, and its readiness to operate in an efficient manner. He will make such inspections as are necessary to insure that the above requirements are satisfied. He will make calls on the ASP officer for assistance of labor or equipment required for operations which are beyond the capabilities of his platoon. He will coordinate the requirements of the sections of the platoon for such assistance and allocate the facilities available as he deems most advisable. He has as his assistant one technical sergeant.

The lieutenant in charge of one or more sections of the platoon is responsible to the platoon commander that:

All ammunition is properly handled.

Ammunition received is properly inspected and stacked in accordance with prepared plans.

All issues required from his sections are promptly and accurately made.

The most efficient labor handling methods are employed.

Conditions of storage are the best possible under the conditions existing.

Camouflage is adequately maintained.

The section chief is the lieutenant's principal non-commissioned assistant within the section. His regular duties consist of the supervision of the operations of the section. He will perform any other duties assigned by the lieutenant.

The camouflage sergeant is responsible to the lieutenant that all camouflage is maintained in a satisfactory manner. He will be guided by the principles of FM 5-20 (Engineer Field Manual, Camouflage).

The assistant section chiefs will supervise the work of the checkers and laborers in loading trucks or building stacks. They will also supervise the work of laborers in clearing brush, ditching, installing camouflage material, etc., as directed by their superiors.

The depot commander must always realize that the success in combat of the troops he serves is dependent in no small measure on the character of the ammunition service he provides.

The SERVICE PLATOON

The operations of the service platoon involve the rendering of a number of necessary but unrelated services to the other subdivisions of the company.

The service platoon of the ammunition company consists of one officer and fifty enlisted men, assigned to sections as indicated by the chart below. This chart is intended merely as a guide for the organization of the platoon.

The service platoon operates the motor transportation of the company, which consists of the vehicles assigned in Table of Basic Allowances #9. These vehicles, with the exception of those assigned to the company headquarters, are described in the following paragraphs.



The 1/4-ton trucks are used for messenger and other contact work within the ASP, and between the ASP and other organizations.



The 3/4-ton weapons carriers, which replace pick-up trucks (1/2-ton), are used for moving small lots of damaged ammunition between the magazine areas and the service platoon shop section, delivering signs, transporting small bodies of personnel, and similar light work within the depot. They may also be used for transporting small quantities of ammunition between the depot and other installations, such as the railway siding, for securing rations from the Class I railhead, and delivering hot food to sub-ASP personnel.



The 2-1/2-ton cargo trucks carry the company equipment (except that carried by the kitchen truck) while on the march. While in bivouac they may be used to augment the lighter trucks for miscellaneous transportation needs.*

* These two trucks are equipped with winches, while the kitchen truck is not.

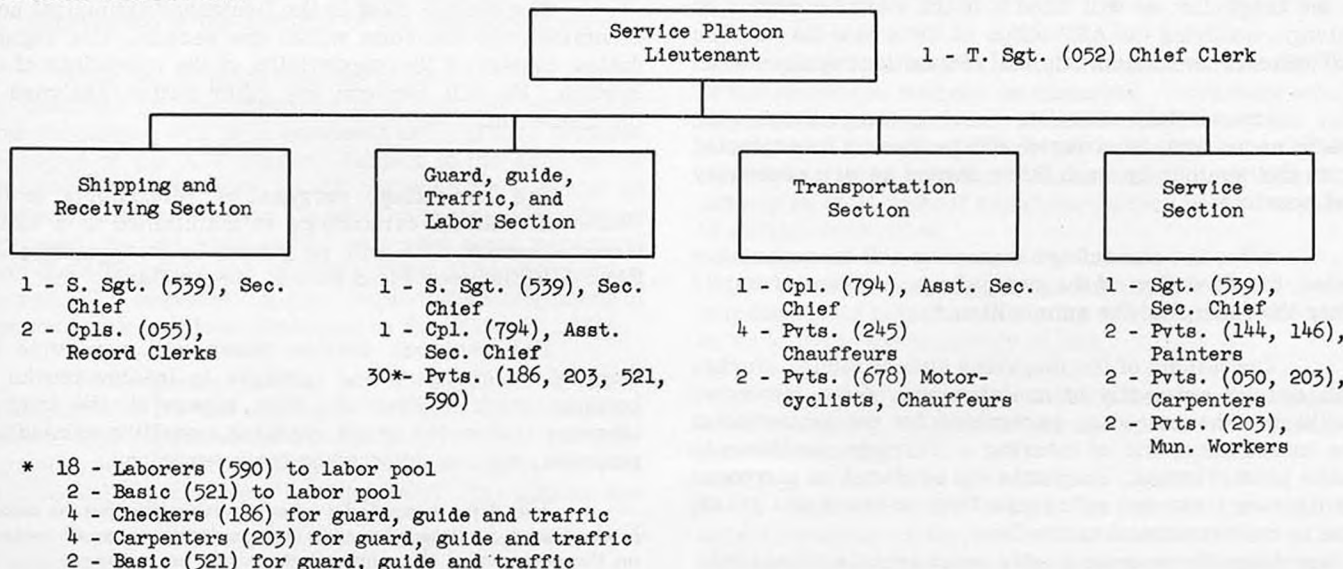
The shop section of the service platoon has such equipment as carpenter tools, etc., required for opening and repairing ammunition containers, general woodwork of a simple nature, making and painting signs, etc.

Detachments from the service platoon for sub-ASP operation will vary greatly, depending upon local conditions. The organization of such a detachment should provide personnel for administrative work in connection with shipping and receiving; for guards and traffic control; a carpenter for miscellaneous work, including the making of signs; and a vehicle for liaison work. The sub-ASP should in every case be connected with the company headquarters by telephone. If the company telephone system will not suffice for this, assistance should be requested, through channels, from the appropriate signal officer. The detachment will operate under the command of the sub-ASP officer. The chart on the following page may be used as a guide for the organization of such a detachment. It is not contemplated that the operation of a labor pool will be practicable or desirable in a sub-ASP. All renovation or repairs to containers beyond the capabilities of the skill and equipment available should be sent to the rear.

The operations of the service platoon involve the rendering of a number of necessary but unrelated services to the other subdivisions of the company. The operations of a sub-ASP detachment will follow the same general lines, with the exceptions noted in the preceding paragraph.

During replenishments by rail the service platoon is responsible for all operations at the railroad siding. Depending upon the size of the shipment, almost the entire platoon may be used to supplement the shipping and receiving section. In this case, additional labor and transportation are secured as required, and the necessary Ordnance personnel become checkers, supervisors, guides, and traffic directors.

Assuming that all arrangements have been made for labor and trucks and that the bills of lading and other necessary papers have been received from the ASP office,



the following should be accomplished before the arrival of the train.

The platoon commander makes such plans as the situation warrants. These may cover such points as:

The preparation of a traffic flow chart.

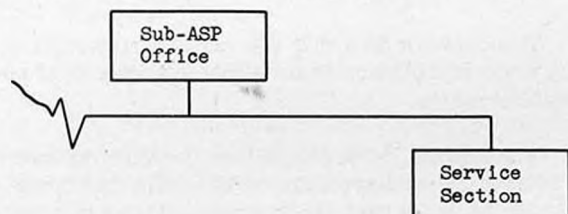
The assignment of traffic directors.

The assignment of guides. This function may, in some cases, be consolidated with the one above.

The assignment of checkers to cars.

The instruction of traffic control personnel and guides must be included in these preliminary arrangements. The transportation of the required personnel to the railroad siding must be provided for, as well as the placing of traffic directors along the route. Adequate instructions must be provided for supervisors, checkers, labor foremen, and truck drivers. The assignment of checkers, labor,

ORGANIZATION OF DETACHMENT, SERVICE PLATOON



- 1 - Record Clerk - from shipping and receiving Section
- 1 - Checker - from guard, guide, and traffic section
- 5 - Laborers - from labor pool
- 1 - Carpenter - from guard, guide, and traffic section
- 1 - Chauffeur - from transportation section

and trucks to cars by number is essential prior to the arrival of the train. Checkers are given the necessary papers for their cars.

Upon arrival of the train the procedure is as follows:

Car numbers are checked against the bills of lading.

The cars are opened and the first trucks loaded. The order of loading should be such as to require the minimum amount of segregation or movement of ammunition. Each truck must be loaded with that ammunition called for by some one Tally. That Tally should be selected which calls for the ammunition most readily at hand. Lot numbers of artillery ammunition must be closely watched. Previous to and during loading, the possibility of using roller conveyors and any other labor saving devices should be kept constantly in mind in order that the operation may be completed as rapidly as possible.

Each truck driver is given the tally slip for his load and instructed to hand it to the guide at the depot entrance for further instructions.

Succeeding trucks are loaded until the car is emptied.

The railway train is released.

Any additional labor is released.

Ordnance personnel return to the depot. Some may ride the last truckload of ammunition.

QM trucks are released after being unloaded at the depot.

During replenishment by truck it is obvious that the operations described above are not applicable. In this case the service platoon furnishes the necessary personnel for guides and traffic directors.

The shipping and receiving section of the service platoon contains only supervisory and administrative personnel. It secures checkers and labor from the guard, labor and traffic section. It will frequently happen that all of the personnel available will be required for checking and that the full requirement for labor must be obtained from other sources. During initial stockage it will usually be necessary to use all available personnel from the entire company for checkers, guides, and traffic control.

In connection with the receipt by rail of ammunition for stockage, the receiving and shipping section is responsible that the ammunition is properly checked, segregated, and loaded into the trucks, and that the truck drivers are given a tally for the load. QM labor, when used, will usually be under the command of QM noncommissioned officers. All instructions given by Ordnance personnel should be through such noncommissioned officers.

Other duties of the receiving and shipping section will be in connection with the shipment of receipt of small quantities of ammunition, and will include checking, preparation of vouchers and other administrative matters, packing or opening containers, and transportation between the ASP and shipping point. Assistance will be secured, as required, from the transportation and service sections.

The operation of the guard, guide and traffic section include the following:

The maintenance of a guard and alarm service for protection against:

Fire.

Gas attack.

Mechanized attack.

Air attack or observation.

Prowlers, loiterers, and other unauthorized personnel.

The furnishing of guides for ammunition trains to and within the ASP.

Traffic direction.

The operations of a labor pool (when required), and the supply of labor as required by the other sections.

The transportation section furnishes transportation as required by ASP personnel or as directed by the company commander.

(Continued on page 391)

An ammunition depot or ASP is an organized locality for the reception, classification, storage and issue of ammunition.

The basic principles governing ammunition depots and ASP's are discussed in detail in FM 9-16, Chapter 5. The details outlined below are based on these principles.

The first requirement for any ammunition depot is certainty of supply. The sole purpose of the depot is to have available to the troops that ammunition which they require at the time they require it. All plans and operations of the company should be directed toward that end. Another consideration is convenience to the troops being served. The ammunition must be placed at such a point with reference to the location of the troops that it is not difficult to obtain. In evaluating the various factors affecting the location, arrangement, and operation of the depot or ASP, many conflicting conditions will be met. These requirements must be kept constantly in mind in order to arrive at a correct solution.

The factors governing the selection of a depot area are discussed in Section III, Chapter 5, FM 9-6, as follows:

"The handling of supplies within the Army Area, including their storage, if any, and delivery to components is accomplished through installations located by the Army Commander. Since the ammunition constitutes by far the greatest mass of supplies to be moved to combat troops, ammunition supply points are given preference in the selection of locations in forward areas. The Ordnance Officer will make or cause to be made, the necessary reconnaissance, and will submit recommendations to the army commander for the location of the army depots.

"The selection of a depot site, within areas designated by the administrative orders, will be governed by the following considerations:

"It must be on the best road net obtainable with access to the front and rear.

"It should be within an area protected from mechanized attack.

"It should be as near as possible to the railroad from which it is to be restocked, thereby affording, if time permits, the construction of narrow or standard gauge lines to the depot.

"If possible, a siding capacity of at least 33 cars should be available.

"It should be in rear of all units it supplies with small arms and artillery ammunition. (This does not include aircraft or antiaircraft).

"It should not be within 500 yards at any point of the nearest army establishment or within 1000 yards of medical establishments.

"It should be, where possible, beyond the extreme range of hostile artillery fire, or if within this range, its site should be so chosen as to make full use of whatever defilade exists.

"Not all of the general considerations governing the location of an Army Ammunition Depot can be complied with in each situation. It must be recognized that in most cases topographical conditions, or the tactical situation, or both, may impose conditions that may seriously interfere. However, the four cardinal principles of sup-

THE CARDINAL PRINCIPLES

The cardinal principles of any supply service which can hope to function successfully under combat conditions, are:

SIMPLICITY
MOBILITY
FLEXIBILITY
SECURITY

These are indispensable conditions which must be met by any system, consequently their application to ammunition supply cannot be too strongly emphasized. It might appear on the surface that certain of these conditions are mutually contradictory. This is not the case, for the application of these four criteria to the supply system requires that each individual criterion be evaluated in terms of the complete mission. Consequently, a rigid application of each principle cannot always be made. However, the first aim of the ammunition supply system should be to provide an organization within which may be achieved the four principles listed above. Within this framework that

principle which is of primary importance in the particular situation, should be given its proper emphasis. Since these principles are applicable to all echelons of the ammunition supply system, they are deemed worthy of discussion here.

SIMPLICITY

This requirement demands the maximum of intelligent planning and foresight to insure its attainment. The simpler the arrangements, the less likelihood of mistakes and the greater the probability of successful operation. It should be remembered that the opportunities for errors increase in geometric ratio to each additional complexity introduced into the system. Therefore, the layout and operation of an ammunition depot should be as simple as is consistent with the other cardinal considerations. Since conditions may be expected to be constantly changing, the depot commander must be continually on the alert for ways and means of simplifying the service of his depot; he should report to his superior the details or factors,

COMBAT ZONE

ply" — simplicity, mobility, flexibility, security — "are always applicable and the resourcefulness and ingenuity of the depot commander will compensate in large part for any difficulties imposed by the specific situation. He must always realize that the success in combat of the troops he serves is dependent in no small measure on the character of the ammunition service he provides. For this reason, too much advance thought and planning cannot be given to the location and establishment of the Army Ammunition Depot."

These factors must be kept in mind when the individual locations for the following subdivisions are chosen:

Company Headquarters, including the company mess.

The ASP Office.

The Magazine Sections.

The requirements for the magazine sections are given below, and they will serve in general as the requirements for the other sections. In case of insufficiency of space the magazine sections must have first priority.

The section should be located along a road of sufficient width to allow traffic past parked trucks. The road should be sufficiently hard and well drained to insure that repairs will not be excessive during the occupation of the site. It should be of such a nature that it will not become impassable under any conditions. It need not be paved, but dirt roads through woods should be ex-

amined carefully in the rainy season. Short critical stretches may be improved with corduroy construction if the site is otherwise suitable. When sufficient roads are not available, fields and woods must be used. In such cases fullest use must be made of the high ground.

Stack sites should have hard standing and be well drained or capable of being easily drained. They should be sufficiently level to permit stacking the ammunition. Slight irregularities may be leveled by hand. A small slope is desirable from a drainage standpoint. Too great a slope increases the labor of handling. The ground should be near the level of the road — sites where roads pass over fills or through cuts are not satisfactory. The ditch along the side of the road must not be too wide or too deep to allow ammunition to be carried over it, unless roller conveyors are available. If the site is in the woods, brush may be cleared, where necessary, to place stocks.

Sufficient cover to hide the ammunition from observation is very desirable but may not always be possible. Full use should be made of all available cover in order to reduce the amount of artificial camouflage necessary. The requirements for cover should be borne in mind in clearing brush and trees. In making use of defilade, the requirements mentioned in the preceding paragraph must be kept in mind.

From the standpoint of safety, because of the peculiar hazards of ammunition and the requirement for protection from air observation, the sections of the ASP should be separated from each other by considerable spaces — at least 100 yards. However, the stacks of any section should be in one group. A section should not be divided by a large ravine, big hill, wide space of open ground, etc. The area required by a large ASP or depot is considerable, and much of the terrain will be unsuitable. The ASP thus will be widely dispersed. Care should be exercised to utilize the suitable terrain to the best advantage by assigning the different sized sections to areas

OF SUPPLY

which experience has shown make for simplicity within the depot. He should strive to make the task of the combat units served as light as possible. The simpler his plan of service, the more chance there is of his achieving this end.

MOBILITY

This requirement should appear to be most readily met if all supplies were maintained in the form of rolling reserves. Such an arrangement would be neither practicable nor desirable since there would never be sufficient transportation available for such a purpose. If there were this amount of transportation, the organic assignment of such vast numbers of vehicles to supply organizations would impose extremely formidable operational difficulties and thereby seriously violate the principle of simplicity. The solution of this requirement, then, can only be achieved by maintaining a continuous estimate of the supply and transportation situation for each operation, evaluated in terms of the tactical situation. This, of course, demands

the careful balancing of stockage in order that when a move becomes necessary, there will be the minimum of rehandling.

FLEXIBILITY

This requirement is a direct correlary of the two preceding principles. Its fulfillment enables the supply system to meet the widely varying demands of rapidly moving situations. This requirement is met by the proper echelonnement of the supply system in width as well as in depth.

SECURITY

This requirement demands the fullest utilization of the protection afforded by tactical units as well as the maximum exploitation of passive methods of protection. Organization of the terrain as well as camouflage to avoid detection from either terrestrial or air reconnaissance is of vital importance to the security of the installation.

of suitable size.

All traffic through the ASP should be one-way. In a small ASP, having three or four sections, this presents no great problem. In a large ASP, having many sections, the question of traffic control and the road net becomes of paramount importance and will often be the determining factor in the selection of the ASP site. As far as possible, trains should not be required to pass other trains which are being loaded. This condition can seldom be realized, but the requirement should be kept in mind. The ideal situation is one in which each section of the ASP is laid out on a little side road connected at one end with a feeder leading from the ASP entrance, and connected at the other end to a feeder leading to the ASP exit. In determining the routes through the ASP it may be found necessary to construct or break short stretches of temporary road, but such operations should be kept to the absolute minimum.

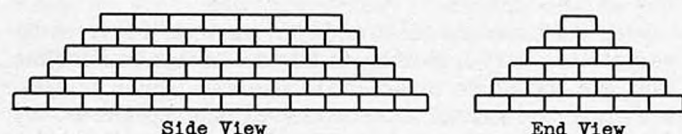


DIAGRAM OF STANDARD "A" STACK

The longest dimension of the container is placed parallel to the ridge of the stack; the shortest vertically.

All routes should lead through the ASP rather than into it and back out. In no case should trucks be allowed to turn around in the road. A map or chart of the ASP should be prepared, showing the location of sections and the routes of ammunition trains from the different units which the ASP serves. A similar map should be prepared for replenishment operations, and the traffic flow so adjusted that issues and replenishments can be made simultaneously when required. This study must be made in connection with the original planning for the ASP layout, and must be completed before any ammunition is moved into the ASP. As the variations of road nets are innumerable, and the particular type which will have to be used cannot be predetermined, no type solution or instructions for solution are given here.

Numerous hazards enter into a discussion of security in the ASP. For example, fires may occur in nearby brush, dead leaves, etc., or in the ammunition; they may be set by carelessness or by enemy action; they may be prevented or extinguished.

Fires set in brush by carelessness may be prevented by proper discipline or training. This discipline and training must extend not only to company personnel, but also to ammunition train personnel, QM laborers and truck drivers, and all other visitors. The regulations for the prevention of fire should be published by the com-

NUMBER OF CONTAINERS IN A STANDARD "A" STACK

Containers, Long	Containers - Wide and High									
	3	4	5	6	7	8	9	10	11	12
Containers in stack										
5	26	40	55							
6	32	50	70	91						
7	38	60	85	112	140					
8	44	70	100	133	168	204				
9	50	80	115	154	196	240	285			
10	56	90	130	175	224	276	330	385		
11	62	100	145	196	252	312	375	440	506	
12	68	110	160	217	280	348	420	495	572	650
13	74	120	175	238	308	384	465	550	638	728
14	80	130	190	259	336	420	510	605	704	806
15	86	140	205	280	364	456	555	660	770	884
16	92	150	220	301	392	492	600	715	836	962
17	98	160	235	322	420	528	645	770	902	1040
18	104	170	250	343	448	564	690	825	968	1118
19	110	180	265	364	476	600	735	880	1034	1196
20	116	190	280	385	504	636	780	935	1100	1274
21	122	200	295	406	532	672	825	990	1166	1352
22	128	210	310	427	560	708	870	1045	1232	1430
23	134	220	325	448	588	744	915	1100	1298	1508
24	140	230	340	469	616	780	960	1155	1364	1586
25	146	240	355	490	644	816	1005	1210	1430	1664
26	152	250	370	511	672	852	1050	1265	1496	1742
27	158	260	385	532	700	888	1095	1320	1562	1820
28	164	270	400	553	728	924	1140	1375	1628	1898
29	170	280	415	574	756	960	1185	1430	1694	1976
30	176	290	430	595	784	996	1230	1485	1760	2054
31	182	300	445	616	812	1032	1275	1540	1826	2132
32	188	310	460	637	840	1068	1320	1595	1892	2210
33	194	320	475	658	868	1104	1365	1650	1958	2288
34	200	330	490	679	896	1140	1410	1705	2024	2366
35	206	340	505	700	924	1176	1455	1760	2090	2444
36	212	350	520	721	952	1212	1500	1815	2156	2522
37	218	360	535	742	980	1248	1545	1870	2222	2600
38	224	370	550	763	1008	1284	1590	1925	2288	2678
39	230	380	565	784	1036	1320	1635	1980	2354	2756
40	236	390	580	805	1064	1356	1680	2035	2420	2834

Ex: The length of a stack to contain 550 containers, when the height is limited to 6 containers, is found from the table to be 28 containers.

pany commander after a careful study of the subject, and all visitors promptly notified of the requirements. They should cover such subjects as:

Smoking in forbidden areas.

Use of matches, kerosene lanterns, and other open fires.

Use of gasoline and other highly inflammable substances.

Burning of brush and trash.

Passive measures include the disposition of brush and trash, other such policing measures, and the posting of a suitable guard. The use of guides and traffic directors in this connection should be considered.

Fires set by enemy action cannot be prevented in the case of aerial incendiaries, but their effect can be minimized by the passive measures outlined above. Fires set by guerillas, paratroops, etc., can be prevented or minimized by an effective guard.

Fires in brush can be extinguished, or their spread prevented, by beating with wet sacks, covering with dirt, digging a fire break, etc. Water and fire extinguishers will seldom be available.

Fires and explosions in ammunition due to carelessness are inexcusable. Every man in an ammunition company should be fully conversant with proper methods of handling and the dangers incident to improper handling. All cases of carelessness in handling, whether accompanied by disaster or not, should be made the subject of severe disciplinary action. All Ordnance personnel should be constantly alert to observe the manner of ammunition handling employed by others, to instruct others in the proper methods, and to report immediately any case of noncooperation by others to the company commander.

All Ordnance personnel should be fully conversant with approved methods of extinguishing fires in ammunition and thoroughly trained in applying such methods. As far as possible, ammunition should be left in original containers, and no loose ammunition should be lying around. Containers afford a considerable protection against fire. Powder, when ignited, cannot be extinguished. If the fire is beyond control or of such a nature that it cannot be extinguished, the ammunition should be abandoned and personnel withdrawn to a place of safety. This does not mean, however, that every little explosion or blaze should be the cause of a general exodus.

All guards, guides, and traffic directors should be provided with gas alarms, and the company must be thoroughly drilled in defense against chemical attack. If the ASP is neutralized by persistent gas, assistance by chemical troops should be requested through channels.

Mechanized attack on the depot will usually be in the nature of a raid with the object of destroying the ammunition. While considerable damage may be done to the ammunition by gunfire from the vehicles, extensive demolition operations can only be undertaken by dismounted personnel. The ASP should not be abandoned, but all company personnel should take cover and protect the ASP with the weapons available. Higher headquarters and any near-

by friendly troops should be notified immediately.

In connection with the study of traffic, schedules should be prepared showing the hours for replenishment and the hours during which issues will normally be made to the different units served by the ASP. Such schedules must be adjusted so as to give the most uniform and the simplest traffic flow consistent with convenience to the troops being served. When completed, the schedule will be transmitted to the appropriate Ordnance officer for approval and publication by the headquarters concerned. Such schedules will be adhered to as far as possible, but, in emergencies, issues will be made to all units upon demand.

ASP LAYOUT

The first step in the layout of a new ASP is the determination of its requirements. Decisions as to the location, time of opening, units served, and stockage levels are not within the province of the company commander. They are functions of higher headquarters, and are transmitted to the company commander in the form of an order. If any of the above information is omitted from the order, it should be immediately requested. While the company commander can make recommendations for all matters concerned with the ASP, he can make no decisions on the above mentioned items. Other details in connection with the operation, such as the relief of the company from its present assignment, its transport to the new site, arrangements for its Class I supply, etc., may be included in the order or may be furnished otherwise. When the initial stockage is made by rail, the time of arrival of the ammunition train, a copy of the Bill of Lading (showing the loading of each car, including lot numbers), and information concerning arrangements for QM labor and transportation, will also be furnished.

A reconnaissance of the ASP area should be made and a map prepared. This map need not be elaborate but it should be to scale, distances being determined by pacing or by speedometer readings. It should cover the entire area assigned, in order that the most suitable part may be selected. It should show wooded areas or other cover, approximate grades, areas which are suitable for use, and lengths of roads between intersections. If a map is already available, it should be checked, unless it is known to be complete and correct.

There must be a section for each caliber of ammunition which will be issued by the ASP. Certainty of supply and the ever present threat of loss of a section by accident or enemy action require that there be at least two sections for each caliber of ammunition to be stocked. Other considerations may require three or more sections of a particular kind. Thus, in a depot to serve a corps artillery brigade there will be four battalion ammunition trains to draw 155-mm howitzer ammunition. If issues are to be made to all 155-mm howitzer battalions simultaneously, there must be not less than four sections of this kind. If issues can be scheduled so that only two battalions will draw simultaneously, then only two sections will be required, provided consideration of tonnage to be stocked or terrain available does not require more than two sections. Increasing the number of sections increases the requirements for road space and cover, complicates the labor problem, and is apt to increase the complexity of the traffic situation.

Within a section there should be at least one stack for each truck of the ammunition train which will draw from the section. Considerations of tonnage may require a greater number of stacks than this. In order that trucks may park on the road in a convenient position for loading, stacks should be at 10-yard intervals. Considerations of safety limit the density of the ammunition to approximately 30 tons per 50 yards of road space. This imposes a normal limit of six tons per stack.

A stack may consist of one kind of ammunition, as 105-mm HE shell, or of several kinds, as Cal. .45 pistol ammunition and Cal. .30 ball, cal. .30 AP, and Cal. .30 tracer for M1 rifles. In the latter case, the stack would consist of several short stacks placed end to end with a convenient small space between. Where small arms packing differs, different packings must be separated. If more convenient, the small stacks might be placed side by side. In the case of artillery ammunition, lot numbers must be segregated. In the case of separate loading ammunition, stacks should contain complete rounds; that is, a stack should consist of the proportionate numbers of projectiles, propelling charges, fuzes, and primers.

For stability and ease of camouflage, stacks should be built up into pyramidal shape, each layer being 1 box narrower and 1 box shorter than the layer under it. Boxes should be placed longest dimensions lengthways of the stack and the shortest dimension vertical. The stack should not be too high for convenient loading — say 4 or 5 feet. With this article are tables which will be found useful in the planning of stacks.

The sections are now located on the map. A convenient way of doing this is to cut a strip of paper to represent each section, to the scale of the map. These may be pinned to the map in the best locations, road space and cover considered. The point for the ASP entrance is located and the traffic routes studied. Sections are shifted about as the nature of the terrain permits, until the best locations are found. In this study a clear space of at least 100 yards between sections should be allowed, and a similar space between the ASP entrance, the ASP office, the ASP exit, and the nearest section.

The ASP office should be located near the ASP entrance at a spot which all ammunition trains will have to pass. It should be at least 100 yards inside the entrance, so that when the head of a train stops at the office, the tail of the train will be within the entrance. It should be well covered or camouflaged.

The service platoon should be located close to the office, so that demands for labor or transportation can be promptly met. The service section should be in a central location, with respect to the magazine sections, to reduce transportation of defective ammunition. If renovation or similar operations involving ammunition are carried on, such operations should be conducted in a location remote from the magazine sections.

The company office, mess, and bivouac should be located in a suitable covered place outside of the ASP area.

Having completed the layout on the map, the layout on the terrain is made. Tent sites are located and tents erected. Camouflage operations are started. The limits of the different sections are located and appropriate signs erected. These should show the number of the section,

the number and order of the stacks, and the kind of ammunition in each. Stack sites are marked by stakes off the side of the road at the center of the stacks. The stake should have the number of the stack in large figures, a tag showing the number of containers of each kind and the width and length of the bottom layer in boxes. Traffic and similar signs are erected at appropriate points. Stakes and signs will be prepared in advance by the shop section of the service platoon.

STOCKAGE

Planning for the layout of the ASP and for its initial stockage are closely related. The plan for the layout has determined the disposition of the ammunition at the

METHOD OF STACKING

ITEM	Number in box	ONE "A" STACK PER FIFT				
		Boxes	Quantity	Dimensions		
				Boxes		
				L	W	H
CALIBER .30						
In clips and bandoleers for rifle	1200	600	720,000	31	6	6
In fabric belts (MG)	1250	600	750,000	31	6	6
For Carbine*	2160	860	1,857,600	33	7	7
CALIBER .45						
Ball and tracer	2000	545	1,090,000	28	6	6
CALIBER .50, m.l.b.	265	625	165,625	32	6	6
SIGNALS, ground	50	460	23,000	24	6	6
Very lights	252	970	244,440	37	7	7
GRENADES, fragmentation	25	600	15,000	31	6	6
60mm MORTAR	18	740	13,320	23	8	4#
81mm MORTAR						
Shell, HE, light	6	1,035	6,210	22	10	5#
Shell, HE, heavy, and Shell, smoke	3	1,335	4,005	21	12	6#
37mm ANTI-TANK	20	600	12,000	42	5	5
75mm ANTI-TANK						
H.E. and A.P.	3	880	2,640	19	10	5#
Gas and Smoke	3	1,000	3,000	17	12	6#
75mm PACK HOWITZER	3	880	2,640	19	10	5#
105mm HOWITZER	2	475	950	16	8	8
ANTI-AIRCRAFT ARTILLERY						
37mm M1A1 - M1A2	25	600	15,000	42	5	5
3" (all models)	4	400	1,600	21	6	6

*Standard packing data not available. Assumed to have same box weight and dimensions as Cal. .30 rifle.

#Triangular bundles may be nestled, thereby reducing the height of a stack

L - length W - width H - height

destination of its movement. The plan for the initial stockage of a depot must take into account the disposition of the ammunition at the origin of the shipment and its movement between origin and destination. For this reason, plans for such initial stockage cannot be made until a bill of lading, or manifest, has been received, showing the number of cars in which the ammunition is loaded and the loading of each car. The various steps in the planning and the basis for each are given below.

The maximum number of men that can be used effectively in unloading a railroad car from one side is ten laborers and one NCO. If the car can be unloaded from both sides, eighteen men may be employed but this is usually not practicable. An equal number of men are re-

quired at the depot site for unloading. In the normal case, all available Ordnance personnel will be required for checking, traffic control, guides, supervisors, etc., and all common labor will have to be obtained from the quartermaster. Labor should be requested to report at the railroad siding at least half an hour before the arrival of the railroad train, in order to give time for organizing parties, issuing instructions, and other preliminary arrangements. The time and place of the expected release of the labor should be given in the request.

The basis for the use of the labor contemplates a fixed rate of handling for a limited time, followed by a rest period. If the operation will require more than 4 to 5 hours, provision must be made for a relief shift. The em-

AMMUNITION FOR OPEN STORAGE

CARDS			FIVE "A" STACKS PER FIFTY YARDS								
of Stack			Boxes	Quantity	Dimensions of each stack						
Feet					Boxes			Feet			
L	W	H			L	W	H	L	W	H	
47.7	7.7	4.7	120	144,000	13	4	4	20.0	4.9	3.1	
47.7	7.7	4.7	120	150,000	13	4	4	20.0	4.9	3.1	
50.1	8.6	5.5	172	371,520	19	4	4	29.3	4.9	3.1	
38.3	6.3	3.8	109	218,000	12	4	4	16.4	4.2	2.5	
49.3	7.4	4.7	125	33,125	14	4	4	21.6	4.9	3.1	
49.2	7.0	5.6	92	4,600	11	4	4	22.6	4.6	3.8	
54.0	6.0	5.3	194	48,888	15	5	5	21.9	4.2	3.8	
41.7	8.1	3.4	120	3,000	13	4	4	17.6	5.4	2.3	
44.2	14.4	4.4	148	2,664	16	4	2#	30.7	7.2	2.2	
56.1	6.8	3.2	207	1,242	12	6	3#	30.6	4.1	1.9	
45.2	8.2	3.8	267	801	10	8	4#	21.5	5.4	2.5	
61.7	7.2	5.4	120	2,400	13	4	4	19.1	5.7	4.3	
46.4	6.8	3.2	176	528	8	8	4#	19.5	5.4	2.5	
38.4	8.1	3.8	200	600	8	8	4#	17.9	5.4	2.5	
41.2	6.8	3.2	176	528	8	8	4#	17.4	5.4	2.5	
51.0	8.5	4.6	95	190	11	4	4	35.1	4.2	2.3	
59.6	6.3	5.8	120	3,000	13	4	4	18.5	5.0	4.6	
71.4	5.8	5.8	80	320	9	4	4	30.6	3.8	3.8	

ployment of labor beyond the economical point results in a greatly reduced rate of handling and a corresponding increase in the time required. The effective use of roller conveyors and other labor saving devices will materially increase handling rates.

A study of the transportation requirements also involves a consideration of labor and time. In the ideal situation, an empty truck arrives at the railroad siding as the loading of the previous truck is completed. The total number of trucks required will depend on the

- Number of railroad cars or loading points.
- Capacity of truck.
- Rate of loading per man.
- Number of men per railroad car or loading point.
- Length of turnaround.
- Average speed of truck on turnaround.

Note that the number of trucks is not dependent on the capacity or load of the railroad car.

All other units of the company operate toward the end that the magazine platoon will efficiently accomplish its mission of receiving, storing and issuing ammunition.

The number of railroad cars is determined from the Bill of Lading or Manifest. A reconnaissance should be made to determine if all cars can be unloaded simultaneously. In most cases this will be possible. In some cases, a small amount of work, such as grading and the construction of simple culverts, may be necessary, but no extensive operations of this nature should be undertaken. If all cars cannot be unloaded simultaneously, the operation should be divided into two or more distinct parts, and each part treated as a separate problem. Consideration should be given to the question of including the maximum number of cars possible in the first part, the second part consisting of whatever is left over; or of having the two parts include equal numbers of cars. The urgency of the situation and the availability of labor will be the determining factor — not neglecting the question of relief of labor in prolonged operations. Each case must be decided on its own merits.

Capacity of trucks can be determined from the copy of the order sent to the QM.

The rate of unloading from car to truck, or from truck to ground, may be taken, for purposes of computation, at 5/6 ton per man per hour for four hours, followed by a four-hour rest period; and 3/4 ton per man per hour for loading from ground to truck.

The number of men per railroad car or loading point is given above as ten. As this number may not be available, the actual number should be determined from the QM order concerned. Note that a reduction in the number of men will reduce the computed requirements for trucks; this is desirable, since trucks may be worked continuously over a long period of time without rest. A reduction in the number of trucks available might also be accompanied by a reduction in the number of men required. However, the desirability of this should be carefully studied, as it might be better to use the full quota of men and allow a short rest period between trucks, to permit operations over a longer period without relief.

Length of turnaround may be determined from the operations map or from a reconnaissance, using speedometer readings.

The average speed of trucks on the turnaround should be estimated for each case. It will depend on the nature of the road, hour of the day or night, amount of moonlight, fog or rain, traffic on the road, etc. Empty trucks returning to the railroad siding may make better time than loaded trucks going to the depot. Speeds of 25 miles per hour may be expected in daylight. From three to twelve miles per hour may be expected at night, the former for trucks following a foot guide, the latter under good conditions on an open road.

Time may be computed from the rates and quantities as indicated above. With the full requirement in labor and trucks available, the time for unloading a 50-ton car will be six hours. This will be the basis for release of the railroad train. Time for loading a 2-1/2-ton truck will be 18 minutes. Total time for the operation will be six hours, plus eighteen minutes for the last truck to un-

load, plus running time for the last truck. This will be the basis for release of labor and transportation.

A margin of at least 1/2 hour should be allowed at the end of the operation. If the operation is divided into two parts, 1/4 hour should be allowed between parts for shifting cars. Steps should be taken to insure that a locomotive is available at that time.

The disposition of the ammunition within the depot must be determined for each truckload as a part of the planning for the operation. This is effected by means of the Tally-In slip which is given the driver for each load. The Tally-In shows the section and stack to which the load is to be delivered. Plans for the depot layout will show the numbers of containers for each kind of ammunition in each stack. The Bill of Lading will show the numbers of containers of each kind of ammunition in each car, and also the lot numbers. A Tally-In is prepared for each truckload required by the different stacks in order to make up their quota of ammunition. The section and stack numbers are placed on the forms. When the Bill of Lading is received, consideration is given to the question of which lot numbers will be assigned to the different sections and stacks. The numbers and lot numbers are placed on the Tallies-In. In this connection a study should be made of the effect on traffic and labor requirements of assigning successive loads to different sections of the depot. Any plans for doing this should be carefully explained to the checker at the car, who will normally load that ammunition which is most convenient without regard to the order of the Tallies. It may, in fact, be impossible for him to dispatch loads in any predetermined order.

A replenishment shipment may be sufficient to bring the depot levels up to their original value. In this case, the procedure outlined above is sufficient, due regard being given to consideration of identical lots. If the shipment is sufficient to bring the depot levels up to their original values, it must be decided which sections will receive increments. A study of lot numbers may be a deciding factor in this. If lot numbers do not yield the answer to the question, a knowledge of the units drawing from the depot and their probable requirements may assist in deciding whether to raise the levels in all sections or bring some sections up to full level, leaving others depleted.

The discussion of ASP stockage in this article has been concerned principally with the stockage of the large depots from a railroad siding. It must be remembered that the majority of the ASP's receive both their initial stockage and their replenishments by truck train from the depots. In these cases, the problems imposed by initial stockage are much simpler and do not involve elaborate planning. The plan for the layout is made upon receipt of the Transportation Order, authorizing the movement, and the amount of ammunition that will be placed in each section is decided. When the truck train from the depot arrives, guides direct the truck drivers to the proper section, where the ammunition is unloaded and stacked by Ordnance personnel, or, in the case of an exceptionally large initial stockage, by quartermaster labor directed by Ordnance personnel.

AMMUNITION RAILHEADS AND DUMPS

A railhead is a point or siding on a railroad where supplies are transferred from rail transportation to unit transportation. Ammunition railheads are discussed in

some detail in FM 9-6, Pars. 112-118. The point where depot stockage is unloaded from the railroad cars for transportation by truck to the depot site is not considered as a railhead. No reserve is carried at an ammunition railhead. While a Class I railhead may carry a small reserve of small arms ammunition, an ammunition railhead which stocks a reserve thereby becomes a depot, albeit the size may be small. At the railhead, control of the ammunition passes from the regulating officer to the commander of the using troops, under the control of the Army Ordnance Officer. Ordnance personnel will be present to

METHOD OF STACKING COMPLETE

ITEM	Number in box	ONE "A" STACK PER FIFTY				
		Boxes	Quantity	Dimensions		
				Boxes		
				L	W	H
<u>155mm HOWITZER WITH GREEN BAG PROPELLING CHARGE</u>						
Projectiles	1	570	570	38	15	1*
Green bag Prop. Chg.	6	95	570	7	6	3#
Fuses	25	23	575	5	3	3
Primers##	50	13	650	Spread on top		
<u>155mm HOWITZER WITH WHITE BAG PROPELLING CHARGE</u>						
Projectiles	1	540	540	36	15	1*
White bag Prop. Chg.	6	90	540	6	6	3#
Fuses	25	22	550	5	3	3
Primers##	50	12	600	Spread on top		
<u>155mm GUN M1</u>						
Projectiles	1	420	420	28	15	1*
Propelling Charges	3	140	420	7	7	4#
Fuses	25	17	425	4	3	3
Primers##	50	10	500	Spread on top		
<u>155mm GUN M'17, M'17A1, M'18M1</u>						
Projectiles	1	450	450	30	15	1*
Propelling Charges	3	150	450	8	7	4#
Fuses	25	18	450	4	3	3
Primers##	50	10	500	Spread on top		

- * Projectiles are stood on their bases. L - Length W - Width
- ** Total length of stack, including one yard between piles of components. H - Height
- # Triangular bundles may be nestled, thereby reducing the height of the stack.
- ## 110% primers. Substantially more boxes of fuses and primers than shown above will be needed if small issues are made from the stacks, since individual primers and fuses

render technical supervision and assume technical responsibility up to and including the loading on the trucks.

Ammunition railheads may be used in any situation for which their characteristics adapt them. They are normally used in two typical situations:

(1) During a concentration, before contact is established with the main body of hostile troops and while expenditures are small.

(2) For the supply of a troop unit whose requirements are small, when such unit is operating at a considerable distance from the main body of troops - as a cavalry unit protecting a flank. In this case, replenishments are small, and a reserve is not desirable. The establishment of a depot for the unit is not called for. At the same time, the distance from existing depots is too great for daily truck haulage. A railhead may be estab-

lished, and daily replenishments requisitioned.

Operations at the railhead are comparatively simple. The principal duties of Ordnance personnel are in connection with technical supervision of the handling of the ammunition. As the ammunition is not stocked, magazine personnel is not required; and as it is consigned to the using troops, little or no administrative work is involved. Such problems as arise should be easily solved by the application of the principle governing a depot. A railhead is a particularly vulnerable point which cannot

ROUNDS FOR OPEN STORAGE

YARDS			FIVE "A" STACKS PER FIFTY YARDS								
of stack			Boxes	Quantity	Dimensions of each stack						
Feet					Boxes			Feet			
L	W	H			L	W	H	L	W	H	
23.2	9.2	2.2	114	114	19	6	1*	11.6	3.7	2.2	
14.6	5.9	2.8	19	114	4	4	3#	8.3	4.0	2.8	
7.3	4.0	2.3	5	125	3	2	1	4.4	2.6	0.8	
of fuses			3	150	Spread on top			of fuses			
51.1**								30.3**			
22.0	9.2	2.2	108	108	18	6	1*	11.0	3.7	2.2	
12.5	7.0	3.3	18	108	4	4	3#	8.3	4.6	3.3	
7.3	4.0	2.3	5	125	3	2	1	4.4	2.6	0.8	
of fuses			3	150	Spread on top			of fuses			
47.8**								29.7**			
17.1	9.2	2.2	84	84	14	6	1*	8.5	2.4	2.2	
23.5	13.0	6.9	28	84	4	4	2#	13.4	7.4	3.5	
5.8	4.0	2.3	4	100	2	2	1	2.9	2.6	0.8	
of fuses			2	100	Spread on top			of fuses			
52.4**								30.8**			
18.3	9.2	2.2	90	90	15	6	1*	9.4	2.4	2.2	
26.5	8.1	4.4	30	90	4	4	2#	13.2	4.6	2.2	
5.8	4.0	2.3	4	100	2	2	1	2.9	2.6	0.8	
of fuses			2	100	Spread on top			of fuses			
56.6**								31.3**			

cannot be supplied.

NOTE: For safety a maximum quantity of each kind of ammunition per fifty yards is prescribed. The extreme arrangements of this maximum quantity per fifty yards are: one stack on one side of the road; or, five stacks on one side of the road. This table shows quantities in stacks in these extremes. The stacks are arranged to suit the terrain and cover available. One vehicle occupies ten yards of road, either loading or unloading. There must be at least two widely separated stacks of each kind and type of ammunition at every ASP. Ammunition must be segregated by lot.

be moved nor camouflaged while in operation, and little or no protection is ordinarily available. For these reasons, freight cars should be carefully loaded in accordance with the requirements of the troops for which the ammunition is intended, since little or no sorting should be attempted at the railhead. The train should be unloaded and the trucks moved out as quickly as possible. Transportation and labor required are arranged for by the commander of the using troops. As Ordnance personnel detached for operations at the railhead will be at a distance from their company bivouac, they should be attached to using troops for shelter and messing.

Temporary stockages of ammunition placed on the ground by a corps, division, or smaller unit in forward areas are called dumps. When issues are made, the dump becomes a distributing point. Dumps and distributing

points are discussed in FM 9-16, Par. 119-120. Dumps may be established for either or both of two reasons:

(1) To release organic transportation for other uses.

(2) To accumulate a reserve of ammunition for use in an anticipated action.

When Ordnance personnel are used in connection with dumps, their principal function is to supervise the handling of ammunition and its distribution on the ground. In the case of distributing points, personnel are also required to supervise the issues. In this case, such simplified administrative procedure as may be required will be prescribed by the Division (or other appropriate) Ordnance Officer. Such procedure will be based on that given for the ASP. Arrangements for labor and transportation will be made by the troop commander responsible. Arrangements for Ordnance personnel, including their shelter and messing, where required, will be made by the Division Ordnance Officer, through technical channels, with the Army Ordnance Officer.

THE SERVICE PLATOON

(Continued from page 383)

The operation of the service section includes the following:

Packing of ammunition for shipment.

Repairing of ammunition containers.

Renovation of ammunition, where feasible.

Preparation of signs and stakes.

Miscellaneous carpentry work, as required.

The installation and operation of the ASP telephone system.

The platoon commander is responsible to the ASP officer for the supervision and coordination of the activities of the different sections of the platoon; for formulation of policies in regard to requests from other subdivisions of the company for labor and transportation; for formulation of regulations concerning the guard and traffic; for plans for the training of personnel of the platoon; for plans for the organization of the party at the railroad siding when shipments are received by rail; for such inspections as he deems necessary to insure that his plans and policies are being carried out, and that his platoon has reached the highest possible state of efficiency; and for such plans as may be necessary to anticipate future requirements on his platoon.

The chief clerk is the platoon commander's first noncommissioned assistant. He carries out the orders of the platoon commander and assists him in any other manner possible. In the absence of the platoon commander he is in charge of the platoon and renders such de-

(Continued on page 445)

The ORDNANCE BATTALION Ammunition

The mission of the Ordnance Battalion, Ammunition, is to establish and operate ammunition supply points as required by the Army Ordnance Officer.

The functions of the companies of the battalion are discussed in the preceding articles of this series. The functions of the headquarters and headquarters detachment are given in an article which follows.

An ammunition battalion is normally one of two such units assigned to a field army, and is responsible to the Army Ordnance Officer, or other appropriate higher authority, for:

The establishment and operation of ammunition supply points in the area assigned to the battalion.

The maintenance of complete information concerning the area assigned to the battalion in order that the Army Ordnance Officer may have immediately available all the information necessary to establish new ASP's.

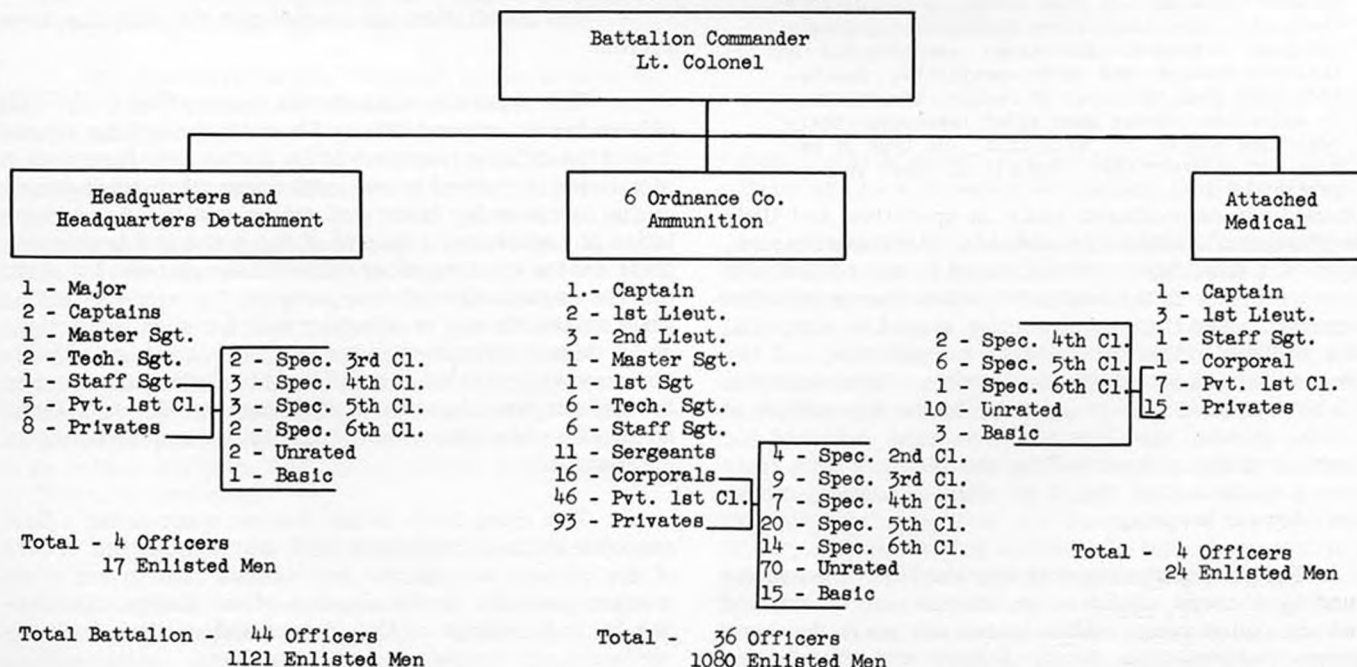
In the fulfillment of the mission of the battalion, the installation and operation of the supply points will be effected by the companies as described in preceding articles.

The headquarters and headquarters detachment of the battalion will supervise and coordinate the activities of the companies and render such administrative services as may be necessary.

The organization of the Ordnance Battalion, Ammunition, is prescribed in T/O 9-15 and is shown by the chart below. It consists of a headquarters and headquarters detachment, six ammunition companies, and attached medical personnel. The equipment of the Ordnance Battalion, Ammunition, is prescribed in T/BA 9.

The services of an entire ammunition battalion may sometimes be required in the case of large depots. Such depots normally will be found only in the communications zone. The organization and operation of ASP's as described in preceding articles of this series were dictated largely by tactical considerations. In the communications zone these considerations are not of such great importance, and the organization and operation of ammunition depots can more closely approach those employed in the depots in the zone of the interior. Many of the principles outlined in FM 9-25, "The Depot Company", will apply. Reference should also be made to TM 9-1900.

ORGANIZATION OF THE ORDNANCE BATTALION, AMMUNITION
(T/O 9-15, November 1, 1940)





COMMUNICATIONS ZONE DEPOTS

The following factors affecting ammunition depots in the communications zone are interdependent, i.e., the effect of each factor must be evaluated only after consideration of the other factors.

LOCATION

The discussion of factors governing the location of depots included in a preceding article titled "The ASP in the Combat Zone" are equally applicable to communications zone depots. The depot should be on a main line railroad leading to the regulating station. This does not mean that the railroad should run through the depot area, but that a short switch or branch line should connect the depot area with the main line. It should be near, but not in, a town of sufficient size to provide the necessary utilities. In this connection, the provisions of the "Ordnance Safety Manual" should be complied with to a reasonable

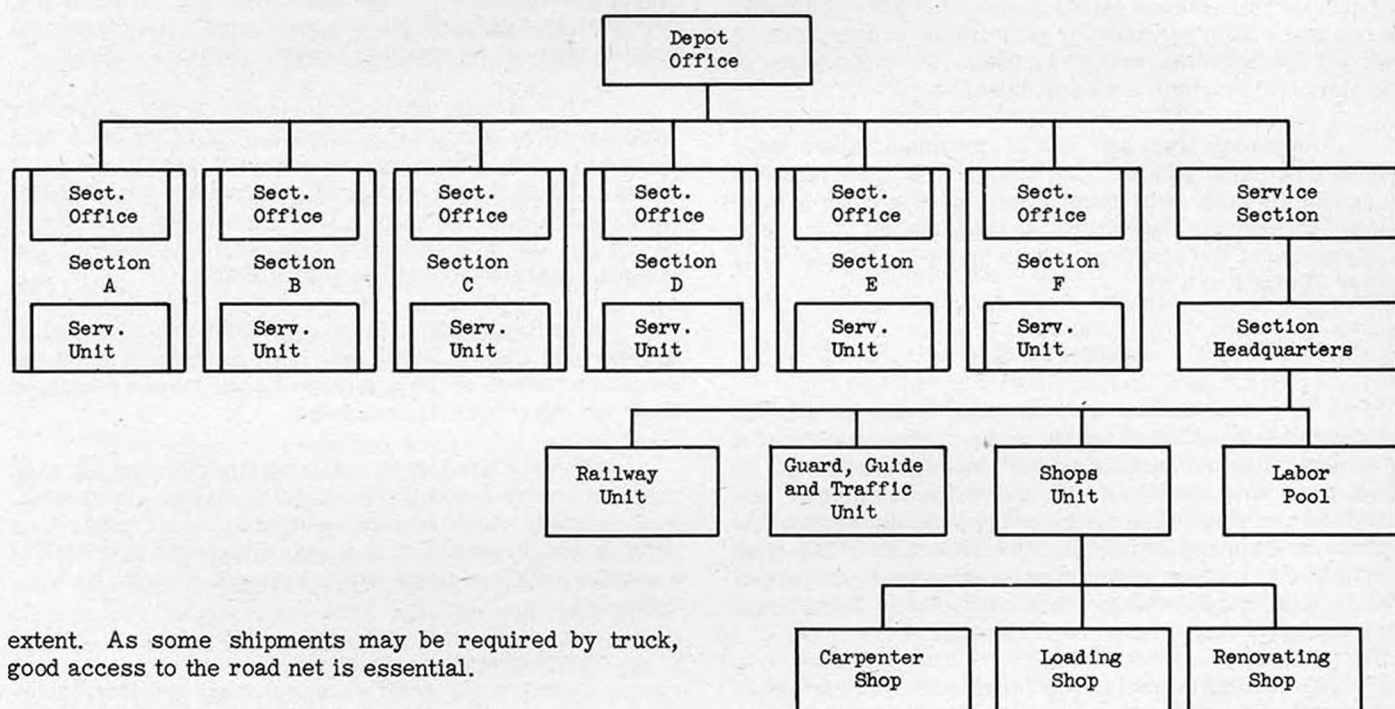
COMMUNICATIONS

Adequate telephone and messenger service should be available between the battalion headquarters, main depot office, depot sub-offices, magazine sections, and company headquarters. The battalion headquarters and main depot office should be connected to the communications net of the communications zone, with a direct line to the regulating station, if practicable.

TERRAIN

Terrain requirements will normally be subordinate to transportation requirements, but the ground should be hard and well drained.

COMMUNICATIONS ZONE AMMUNITION DEPOT



extent. As some shipments may be required by truck, good access to the road net is essential.

The internal road net should provide:

Two-lane roads of good construction and adequate drainage.

One-way traffic.

Traffic circuits — no turnaround in the road.

Access to each section of the depot along the entire length of one side.

A minimum number of railroad crossings.

Railroad tracks for loading and unloading should extend along the entire length of one side of each section of the depot. Depending on conditions, storage tracks may also be desirable. A gasoline locomotive or power winch facilities for moving cars may be required.

The size of the depot and the necessity for new construction will reduce the extent of the use of natural cover for concealment. Though the necessity for concealment is not as great as in the combat zone, advantage should be taken of every opportunity to render the depot as inconspicuous as possible.

Considerations of safety make a wide dispersion of the ammunition desirable. This greatly increases the requirements for rail and road construction. A compromise must be effected, based on:

Extent of suitable area available.

Expected permanency of the installation.
Ease of securing the necessary new construction.

SECURITY

Care must be taken to exclude unauthorized personnel from the depot area. The depot should be provided with adequate antiaircraft defensive measures, and fire extinguishers and water barrels should be distributed as deemed advisable. Provisions should be made to secure the prompt arrival of fire fighting equipment in emergencies.

SIZE AND PERMANENCY

Some of the considerations which limit the size of supply points in the combat zone, i.e., necessity for concealment, mobility, close support of combat troops by truck, liability to capture or destruction by enemy action, are not so pressing in planning layouts for communications zone depots. Stockages in these depots are usually quite heavy. Suitable sites are limited. Many economies in labor, in administrative detail, and in requirements for supervisory personnel may be effected in large installations.

Because of the great tonnage of ammunition stocked in communications zone depots, these depots are relatively permanent. Such permanency permits the construction of rail sidings and road nets to facilitate the distribution of the ammunition within the depot area.

Shipments into and out of communications zone depots will usually be by train loads. The time required to handle the quantities involved will usually make it necessary to carry on operations during both night and day. Arrangements for night operations must include the provision of blackout aids.

FACILITIES

The comparative permanency of the installation renders the use of labor saving devices more practicable. A careful study of each individual installation should be made from this standpoint. Some equipment may be improvised and much of it can be constructed in neighboring Ordnance maintenance shops. The reduction of the time required for loading which may be effected by the use of this type of equipment may often be of greater importance than the reduction of labor requirements.

Depending on the expected permanency of the installation and on the difficulty of securing construction, semi-permanent or portable buildings or tentage may be erected for housing those parts of the depot which require protection from the weather. Such buildings may be used for offices, messes, shops, and magazines for those types of ammunition which deteriorate most rapidly when exposed.

Whenever possible civilian labor will be used. Such labor should be carefully supervised.

The provision of road, rail, and other new construction, including buildings, should be requested through channels from the Corps of Engineers. Communication facilities, beyond those included in the equipment of the ammunition companies, will be provided by signal troops.

ORGANIZATION OF THE DEPOT

The organization of the depot will be determined by the battalion commander for each individual situation. The following general remarks are given as a guide.

There should be a depot office and section for each company. If deemed advisable, a service section may be organized for the entire depot.

The functions of the depot office will be similar to those given in preceding articles of this series. Its organization may follow the same general lines. A Stock Record and Credit Record must be maintained. A Lot Record should be maintained so that the same lot of a kind of ammunition may be sent to the same ASP (in the combat zone), as far as practicable. A record should be kept showing the number of each kind and size of railroad empties on hand at all times. The usual files must be maintained. Reports will be rendered as ordered.

Personnel to man the depot offices will be drawn from the depot office sections of the companies present.

There should be a magazine section for each company. Each section will be organized along the general lines of a small ASP. There will be a section office, operated by depot office personnel of the company, and as many magazines or stock groups as may be necessary, operated by magazine platoon personnel. A service unit may or may not be retained in each magazine section.

The section office will perform the necessary administrative work for the section. The office force will be small, most of the personnel being assigned to the depot office. The amount of work required will likewise be small, as it will not be necessary to maintain Stock or Credit Records. The preparation of Tallies, liaison work, and issuing orders will be the principal duties.

The magazine will be organized and operated as deemed advisable. Personnel will be furnished by the magazine platoon of the company. Labor may be furnished from the labor pool, if established.

The desirability of retaining a service unit in each magazine section should be carefully studied. In general, each company should be kept together as a unit rather than split up and dispersed over a wide area. The functions of a service unit in a depot of this kind will include the provision of:

Transportation.
Guard, guide, traffic control, and, possibly, labor.
Shop facilities.

Transportation is required in the depot for intra-depot transfer of small quantities of ammunition. The transportation of each company, as far as practicable, will be retained within the company. Vehicles required for the depot office, and the service section, with the necessary drivers, should be assigned from the companies.

The nature of their duties would indicate that guards, guides, and traffic control personnel should operate from a central agency. They might best be pooled in a service section. Unless an abnormal amount of shipping is by trucks, the requirements for guides and traffic control personnel should be light. Some of this personnel

may be used on other duties, as will be pointed out a little later.

A single requisition will not normally require issues from all sections of the depot. There will be times when one or more sections are overloaded while other sections are not busy. Under such conditions economy might indicate the use of a labor pool. This would be especially true if some civilian labor is used. In this case, military personnel would be used as checkers and supervisors, and civilians as laborers.

It is very probable that such work as repairing containers, making signs, etc., can be done in each magazine section as well as in a central shop, if satisfactory cover can be obtained in the section area. This will reduce transportation requirements. On the other hand, such work as renovation, loading clips and machine gun belts, can best be accomplished in central shops equipped for the purpose.

The service section may be organized into a headquarters and units as follows: railway; guard, guide, and traffic; labor; and shops. Personnel and sufficient transportation to care for the requirements of the section will be assigned from the companies.

The headquarters will exercise command functions, supervision, and coordination. It will also have the transportation assigned for the use of the section, and will operate the internal telephone system and any other utilities of the depot.

The railway unit will assign cars to magazine sections for loading. They will spot and remove cars as ordered. They will keep the depot office informed of the number and size of empties on hand. All matters concerning railway service within the depot will be handled by this unit. (Note: All transactions concerning railway matters between the depot and outside agencies will be conducted by the battalion headquarters.) Guides and traffic control personnel not required for their normal duties may be assigned to this unit.

Both the guard, guide and traffic unit and the labor pool may be organized and operated as described in a preceding article.

The shops unit may be organized into a general shop (carpenter), clip and belt loading shop, and renovation shop. Considerable work may be required of the loading shop, and special facilities and labor may be provided for it. Only the simplest kind of renovation should be attempted. The renovation shop should be at a distance from all other establishments.

OPERATION OF THE DEPOT

Only an outline of a suggested administrative procedure will be presented here. The other phases of the depot operation present no unusual features.

On receipt of a Requisition in the depot office, the Requisition is examined and extracts are prepared for the use of the various magazine sections. The list of empty cars is examined to determine the number and size of the cars to be sent to each section. A Loading Sheet is then prepared for each section.

The Loading Sheet shows the number and size of the cars to be spotted at each section for shipping the ammunition required from that section. The requirements of a section will not normally total an exact number of car loads. It is desirable to have all cars loaded to capacity, except possibly the last one. This requires that cars partially filled from some sections be shifted to other sections to complete the loading. The first section of the loading sheet constitutes an order on the service section for these car movements. The sheets are sent to the service section.

When the initial spotting of the cars is completed, the service section makes appropriate entries on the Loading Sheet and gives it to the magazine section concerned.

The magazine section loads the cars as required and posts the loadings to the sheet. The sheet then goes to the depot office.

When all Loading Sheets are received in the depot office, the service section is notified to make the train up, so that it may be dispatched as soon as the locomotive and train crew arrive. However, it may be more desirable to have the locomotive and train crew from the military railway service make up the train. Such matters will be decided between higher headquarters and the military railway service.

Stock and Credit Records in the depot office are posted from the Loading Sheets, and the loading schedule and Bill of Lading prepared from them.

BASIS FOR PLANNING

Communications zone depots will normally be stocked in terms of "days of supply". Issues will be made of those kinds and quantities of ammunition required to replace expenditures by combat troops. The proportions of the different calibers of ammunition issued may be expected, on the average, to approximate the proportions of the same calibers in the unit of fire. For purposes of this discussion, it will be assumed that one depot will be established per field army, that the stockage level will be of the order of 15 days of supply, and that this quantity will be approximately 30,000 - 40,000 tons. It is also assumed that one unit of fire for a type army totals 11,334 tons, including a basic load of grenades, anti-tank mines, and pyrotechnics, but not including ammunition for air force units, and may be subdivided as given below.

It is desirable that the companies of a battalion retain their identity as far as possible. To facilitate this, the depot should be divided into sections, one section being assigned to each company. If the depot has six sections, and air force units are numerous, two sections might be assigned to the air force ammunition and four sections to field army ammunition. Such sections would approximate 8,000 tons (stockage level).

A unit of fire for a type army may be subdivided as follows:

Small Arms	2614 T
Mortar	1296
Grenades, AT Mines, Signals	201
AT Artillery	588

(Continued on page 446)

The HEADQUARTERS and HEADQUARTERS DETACHMENT

The organization of the Headquarters and Headquarters Detachment is prescribed in T/O 9-15 and shown by the chart below. The equipment of the Headquarters and Headquarters Detachment is prescribed in T/BA 9.

The operations of the Headquarters and Headquarters Detachment will normally fall into the following classes:

Supervision and coordination of the activities of its companies.

Administrative assistance to its companies.

Liaison between its companies and other headquarters.

The furnishing of technical information and other assistance to higher headquarters.

The battalion commander and his staff should regard themselves as the personal agents or representatives of the Army Ordnance Officer, and should endeavor at all times to secure and transmit to the Army Ordnance Officer all pertinent information concerning the ammunition supply situation.

The military section is responsible to the battalion commander for the military administration of the battalion. It will:

Receive and carry out the orders and policies of the commanding officer.

Receive and transmit to the proper person or section all orders and instructions from proper authority.

Issue necessary orders to subordinate units.

Prepare such reports from the battalion to higher authority as are required.

Perform such duties in connection with personnel matters as are required: i.e., maintain files, conduct correspondence, and attend to other routine administrative details.

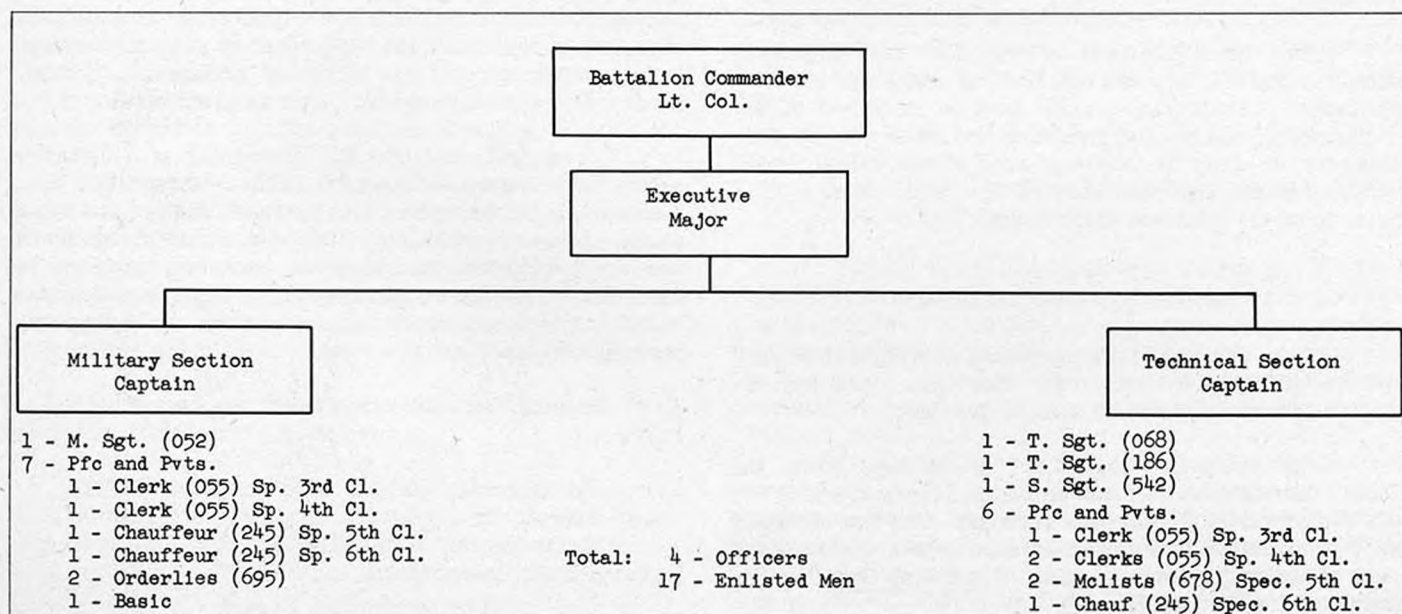
Prepare training programs and conduct such schools as may be practicable. These will be coordinated with the technical section, when deemed advisable.

Coordinate Class I and other supply requirements of its companies with higher headquarters; make any necessary arrangements with Class I and other railheads.

Arrange for Class I and Class III supplies for outside labor and transportation when necessary during ammunition movements.

Arrange for the necessary transportation and any

ORGANIZATION OF HEADQUARTERS AND HEADQUARTERS DETACHMENT
ORDNANCE BATTALION - AMMUNITION





TRUCK, CARGO
2 1/2 TON 6X6



TRUCK, 3/4 TON
4X4



TRUCK, 1/4 TON,
4X4



TRUCK, 1/4 TON,
4X4



CAR, LIGHT
5 PAS. SEDAN

other facilities required when a company is moved from one site to another.

In sub-ASP operation, make a study of the possibility of, and make the necessary arrangements for, the supply of messing, transportation, and similar facilities by one company to a nearby section of another company.

Make such military inspections of companies as are ordered by the battalion commander. These inspections to cover such matters as military training of personnel, guard, safety precautions, camouflage, sanitation, etc.

In short, the military section will perform all the normal functions of a headquarters and such other functions as may be assigned to it by the battalion commander.

The technical section is responsible to the battalion commander for the correctness and adequacy of the technical operations of the battalion. It will:

Assign depot missions to ammunition companies.

Supervise the movement and establishment of depots.

Check all plans for transportation and labor.

Secure such additional transportation and labor as may be required.

Secure and forward to appropriate companies all Bills of Lading, train schedules, loading plans, truck movement plans, etc.

Make arrangements for services required in the establishment and operation of depots, such as spotting cars and moving trains, road construction, telephone installation, etc.

Supervise plans for traffic control and make such arrangements as may be necessary to carry out such plans.

Reconnoiter for, and maintain a situation map showing any or all of the following:

Present location of depots and ASP's.
Possible future locations of depots and ASP's.
Appropriate rail sidings.
Suitable road nets.

This situation map should show detailed information concerning all pertinent factors.

Consolidate and post to the situation map all pertinent information received from the companies.

Submit recommendations to the Army Ordnance Officer for depot and ASP sites, when required.

Recommend changes in the depot and ASP sites

to the Army Ordnance Officer, when the situation makes such changes desirable.

Transmit to other headquarters, for concurrence, schedules of issues, when such schedules are desirable and practicable.

Make such technical inspections of depots as are required by the battalion commander. Such inspections will be concerned with:

General layout.
Conditions of storage.
Traffic situation.
Administrative procedure.

Prepare and consolidate technical reports, if required.

Make arrangements with the salvage service for:

Repossession of serviceable salvaged ammunition.

Repossession of serviceable salvaged components, such as machine gun belts and clips, when desirable.

Arrange for transmission to the rear of damaged ammunition from the companies.



Speaking of ammunition, have you ever tried to formulate a precise definition for "Fire Power"? It's probably one of the most vague of all military terms, because it depends upon so many things. Col. Garber's "Modern Military Dictionary" defines fire power as "the volume, accuracy, distribution, and control of fire, considered together. The potential capacity of an organization for delivering fire." You'll hear more about this in a later issue.



"Either this gun got more fire power or my suspenders are over-age"

Suggestions for MOTOR

MARCHES

PREPARATION FOR MARCHING

All vehicle loads will be checked and made secure. All panels, curtains, catches, and straps will be neatly and firmly secured.

At the direction of the motor officer, all vehicles will be operated for five minutes at low engine speed to warm them up and to check their functioning. At this time particular attention will be paid to operation of all gages,



to note that they are functioning satisfactorily and that readings are correct.

All tires will again be visually checked to note presence of slow leaks, and an inspection will be made for the presence of gas, oil, or water leaks.

Prompt report will be made, and action taken to correct any deficiencies noted.

Under the supervision of the 1st sergeant, all men will join in a police of the bivouac area prior to departure.

STARTING FROM HALTS

Wait till preceding vehicle has almost reached the proper distance in front of you before starting.

MAINTAINING PROPER DISTANCE BETWEEN VEHICLES

Drivers must always be alert to keep the prescribed



distance between their vehicles. This may sometimes be accomplished by counting the number of telephone poles in a mile and, having found the distance between them, measuring the intervehicle distance by that means.

Changes in speed must not be abrupt, but should be made gradually, in order to avoid telescoping or unduly stretching the column.

CLOSING TO GO THROUGH CITIES OR LARGE TOWNS

At a proper distance from a city or large town, the lead vehicle of the column will give a signal to close up and will decrease its speed to 20 m.p.h. The signal to close up will be passed to the rear by all drivers. All vehicles will continue at the normal marching rate until



closed on the preceding vehicle to a safe march distance (30 to 40 yards). This closing will be accomplished without delay. This will insure that the last vehicle will be closed before entering the city.



MARCHING IN CITIES AND TOWNS

In cities and towns, the lead vehicle will not travel at a rate faster than 20 m.p.h. The driver or his assistant will keep a sharp lookout to the rear to observe any unusual occurrences in the remainder of the column and to take appropriate action in case of difficulty.

Every effort will be made to keep the column closed and to prevent civilian traffic from cutting into the column. This effort must not, however, result in dangerous or discourteous driving that may result in accidents.

When accompanied by traffic officers, the column will proceed against red lights in following the officer.

When not accompanied by a traffic officer the column control officer will be responsible at principal intersections, even if normally controlled by lights, to the extent of stopping all other traffic until the column has cleared (This is not a strictly legal procedure, but may be supported. It will be accomplished courteously.) If a

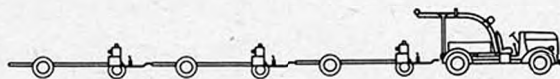
traffic guard is left at the intersections without transportation, he will be picked up by the last vehicle in the column with the least possible delay.

In the absence of civil or military control at an intersection, vehicles will not pass a red light.

EXTENDING THE COLUMN AFTER PASSING A CITY OR TOWN

The lead vehicle will continue to march at a rate not greater than 20 m.p.h. for at least 10 miles after passing a city, to insure that all vehicles have cleared.

The above may be modified when the control officer, after observing the tail vehicle clear the city, notifies the lead vehicle that such is the case.





The lead vehicle, after notification of clearance, or after the prescribed distance of 10 miles has been reached, will resume the march rate, and all vehicles will attain the prescribed marching distance.

HALTS

Rest or gassing halts will not be made except in the open country. They will be made where shoulders are wide enough to allow vehicles to move completely off the road. Vehicles will endeavor to move completely off the road, and men will stay on the right side of the vehicles except when a duty requires that they move to the left side. Traffic guards will be placed at the head and tail of the halted column.



At all march halts drivers and assistant drivers will carefully but quickly examine their vehicles, paying particular attention to:

All wheel lugs and tires.

Loose running gear of any kind, including hydraulic brake lines.

Condition of load.

Amounts of water and oil present.

Gas, oil, and water leaks.

An immediate report of the following will be made to the motor officer, or the transportation sergeant:

Any deficiency that cannot be quickly remedied by the vehicle crew.

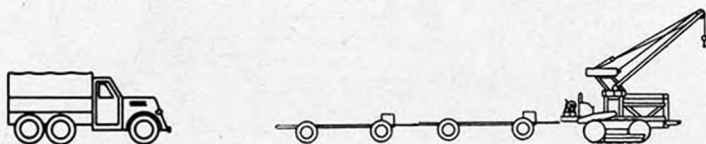
Any deficiency in the operation of the vehicles while on the march.

A gassing plan will be prepared for each day's march, which will prescribe the halts at which each vehicle will be gassed and the amount of gas each vehicle



will take aboard. A copy of this plan will be in the hands of the motor officer, the transportation sergeant, and the driver of the gas truck. Each vehicle driver will be furnished a written statement of the part of the plan that pertains to his vehicle.

When the column has halted for a gassing halt, the gas truck will drive along the column, putting off at each vehicle the gas required. It will then pull in at the head of the column and halt. Empty drums will be promptly returned to the gas truck at this point. When the column moves out, the gas truck will resume its normal position in the column. Drivers will promptly record in their vehicle record notebooks the date, mileage and quantities of gas and oil used.



Men will not leave their assigned vehicle until they have accomplished their required duties.

In bivouac halts, immediately upon arrival at a bivouac area, the kitchen detail will proceed to the kitchen truck and perform their duties. All other men will assist in replenishing gas and oil in all vehicles. The gas truck will then proceed to be restocked.

When the above has been accomplished, shelter tents will be pitched under the supervision of the 1st sergeant.

The details prescribed for the performance of other camp duties will then proceed to those duties.



As soon thereafter as practicable, drivers and assistant drivers will be assembled and, under the supervision of the motor officer, will thoroughly check each vehicle with particular attention to:

All wheel lugs and tires.

Loose running gear of any kind, including hydraulic brake lines.

Condition of load.

Amounts of oil and water present.

Gas, oil, and water leaks.

Batteries.

Lights.

Ignition system.

Fuel system.

Proper inflation of tires.

DRIVING SIGNALS

In addition to the standard arm signals normally used in driving, the following signals will be used in convoy driving:



Close up. - Extend the arms horizontally straight to the front, palms in. Move the hands together, and then resume the first position. Repeat several times.

Slow or stop. - Extend the left arm outward to an angle of 45 degrees below the horizontal.

GENERAL RULES

At all times pay careful attention to the functioning of your vehicle, noting readings of all gages, listening for unusual sounds, etc.

Drive carefully. - Treat your vehicle with care; remember that it can fail if abused. Vehicular abuse means expense to the Government, loss of time, and much

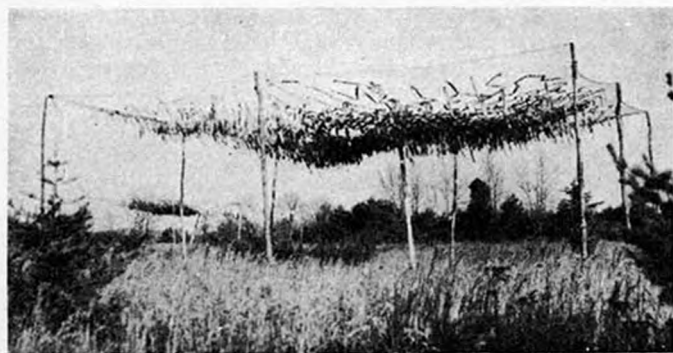
(Continued on page 441)



Technique of the CAMOUFLEUR

This article is not intended as an exhaustive study of the art of camouflage. It is, rather, a brief discussion of a few of the most important principles associated with camouflage. Readers who are interested in this subject are referred to Engineer Field Manual 5-20, Camouflage. This publication may be procured from the Superintendent of Documents, Washington, D. C., for 15 cents.

Camouflage is defined as work done to provide protective concealment of materiel, troops, or military works from enemy observation from airplanes, captive balloons, and ground observation posts.



FLATTOP



DRAPE

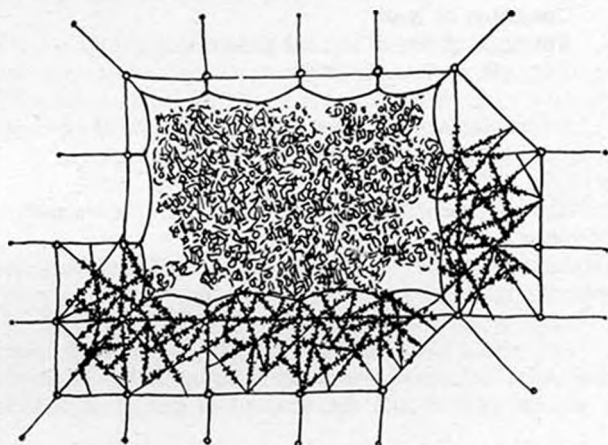
Observation is of two kinds: by direct observation, by direct vision which may be aided by field glasses or telescopes; or by indirect observation, from the study of photographs.

Indirect observation provided by aerial photographs is by far the more effective. The skill of the expert photograph interpreter in translating apparently insignificant details in important military intelligence can hardly be realized by one who has not specialized in it.

The road, paths, houses, towns, etc., in peace appear in certain fixed patterns on aerial photographs. The pattern may be large and simple as in a farming district, or it may be intricate and confused as in broken, wooded areas. In war, these peace-time patterns are disrupted. War requires new roads, new paths, trenches, battery positions, etc., and rarely will any of these fail to register on an aerial photograph as separate and distinct from the normal pattern of the terrain unless properly camouflaged. An intricate pattern makes the work of the photograph interpreter more difficult and the work of camouflage easier.

Photograph interpreters identify objects by —

Form. - In searching for objects of human origin, regular forms quickly attract the eye. Camouflage should hide any regularity of form, either in the shape of individual objects or the lay-out of a group of objects, and should not itself have an identifiable form.



EXTENDING IRREGULARITIES WITH GARLANDS

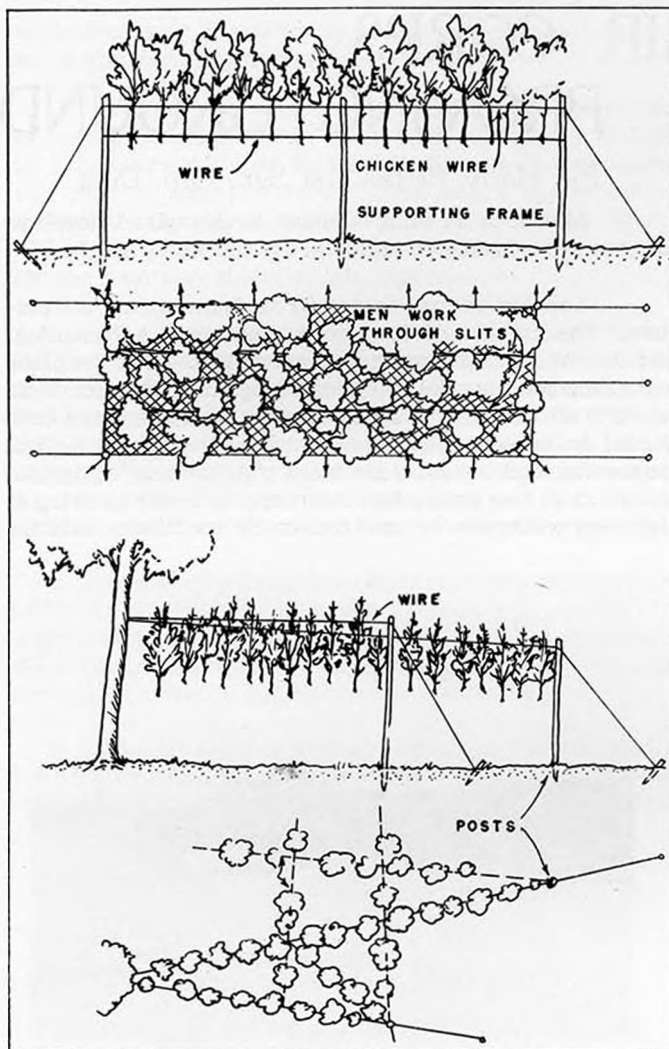


DETAIL OF GARLANDS

USE FRICTION TAPE OR KINK WIRE TO PREVENT SLIPPING

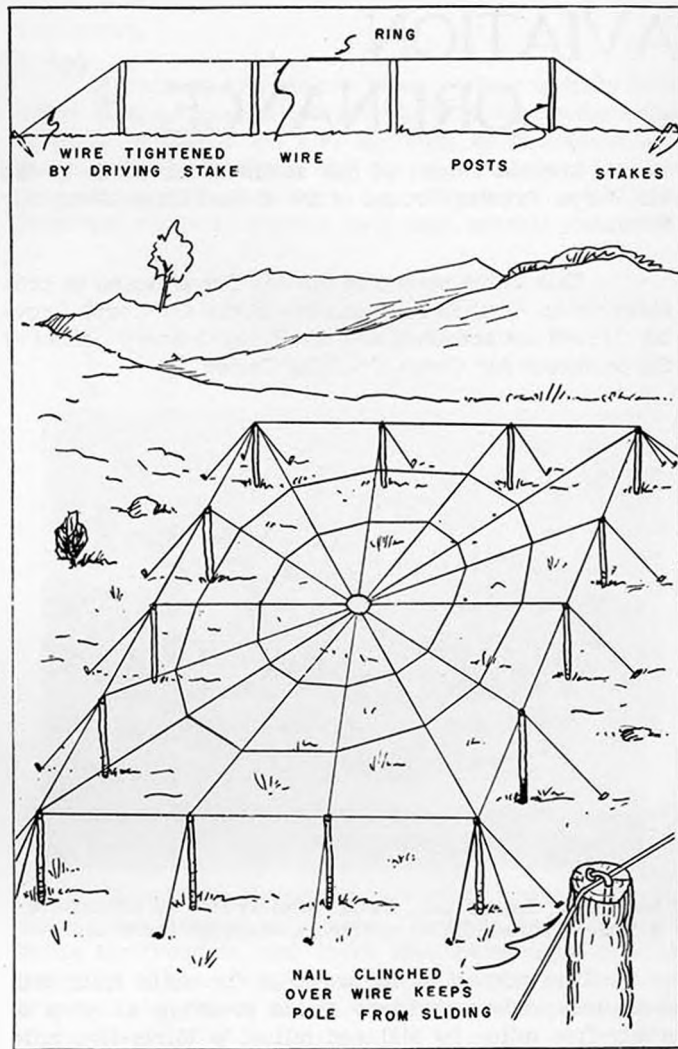


GARLANDS USED TO THICKEN NATURAL COVER



Overhead covers of natural materials

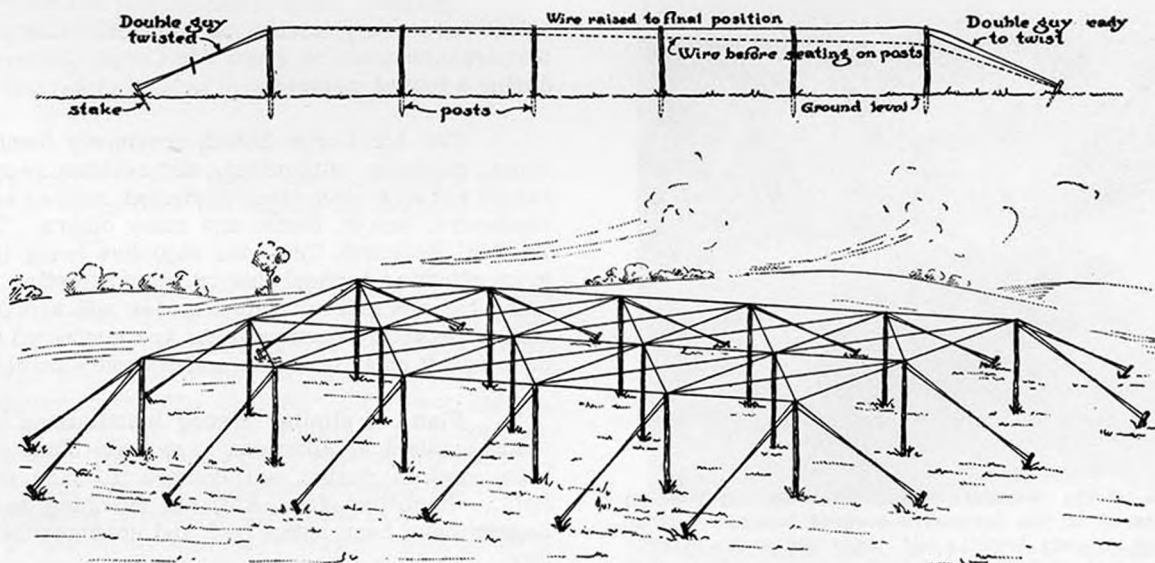
Shadow. - Each object casts a typical shadow by which it can often be identified on an aerial photograph. Camouflage must break up this shadow so that the object cannot be identified, nor should the camouflage itself cast an identifiable shadow.



Method of erecting flat-top wire frame

Texture. - The smoother a surface is the more light it reflects and the lighter it photographs. Standing vegetation is irregular; it casts shadows, absorbs light, and therefore photographs dark. Roads, paths, and bare

(Continued on page 447)



Method of erecting flat-top wire frame

AVIATION ORDNANCE

at the

AIR CORPS PROVING GROUND

Located at one of our southern air fields is the Air Corps Proving Ground of the United States Army Air Force.

This is the station of the Air Corps Board as provided for in Army Regulations 95-20, the Air Corps Proving Ground Detachment, and the Fixed Gunnery School of the Southeast Air Corps Training Center.



Emergency Repair and Small Arms Truck at Automotive Maintenance Section to undergo a thorough check-up.

This station is composed of the main field with seven independent auxiliary fields covering an area of twenty-five miles by eighteen miles, a thirty-five mile stretch of water on the Gulf of Mexico, a Demolition Bomb Range, a Precision Range, a Ground Gunnery Range, and an Armament Laboratory.

Wright Field in Ohio develops, purchases, experiments, tests, and approves the Army airplane.



A section of the Magazine Area, showing clay road on sand adjacent to the tarpaulin-covered bombs. Layout facilitates one-way traffic and easy access to materiel. A new and much larger Magazine Area is now under construction and will be one of the largest and most modern in the Southeast Air Corps Training Center.

By: Harry Pertka, 1st Sgt., Ord. Dept.

Aberdeen Proving Ground in Maryland develops and tests the Ordnance Materiel for the Army airplane.

The Air Corps Proving Ground now enters the picture. The results of the above mentioned Aeroneutical and Ordnance activities are "married" insofar as the plane and Ordnance Materiel being tested together. Service tests of Aircraft armament and accessory equipment are conducted to present a comprehensive concentrated plan of inspections and intensive air tests of Armament equipment installed in new production Aircraft, in order to bring to light any weakness or unsatisfactory conditions existing



A bomb crew hitching up a trailer for a "rush order".

therein, to determine the adequacy of operating instructions, and to develop special technique of operation applicable to specific equipment. Detailed reports are submitted upon completion of tests and contain such recommendations as are pertinent.

Ordnance functions and duties are very important as all necessary advice, assistance, observation, and maintenance must be given Air Corps Officers and men during a test of materiel.

The Air Corps Board, previously mentioned, directs, conducts, supervises, and reviews reports on the varied and numerous tests conducted, such as accelerated armament, turret, bomb, and many others. There is a Tactical Research Test, the objective being to find the most effective tactical use or most effective method of using the aircraft with accessories and armament as a combat weapon. Further tests are conducted to develop the aircraft as an offensive and defensive combat weapon.

Plans of similar testing installations to that already existent at Aberdeen have been obtained and are being used in design and construction for use at this field. Facilities for additional Bombing and Gunnery Ranges have been authorized and construction is under way.

The Fixed Gunnery School for Cadets is conducted

at the Auxiliary Fields and is mainly concerned with supply and maintenance of Ordnance Materiel.

At the present time the approximate expenditure of ammunition for use by Cadets Fixed Gunnery training is 275,000 rounds per month. By June or July expansion will have progressed to the point where approximately 1,250,000 rounds per month will be used. These figures will give an idea as to the magnitude of the future program for the Auxiliary fields at this station.

The Ordnance member of the Air Corps Board, Colonel S. B. Huff, has spent practically all his service in various duties of developing, experimenting, and manufacturing of Aircraft Armament and Ammunition. Colonel Huff has at various times been assigned to duty in the office of the Chief of Ordnance, with tactical units of the Air Corps, at Aberdeen Proving Ground, and has been the Ordnance member of the Air Corps Board since 1940.

Specialized Ordnance Officers, Non-commissioned Officers and enlisted men are necessary to conduct the many and varied activities performed here. Accordingly, the Ordnance companies are unusual insofar as size, ratings, equipment, and duties are concerned.

The Air Corps Proving Ground as you can readily see is playing an exceedingly important role in this country's fight for the inevitable VICTORY that is rightfully ours!



Bomb Trailer Section of the Ordnance Motor Pool.

* * * * *

The importance of the phase of Ordnance activity discussed in this article can hardly be realized by the average individual.

According to Maj. Gen. Barton K. Yount, writing in "The Air Forces News Letter", "The course of events in Europe and more recently in the Pacific area has demonstrated conclusively that air power is apt to be the deciding factor in modern warfare. This year and next will bring on the great crisis. America must gain air supremacy now. The urgency of the need is a tremendous challenge to our rapidly expanding aircraft industry to strain every effort to produce the 60,000 military aircraft required by our Army and Navy during 1942. It is no less a challenge to our Air Forces to produce a huge pool of highly trained airmen to man these planes, as well as a vast army of technically trained maintenance and ser-

vice crews.

"Training courses are being revised to include the latest tactical lessons learned the hard way in the actual crucible of war in the air, including an increased emphasis on dive bombing, the use of aerial torpedoes and the employment of gliders. In cooperation with other divisions of the Air Forces, new sites, schools and neces-



Guards at entrance to magazine area.

sary facilities are being arranged which eventually will more than double the present program.

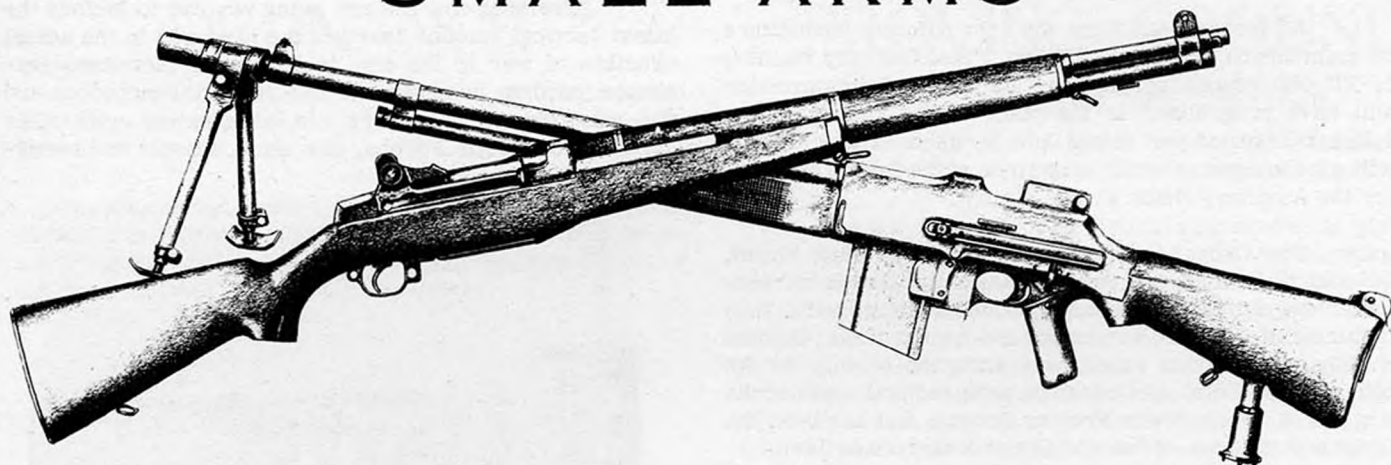
"American air power is already beginning to influence the fighting on several fronts in the world-wide battle for freedom, and there have been many thrilling examples of how effective our flying training has been and how good our planes are in comparison with the best the enemy has to offer."

Ordnance personnel, also, may feel pride in the records being written by the American Air Forces, for although Ordnance personnel can never win an air battle, a lack of efficiency on the part of Ordnance personnel could very easily lose an air battle in spite of the Air Force and its best efforts. While they "Keep 'em flying" let us "Keep 'em firing", so that the flying fighter will have a "firing" chance.



The author and a portion of the Post Ordnance Office. A new cream-colored, red stucco roofed spacious air-conditioned building, equipped with the latest in modern steel office equipment.

SMALL ARMS



Conducted by: C. B. Goodman, Capt., Ord. Dept.

SHOTGUN, REMINGTON, 12-GAUGE, M1910, RIOT TYPE

By: Edward Dyer, T. Sgt. Ord. Dept.

DESCRIPTION OF PARTS

RECEIVER. - The receiver is rectangular in cross-section, and rounded on top and bottom. The top surface is milled to form a rib type rear sight. On the exterior of the right wall there are located the following openings; starting from the front, the breechblock supporting pin hole and three holes almost vertically aligned. The largest of these is for the action bar lock button. Below this is a tapped and counterbored hole for the guard screw (and on later models a hole above and next to it for the guard screw check screw.) Slightly to the rear, and above the action bar lock button hole, is the breechblock guide stud hole, into which the breechblock guide is riveted.

The front end of the receiver has three openings, two cylindrical and one of irregular contour. The cylindrical openings are aligned vertically, the upper one having special threads to receive the barrel adjusting bushing, while the lower one has interrupted threads and serves as the seat for the magazine tube. The irregularly shaped opening communicates with the interior of the receiver, and permits insertion of the action bar for the operation of the weapon.

On the opposite side of the action bar opening is a milled groove for the barrel adjusting bushing lock. The groove terminates in a tapped hole for the barrel yoke stop screw. A directional arrow is stamped on the face of the receiver to indicate the direction of rotation of the adjusting bushing.

On the exterior of the left wall, starting from the front is the Ordnance escutcheon with the letters U. S. underneath. Next is the hole for the left breechblock supporting pin, followed by the hole for the guard screw.

The rear end of the receiver is open, the upper part of it being prolonged to form the tang which extends rear-

ward about an inch and a half. The tang has two tapped holes, the larger for the tang screw and the smaller for the tang screw check screw. The edges of the walls at the rear end are cut out to form a seat for the stock tenon.

The bottom of the receiver is completely open except for about an inch at the extreme front end. On this solid portion is scribed the alignment mark, to which is brought the alignment mark on the barrel yoke when the gun is assembled. The serial number of the shotgun is also stamped on this surface. About 3/4" from the rear, and on the bottom edge of the right wall, is the cut out portion into which the carrier stop is assembled.

The upper part of the receiver interior is rounded to conform with the contour of the top surface of the breechblock. The center of this rounded portion is milled to form a seat for the ejector spring. Where the ejector seat ends at the barrel opening, the rounded portion is cut away to act as a shoulder, against which the barrel rests.

The receiver interior (Figure 1) is so cut that a heavy locking shoulder is formed at the rear of the ejector seat to act as a locking shoulder for the breechblock.

The left wall on the interior of the receiver has a rather wide groove extending the length of the receiver. This guides the action bar. Above this groove and to the front is the breechblock guide-way. The rear portion of this guide-way is inclined and joins with the extreme forward portion, which is straight. Near the bottom edge at the rear is the groove for the trigger guard.

On the right wall of the receiver interior, above the breechblock supporting pin, *b*, is the short recess, *c*, corresponding to the straight portion of the guide-way on the left wall. Below this are the irregularly cut away surfaces, *d d d*, which provide clearance for the carrier when it is rotated upward. The surfaces, *e e*, provide clearance

for the carrier spring, while the rounded out portion, *f*, provides clearance for the cartridge stop.

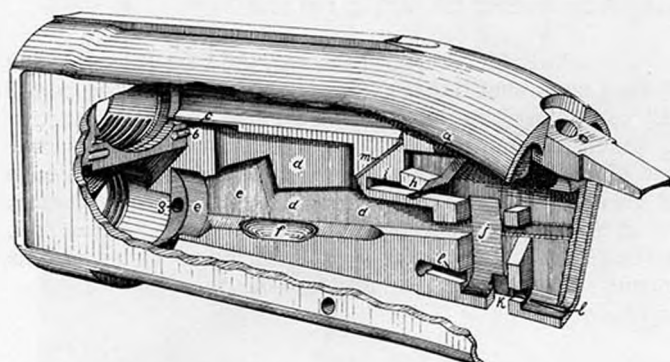


Figure 1 - Receiver Interior

Below the right breechblock supporting pin, and on the right side of the magazine opening, is located the hole, *g*, which supports the front end of the carrier. It is also the seat for the carrier friction spring.

Toward the rear of the receiver, just below the locking shoulder, is the recess into which the breechblock guide, *h*, is assembled, and below it the groove, *i*, which acts as a seat for the action bar lock when the breechblock is in the locked position. It also acts as a seat for the action bar lock button spring retainer. To the rear of this is the cut out portion, *j*, for the carrier cam and, toward the bottom, the groove, *k*, for the carrier stop. Along the bottom extends the groove, *l*, for the trigger guard.

In front of the breechblock guide, and above the action bar lock groove, is located the cam surface *m*, which acts as a cartridge guide. When the carrier flap raises the cartridge, this cam surface acting on the flange of the cartridge causes the cartridge to move rearward until the flange of the cartridge is opposite the cut in the projecting wall of the breechblock rib groove.

BARREL. - The barrel (Figure 2) is nickel steel, plain cylinder bore, twenty inches long. It has a bead type front sight, riveted on the barrel about one-half inch from the muzzle. On the underside, about two and one-half inches from the muzzle, are located two blind holes one-half inch apart; the first, *a*, for the barrel lug stop, and the second, *b*, for the barrel lug screw.



Figure 2 - Barrel and Barrel Yoke

At the rear of the barrel, just in front of the yoke, is stamped the serial number which should correspond with that on the receiver. One inch from the yoke, and on the bottom of the barrel, is a blind hole, *c*, for assembly purposes. An alignment mark is impressed on the barrel and acts as an assembly mark for the yoke. The yoke is assembled to the barrel by screwing over the straight threaded section. The square interrupted threads, *d*, on the rear end of the barrel, serve to engage the barrel to the receiver.

BARREL YOKE. - The barrel yoke (Figure 2) is assembled to the barrel at manufacture, and must not be

disassembled from the barrel. It has two circular openings aligned vertically, one internally threaded into which the barrel assembles, and the lower plain one, through which the magazine assembles to the receiver. The upper right side of this hole is cut away to permit passage of the action bar.

BREECHBLOCK. - The breechblock (Figure 3) is manufactured from a solid piece. The top is convex while the bottom is concave. The front face is straight, the rear end slightly rounded. On the front face of the breechblock are located the firing pin hole, *a*, and, farther down, the two semi-circular recesses, *b*, that mate with the breechblock supporting pins around which the breechblock is pivoted in locking.

The top of the breechblock is grooved to form a seat, *c*, for the extractor and extractor spring. The forward end of the groove has a rectangular opening which communicates with the firing pin bore. Into this opening projects a small cam on the underside of the extractor.

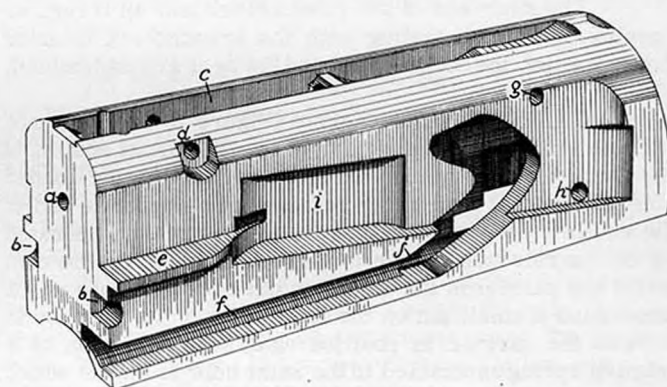


Figure 3 - Breechblock

The left side of the breechblock has the following cuts, openings, grooves, etc. Starting from the top, near the front end is the counterbored hole, *d*, for the extractor pin. Farther down is the breechblock rib, *e*, (about 3/4" long) which guides the breechblock. Below this is the action bar groove, *f*, which is straight for about 1-3/4" from the front and then sweeps up into the breechblock. About a half inch from the rear, near the top, is the hole, *g*, for the firing pin bushing pin. Below this, and farther to the rear, is the sear pin hole, *h*. The large cut out area, *i*, to the rear of the breechblock rib, is a lightening cut. In the action bar groove, where the straight part joins the upsweeping part, is a large drilled hole, *j*, into which assembles the stud on the action bar lock.

On the right side of breechblock (Figure 4) is the counterbored hole, *a*, for the extractor pin, and toward the rear the hole, *b*, for the firing pin bushing pin. Near the lower front end is the camming groove, *c*, which acts on the carrier cam. To the rear of the camming groove is located the action bar lock groove, *d*, near the front end of which is the large hole, *e*, through which the stud on the action bar lock passes. The vertical hole, *f*, passing through the groove, is for the action bar lock pin. The horizontally drilled hole, *g*, is for the sear pin.

The bottom side of the breechblock is concave to facilitate loading of the magazine. Toward the rear is the opening, *h*, into which the sear spring is assembled. A small shoulder is provided in the opening toward the

front end of the breechblock with a tapped hole, *i*, for the sear spring screw.

The small vertical hole, *j*, is not found on all breechblocks and is for the assembly of the breechblock latch pin.

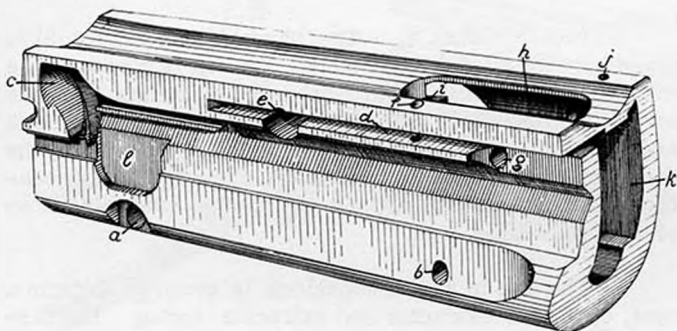


Figure 4 - Breechblock (Right side)

The rear end of the breechblock has an irregular opening, *k*, communicating with the breechblock interior through which the cocking head and the sear are assembled.

CARRIER. - The carrier (Figure 5) is a long rod with an integrally formed thin flap. The front end, *a*, of the carrier rod is cylindrical and fits into a spring-loaded hole in the front part of the receiver. The opposite end of the rod is formed into a cam, *b*, (carrier cam), operated by the carrier cam groove in the breechblock. On the cam end of the carrier is the small cut out recess, *c*, into which assembles a small pin on the carrier stop. Its purpose is to hold the carrier in position against the tension of a friction spring assembled in the same hole as that in which the front end of the carrier is assembled.



Figure 5 - Carrier

The carrier spring, *d*, is riveted to the forward edge of the flap. This is an irregularly formed piece which serves to hold the cartridges in the magazine.

The flap, *e*, prevents the cartridges from falling through the ejection opening during feeding. The breechblock cam, *f*, is riveted to the side of the flap opposite the carrier spring. It is a small, practically triangular piece that acts on the breechblock as it is moved into the locked position.

The carrier spring key, *g*, passes through the shank of the carrier spring and is riveted on both sides of the carrier flap. The key prevents any rotation of the spring. The carrier spring rivet, *h*, is the large rivet through the hub of the carrier spring which fastens the spring to the carrier.

The cartridge stop, *i*, is placed at an angle so that when the flap is down, and a cartridge is released from

the magazine, the rim of the cartridge engages against the front edge of the stop, *j*, and thus keeps the cartridge from slamming against the face of the bolt.

CARRIER STOP. - The carrier stop (Figure 6) is shaped somewhat like the letter L, with the long leg pointing up. Toward the top there is a round pinlike projection *a*, which assembles into the cut out portion on the rear end of the carrier. The groove, *b*, along the bottom edge of the stop is for the trigger guard, which, when assembled, locks the carrier stop in position. The two flanges, *c* *d*, mating with corresponding grooves in the receiver, are the means of assembling the stop into the receiver.

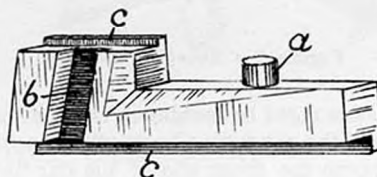


Figure 6 - Carrier stop

COCKING HEAD. - The body of the cocking head (Figure 7) is practically rectangular, about 3/4" x 1-1/4". Its forward edge, *a*, is shaped somewhat like the upswing of the action bar cam groove in the breechblock. The action bar acts on this surface to cock the weapon. The right side of the cocking head has a boss, *b*, which forms a housing for the rear end of the firing pin which is assembled in the hole, *c*. The cocking head pin, which secures the firing pin to the cocking head, assembles through the hole, *d*. The lower surfaces of this boss are cut irregularly to form the sear notch, *e*.

(Continued on page 447)

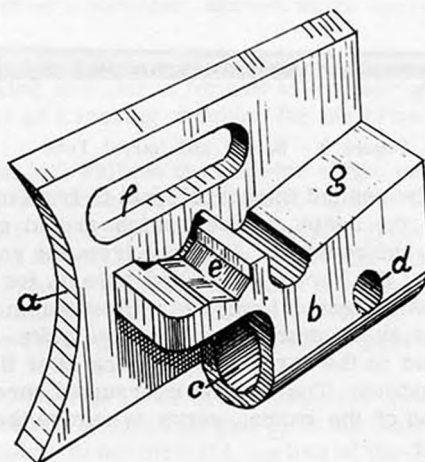
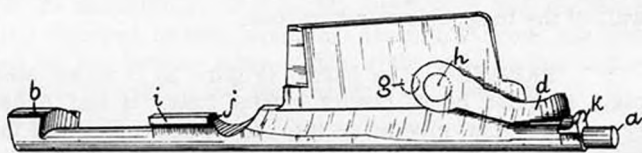
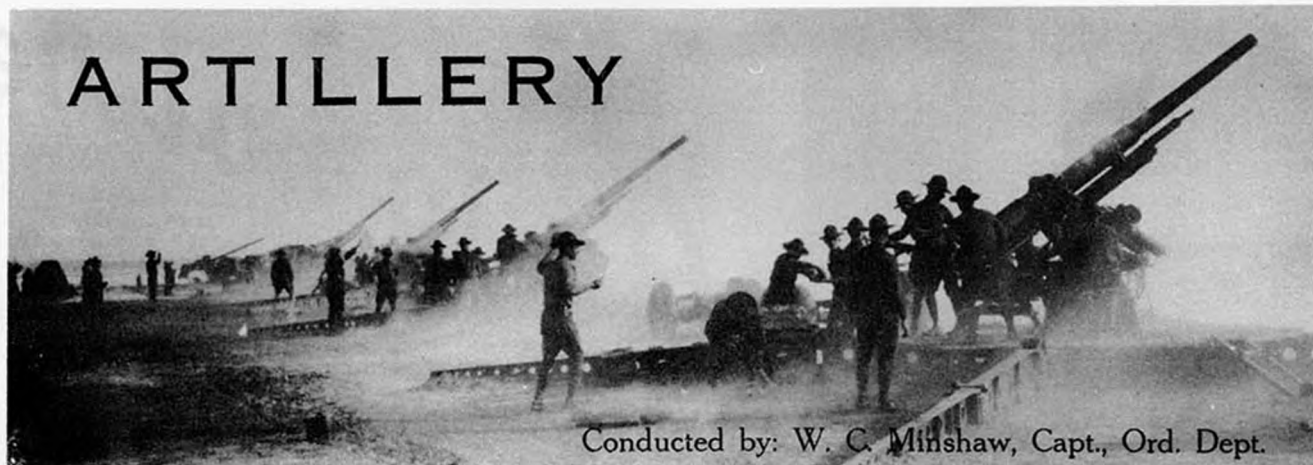


Figure 7 - Cocking Head



TO MEASURE THE PRESSURE AND LIQUID LEVEL IN THE COUNTERRECOIL SYSTEM OF THE 155-MM HOWITZER, M1917, M1918A1, A2 AND A3

Listed here are the tools and gage used to make these tests:

Adapter, pressure gage.
Gage, pressure, 60 kg.
Pipe, filling.
Wrench, filling pipe swivel nut and filling needle valve follower.
Wrench, filling needle valve.
Wrench, filling valve cap.
Wrench, gage cock and filling pipe coupling.

When the liquid level is to be tested the mechanism should remain idle some minutes previously, to allow the liquid to settle.

The howitzer must be in battery and the carriage perfectly level. Use the gunner's quadrant to determine whether the axle is level. If necessary, jack up a wheel until the bubble of the quadrant remains at the center.

Open the cradle head cap. Remove the gauge cock body head. Screw the pressure gauge into the adapter. Be sure that the pressure gauge adapter is clean and screw the pressure gauge into it. See that the adapter valve stem is fully drawn back so that it will not prematurely unseat the gauge cock valve, and check the presence of the adapter gasket; then assemble the adapter and tighten the pressure gauge adapter union.

Using the special gauge cock and filling pipe coupling wrench, turn the gauge cock body until the pointer stands at the lowest graduation on its scale. Do not attempt to do this with an adjustable screw wrench on the pointer hexagon, as the setting of the pointer may be destroyed.

The adapter stem should be screwed in slowly, opening the gauge cock valve. Read the pressure directly

from the gauge. Then note the temperature and compare the gauge reading with that given on the correction pressure plate (on the cradle head cap) for that temperature. Defer correction of the pressure until after correction of liquid level.

TO TEST THE LEVEL OF THE LIQUID. - Close the adapter needle valve, but leave the gauge cock valve open, and by means of the gauge cock wrench turn the gauge cock body in a counterclockwise direction by small angular movements, and at each stop momentarily open the adapter needle valve. When liquid begins to flow through the port on the bottom of the adapter, stop turning the gauge cock and close both valves. If the pointer now stands between 0.5 above and 0.5 below the zero line on the scale the liquid may be considered as at the proper level. If the pointer is outside of these limits, pump in or drain off as directed on the scale.

TO ADD LIQUID TO THE COUNTERRECOIL SYSTEM. - Open the cradle bottom cover. Remove the filling cap and the filling needle valve cap, using the filling valve cap wrench. Assemble the long swivel of the filling tube, marked "sleigh", on the filling valve body (use the filling pipe swivel nut and filling needle valve follower). Mount the liquid pump on the cradle pump bracket and connect it to the filling pipe (use the same wrench on the filling pipe union). Pump a little liquid through the filling pipe before attaching it to the long swivel to insure a good seal in the pump before opening the filling needle valve. Open the filling needle valve with the filling needle valve wrench. Turn the gauge cock body until the pointer stands at zero and pump in liquid until by trial openings of the adapter needle valve the issuance of liquid from the adapter port shows that the proper level is reached.

After securing a satisfactory liquid level, turn the gauge cock body until the pointer stands at "1", and again observe the pressure. If the gauge reading is high, open the adapter needle valve, allowing nitrogen to escape until the desired pressure is reached. If the gauge reading is low, reestablish the normal pressure by adding nitrogen.

TO ADD NITROGEN TO THE COUNTERRECOIL MECHANISM. - Attach the couplings of the filling pipe to the cylinder of compressed nitrogen and filling valve body.

Open the gauge cock valve by screwing in the pressure gauge adapter stem. Be sure the gauge is registering

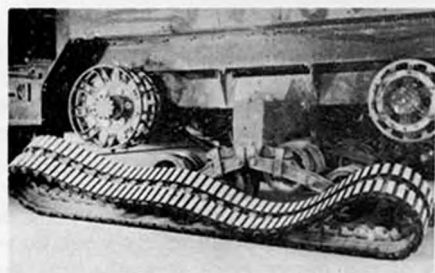
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Automotive

Conducted by:
J. W. WINSLOW,
M. Sgt., Ord. Dept.

PROCEDURE FOR REMOVING BOGIE SPRINGS (C86011)



① Remove track. —————→



② Bogie Spring compressing tool is placed on Bogie Bracket Assembly (D48423). —————→

on Car, Half Track, M2,
Personnel Carrier, M3,
and Mortar Carrier, M4.



③ Screw bolts into Spring Block (C86014). (Be sure that the bolts are screwed in sufficiently to prevent stripping of threads as Bogie Springs are compressed.) —————→



←—————④—————→

Compress Bogie Springs by using ratchet and socket so that Bogie Crab Assembly (040407) is raised about 1/2" above Bogie Arm Tie Bolt (C86015). (Photos show Car blocked up.)



⑤ Remove Nut (A215353) from Bogie Arm Tie Bolt and Nut (A215353) from Bogie Frame Shaft (C86017). —————→

⑥ Loosen Bogie Arm with puller, being careful not to pull Arm out too far. A wedge instead of a puller may be used between the Bogie Arm and Bogie Frame. Use as close to bolt as possible. —————→



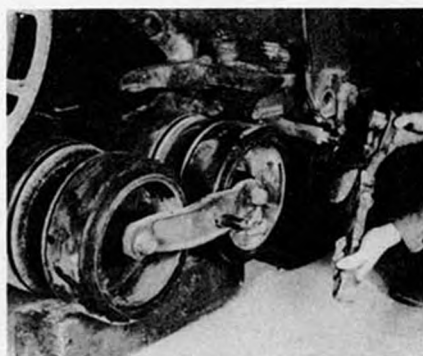
Text by A. L. Hettrich,
1st Lt., Ord. Dept.

Photo sequence by
J. E. Veech, Tech. Sgt., Ord. Dept.

Photos by Photographic Section
The Ordnance School

7

Remove
Bogie Arm
(C86087) or
(C86088).



8

Remove Bogie Tie Bolt (having previously removed Nut from inner side). _____

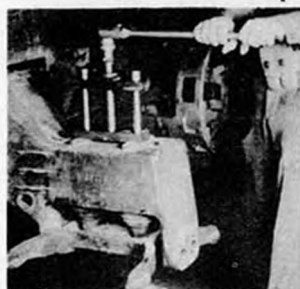
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Inner Bogie Arm may then be removed.
The other Bogie Assembly is removed
by procedure in items 4 to 8.



10

Release tension on
Bogie Springs. ↘



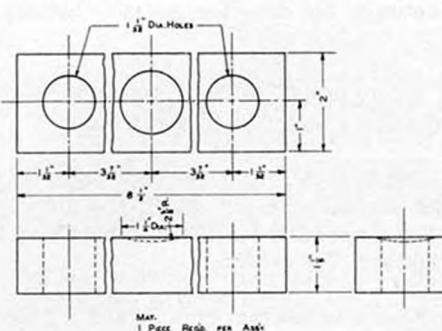
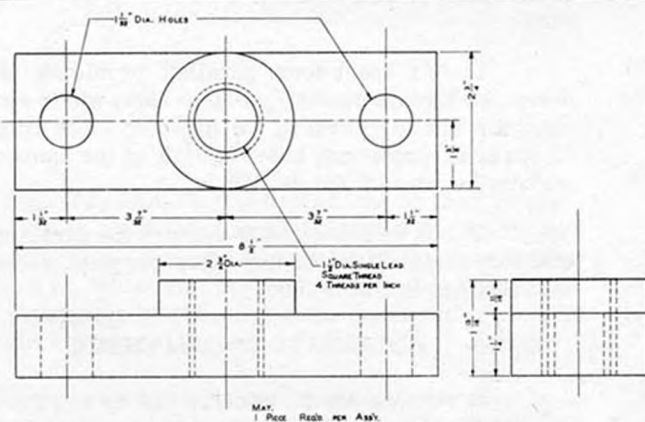
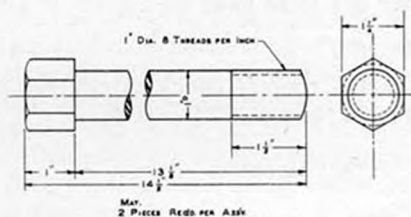
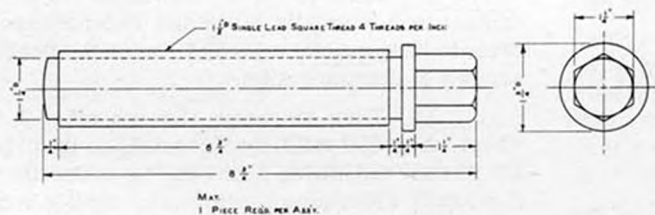
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Ⓜ The Bogie Springs and Bogie Crab must be left slightly compressed by use of blocks so that the removal of the Bogie Spring Compressor is not hindered by any tension on the Compressor Bolts.



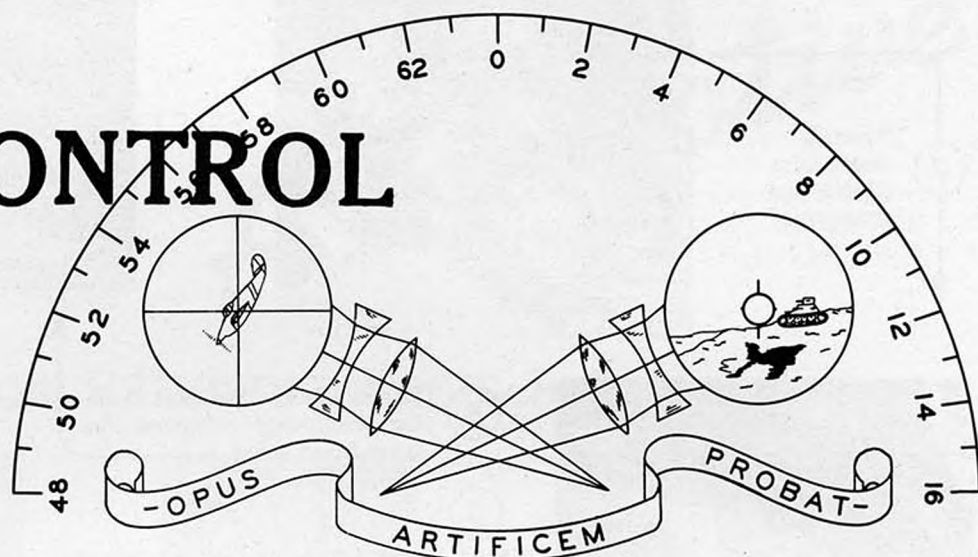
12

Replacement of the Springs and other assemblies, is a reversal of the procedure shown here.



FIRE CONTROL

Conducted by:
R. L. JOHNSON,
Captain, Ord. Dept.



EXCESSIVE PARALLAX, DIRECTOR, M4

For tactical or geographical reasons it sometimes will be found necessary to increase the amount of horizontal parallax between the director (or external tracker, if used) and emplacement of the gun battery above the maximum obtainable from the parallax adjustments on the director. This maximum is 450 yards component parallax along any of the four cardinal headings, i.e., North, South, East and West. The component parallax may be increased by internal adjustments within the director to several thousand yards, if necessary. However, it is not recommended that values in excess of 1000 yards be ordinarily attempted.

Directors internally adjusted for parallax should be marked with a note stating the amount of internal parallax set in. Test problems involving this amount of parallax are to be computed and set into the director as a check for operation at regular intervals. The following instructions are to be used as a guide in making this adjustment.

1. Make contact check as outlined on Page V-19 of the technical manual, TM 9-1655.

2. Orient director.

3. With orienting clutch in, point director at the battery directing point, using the azimuth tracking telescope, and block the A_0 handwheel.

4. Set in on R_0 counter the measured horizontal distance between the director and the battery, plus 5000 yards.

5. Apply power to the director through the motor switch and allow prediction to settle out.

6. Set in a lateral right spot equal to the drift in mils of the ammunition for which the director is fitted. This is a flat correction for drift. Values may be obtained from the table in TM 9-1655.

7. Check to see that both R_p and AT agree with R_0 and A_0 within 30 yards. (Mils converted to yards for angle

of train differences.)

8. Remove right side cover plate.

9. Block the N-S and E-W contacts with paper.

10. Put a jumper on 14 and R2 on the quadrant switch.

11. By means of the motor switch, turn power on until the R_p dial reads exactly 5000 yards, then turn power off.

12. Remove jumper. Turn on motor switch and allow director to run for approximately one minute, then turn power off.

13. Remove paper, loosen the three screws in the contact arm clamping discs and recentralize both contact arms to hang exactly midway between the contacts. Tighten screws of clamping disc.

14. Turn on power and set off with the A_0 handwheel, about 200 mils, then reset A_0 to its original setting. AT should not differ from A_0 by more than +30 yards, (i.e., mils difference converted to yards); then set off with the R_0 handcrank, about 500 yards, and then reset R_0 to its original setting and R_p should read 5000 yards +30 yards.

15. At least four parallax problems should be computed for this special parallax case, one in each quadrant, for use in checking the director. For computation of parallax problems, see Page 18 of the inspection report in the rear of TM 9-1655.

16. If it is desired to restore the director to normal for checking or for any other purpose, refer to contact settings in TM 9-1655.

ALTERNATE E_0 CAM CHECK

In running the E_0 cam checks as required in Par. 44, TM 9-1655, it has been found that the use of 1/10 mil

settings in setting the E_o outer dials is very inaccurate and tedious. This is due to the fact that the E_o outer dial is graduated in units of 5 mils each. It is obvious, therefore, that setting on 1/10 mil would be extremely inaccurate.

To overcome this difficulty, a system has been devised in the A.A. Fire Control Section of the Ordnance School whereby the ranges are computed for even altitudes and even angular heights. This necessitated the computation of new tables to replace Tables III and V in Par. 44, TM 9-1655. These new tables showing the new values of range and angular heights are illustrated in Figures I and II.

E _o CAM CHECK FOR ALTITUDE SETTING (at 1000 yards altitude)						
Range in yards	:2011	:2978	:3992	:5027	:5936	:6977
True Present Angular:	:	:	:	:	:	:
Height in Mils	: 470	: 330	: 250	: 200	: 170	: 145
Range Error UP	:	:	:	:	:	:
(Ro) DN	:	:	:	:	:	:

FIGURE I

ALTERNATE E _o CAM CHECK						
H _o	: 2011	: 2978	: 3992	: 5027	: 5936	: 6977
1000	: 470	: 330	: 250	: 200	: 170	: 145
UP:	:	:	:	:	:	:
DN:	:	:	:	:	:	:
R _o Error	:	:	:	:	:	:
2000	: 2000	: 2993	: 4022	: 4966	: 5956	: 6961
	: 800	: 600	: 470	: 390	: 330	: 285
UP:	:	:	:	:	:	:
DN:	:	:	:	:	:	:
R _o Error	:	:	:	:	:	:
3000	: 2005	: 3000	: 4004	: 5005	: 6034	: 7046
	: 1000	: 800	: 655	: 550	: 470	: 410
UP:	:	:	:	:	:	:
DN:	:	:	:	:	:	:
R _o Error	:	:	:	:	:	:
4000	: 1989	: 2997	: 4000	: 5023	: 5986	:
	: 1130	: 945	: 800	: 685	: 600	:
UP:	:	:	:	:	:	:
DN:	:	:	:	:	:	:
R _o Error	:	: 2997	:	:	:	:
5000	: 2014	: 1050	: 3982	: 5000	:	:
	: 1210	:	: 915	: 800	:	:
UP:	:	:	:	:	:	:
DN:	:	:	:	:	:	:
R _o Error	:	:	:	:	:	:
6000	: 2015	: 2983	: 4009	:	:	:
	: 1270	: 1130	: 1000	:	:	:
UP:	:	:	:	:	:	:
DN:	:	:	:	:	:	:
R _o Error	:	:	:	:	:	:
7000	: 2011	: 2980	:	:	:	:
	: 1315	: 1190	:	:	:	:
UP:	:	:	:	:	:	:
DN:	:	:	:	:	:	:
R _o	:	:	:	:	:	:

Figure II

Table IV, Par. 44, TM 9-1655 can be used to compute changes to the H_o dial and R_o Counter due to the fact that the differences obtained in ranges with the new angular heights are so small that the added error due to this difference in angular heights and consequent differences in ranges will not exceed 1 yard.

This method still gives results which may be in error in amounts of less than 1 yard, while the method

using odd mils and 1/10 mils may be in errors as high as 10 to 15 yards due to inaccuracy of setting angular heights.

SETTING TIME OF FLIGHT SECONDARY CONTACT CHECK

In the preliminary setting of the contact controls as covered in Par. 52, TM 9-1655, the instructions state that the 1/t cam pin should project approximately 1-1/8 inches from the edge of the bearing flange. This is set so as to give a definite time of flight by which the wind rates are multiplied in the secondary contact check.

This setting of the 1/t cam pin, when multiplied by a 50 mile per hour wind rate gives a deviation in AT of approximately six mils. As the primary purpose of the secondary check is to find errors and because of the fact that a small deviation lessens the chance of any errors showing up, it is desirable to have a large deviation for a 50 mile per hour wind rate.

The most accurate method of obtaining this deviation is to first adjust the 1/t cam pin so that it is against the stop when the tip is flush with the bearing flange. Then block out the cam pin at a point which will cause the gear on the N-S multiplier disc to rotate at one revolution per second. This setting of the 1/t cam pin will give readings between 30 and 35 mils for a 50 mile per hour wind rate. This increases the probability that the error (if any) will show up and therefore is much more accurate.

Rp DIAL CORRECTION AFTER FINAL CONTACT CHECK

Par. 59i, TM 9-1655 states that if a future range dial correction is required during the final contact adjustment, it is necessary to reset the ballistic cam carriage by removing the ballistic cam and inserting the cam setting fixture.

The change as indicated in a final contact check indicates that the Rp disc and Rp dial are out of agreement. However, when the ballistic cam was set, it was set in agreement with the future range dial. This means that we now have a situation where the cam is in agreement with the dial, the dial is out of agreement with the disc, and the disc is, therefore, out of agreement with the cam. This can be better illustrated by means of a diagram as shown in Figure 1. (NOTE: Solid lines denote agreement. Broken lines denote disagreement.)

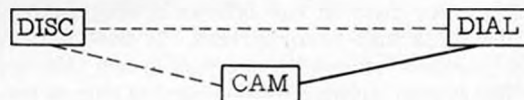
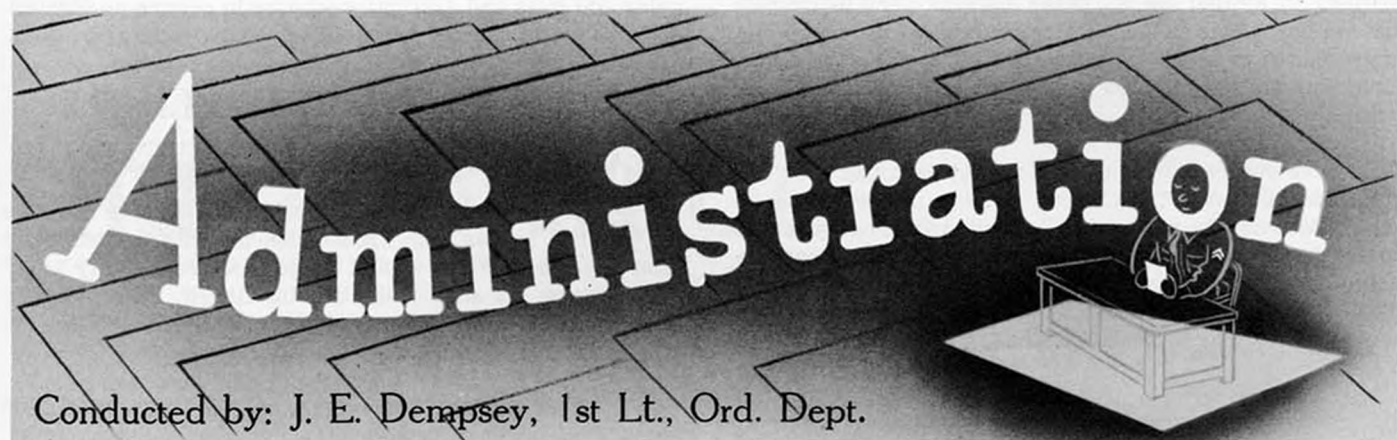


FIGURE 1.

Because of the fact that all three units must be in agreement in order that the director may function correctly, it is obvious that a change must be made to the dial to make it agree with the disc. This, however, will upset the agreement between the dial and cam, so to make this change, proceed in the following manner:

1. Set Rp to some even range (6000 yards). This sets the ballistic cam to 6000 yards.

(Continued on page 449)



Conducted by: J. E. Dempsey, 1st Lt., Ord. Dept.

FILING WAR DEPARTMENT CORRESPONDENCE FILE AND THE COMPANY FILING SYSTEM

In working with correspondence, we know that some system is needed for the preservation of papers for future reference and use. This embodies a method of filing correspondence along the lines of a system designed in such a manner as to make a particular paper readily accessible with a minimum of time and trouble.

Theoretically, papers for future use were formerly "thrown into a barrel" and any time one was needed, an extensive search was necessary. With several thousand pieces of valuable correspondence at stake, this old method cannot enter into filing in any way.

As a means of identification, papers in a file are usually given a numerical designation. In a system whereby the number used by one office or headquarters corresponds identically with the number used by several other offices to identify the same subject matter a point of perfection is being reached in that it saves time and trouble for any one handling that particular paper once it has been properly classified and numbered.

This result has been reached through the adoption and use of the "War Department Correspondence File". This method of filing is based on the Dewey-Decimal System of Library Classification, giving a particular numerical classification to each subject of human knowledge, and was devised by Mr. Melville Dewey for the operation of correspondence files in the offices of Regiments, Corps Areas and other high headquarters. It does not apply and was not intended for use by companies and like organizations. The system divides the subjects of human knowledge into not more than ten main classes, represented by the Arabic numerals 0 and 9 inclusive. These main classes were each in turn divided into not more than ten sub-classes and the sub-classes thus created were each in turn divided into not more than ten divisions of the sub-class and so on. The numerals designating the ten main classes are expressed in numbers of three digits as 000, 100, 200 and so on up to 900. The first digit on the left represents a main class, the second digit represents a sub-class of the main class and the last digit on the right represents a division of the sub-class. Further sub-divisions are made by adding additional digits to the number, separated therefrom by a decimal point.

This system not only groups all correspondence of the same subject together, but those that are closely allied with the subject will either closely precede or follow it in the file.

It is well to remember that it is the subject matter of the paper that determines its file number or classification and its subsequent place in the file.

The nine (9) main classes and the subject matter they represent are:

Class 000 - General.

Class 100 - Finance and Accounting.

Class 200 - Personnel.

Class 300 - Administration.

Class 400 - Supplies and Equipment.

Class 500 - Transportation.

Class 600 - Buildings and Grounds.

Class 700 - Medicine, Hygiene and Sanitation.

Class 800 - Rivers and Harbors.

and Class 900 - which has no subject assigned at the present time.

In the following we have a brief description of the subject matter to be found in each main class.

Class 000 - General. - This class is what the name implies, it covers correspondence which is so general in application it cannot be properly classified as belonging to any other class. Such general subjects are: Politics, religion, crimes and criminals, weights and measures,

by-

H. S. Smith, T. Sgt., Ord. Dept.,
Savanna Section, The Ordnance School

fine arts, laws and legal matters, statistics, maps, societies and organizations such as the Red Cross and the Y.M.C.A., etc. There is also a place in the general class for filing indexes of new subjects which may arise and a precedent file for decisions and papers which form precedents.

Class 100 - Finance and Accounting. - This class covers all subjects of a fiscal nature such as appropriations, accounting for property and supplies, letting of contracts and other subjects of this nature.

Class 200 - Personnel. - This class covers all subjects pertaining to persons, either commissioned officers, enlisted men, civilian employees or civilians. The number 200 takes in all matters affecting pay and allowances, discipline, trials by Courts-martial and questions of race, funerals and burials and other matters relative to personnel. The number 201 is used to file papers relative to a particular individual, either officer, enlisted man or civilian, and within this number 201, the file is arranged alphabetically by the names of the men.

Class 300 - Administration. - Under this number are filed all papers which have as their subject matter all matters of administration (except discipline) such as business methods and procedures, military control, inspections, honors and ceremonies, education and training including Army Schools and Staff Colleges, maneuvers, plans and preparation for war.

Class 400 - Supplies, Equipment and Services. - The first part of the 400 class is used for the different things that may happen to supplies and equipment, such as selection, sale, purchase, manufacture, and distribution and may be processed with the latter part of the class which deals with the supplies themselves, such as machines, tools, clothing, subsistence supplies, telephone and telegraph services and various other services.

Class 500 - Transportation. - This group comprises all subjects pertaining to the transportation of persons or supplies, either by land or water; tariff rates, transportation accounts and contracts, Army Transport Service and harbor boat service.

Class 600 - Buildings and Grounds. - This class is similar to the 400 class in that the first part of the class is taken up with the different things that may happen to buildings and grounds; such as the construction, repair and protection of them, and the latter part deals with the specific kinds of buildings and grounds. In this class, subjects such as reservations, target ranges, barracks, hospitals, and fortifications, etc. are covered.

Class 700 - Medicine, hygiene and Sanitation. - This class deals with all matters affecting the health and sanitation of the Army; hospitals, surgery, examinations, etc.

Class 800 - Rivers and Harbors. - The 800 class also resembles the 400 class in that the first part deals with the things that are done to rivers and harbors while the latter part treats the specific things, such as rivers, lakes, harbors, piers, bridges, wharves, etc.

Class 900 - Covers no specific subjects, but is used to file subjects of a miscellaneous nature that do not apply to any of the other classes.

The use of any or all of these classes is not confined to any office for which the system is authorized, but no attempt should be made to confine the classification of correspondence to any one class, to the exclusion of the other eight.

Before a person can attempt to classify or otherwise file papers under this system, he must have an understanding of the subject matter presented in the paper and fully understand the procedure of assigning classification. Any attempt to assign classifications without a full understanding of the system will cause confusion and result in having papers erroneously filed. To prevent such conditions arising, officers and clerks charged with the operation of the system should make a careful study of the principles of its operation as set forth in the book entitled, "War Department Correspondence File", as printed in the Government Printing Office at Washington, D. C. The system is simple, and by careful study and application its principles can be grasped in a few days.

As an aid to classification, the person studying the system should make a point of learning the ten main classes and the type of subject matter covered by each. In this way, a subject will readily fall into a main class without further reference.

In thinking or speaking of the class numbers, always divide at the decimal point and name the decimal point; for example, 470.4 should be thought of or spoken as four seventy POINT four. If the point was omitted, it would be possible for someone listening to you to interpret 470.4 as 474.

The words opposite the file numbers in the War Department Correspondence File book represent the subjects of the papers and not the names of them. In this respect, all correspondence should be filed according to its subject and not by the name of it or what it might be. For an example: 300.4 is "Orders" but in this group not an order will be filed. The orders will be filed by their subjects or purpose of the order under the subjects, for instance, orders for a change of station of the Seventeenth Infantry from Madison Barracks, New York to Fort McPherson, Georgia would be filed under Seventeenth Infantry, 370.5, (Assignments, Change of Stations) as being its proper classification.

As the system is put to use, it will be found that many pieces of correspondence have a subject that would warrant its being filed correctly under two or more subjects or classification numbers. In such a case, it will be decided which subject is most definite and concrete, and the papers filed under that number and sheets placed under the other numbers identifying the number or subject under which the correspondence has actually been filed, as a cross reference.

In some cases, papers will be incorrectly classed under an improper subject. At the time when they are properly classified and moved to their proper file, a sheet should be placed under the old number designating the present location of the paper in the files. This will avoid much confusion at the time when the paper will be looked for under its old classification.

There will be some subjects for which no specific classification has been made. In this case, the corre-

(Continued on page 450)



USE OF THE STANDARD NOMENCLATURE LIST

Conducted by: J. E. Dempsey, 1st Lt., Ord. Dept.

The Standard Nomenclature List contains a wealth of information for those who know how to extract it. While the SNL can not be considered to be difficult to understand, yet a certain amount of understanding must be had of the pattern or scheme by which the Ordnance Catalog is compiled if one is to make the fullest use of the publication. It is for the benefit of the soldier, new to the Ordnance Department, who is not yet familiar with the Standard Nomenclature List that this article is published.

By: Amos L. Prouty, M. Sgt., Ord. Dept.

The Ordnance Catalog and the Standard Nomenclature Lists included therein are primarily lists of parts and equipment for use in the requisitioning, supply, and procurement of Ordnance Materiel. They constitute also a system of uniform nomenclature for Ordnance materiel. The Standard Nomenclature Lists contain such information and data as is necessary to aid Ordnance personnel in their various activities and transactions within the Department including storage, issue and accountability. These lists are supplements to Tables of Organization, Tables of Allowances, and Tables of Basic Allowances, and are the medium through which the details of allowances not shown in these tables are published.

Ordnance items are classified in the Ordnance Catalog into alphabetical groups according to their use or characteristics. The Ordnance Publications for Supply Index (OPSI) lists the several lettered groups and describes the type of articles belonging to each letter classification. A very brief description of the several groups is as follows:

GROUP A - Automatic weapons, small caliber cannon, light mortars, and parts and equipment pertaining thereto.

GROUP B - Small arms, hand arms, semiautomatic rifles, etc. and pertaining parts and equipment.

GROUP C - Light and medium field artillery and pack artillery and pertaining parts and equipment.

GROUP D - Heavy field artillery beginning with 155mm guns, and antiaircraft guns, 3-inch and up, with pertaining parts and equipment including sub-caliber guns.

GROUP E - Railway artillery including cannon, cars, cranes, and artillery for permanent emplacements, with pertaining parts and equipment.

GROUP F - Fire control equipment including sighting, range finding, and observation optical instru-

SNL B-1

THE ORDNANCE CATALOG
(ORDNANCE PROVISION SYSTEM)

GROUP B

ORDNANCE DEPARTMENT,
WASHINGTON, OCTOBER 25, 1940.

STANDARD NOMENCLATURE LIST NO. B-1

MAJOR ITEMS

(Supersedes Standard Nomenclature List No. B-1, October 7, 1938)

For full information relative to standard nomenclature lists, the procedure followed and the principles employed in their compilation, together with the purposes and uses thereof, see Introduction to The Ordnance Catalog.

CONTENTS

Major Items	-----	Page
Notes	-----	1
Use of Prices	-----	2
		5

Note Symbol	S.N.L. No.	Item	Unit Price
	B-8	BAYONET, M1917 -----	\$ 4.13
	B-8	BAYONET, M1905 -----	3.20
(c)	B-13	HELMET, steel, M1917 -----	2.75
(c)	B-13	HELMET, steel, M1917A1 -----	4.90
	B-6	PISTOL, automatic, cal..45, M1911 -----	26.42P
	B-6	PISTOL, automatic, cal..45, M1911A1 -----	26.97P
	B-18	PISTOL, pyrotechnic, M2 -----	26.58P
(g)	B-23	PISTOL, Very, 10-gage, Mk. III -----	6.25P
(g)	B-12	PISTOL, Very, 25 mm, Mk. IV -----	10.36
(g)	B-19	PROJECTOR, signal, ground, M1 -----	43.12
(g)	B-24	PROJECTOR, signal, ground, M3 -----	3.97
(g)	B-24	PROJECTOR, signal, ground, M4 -----	
	B-7	REVOLVER, Colt, cal..45, M1917 -----	14.50P
	B-7	REVOLVER, S. & W., cal..45, M1917 -----	16.15P
(n)	B-17	RIFLE, U.S., cal..22, M1922 -----	58.26
(n)	B-17	RIFLE, U.S., cal..22, M1922M2 -----	59.16
(n)	B-17	RIFLE, U.S., cal..22, M1922M1 -----	58.58
(nra)	B-17	RIFLE, U.S., cal..22, M1922M1 (N.R.A.) -----	58.71
(n)	B-17	RIFLE, U.S., cal..22, M1922M1 (N.R.A.) -----	59.61
(n)	B-17	RIFLE, U.S., cal..22, M2 -----	59.90
(a)	B-3	RIFLE, U.S., cal..30, M1903 -----	47.65
(pg)	B-3	RIFLE, U.S., cal..30, M1903A1 -----	48.58
(nm)	B-3	RIFLE, U.S., cal..30, M1903A1, national match -----	57.81
(st)	B-3	RIFLE, U.S., cal..30, M1903A1, special target -----	53.43
(m)	B-3	RIFLE, U.S., cal..30, M1903, style "T", 30-inch heavy service barrel -----	97.75

ments; watches, time interval recorders, and lighting devices for fire control equipment.

GROUP G - Tanks, tractors, half track trucks, trailers, scout and armored cars; tank and combat car trainers, etc.

GROUP H - Standard and miscellaneous hardware, leather straps, and findings; hose, pipe, and electrical fittings; miscellaneous piece material (screen, tape, duck, etc.); Metal stock; standard bearings.

GROUP J - Standard tools, machines, and tool appurtenances.

GROUP K - Materials for cleaning and preservation of Ordnance general supplies and ammunition; Special oils, greases, welding compounds, and related items for Ordnance maintenance work.

GROUP L - Targets and target material for construction and operation of target ranges.

GROUP M - Electrical apparatus units and parts; Miscellaneous accessory units and parts; component parts common to two or more groups; miscellaneous semi-special bulk material; Chests, tool rolls, etc.

GROUP N - Units of equipment, assemblages, and materials not otherwise classified.

GROUP P - Ammunition for medium and major caliber seacoast artillery, railway and heavy field artillery, anti-aircraft, and subcaliber ammunition for these types of artillery.

GROUP R - Minor and medium caliber ammunition for mobile artillery and trench mortar.

GROUP S - Grenades, pyrotechnics, aircraft bombs, and components.

GROUP T - Small arms and automatic gun ammunition.

GROUP V - High and low explosives and raw materials therefor. (Stored for manufacturing service, not for issue), (Transferred to ammunition Division Industrial Service).

GROUP W - All types of components of ammunition and miscellaneous materials for manufacturing thereof; packing materials and containers therefor. (Stored for manufacturing service, not for issue) (Transferred to Ammunition Division, Industrial Service)

OGS GROUP - (Obsolete General Supply) General supplies that have been officially declared obsolete.

It should be noted that groups V and W are items which are not for issue and therefore will be of little concern to the man in the field.

After being classified into one of the several general groups designated by a letter, materiel is further subdivided into numbered Standard Nomenclature Lists. For

example: Group B is sub-divided into numbered lists, one for each of the major items in the B group, such as B-3 for RIFLE, U.S., Cal. .30, M1903; M1903A1 - parts, equipment, and appendages, and B-6 for PISTOL, automatic, cal. .45, M1911 and M1911A1 - parts and equipment. Also there may be other numbered lists under each group such as B-15 for items common to two or more group B products.

The Ordnance Publications for Supply Index (OPSI) lists all of these numbered lists under each lettered group giving the last publication date of each and indicates what changes, if any, have been published to each. It will be noted therein that some numbered lists shown in the OPSI have had nothing yet assigned to them. Others that have been assigned have not been published, such as B-16 which lists Arms Chests, Arms Lockers, Arms Racks, etc. Due to the system of cross reference used in the Ordnance Catalog, all necessary information concerning arms racks etc., may be found in other numbered lists which makes the publication of the B-16 list unnecessary. This cross reference system will be described later in this article.

Standard Nomenclature Lists in Groups A to G inclusive follow substantially the same pattern in the presentation of their contents. Normally the first Standard Nomenclature List in each Group is the index to major items in that group and gives a cross reference to the numbered list which describes in detail any particular

SNL B-6					
PISTOL, AUTOMATIC, CAL. .45, M1911 AND M1911A1					
Note symbol	Plate No.	Piece mark or drawing No.	Item	Quantity per unit assembly	Unit price
			EQUIPMENT—Continued		
			Accessories for pistol—Continued		
		D6436	HOLSTER, pistol, M1 (canvas) (issued when canvas holster is desired).....	—	\$0.82
		20-17-48	HOLSTER, pistol, M1916 (leather).....	1	1.98
		D35400	KIT, cleaning, pistol, M1912, w/contents, complete (Containing: 10 BRUSH, thong, 1 CAN, brass, diam. 3 in., depth ¾ in., 1 OILER, circular, flat, brass, 2½ in. spout, 3-oz. (w/cap and chain), 10 ROD, cleaning, cal. .45, M4, 10 SCREWDRIVER, pistol.)	1	5.34 P
		20-20-6	KIT, cleaning, pistol, M1912.....	(b)	1.60 P
		C64148	LANYARD, pistol, M1.....	1	.56
		20-18-48	LANYARD, pistol, M1918 (issued in lieu of M1 lanyard until supply is exhausted).....	—	.20
		C64151	OILER, circular, flat, brass, 2½ in. spout, 3-oz. (w/cap and chain).....	(b)	.67 P
		C64102	ROD, cleaning, cal. .45, M4.....	(b)	.08 P
		C64149	SCREWDRIVER, pistol.....	(b)	.15 P
			Accessories for Posts, Camps, and Stations		
			(Not taken upon permanent change of station)		
		49-1-18	LOCKER, arm, M1 (capacity 50 pistols).....	1—	10.75
		D7453	RACK, arm, pistol, M1920.....	1—	47.10
			Articles for Instructional Purposes		
			(Not taken into the field)		
		B6253	CARTRIDGE, dummy, cal. .45, M1921.....	50	(p)
		—	CHART, instruction, Automatic Pistol, cal. .45, M1911 and M1911A1— (Consisting of 1 plate—Ord. 11843).....	1	.26 P
			Ammunition		
		B503	CARTRIDGE, ball, cal. .45, M1911.....	(a)	(p)
			PARTS FOR ACCESSORIES		
			For Holster, Pistol, M1 (Canvas) (D6436)		
		—	BINDING (See WEBBING).....	(1)	.04
		D6437A	BODY (See DUCK).....	(1)	.20
		—	CAP, rivet, ¾ in. O. D.....	1	.01 P
		—	DUCK, cotton, plied-yarns, type I, numbered, old, med., No. 1, yd. (issued and cut as required in replacement of BODY—D6437A).....	—	.50 P
		—	EYELET, No. 4211, w/washer No. 4096.....	3	.01 P

¹ Per 50 pistols or major fraction thereof; minimum of 1 per organization.

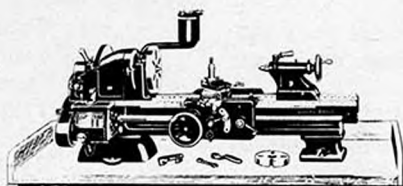
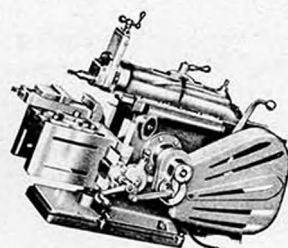
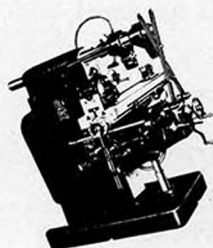
² Issued only to EM of Cavalry and Mounted Engineers armed with pistol.

³ Quantity sufficient for Arms issued.

⁴ Per combat organization armed with pistol.

PLATE 3.—AUTOMATIC PISTOL. CAL. 45. MINIMAL-CROSS SECTIONED

THE MACHINE SHOP



Conducted by: F. P. Bingert, T. Sgt., Ord. Dept.

TRAINING THE ORDNANCE MACHINIST

By — F. P. Bingert and G. E. Tibbetts,
Technical Sergeants, Ord. Dept.

In the April issue, our students completed their bench work. The next phase of the course will cover the "Engine Lathe". Each student is now assigned a lathe, equipment, and tool box. The students are then divided into small groups, with an instructor attached to each group.

For the next day the instructor, with his group, covers the lathe completely, including nomenclature, types, capacity, function of various groups, care and maintenance, safety precautions, speeds and feeds, attachments, and different methods of mounting work.



After the instructor is thoroughly convinced that the students understand the theory of the lathe, he then instructs the class in tool bit grinding. Each student is given a piece of cold rolled steel for practice grinding. This steel is the same size as the regular high speed tool bit. The reason cold rolled steel is used is because it is much cheaper to burn up and grind away on an emery wheel than high speed steel. After a student has produced a tool bit that will cut efficiently, he is then given a high speed steel tool bit to grind, which he will actually use on the problems that follow.

The instructors, under the observation of their students, then proceed to demonstrate various elementary set-ups such as facing, straight turning and center drilling. During this demonstration each student is given the opportunity, under the supervision of the instructor, to operate the machine with these various set-ups. The more complicated operations are taken up in the same manner as the course progresses.

The following is a description of the common Engine Lathe which includes operations, capacity and purpose.

1. Purpose.

A machine for producing cylindrical, conical, spherical, and helical surfaces in metals.

2. Description.

The "backbone" of the lathe is the bed, on one end of which is mounted the headstock, containing the spindle and some mechanism, either gears or a step-cone pulley, for revolving the spindle at various selected speeds. The spindle is threaded at one end to take various types of chucks and face plates for holding the work. At the other end of the bed is the tailstock, used primarily for supporting the outer end of long pieces of work. Straddling the bed, between the head and tailstocks, is the carriage, the purpose of which is to carry the tool in the direction desired. Power is delivered to the carriage through the apron by the leadscrew, mounted on the front of the bed. The lead-screw in turn receives its power from the spindle through the stud and sector gears (at the back end of the headstock) and the quick change gear box. The purpose of the gear box is to allow selection of the desired rate of motion for the carriage.

3. Operations.

Many types of work can be done on the engine lathe, but all are either one of the following basic operations or a combination of two or more of them.

a. Threading. The cutting of a screw thread on an internal or external surface of a cylindrical or conical piece of work.

b. Facing. The cutting of the work by moving the tool across the bed. The cross feed or the compound rest is used in this operation.

c. Turning. The cutting of the work by moving the tool the length of the bed. The long feed is used in this operation.

d. Drilling. The making of holes in the work with a twist drill held either in a tailstock chuck or a drill holder.

e. Boring. The making of holes in the work by cutting internally with a tool bit held in a boring bar.

f. Taper turning, and boring. The same as turning or boring except that the direction of motion of the tool is modified by use of the taper attachment so as to produce a tapered or conical surface.

4. Cutting.

Cutting is accomplished by revolving the work and moving the tool at a controlled rate and direction in a plane running horizontally through the axis of the work.

5. Size.

The size of a lathe may be given in either of two different ways. The first is to give the largest diameter of work that the machine can handle in inches and the length of the bed in feet. For example: 14" x 6', which means that the machine has a fourteen-inch swing and that the bed is six feet long. This is not a very good method since it gives no idea of how long a piece of work the machine will handle. The better method is the one giving the swing in inches and the distance between centers (head and tailstock) in inches. For example: 14" x 30", which means that work thirty inches long or fourteen inches in diameter can be handled.

On these pages are drawings showing the types of problems which our students are compelled to complete. They cover every basic operation on the lathe.

The Stud and Nuts cover the following operations:

- Center drilling
- Facing
- Threading (right and left hand)
- Knurling
- Chamfering
- Necking
- Boring
- Internal threading (right and left hand)
- Chucking

The "T" Bolt covers the following operations:

- Chucking
- Center drilling
- Turning
- Threading
- Facing
- Necking

The Lathe Center covers the following operations:

- Chucking in 4 jaw independent chuck
- Center drilling
- Turning
- Taper turning
- Angular turning with the compound rest.

The Pin Punch covers the following operations:

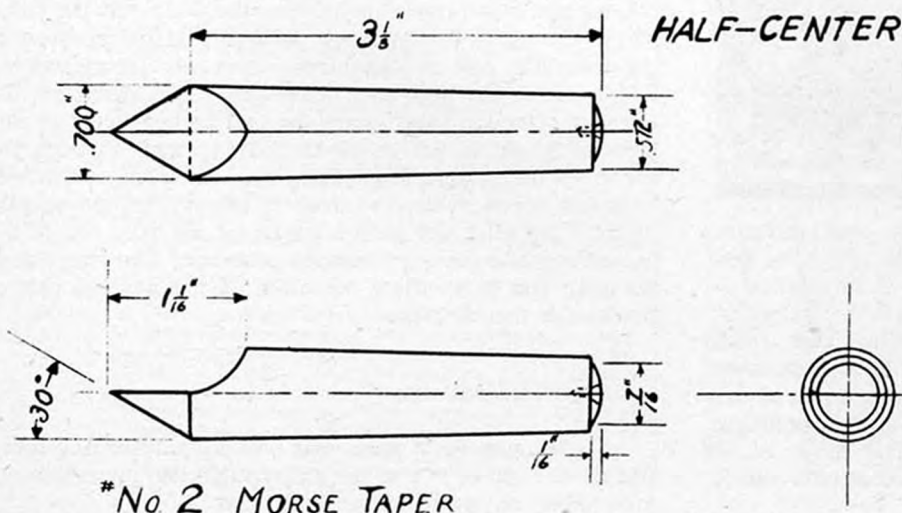
- Knurling
- Turning
- Facing
- Radius turning

The Lathe Mandrel covers the following operations:

- Turning
- Center drilling
- Facing
- Tool Post Grinding

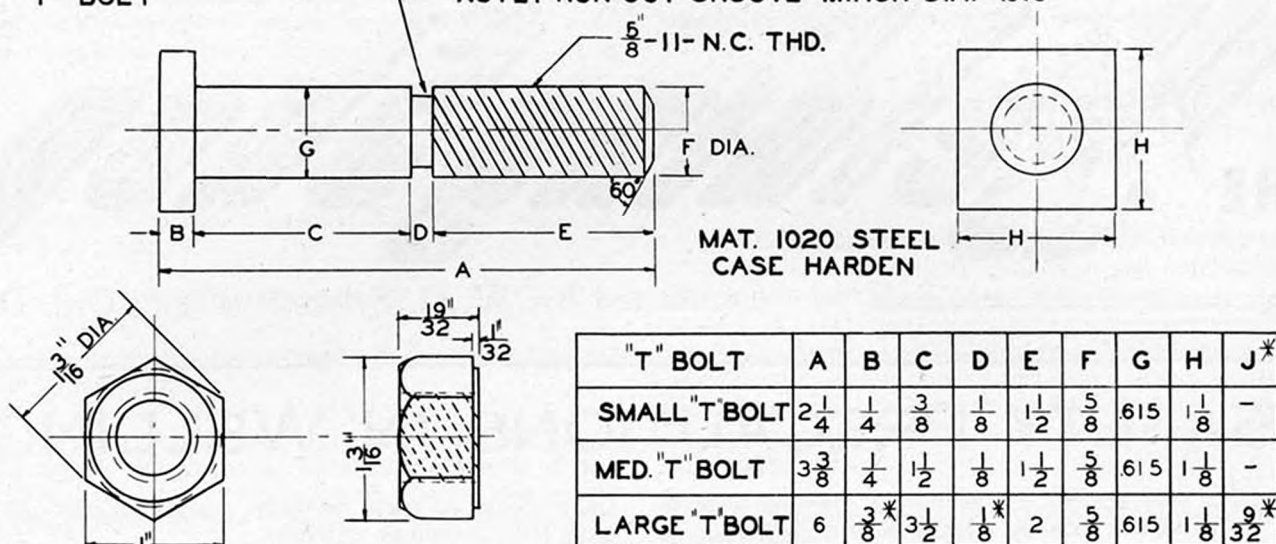
The above mentioned problems cover every operation necessary on the lathe with which we feel our students will come in contact in the future. The following problems are extra, being used only to help students gain experience.

- Steel Shaft
- Cast Iron collar
- Tap blank
- Beam trammels



"T" BOLT

NOTE: RUN OUT GROOVE-MINOR DIA. -.010



LOWER DRAWING FOR "T" BOLTS
LONGER THAN 4" IN LENGTH

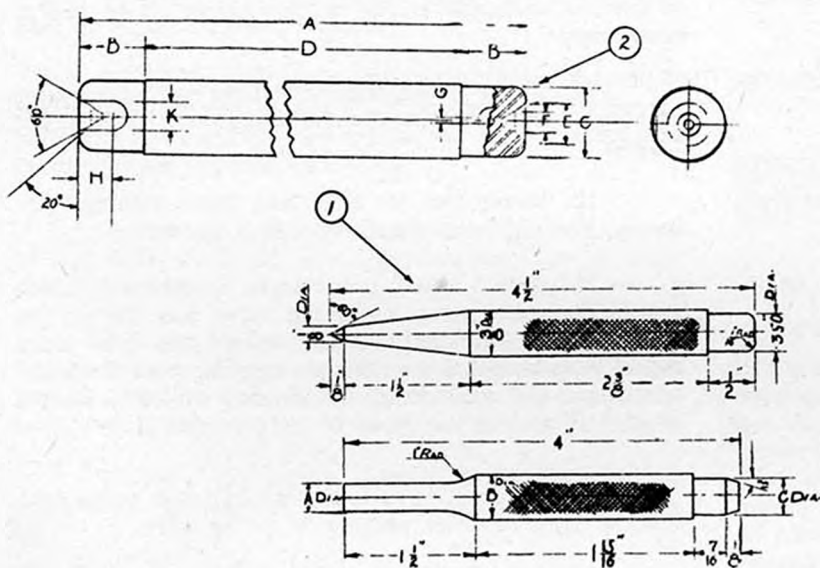
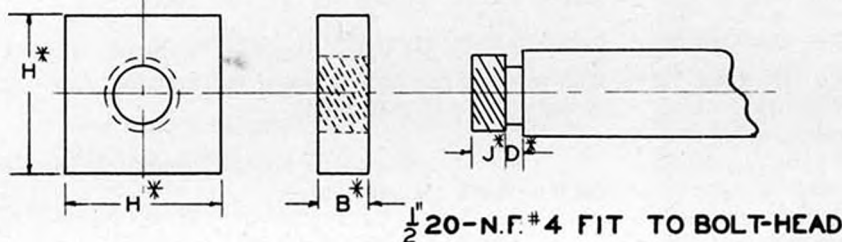


TABLE OF PIN PUNCH SIZES

PUNCH NO.	DIA-A.	DIA-B.	DIA-C.
1-1/16	.0625	.325	.300
2-3/32	.0837	.325	.300
3-1/8	.1250	.325	.300
4-5/32	.1562	.325	.300
5-3/16	.1875	.325	.300
6-7/32	.2187	.325	.300
7-1/4	.250	.375	.350
8-5/16	.3125	.425	.400

① PIN PUNCH

② MANDREL



NOMINAL DIA.	A	B	C	D	E	F	G	G	H	K
3/16	3-1/4	5/16	5/32	2-5/8	5/64	5/64	56	3/32	1/8	
1/4	3-3/4	7/16	7/32	2-7/8	11/64	1/8	1/16	52	7/32	5/32
5/16	4	7/16	9/32	3-1/8	7/32	1/8	1/16	52	1/4	3/16
3/8	4-1/4	1/2	11/32	3-1/4	1/4	5/32	1/16	52	9/32	1/4
7/16	4-1/2	1/2	13/32	3-1/2	1/4	5/32	1/16	52	9/32	1/4
1/2	5	9/16	15/32	3-7/8	5/16	3/16	5/64	47	5/16	9/32
9/16	5-1/4	9/16	17/32	4-1/8	5/16	3/16	5/64	47	5/16	9/32
5/8	5-1/2	5/8	19/32	4-1/8	13/32	7/32	5/64	47	5/16	9/32
11/16	5-3/4	5/8	21/32	4-1/2	3/8	7/32	5/64	47	3/8	5/16
3/4	6	3/4	23/32	4-1/2	7/16	1/4	3/32	42	3/8	5/16
13/16	6-1/4	3/4	25/32	4-3/4	15/32	1/4	3/32	42	13/32	5/16
7/8	6-1/2	13/16	28/32	4-7/8	17/32	9/32	3/32	42	13/32	3/8
15/16	6-3/4	7/8	29/32	5	17/32	9/32	3/32	42	7/16	3/8
1	7	7/8	31/32	5-1/4	9/16	5/16	3/32	42	7/16	3/8
1-1/16	7-1/4	7/8	1	5-1/2	9/16	5/16	3/32	42	7/16	7/16
1-1/8	7-1/2	1	1-1/16	5-1/2	9/16	5/16	7/64	38	15/32	7/16
1-3/16	7-3/4	1	1-1/8	5-3/4	5/8	11/32	7/64	38	15/32	7/16
1-1/4	8	1	1-3/16	6	5/8	11/32	7/64	38	15/32	1/2
1-5/16	8-1/4	1	1-1/4	6-1/4	11/16	3/8	7/64	38	1/2	1/2
1-3/8	8-1/2	1-1/8	1-5/16	6-1/4	11/16	3/8	7/64	38	1/2	1/2
1-7/16	8-3/4	1-1/8	1-3/8	6-1/2	3/4	3/8	7/64	38	1/2	9/16
1-1/2	9	1-1/8	1-7/16	6-3/4	3/4	3/8	1/8	28	1/2	9/16



Conducted by: W. G. Sylvester, Capt., Ord. Dept.

SAFETY PRECAUTIONS IN WELDING

The development of a proficient practical welding skill is contingent upon the satisfactory coordination of several operating variables. These necessitate a knowledge of the properties of and the heat effects upon the many weldable metals and metal structures, the selective welding procedures required for each, and a thorough understanding of the properties and uses of welding materials and equipment.

In order to more clearly define the latter and its relation to the development of welding procedure control, a survey has been made of the more important safety precautions pertinent to welding. These have been classified under oxyacetylene welding and cutting as well as electric arc welding and have been directed to insure optimum operator safety through preventative maintenance and safe handling of welding equipment.

SAFETY PRECAUTIONS — OXYACETYLENE WELDING AND CUTTING

ACETYLENE CYLINDERS

1. Call acetylene by its full name "acetylene" and not by the word "gas". Acetylene is far different from city or furnace gas.

2. Acetylene cylinders should be stored in an upright position. Do not lay them on their sides.

3. Acetylene cylinders should be stored in a well protected, well ventilated and dry place, well away from highly combustible material such as oil or paint. Do not store the cylinders near stoves, radiators, or furnaces. The heat will increase the pressure and it may melt or blow out the safety plug in the acetylene cylinder. Outlet valves which have become clogged with ice should be thawed with warm water. Do not use scalding water or an open flame.

4. Acetylene cylinders should be handled carefully to avoid damage to the valves or fuse plugs and cause leakage. Do not drop or handle the acetylene cylinders roughly.

5. Never use acetylene from cylinders without reducing the pressure through a suitable pressure-reducing regulator.

6. Acetylene is a highly combustible fuel gas.

Care should be taken to keep sparks, flames and heat away from acetylene cylinders.

7. Always open acetylene cylinder valve slowly to avoid strain on the regulator gauge recording the cylinder pressure. Be sure the regulator tension screw is released before opening the cylinder valve.

8. Do not open acetylene cylinder valves more than one and one half turns of the spindle. One-half turn of the spindle is sufficient.

9. Always use the special T-wrench provided for the acetylene cylinder valve.

10. Leave this special wrench in position on the stem of the acetylene valve while the cylinder is in use, so that the acetylene can be quickly turned off in case of emergency.

11. Never interchange acetylene regulators, hose or other apparatus with similar equipment intended for oxygen.

12. Never test for acetylene leaks with an open flame. Test all joints for leaks with soapy water.

13. Should a leak occur in an acetylene cylinder around the valve stem, close the valve and tighten the packing nut. Cylinders leaking around the fuse plugs should be taken out to the open air away from all fires and sparks and the contents of the cylinder should be wasted by slightly opening the valve.

14. Never open an acetylene cylinder valve near sparks, flame or other welding or cutting work.

15. In the free state, acetylene becomes unstable when compressed to pressures in excess of 15 lb. per square inch. At a pressure of 29.4 lb. per square inch, acetylene becomes self explosive. Do not use acetylene at pressures in excess of 15 lb. per square inch.

16. Turn the acetylene cylinder so that the valve outlet will point away from the oxygen cylinder.

17. Never attempt to transfer acetylene from one cylinder to another nor to refill an acetylene cylinder, nor to mix any other gas or gasses in acetylene cylinders.

18. When returning empty cylinders see that the valves are closed tight to prevent escape of residual acetylene or acetone solvent. Screw on the valve protecting caps.

19. If an acetylene cylinder should catch fire, it can usually be extinguished with a wet blanket. If this fails, spray a stream of water on it to keep it cool. A burlap bag wet with calcium chloride should be kept handy for such an emergency.

OXYGEN CYLINDERS

1. Always refer to oxygen by its full name "Oxygen" and not by the word "air".

2. Keep oxygen away from oil or grease. Do not handle oxygen cylinders, valves, regulators, hose or apparatus with oily hands or oily gloves. Do not cause a jet of oxygen to strike on oily surface or greasy clothes or to enter a fuel oil storage tank. OIL OR GREASE IN THE PRESENCE OF OXYGEN UNDER PRESSURE WILL IGNITE VIOLENTLY.

3. Do not store oxygen and acetylene cylinders together. They should be grouped separately, and if possible with a fire resisting wall between each group of cylinders.

4. Do not store oxygen cylinders near highly combustible materials, especially oil, grease or other inflammable materials. Oxygen will accelerate the combustion of oil or oil soaked materials or waste.

5. When oxygen cylinders are in use or being moved take care to see that the cylinders are not knocked over or struck by heavy objects.

6. All oxygen cylinders with leaky valves or safety plugs should be set aside and marked for the attention of the supplier. Do not tamper with or attempt to repair oxygen cylinder valves.

7. Do not substitute oxygen for compressed air in pneumatic tools, to blow out pipe lines, or to "dust" clothing or work.

8. Open the oxygen cylinder valve slowly to prevent damage to the regulator high pressure gauge mechanism. Be sure the regulator tension screw is released before opening the cylinder valve.

9. When the oxygen cylinder is in use, open the valve to the full limit to prevent leakage around the valve stem.

10. Do not use on oxygen cylinders any regulators, hose, or apparatus which have been designed for or used with other gases.

11. Do not drop or handle oxygen cylinders roughly.

12. Do not use a hammer or wrench to open cylinder valves. In all such instances notify the Instructor or mark the cylinders so defective for attention of the supplier.

13. Always use regulators on oxygen cylinders to

decrease the cylinder pressure to a low working pressure; otherwise the high pressure will burst the hose.

14. When not in use, the oxygen cylinder valves should be closed and the protecting caps should be screwed on tight to prevent damage to the valves.

HOSE

1. Do not allow the hose to come in contact with oil or grease. These will penetrate and deteriorate the rubber and constitute a hazard with oxygen.

2. Always protect hose from being trampled upon or run over. Avoid tangles and kinks. Do not leave the hose where anybody can trip over it and pull a connection off, or worse still, knock over the cylinders and equipment attached to it.

3. Protect the hose from flying sparks, hot slag, hot objects and open flame.

4. Never force hose connections that do not fit.

5. Do not use white lead, oil, grease or other pipe fitting compounds for making joints on hose, torch or regulator connections.

6. Examine all hose for leaks periodically by immersing the hose in water while the hose is under pressure. Do not use matches for checking leaks in acetylene hose.

7. Leaks in hose should be repaired by cutting the hose and inserting a splice. Do not use tape to repair defective hose.

8. Be certain that the hose is securely attached to the torches and regulators before using.

9. Do not use new or formerly stored hose lengths without first blowing out these hose lengths to eliminate talc or accumulated foreign matter which might otherwise enter and clog up the torch ports.

GENERAL SAFETY PRECAUTIONS

1. Use no oil or grease or any other lubricant on welding or cutting apparatus. Never allow oil or grease to come in contact with oxygen under pressure.

2. Do not experiment with or change torches or regulators in any way.

3. Always use the proper tip or nozzle and operate it at the proper pressure for the particular work involved. This information should be taken from tables or work sheets supplied with the equipment.

4. Do not permit unauthorized persons or bystanders to use oxyacetylene welding or cutting equipment.

5. Never modify or use oxygen regulators with acetylene cylinders or vice versa.

6. Do not hang a torch with its hose on regulators or cylinder valves.

7. Do not use matches for lighting torches; a serious hand burn may result. Use friction lighters, stationary pilot flames or some other suitable source of ignition.

8. Do not light torches from hot metal in a confined space. An explosive mixture of acetylene and oxygen in a confined space may cause damage or personal injury when ignited.

9. Always wear goggles when working with a lighted torch. Use only goggles designed specifically for welding use.

10. Do not weld or cut material without first making certain that hot sparks, or hot metal will not fall on the legs or feet of the operator, the hose, cylinders or any inflammable material.

11. No welding or cutting operations should be performed in wooden buildings with wooden floors unless the floors are protected from sparks and hot metal by means of asbestos paper or sand. Have a fire extinguisher on hand.

12. Keep a clear space between the cylinders and the work so that the cylinder valves can be reached easily and quickly if and when necessary.

13. Use cylinders in the order received to avoid rental charge. Store full and empty cylinders separately and mark the latter "MT".

14. Never use cylinders for rollers or supports or for any other purpose than for which they are intended.

15. Do not allow a mixture of acetylene and oxygen to accumulate in a room or confined space. Air-acetylene mixtures containing 2 to 80% by volume of acetylene will explode when ignited.

16. When not in use make certain the torch is not burning and that the valves are closed tightly.

17. All bronze welding on brass, bronze, or galvanized iron should be done in well ventilated places. This precaution is necessary to carry away the zinc fumes given off in bronze welding.

18. Where it is necessary to weld in a confined space, make certain there is proper ventilation and no trace of gasoline, acetylene or other explosive vapors present in the area. Wear woolen or other suitable fireproof clothing and have an assistant present to close the cylinder valves in cases of emergency.

19. Never weld a closed tank, container or any jacketed vessel until every precaution has been taken to vent the confined air sufficiently. This can be done by drilling the vessel or by removing any screwed-in plugs or connections; otherwise the vessel will act as a bomb. If the vessel has been used for combustible liquids or gases, as a gasoline tank, then any of the following steps may be followed to clean the vessel:

(a) Thoroughly steam the vessel until all traces of gas smell are gone, or

(b) Use either a cleaning compound or carbon

tetrachloride to clean the tank. Leave some of the latter in the tank during welding to fill the tank with its fumes and thus prevent an explosive mixture of gasoline vapor and air from forming in the tank, or

(c) Flush the tank with water and weld with the tank full to overflowing with water.

20. Do not use a lifting agent or sling to lift or move cylinders. Where a crane is used, a safe platform should be provided to hold them.

21. Don't neglect to take all fire prevention precautions — keep a fire extinguisher handy.

SAFETY PRECAUTIONS — ELECTRIC ARC WELDING

ELECTRIC ARC WELDING MACHINE

1. All checking of circuits on electric welding machines must be performed on dead circuits. The high power feed voltage of the machine may cause severe injury or even death under certain circumstances. All serious welding troubles should be investigated by a trained electrician.

2. Don't operate the polarity switch while the machine is operating under the load of a welding current. Arcing at the switch causes severe burning of the contact surfaces of the switch and may also burn the person throwing the switch. Operate polarity switch while the machine is idling.

3. The rotary switch for current settings should not be operated while the machine is operating under load. Severe burning of the switch contact surfaces will result. Operate the rotary switch while the machine is idling.

4. Do not operate motor generator without a proper power ground on the machine. Stray currents may cause severe shock to persons coming in contact with the machine and a good ground.

ELECTRICAL CIRCUITS

1. Place the electrode holder on an insulated hook or on any insulating material when not in use. A dead short circuit between electrode holder and the welding ground will result in overload and damage to fuses.

2. Gasoline driven machines should be operated in well ventilated places to avoid carbon monoxide poisoning from the exhaust gases.

3. Perform all welding operations within the rated capacity of the welding cables. Excessive heating due to overload will overheat the insulation and damage the cable leads.

4. Inspect the cables at the joints periodically for tightness and defects due to wear or other damage. Defective or loose cables are a fire hazard and operate inefficiently.

5. Defective electrode holders should be replaced and loose cable connections to the holder should be tightened to permit control of the welding operations and to avoid burning the operator.

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FORGING

Conducted by: B. L. B. Allen, 2nd Lt., Ord. Dept.

The operation of shaping or forming metal by hammering, rolling, or pressing is termed forging.

Forging consists of five different operations; drawing, upsetting, bending, twisting, and forge welding.

The process of stretching a piece of metal in one or more directions, either by hammering or by pressure, is called drawing.

By bending we usually mean the turning or forming of the iron in such a manner as to deflect it from a straight line. The finished product may be a curved or an angular piece.

In the operation of twisting an iron bar, the fibers are wound around each other. The cross-section of one end of a flat bar may be twisted at an angle to the other end, but no change occurs in the direction of the axis of the piece.

Upsetting is the operation of increasing the thickness of a piece of metal by shortening its length.

Forge welding is the process of uniting two pieces of metal into one solid piece by heating them to a welding heat in the forge fire and hammering or pressing them together.

The results obtained in forging and welding depend largely on the condition of the fire in which the work is heated. The fire must be kept clean and free from cinders or other foreign matter. The air blast should come up through the center and should pass through a solid bed of coke. The pressure of the blast should not be excessive.

The fuel for the forge fire should be good coking coal, as free as possible from sulphur, slate and other impurities. Any soft coal that crumbles easily into many-sided small particles with bright shiny surfaces is good smithing coal. However, the best way to learn a coal's coking properties is to try it and see how it cokes. Many blacksmiths do not bank the fire or make a supply of coke for future use. They merely replenish the fire and cover the iron while heating with coke which is charred around the rim of the fire. However, it is good policy to char an extra supply of coal for the purpose of adding fuel to the fire. By this method the edges of the fire are not continually being broken up for addition of fuel to the fire.

The bottom of the tuyere should be about five inches below the hearth to allow sufficient depth of fire below the piece being heated when it is level with the hearth.

THE FORGE FIRE

The pressure of the air blast should be from 2 to 7 ounces per square inch. This low pressure is not liable to injure the metal that is being heated since destructive oxidation (scaling) will occur but slowly.

The hottest part of the forge fire is located at a point 5 to 7 inches above the tuyere.

Three types of fires are used by the blacksmith: the plain open fire, the side banked fire, and the hollow fire. Each type may be either oxidizing or reducing, according to the depth of the fire and the strength of the blast. When the depth of the fire is so thin that the blast can pass through it before all the oxygen is consumed, the oxygen will attack the iron and form scale. A fire of this kind is known as an oxidizing fire. A deep fire in which all oxygen is consumed by combining with the coal before reaching the metal is known as a reducing fire. It is slow heating, but will not oxidize the metal. A reasonably thick fire just large enough to surround the piece being heated with glowing coals should always be maintained. Unburned wet coke packed around the fire will keep it from spreading.

The plain open fire is used for heating flat, wide pieces that cannot be heated in a side banked fire.

The side banked fire is for general use.

The hollow fire is not extensively used but gives an intense heat. An important use for this fire is forge welding, and also heat treating high speed tool steel which must be heated to a very high temperature, 2200° F.

The work should be placed below the top of the fire, so that oxygen of the surrounding air cannot come in contact with it; on the other hand, it must not be placed too low in the fire, or the oxygen from the airblast will come in contact with it. If the air comes in contact with highly treated iron, the oxygen in it will attack the metal, forming scale. If cinders and clinkers are allowed to accumulate they will allow the air to pass up through the fire without using its oxygen. To insure even heating, the work should be placed horizontally in the fire, with the hottest part of the fire surrounding the point that is to be heated. In the case of beginners, the work should be placed in such a position that the progress of the heating can be easily observed.

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Conducted by: L. I. Dance, 2nd Lt., Ord. Dept.

TRENCH MORTAR AMMUNITION

By:

W. L. Parker, T. Sgt., Ord. Dept.

GENERAL

Trench mortar ammunition is designed for firing from a smooth bore weapon at high angles of fire and at ranges less than those of field artillery. Such weapons and ammunition are particularly effective in stabilized trench warfare, hence this ammunition has been known as trench warfare ammunition. In the ammunition of early design, the projectile, not being stabilized, tumbled in flight. To meet requirements for greater range and accuracy, recently designed projectiles are stabilized by fin assemblies. To provide for high angle of fire at various ranges (zones of fire), the propelling charge, which is attached to the base of the projectile, is divided into parts, consisting of an ignition cartridge and the required number of propellant increments. In earlier design the ignition cartridge consisted of a primed shotgun shell containing a charge of propellant powder. As currently manufactured, the ignition cartridge and the primer are separate elements, the primer being designed to screw into the cartridge container (base end of the projectile) after the ignition cartridge has been inserted. Because it is designed for loading into the mortar as a unit and contains provisions for adjusting the propelling charge, mortar ammunition is classified as semi-fixed ammunition.

The round of ammunition is fired by dropping it, fuze end up, into the muzzle of the mortar. The round slides through the barrel until the primer strikes the firing pin in the bottom of the mortar. The firing pin initiates the explosion of the primer, thereby igniting the charge of the ignition cartridge and the propellant increments. The pressure of the gases from the ignition cartridge and propellant increments expels the projectile from the mortar.

According to the purpose for which it is intended, mortar ammunition is classified as high explosive, chemical, practice, or training. High explosive shell are used for fragmentation or demolition effect; chemical shell for laying smoke screens and clouds of gas; practice shell for practice firing when it is not desirable to have fragmentation or blast; and training shell for instructing the mortar crew in the proper use of the mortar.

Two general types of ammunition are authorized for use in the 81-mm and the 3-inch mortars. That ammunition originally designed for the 3-inch mortar is standard for issue, but not standard for manufacture, and is com-

monly known as 3-inch mortar ammunition Mk. I. The ammunition originally designed for the 81-mm mortar is generally grouped into a light class and a heavy class to distinguish between the small and the large shell. For complete information on 3-inch trench mortar ammunition see T.R. 1350-3A. Under certain restrictions as to the use of the full propelling charge, both types of ammunition may be fired in either weapon (81-mm ammunition is adapted for use in the MORTAR, trench, 3-inch, Mk IA2, by reducing the outer zone propelling charge for the M43 and M44 shell from 6 to 4 increments; the M56 and M57 shell, from 4 to 3 increments; for the M45 shell, the full charge of 4 increments may be used. The 81-mm mortar ammunition will not be used in the MORTAR, trench, 3-inch, Mk.I or Mk.IA1. When 3-inch ammunition is fired in the 81-mm mortar, the full outer zone charge, consisting of the ignition cartridge and 3 powder rings may be used.)

Ammunition for the 3-inch trench mortar has no stabilizing fins, and because it is fired from a smooth bore weapon, which imparts no rotation to the projectile, it is unstable in flight and may strike the target in any position — nose first, base first, or on its side. Hence, it requires a fuze which will function regardless of the position of the projectile at the instant of impact. Such a fuze, known as the "Always", is provided for assembly to the nose of the shell. The propelling charge, consisting of an ignition cartridge and propellant increments in the form of powder rings, must be attached to the base of the projectile prior to firing. The full (outer zone) propelling charge of this ammunition may be used when fired from either the 3-inch or 81-mm mortar.

Because of its stabilizing fins, 81-mm mortar ammunition, even though fired from a smooth bore weapon, is stable in flight and strikes the target nose first. This permits the use of a point detonating fuze which is assembled to the nose of the shell. The propelling charge, consisting of an ignition cartridge and propellant increments, is attached to the base of the projectile. The increments are removable to provide for zone firing.

Except for its size, 60-mm mortar ammunition is of the same general design as the 81-mm mortar ammunition.

Ammunition of current design for 60-mm and 81-mm mortars is packed as assembled complete rounds, each in an individual fiber container and these, in turn, in bundle packings; 18 rounds of 60-mm shell per bundle, 3 rounds of heavy or 6 rounds of light 81-mm shell per bundle. Ammunition for the 3-inch mortar is packed as unassembled

complete rounds, 3 per box, with one extra propelling charge.

Ammunition is painted primarily as a prevention against rust; various color markings are used for identification as to type of shell and filler. The color scheme used with trench mortar ammunition is as follows:

High explosive shell - Yellow body with black stenciling.

Chemical shell - Gray body with yellow stenciling to indicate a smoke filler or green stenciling to indicate a gas filler.

Practice shell - Blue body with white stenciling.

Training shell - Black body with white stenciling.

The stenciling on the shell body includes the following information:

Caliber of mortar in which fired.

Kind of filler.

Model of shell.

Ammunition lot number.

Individual fiber containers are sealed with adhesive tape. The color of the tape and stenciling conform with the color scheme of the shell inside.

Metal plates are placed on the ends of each packing bundle. One plate gives the number of rounds contained in the bundle, the nomenclature of the round, the lot number, and the initials of the loading plant. The plate at the opposite end gives the proper shipping name as listed in O.F.S.B. 3-12, the total weight of the loaded bundle, and the cubic displacement.

Packing bundles are held together by a rod passing through the center of the bundle with a wing nut at the end. After loading, each bundle is sealed with a wire and lead seal. If this seal has not been broken, the bundle may be considered as an original package and positively identified by the metal plates at the ends of the bundle and by the marking of the fiber containers.

As a matter of general information the following characteristics of the various trench mortars are given:

TRENCH MORTAR CHARACTERISTICS

Mortar	(type)	3-in.:60-mm.	81-mm.*
Weight of shell	(lbs.)	12 : 3	7 : 10.5 : 15 :
Minimum range	(yds.)	150 : 100	100 : 250 : 100 :
Maximum range	(yds.)	750 : 1750	3280 : 2300 : 1280 :
Minimum elevation	(deg.)	40 : 45	45 :
Maximum elevation	(deg.)	75 : 85	80 :
Weight of tube	(lbs.)	43 : 12	44.5 :
Weight of bipod	(lbs.)	37 : 16	46 :
Weight of base plate	(lbs.)	30 : 10	43.5 :
Weight in firing position	(lbs.)	110 : 39	134 :
* Three weights of projectiles are provided for the 81-mm mortar. Corresponding ranges are shown under respective weights:			

81-MM MORTAR AMMUNITION

The 81-mm mortar is a smooth bore, muzzle loading weapon. Due to the absence of any rifling in the barrel, no rotation is imparted to the projectile when fired. To overcome this deficiency a stabilizer assembly is placed at the rear of the body. By means of this stabilizer the ballistic efficiency of the shell is improved; range and accuracy are greatly increased, and due to the shell striking on its nose, a point detonating fuze may be used. A bourrelet is machined on the body of the shell to provide a bearing surface and a gas check. The bourrelet has several annular grooves machined around it and the action of the propelling charge gases expanding in these grooves and contracting to pass the raised portions tend to slow the gases and prevent their passing the bourrelet. The propelling charge, consisting of the ignition cartridge and the propellant increments, is attached to the projectile by means of the fin assembly. The propelling charge may be adjusted to suit the range and a great flexibility of fire is thus obtained. The ignition cartridge is normally ejected from the mortar with the projectile upon firing.

Ammunition for the 81-mm mortar is provided in four general types: high explosive shell, chemical shell, practice shell, and training shell. The various rounds are readily identified as to their type of filler by their color markings as already listed. The rounds are positively identified by the markings on the shell body, namely — caliber of weapon — model of shell — type of filler — ammunition lot number.

Projectiles for the 81-mm mortar by type and model number are:

Shell, H.E., M43.
 Shell, H.E., M43A1.
 Shell, Practice, M43A1.
 Shell, Practice, M44.
 Shell, H.E., M45.
 Shell, H.E., M56.
 Shell, Chemical, M57.
 Shell, Training, M68.

Ammunition for the 81-mm mortar is packed for storage, shipment, and issue as completely assembled rounds. Each round is placed in an individual fiber container and a number of the containers then placed in a box or bundle. The only action necessary on the part of the mortar crew is to remove the round from the container, adjust the propelling charge to the zone desired, pull the cotter pin from the fuze, and drop the round into the mortar.

Projectiles

Shell, High Explosive, M43. - This shell was originally adopted as the light shell for the 81-mm mortar. It is designed for use against light targets, such as machine gun nests and barb-wire entanglements, and personnel in the open.

The shell body is of forged steel, having a blunt nose and a tapered tail. The explosive filler is 1.22 lbs of TNT. The shell is machined at the nose to receive an adapter, which in turn

receives a bakelite cup and the fuze. The bakelite cup is fitted to the adapter before it is assembled to the shell body and prevents the entrance of any foreign material into the fuze cavity prior to the assembly of the fuze to the round. The fuze used is the point detonating fuze, M45. This fuze has a selective element and can be set for either superquick or delay action. A bourrelet is machined at the forward portion of the shell body to provide a forward bearing surface and a gas check. The body in rear of the bourrelet is a curved taper, reducing the base of the shell to approximately 1-1/4 inches. The base is machined to receive the stabilizer assembly, the construction of which provides a cartridge container and six fins. The cartridge container is machined inside to receive the ignition cartridge and has several holes to the outside to conduct the flames from the ignition cartridge to the propellant increments. The ignition cartridge, M3, is similar in appearance to a shotgun shell; the head is of brass and contains the percussion primer, the body is of cardboard and contains 120 grains of finely granulated double base powder. The propellant increments are in the form of small half-round celluloid increments. These increments are often referred to as "chocolate drops" due to their peculiar shape. Each of these increments contains 100 grains of finely granulated double base powder. A total of one ignition cartridge and six increments comprise the full propelling charge. The increments are held in the stabilizer assembly by small flanges on the fins and may be removed to adjust the propelling charge. The propelling charge may be adjusted for any range between 100 and 3,290 yards. The total weight of the shell, loaded and fuze, is 6.92 lbs. The entire length of the fuze shell is 13-1/4 inches.

The shell body is painted yellow to indicate a high explosive filler. The stenciling on the body is in black and contains the following information:

Caliber of weapon in which used.
Kind of filler.
Model of shell.
Ammunition lot number.

For storage, shipment, and issue this shell is packed as a complete assembled round with the fuze and propelling charge in place. The following packings may be found in service:

One round per individual fiber container, six containers (6 rds.) per bundle. Weight of full bundle 59 lbs.

One round per individual fiber container, eight containers (8 rds.) per wooden packing box. Weight of full box 91 lbs.

Each individual fiber container is sealed with adhesive tape, the tape conforming in color and stenciling with the shell contained inside. Metal plates at the ends of the bundles give information as to nomenclature, number of rounds, shipping name, etc.

Shell, High Explosive, M43A1. - This shell is a modification of the M43 and it is used for the same purposes.

The body, filler, adapter, and bakelite cup are exactly the same as in the M43. The fuze used is the point detonating fuze M52, which has a superquick action. Due to the light weight and blunt nose of this shell, very little

penetration could be obtained, therefore only a superquick action is necessary. The flanges on the fins for holding the propellant increments are omitted, as they are not necessary with the newer type increments. The cartridge container is threaded inside near the end to receive an ignition cartridge in which the percussion primer and the cartridge are two separate elements. The percussion primer is contained in an aluminum head and is screwed into the end of the cartridge container after the cartridge has been inserted. The ignition cartridge is a paper cylinder containing 120 grains of double base powder. The advantage of this type of primer and cartridge is that the whole assembly will leave the mortar with the shell, whereas the older type ignition cartridge would sometimes leave the brass head of its case in the mortar thereby fouling the bore. The propellant increments are made up of square sheets of double base powder and are sewed together to form increments. These sheets are thin and flexible and will not crumble or break as did the celluloid containers used with the M43 shell. One ignition cartridge and six increments are full charge for this shell. The increments are held in the stabilizer by having their corners tucked into holes in the fins, and they may be removed to adjust the propelling charge. The propelling charge may be adjusted for ranges from 100 to 3,290 yards.

The color marking for this shell is the same as for the M43.

The packing for this shell is one round per individual fiber container, six containers (6 rds.) per bundle.

Shell, Practice, M43A1. - This is the same as the M43A1 except that it has an inert filler and a small amount of black powder (.16 lb.) for a spotting charge. The body is painted blue with white stenciling.

Shell, Practice, M44. - This shell was originally adopted as a practice shell for the 81-mm mortar. It is used for practice firing when fragmentation and blast effect are not desired.

The body of the shell is made of cast iron and contains an inert filler. A small amount of black powder (.20 lb.) is placed just below the fuze to give a spotting effect when the fuze functions. In size, shape, and weight this shell resembles the M43 high explosive very closely.

The body of the shell is painted blue and stenciled in white.

Packing for this shell is the same as for the M43 high explosive shell.

Shell, High Explosive, M45. - This shell is one of the early types adopted for use in the 81-mm mortar. At the present time this shell is standard for issue but not standard for manufacture. The principal use of this shell is against dugouts, heavy barricades, and underground structures where a mining action is most effective.

The body of this shell is cylindrical with a tapered nose and tail. The explosive filler is 4.48 lbs. of TNT. The fuze used is the point detonating fuze M45, having a selective setting for either superquick or delay action. There is one bourrelet machined on the body near the tail which serves as a bearing surface and a gas check. There is no bourrelet at the front of the shell. The stabilizer

assembly of this shell is unique in that it folds together and opens to a greater diameter than the shell body after it has cleared the muzzle of the mortar. This was an attempt to increase the stability of the shell by increasing the fin surface. This was not very successful, however, because the springs lost their tension and the blast of the propelling charge explosion distorted the fins. The fins, when folded, are held in place by small copper wires and form a means of holding the propellant increments. In the center of the stabilizer assembly is a cartridge container. The ignition cartridge M3 is used with this shell. It contains 120 grains of double base powder and is similar to a shotgun shell in construction and appearance. Four propellant increments are used as a full charge, each containing 100 grains of double base powder. The propellant increments are small half-round celluloid containers filled with finely granulated double base powder. The propelling charge may be adjusted for any range between 100 and 1,275 yards. The total weight of the shell, loaded and fuze, is 15.01 lbs. The entire length of the shell with fuze assembled is 23-1/2 inches.

The body of the shell is painted yellow with black stenciling. Information on the body includes: caliber of weapon in which to be used, type of filler, model of shell, and lot number.

This shell is packed as a completely assembled round for storage, shipment and issue. The following packings will be found in storage:

One round per individual fiber container, four containers (4 rds.) per wooden packing box.

One round per individual fiber container, three containers (3 rds.) per bundle.

Each individual container is sealed with adhesive tape, the tape conforming in color and stenciling with the shell inside. Metal plates at the ends of the bundles give information as to nomenclature, number of rounds, shipping name, etc.

Shell, High Explosive, M56. - This shell was developed to replace the high explosive shell M45. It is used against dugouts, barricades, and underground structures where a mining action is more effective. This is a much higher capacity shell than the M45, containing approximately 40% (as compared with 30%) of explosive filler.

The body of this shell is long and cylindrical with a tapered nose and tail. The explosive filler is 4.3 lbs. of TNT. The nose of the shell is threaded to receive an adapter and the adapter in turn receives a bakelite cup and the fuze. The bakelite cup is attached to the adapter before it is assembled to the shell and prevents any foreign material from entering the fuze cavity before the fuze is assembled to the round. The fuze used is the M53 delay action point detonating fuze. There is a bourrelet machined on the body of the shell near the base, which acts as a bearing surface and as a gas check. There are three raised portions around the shell near the nose to provide a forward bearing surface. The stabilizer at the rear of the body is of the stationary fin type and is made of aluminum alloy. The stabilizer consists of a long stem, a cartridge container, and the fins. There are holes in the cartridge container near the forward portion of the fins to conduct the flames from the ignition cartridge to the propellant increments. The early shell of this model used

the M3 ignition cartridge of the shotgun shell type; later revisions call for an ignition element consisting of a percussion primer and a separate cartridge. This is to reduce the possibility of the head of the ignition cartridge being blown off, leaving it in the bore of the mortar. The newer type of percussion primer is contained in an aluminum body and is screwed into the cartridge container after the cartridge has been inserted. The propellant increments are placed just forward of the fins and are held in place by a star-shaped wire clip. The propellant increments are made up of thin, square sheets of double base powder sewed together. A hole of the same size as the stem of the stabilizer is cut in the center of each increment and a slit runs to the outer edge so that the increment may be easily attached to the stem, or removed for adjusting the propelling charge to the range. One ignition cartridge and four propellant increments of 205 grains each are used as full charge. Ranges of from 300 to 2,655 yards may be obtained. The total weight of the shell, loaded and fuze, is 10.62 lbs. The entire length of the shell with the fuze assembled is 22.89 inches.

The body of the shell is painted yellow to indicate a high explosive filler and is stenciled in black. The caliber of the weapon to be used in, type of filler, model of shell and the ammunition lot number are stenciled on the body.

The shell is packed for storage, shipment, and issue as a complete assembled round. One round per individual fiber container, three containers (3 rds.) per bundle. Each individual fiber container is sealed with adhesive tape. The color and stenciling of the tape conform with the marking of the shell inside. Each bundle is provided with metal plates at each end which give information as to nomenclature, number of rounds, shipping name, etc.

Shell, Chemical, M57. - This shell is used for the placing of smoke screens and gas clouds.

In general construction this shell body has the same outer characteristics as the high explosive shell M56. The nose of the shell is threaded to receive an adapter. The adapter is machined inside to receive the fuze, M52, superquick, and the M2 burster casing. The chemical filler is loaded into the shell body and then the burster casing is pressed into place. The head of the casing has a slight taper, and when pressed into place in the adapter sleeve, forms a gas tight seal. A recess is machined in the base of the shell cavity to receive the end of the casing, preventing it from becoming loose due to the shock and jars incident to shipment. During the loading of the chemical filler and the pressing of the burster casing in place there is no explosive charge present in the casing. The burster charge (teteryl pellets in a thin aluminum or cardboard cylinder) is placed in the burster casing prior to the assembly of the fuze to the shell. The stabilizer assembly, ignition cartridge, and propellant increments are identical to those used with the high explosive shell M56. Three chemical fillers are loaded at the present time; W.P. Smoke, F.S. Smoke, and H.S. Gas. The weight of the complete round varies with the filler used. The weights of the various rounds are given below:

Filler	Wt. of Filler	Wt. of Shell (loaded and fuze)
W.P.	4.06 lbs.	11.36 lbs.
F.S.	4.59 "	11.86 "
H. S.	3.15 "	10.41 "

The total length of the shell with the fuze assembled is 22.89 inches.

The body of the shell, regardless of filler, is painted gray. The color bands and stenciling indicate the type of chemical filler. Yellow markings indicate a smoke filler; green markings a gas filler.

Packing is the same as for the M56 high explosive.

Shell, Training, M68. - This shell is designed to give the mortar crew practice in firing under conditions which will not permit firing in more than the first zone.

The body of this shell is of cast iron and has no filler, fuze, or propellant increments. It conforms in shape, size, and weight with the high explosive shell M56. Several ignition cartridges are provided with each round so that it can be fired more than one time.

The body of this shell is painted black and stenciled in white.

Information as to the packing of this shell is not available at the present time.

60-MM MORTAR AMMUNITION

Although the using arms have many uses for the 81-mm mortar, numerous missions can be accomplished more suitably with a smaller weapon. The 60-mm mortar proved to be the best weapon for this purpose. The mobility of this weapon (due to its light weight and the quantities of ammunition that can be carried) will increase the fire power of the using arm during movement.

The general design of the 60-mm mortar shell is similar to the light shell for the 81-mm mortar. The method of firing is exactly the same. The color marking and stenciling are the same as for the 81-mm mortar ammunition of the same types. Three types of ammunition are provided for the 60-mm mortar: high explosive shell, practice shell, and training shell.

Projectiles

Shell, High Explosive, M49A2. - This is the pres-

ent standard high explosive shell for use in the 60-mm mortar. It is used against light targets and personnel in the open.

The body of this shell closely resembles the light shell for the 81-mm mortar in shape, however it is much smaller in size. Several methods of manufacturing the shell body are in practice at the present time, depending upon the method best adapted to the individual manufacturer. The body may be of forged steel, cupped rolled plate welded longitudinally, or a machined casting. The bursting charge is .34 lbs. of TNT. The point detonating fuze, M52, containing a superquick action, is used with this shell. There is one bourrelet machined at the forward portion of the shell body to act as a forward bearing surface and as a gas check. There have been several revisions and modifications of this shell. Principal among these was the changing of the stabilizer assembly. Early models of this shell had the stabilizer and the body made from one piece and the fins attached. Later models have the stabilizer as a separate component. The cartridge container is machined to receive the newer type ignition element in which the percussion primer is separate from the cartridge. The percussion primer, M32, is contained in an aluminum body and screws into the cartridge container after the cartridge has been inserted. The ignition cartridge contains 47 grains of finely granulated double base powder. The propellant increments are thin square sheets of double base powder sewed together. Each increment weighs 35 grains. One ignition cartridge and four powder increments make up the full charge. The propellant increments are held in place by the fins and may easily be adjusted to the range desired. Ranges of from 100 to 1,935 yards may be obtained. The total weight of the shell, loaded and fuze, is 2.90 lbs. The entire length of the shell with fuze assembled is 9-1/2 inches.

The body of the shell is painted yellow to indicate a high explosive filler, and is stenciled in black.

The shell is shipped as a complete round; one round per individual fiber container, six individual containers per large outer fiber container, three large outer containers (18 rds.) per bundle. Each fiber container is sealed with adhesive tape, the color marking of which conforms with the color of the shell inside. Metal plates

(Continued on page 453)



LIBRARY

Conducted by: J. M. Kelleher, Tech. Sgt., Ord. Dept.

If the three (3) following sheets are trimmed close to the center binding, and then folded across their middle without being separated, the result will be a pamphlet ap-

proximately 6" x 9" in size containing indexes which should be quite useful.

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The alphabetical lists contained herein were prepared by Sergeant Larry E. Lovell, of the staff of The Ordnance School Library, and published in

THE ORDNANCE SERGEANT

for

Vol. 3

May, 1942

No. 5

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Conducted by: Glenn H. Staley, 2nd Lieut., Ord. Dept.

AUTHORIZED TOOLS FOR THE 20-MM AIRCRAFT GUN, M1 & M2

Tools for the assembly and disassembly of the 20-mm Aircraft Gun are not yet available for use in Aviation Ordnance field units. Since there are many of the guns being used in the field the need for the tools is becoming an increasingly acute one.

By: J. W. Simpson, 2nd Lt., Ord. Dept.

This is the first of two articles giving the description and uses of the special tools listed in SNL A-47, Gun, Aircraft, 20-mm, M1 & M2. The descriptions and

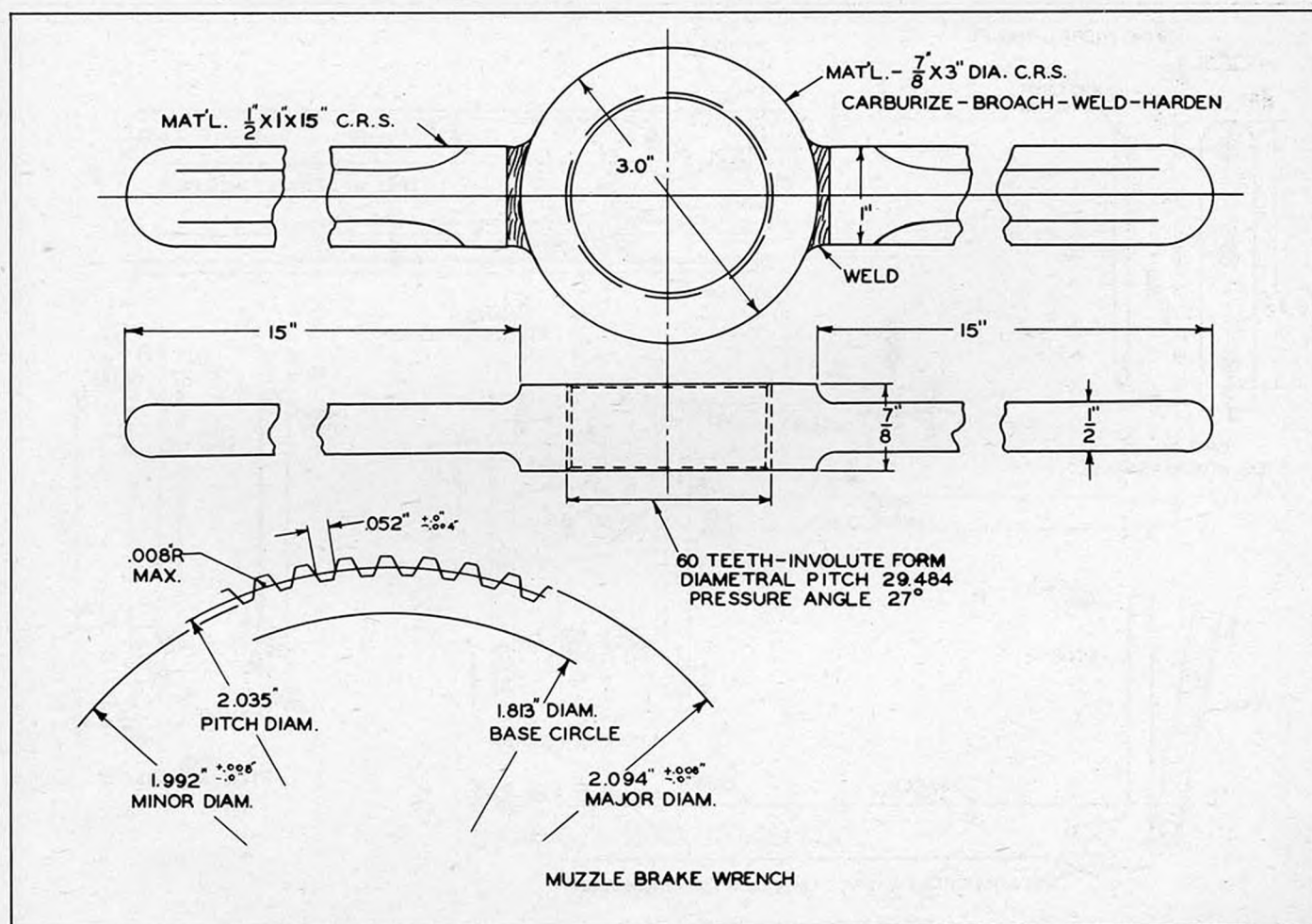


Figure 1

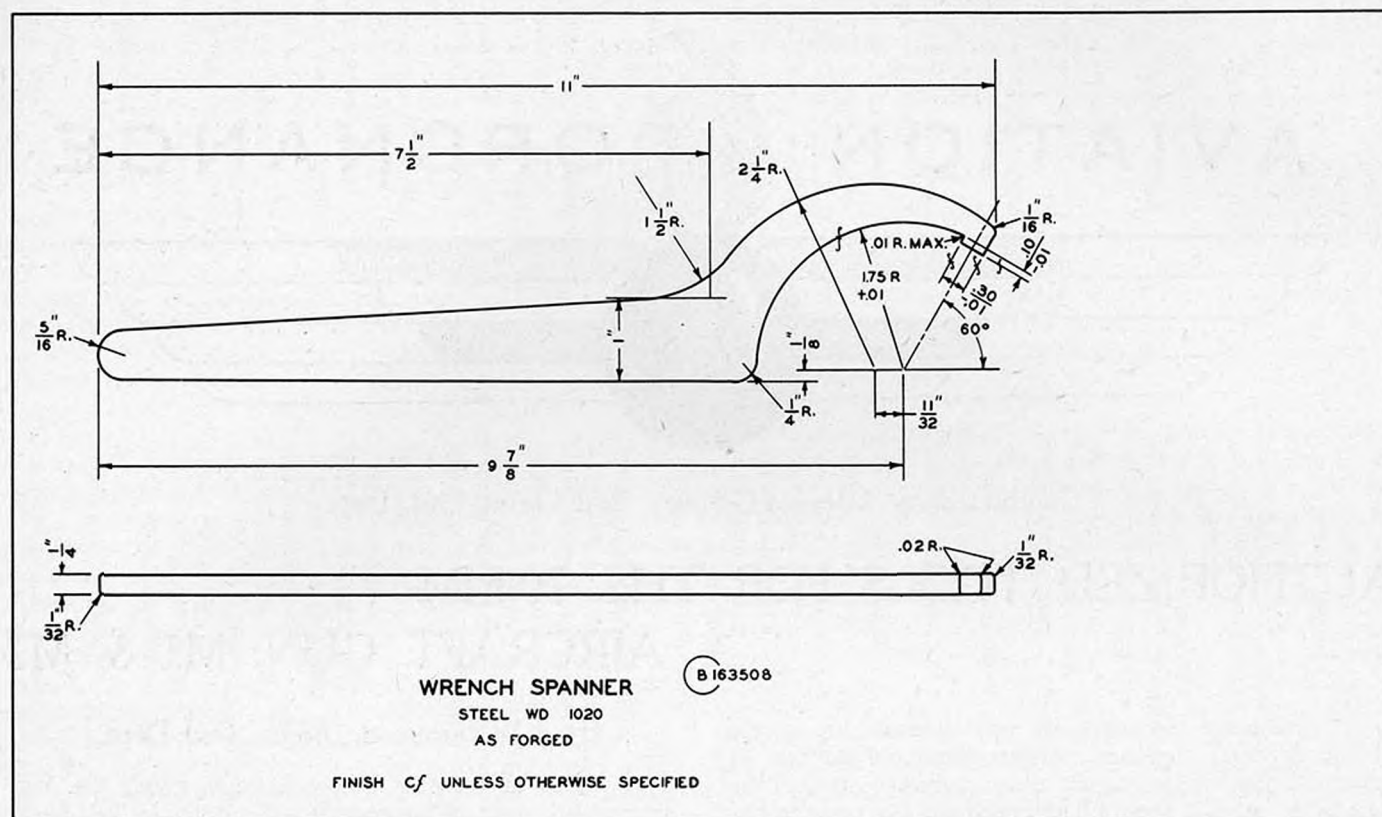


Figure 2

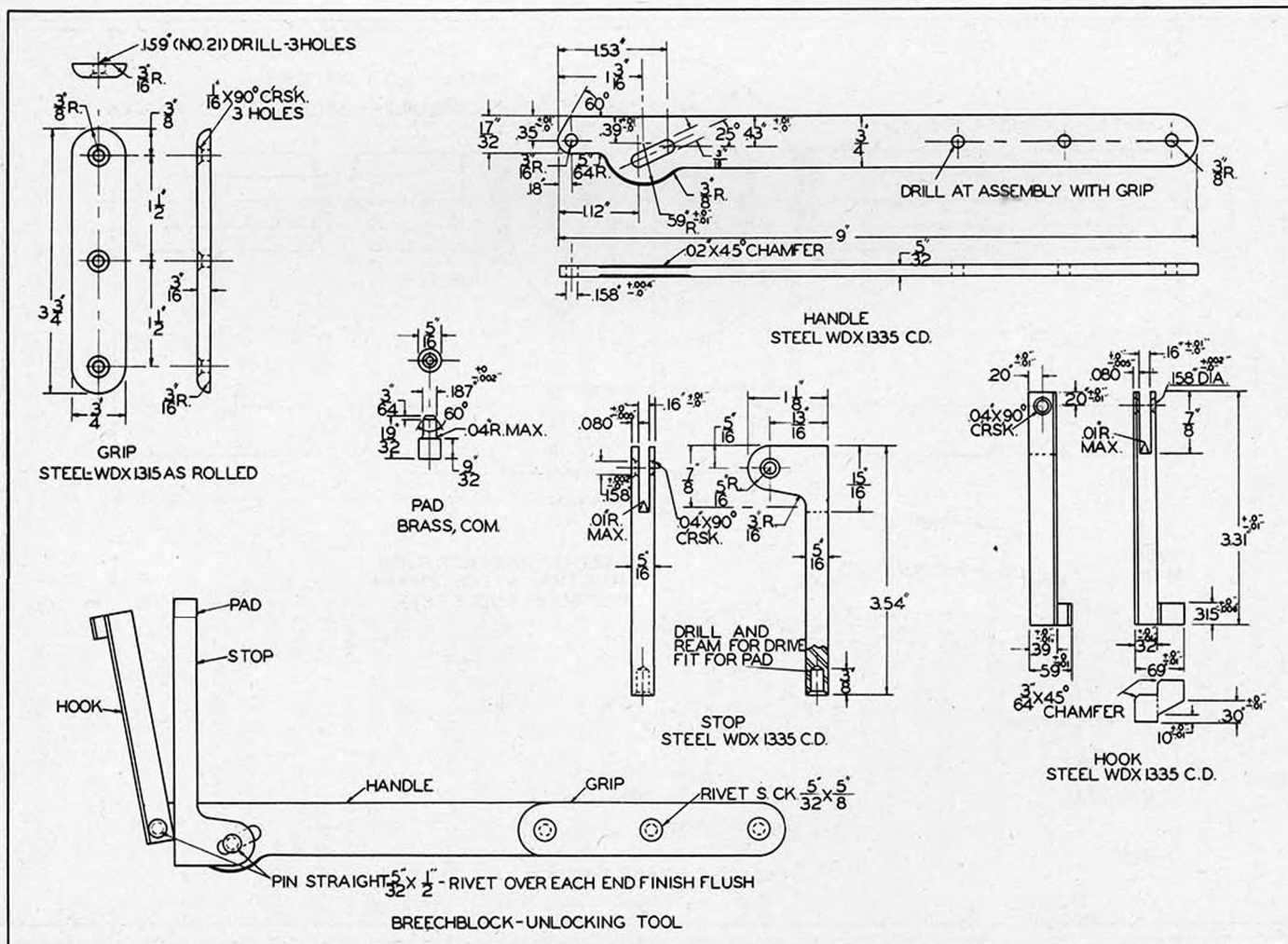


Figure 3

drawings of the tools are of tools now being used by certain manufacturers and The Ordnance School and may differ slightly from the standard tools. However, since most of these tools can be made in Ordnance field shops they will fill the need until the standard tools can be issued.

Wrench, Muzzle Brake, C70606. - This wrench is a specially designed tool used both to remove and to re-assemble the muzzle brake assembly to the front end of the tube. As shown in Figure 1, the wrench consists of a circular center portion with two handles extending from opposite sides of the circumferential rim. The inside of the circular portion is serrated to correspond with serrations on the rear muzzle brake ferrule. The muzzle brake assembly is screwed on the front end of the tube as far as possible by hand. The wrench is then slipped over the muzzle brake from the front until the serrations in the wrench engage corresponding serrations on the rear muzzle brake ferrule. The wrench is turned clockwise until the muzzle brake assembly is screwed on the tube as far as possible. This action compresses the recoil spring until the rear end recoil spring filler sleeve bears against the dash pot piston and the front end bears against the recoil spring sleeve.

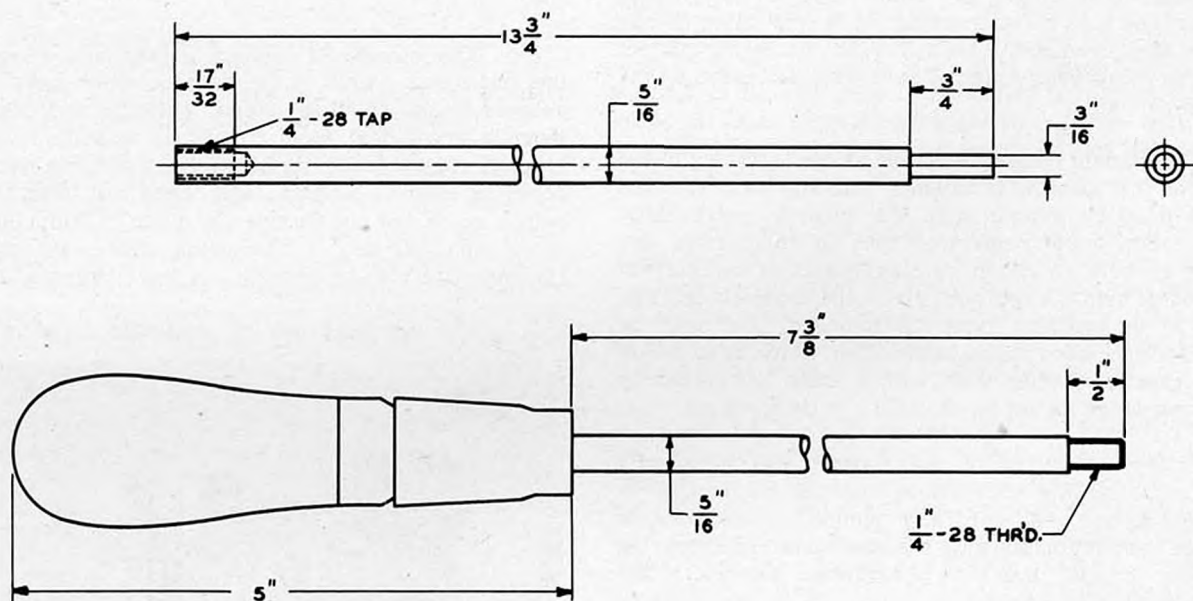
Due to the serrations on the inside of the wrench, it will be difficult to make in the field shop. However, the muzzle brake locking collar, B163329, which is received with each gun may be used as a model or pattern to make the muzzle brake wrench. When the inside flange on the collar is removed, a ring-shaped piece is left which

is serrated on the inside in such a manner as to fit the serrations on the rear muzzle brake ferrule. By the addition of two bars to the ring to form handles, a similarly constructed ring would make an acceptable muzzle brake wrench.

Wrench, Spanner, B163508. - This wrench is a forged tool which engages the raised rectangular surfaces on the outside of the mounting sleeve nut when tightening or loosening it. The wrench can be made from flat bar stock forged into an arc (as shown in Figure 2) at one end with a projection at the end of the arc to engage the raised rectangular surfaces on the exterior of the nut. This nut is not used with installations in some types of aircraft but necessitates this spanner wrench when used.

Tool, Breechblock Unlocking, B163502. - This tool is used for the purpose of unlocking the breechblock when the gun is being disassembled or being worked on. The tool is a lever arrangement made up of three units. Figure 3 shows the dimensions of each unit and how they are assembled. The front leg or lever has a lug at its forward end to engage the front face of the right hand breechblock slide. The rear lever is fitted with a brass stud in its forward end to prevent injury to the rear face of the tube. The body or handle of the tool has an inclined slot in the forward end and has two plates rivetted on the rear end to form a grip. The tool is placed in the top of the gun with handle held vertically and the two levers extending forward. The forward lever lies flat on top of the bolt body

(Continued on page 453)



DRIVING SPRING GUIDE TOOL

Figure 4

ORDNANCE TRAINING ACTIVITIES

Conducted by: G. D. Meixel, 1st Lieut., Ord. Dept.

Secretary, The Ordnance School

ORDNANCE TRAINING METHODS

By: P. J. Phillips, Major, Ord. Dept.
Director of Training Methods, The Ordnance School

Part II

METHODS OF INSTRUCTION

The process involved in teaching must be understood and mastered by the instructor. It applies in teaching a single lesson, a specific item of information or procedure, or an entire subject. It consists of:

- Preparation by instructor.
- Explanation.
- Demonstration.
- Application.
- Examination.
- Discussion.

The instructor must have mastered the subject which he is to teach. He must develop a complete and thoroughly organized plan, including the purpose, the essential facts to be taught, the material to be used, texts, equipment and aids to instruction. It is only after he has carefully organized his presentation of the entire subject that he can intelligently plan each individual lesson or instruction period.

The student must understand at the beginning of the instruction just what he is to learn and why he is to learn it. This must be explained to him clearly, yet briefly. The instructor must remember that an appropriate example or experience will more clearly arouse the interest of the student than a lengthy and tiresome explanation. The interest of the student must be aroused. He must be made to look forward to the instruction which is to follow with anticipation rather than with a mind perplexed by many ideas which as yet he is unable to tie together.

A demonstration of the subject will frequently make a more lasting impression than can be created by any other means. A carefully planned demonstration simplifies instruction and aids the student in remembering points which might otherwise be forgotten quickly, if not completely overlooked.

By practicing those things in which he has received instruction, the student acquires further knowledge and develops skill through repetition. See Figures 2 and 3. This form of instruction, however, must be carefully supervised by the instructor in order to prevent the forming of bad habits which are difficult to eradicate. Under supervision, the students practice correct methods until these methods become fixed habits. Intelligent use of competition between individuals and groups stimulates interest and activity and increases knowledge and skill, but care must be exercised to prevent it from developing

jealousy and discouraging teamwork.

Tests and examinations have the twofold purpose of reviewing the essentials of the subject of instruction and thus impressing them on the mind of the student, and of determining whether or not the student has the requisite knowledge and ability to apply it. In whatever form the examination is given — written, oral, or actual practice — it encourages the student to strenuous effort. He knows that he must review and analyze his instruction in order to apply his knowledge to specific situations.

An examination should never be intended merely to test the student's memory, but to test his practical application of the knowledge he has acquired. Questions must be clearly understandable by the student, and must be of a type which permits uniform grading for fairness in comparison.

The instructor may well note that an examination serves another purpose in addition to testing the knowledge or ability of the student. It often provides a measure of the ability of the instructor himself, and of the effectiveness of his methods of instruction. When there is a general failure to absorb instruction on the part of a group, the methods of instruction used should be critically analyzed, and the instructor surveyed to determine where the fault lies.

The purpose of discussion is to sum up and clarify the important points of the subject which have been developed by the previous steps. Oftentimes a student will learn a great deal from individual lessons, he will find himself consolidating his knowledge during an examination covering several lessons. But there will often be certain points which are not completely clear to him. Instruction is not complete until a discussion affords an opportunity for such points to be brought out and eliminated.

The efficient use of available time requires a

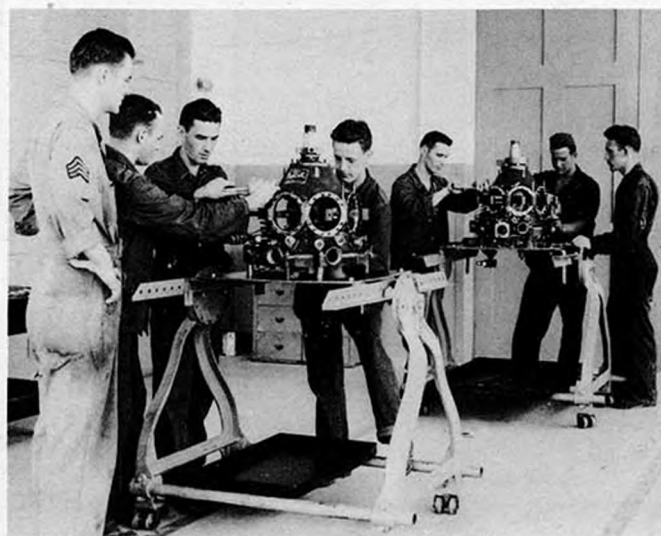


Figure 2



Figure 3

careful analysis of each lesson. A lesson must be integral. It must possess a definite unity or wholeness of one phase of the instruction. The lesson must have a new element. The new thing to be learned provides the necessary incentive for the student. Even a review lesson induces a new degree of response — a strengthening of relationships previously made. The lesson must be reasonable in scope. The student must be able to see the successful outcome of his efforts and the completion of his task before his interest wanes by reason of fatigue or the urge of other interests.

The instructor will develop carefully in advance of each lesson a plan which indicates the complete content and procedure of the entire lesson. This plan is made in outline form, stating the lesson activities in the order in which they will be given during the lesson period. This plan is for the guidance of the instructor. Only efficient planning can eliminate waste of time and energy and accomplish the complete training of all the students in all the skills of the job. (Continued on next page)

THE ORDNANCE BASE SHOP SCHOOL

On January 19th, 1942, there was organized at the Ordnance Training Center, a Base Shop School under the command of Colonel G. W. Outland, with Major G. F. Powell as Executive.

The mission of this school, as its name implies, is to train individuals and organizations to operate base shops for the performance of major overhaul or 4th echelon operations on all types of Ordnance materiel. (It is contemplated that the base shops which the individuals and organizations mentioned will operate, will be located in the communications zone where they will support the operations of the army Ordnance maintenance echelons.)

The initial personnel for the school was provided by the 39th Ordnance Company (MM), which was assigned to the school. Later, the 97th Ordnance Company (MM) was activated from the personnel of the 39th and also assigned to the school. These organizations handle the military training and administration of the personnel of the school. All technical training is conducted within the shops of the school.

The buildings now in use by the Base Shop School consist of two large shops, a paint and oil storage building, and the necessary barracks for the personnel of the 39th and 97th Ordnance Companies. Two large repair shops and two warehouses, with the necessary spur railroad tracks, are now in the process of construction in the Ordnance Training Center area. Upon completion of these buildings, the equipment of the Ordnance Base Shop School will be divided as follows:

a. One Automotive Shop for the repair and maintenance of all wheeled and half-track vehicles, tanks, and tractors.

b. One Artillery Shop for the repair and maintenance of all light, medium, and heavy field artillery, and antiaircraft artillery.

c. One Small Arms-Instrument Repair Shop for the

repair and maintenance of all types of small arms, and terrestrial and antiaircraft fire control instruments.

d. One Service Shop for all service work required by the other shops, and to execute the necessary blacksmithing, forging, welding, machining, and carpentry work.

The special tools, equipment, and spare parts required for complete overhaul and repair of all types of Ordnance materiel are now being shipped from the various arsenals to the Ordnance Base Shop School. It is contemplated that the equipment and skilled personnel available within the Base Shop School in the near future will be able to accomplish efficiently the repair of any item of Ordnance materiel.

The Ordnance materiel for repair within the shops of the Base Shop School will be shipped into the Ordnance Training Center from the field, and will consist primarily of items in need of complete overhaul and reconditioning. As quickly as this repair work can be accomplished these items will be shipped back to the using troops.

In the picture of Ordnance specialist training, the Base Shop School gives a post graduate course to supplement the elementary training given by the Replacement Training Center and the secondary training given by the Ordnance School. The personnel assigned to the Ordnance Base Shop School are drawn from the graduates of the Ordnance Replacement Training Center and the Ordnance School. These men are given sufficient additional instruction in the Ordnance School or in other special schools to prepare them for 4th echelon work within the shops of the Base Shop School. The performance of this shop repair work under instructor supervision qualifies the men as specialists in the 4th echelon repair.

Thus, the Ordnance Base Shop School will operate in a dual function. Primarily, it will train Ordnance personnel as base shop specialists, and, in executing this training, it will function exactly as a base shop by reconditioning Ordnance materiel.

TRAINING

METHODS

(Continued from
preceding page)

The only means by which human beings impart ideas to one another are by the physical senses — seeing, hearing, smelling, tasting, and feeling. Instructors impart ideas to students by one or more of these physical senses. Teaching methods have been developed from this fundamental fact. The teaching methods most commonly used for military instruction are:

Lectures
Conferences
Demonstrations
Group performance
Coach-and-student method.

No single one of these methods is suitable for the presentation of all military subjects. Several of them have only a limited application. Each will be discussed briefly here; the more important will be discussed in future articles of this series.

A lecture is an oral discourse. It may be given with or without aids to instruction. Without such aids, a lecture involves but one physical sense, hearing. By experimental tests, it has been found that the knowledge the average person has obtained through the different senses is approximately as follows:

Sight	85%
Hearing	10%
Touch	2%
Smell	1-1/2%
Taste	1-1/2%

It is obvious that these percentages would not hold in the case of certain professions, such as music with its sense of touch or cooking with its sense of taste, but it is just as evident that the use of the lecture alone in teaching would not be nearly as effective as the lecture accompanied by something the student can see (the illustrated lecture). Illustrated lectures, aided by training films or film strips, for example, are more valuable than lectures in which no aid is used. The lecture method is one of the poorest ways of imparting knowledge.

The conference method of instruction is a directed discussion of a subject. A conference may be used for a detailed discussion either of text material which has been studied by the student or of a subject presented to the class by the instructor. Conferences are most often concerned with the application of a doctrine or procedure to specific situations. This method presents or explains ideas, as does the lecture method, by use of the sense of hearing. It has a distinct advantage over the lecture method in that it enables the instructor to determine readily whether his ideas are making the correct impression and allows the student to clear up, by questions, those points which he does not understand.

A demonstration is an accurate portrayal of a subject or procedure to be taught. A well-planned and carefully presented demonstration is one of the most effective methods of instruction in basic, technical, tactical, and logistical subjects. The demonstration is based on the fact that seeing an object or procedure usually makes

a more rapid and lasting impression on the mind than the other senses produce. A demonstration is always preceded by a thorough explanation of the work to be demonstrated and therefore is not a distinct and separate method of instruction. Demonstrations used in conjunction with other methods of instruction add to the instructional value of the other methods. (Demonstrations will be discussed in detail in a later article of this series).

The group performance method of instruction may be used in the training of any group, regardless of size or organization. It provides careful, simultaneous learning under the direct supervision of an instructor, and centralizes control within the group for the purpose of teaching the mechanics of a subject. It is particularly valuable when there is a lack of well-trained instructors. Its disadvantage lies in the fact that personnel under instruction are frequently removed from the control of their normal commanders. It is an excellent method for use in introductory training and is especially well adapted to instruction in basic subjects. It consists of four distinct steps, as follows:

- (1) Explanation of the subject or action by the instructor (preparation of the student.)
- (2) Demonstration of the subject or action by the instructor or his assistant (presentation).
- (3) Imitation by all undergoing instruction (application).
- (4) Correction of error by the instructor and his assistant (check-up).

The group performance method is excellent for instruction in various technical operations by the slow-motion or step-by-step procedure. After explaining and demonstrating the action, the instructor performs each step slowly, accompanying the action with a detailed explanation. Each student imitates every movement made by the instructor. Assistant instructors verify the correctness of the students' movement. When a large group is being instructed in this manner several assistant instructors are placed so that all students can see one instructor clearly. These assistants all go through the slow-motion action simultaneously.

The coach and student method of instruction logically follows the group performance method and should never be used as an introductory method of training. Its greatest usefulness will be found in instructing large groups of individuals that have passed through other methods of instruction and have mastered many of the subjects of basic military training. In this system individuals are paired off and, acting alternately as coach and student, teach each other the procedure previously explained and demonstrated by the instructor. Properly applied and supervised, this method causes the individual to think as well as to do, stimulates his powers of observation, increases his alertness, trains him in giving commands, and adds to his individual value by providing him with a detailed knowledge of training matters. The procedure is as follows:

- (1) The entire class is divided into as many groups as there are instructors available.
- (2) Groups are divided into pairs with an initial

assignment of one of each pair as coach and the other as student.

(3) The instructor first describes the subject or its first phase and then demonstrates it slowly and with precision.

(4) Next, he gives the group an opportunity to clear up any uncertainties regarding the subject by asking for questions. After assuring himself that all understand the work, he directs the coaches to proceed with the instruction.

(5) Thereupon, each coach explains and demonstrates the work to his student.

(6) Coaches then have their students execute the work or movement and attempt to detect and correct all errors.

(7) The instructor regulates the progress of the instruction and corrects errors made by the coaches. Whenever he notices many faults in the coaching, he stops the instruction and by explanation and demonstration corrects the errors he has detected.

(8) After a short period of instruction the relation is reversed; the students become the coaches, and the former coaches the new students.

(9) After proficiency has been attained by both members of all pairs in the first phase of a subject, or in the entire subject, the instructor explains and demonstrates the next phase or the succeeding subject, and the process of tutoring by pairs is continued as before.

The relationship of coach and pupil must be properly maintained; students should not criticize the work of the coaches. When the situation is reversed, the former student, then acting as a coach, can call attention to the errors in the instruction just given him.

Only one subject or part of a long subject should be taken up at a time. The presentation of too much will only result in confusion and fail to accomplish satisfactory results.

The coach-and-student method, while it is applicable to instruction in many subjects of basic and technical training, will only occasionally be found to be the most suitable method of Ordnance training.

The third article of this series, "Questions are Important", will appear in the June issue of THE ORDNANCE SERGEANT, and will be followed by "Suggestions on Lecture Technique", "Demonstrations", "Grading, and "Aids to Instruction".

THINGS HAVE CHANGED A LOT

(Continued from
page 361)

He will not owe his success to this magazine, but to a trait which is an inherent part of him. He will owe it to ambition and to preparation. The date of the beginning of his heroism, as recorded by history, will be wrong, for his real success starts not from the day of recognition of his great achievement, but from the day when he began to prepare himself for whatever crises might arise. There is more to success than being in the right place at the right time. Much more important is being well prepared to make the best of a bad situation when you find yourself in the wrong place at the wrong time.

History is being written today by men who have suddenly found themselves in unexpected situations. And when we think that things have changed a lot, let's recall that history has always been written by men of this type. They have always had, as do our heroes of today, one characteristic which has never changed since the history of man began—ambition backed up by consistent and persistent effort. The leaders of men have come from all stages of life, but they have possessed one thing in common. They have prepared through long years to meet whatever crisis might enter their lives. And when that crucial moment came they did not have time to vacillate, for they were prepared for immediate action when delay or faltering would almost certainly prove fatal. This is a principle of success which has never changed, although other things may have changed a lot.

We need more men who can realize that modern warfare has not changed everything. The age-tested principles of success are old fashioned, of course, but they still form the basis of all modern success.

MOTOR

(Continued from
page 399)

MARCHES

labor to effect repairs. Careful observation and inspection may prevent a serious failure or accident.

Use the record books provided with each vehicle. Record all gas and oil used (at the time it is put in the vehicle.)

Act on, and pass back, all signals received from preceding vehicles.

If you feel drowsy, do not continue to drive out of a false sense of pride. This may cost lives. Change drivers at the next halt and notify the motor officer of the change.

All drivers will be changed on even numbered halts, i.e., about every 120 miles.

Do not pass other vehicles in convoy, except when they are at a halt.

If your vehicle is disabled, join the tail of the next serial, and rejoin your serial at the next halt. Do not drive recklessly trying to rejoin.

For further detailed instructions regarding motor marches see FM 25-10.

Report changes of address promptly in order to receive THE ORDNANCE SERGEANT regularly.

KEEP 'EM
FIRING

NEWS ITEMS

Conducted by:
W. L. BOLAND,
Capt., Ord. dept.

MAY

THE ORDNANCE SERGEANT

1942

VICE-PRESIDENT LAUDS NEW OFFICERS

ARMY DAY PLEASURES PUBLIC

(Pictures on page 444)

April 6th, Army Day, brought thousands of civilians to the Ordnance Training Center to view what was probably the most impressive public demonstration ever staged by the Ordnance Department.

Designed originally to house a normal peace time Ordnance School, this huge training establishment has, during the past one and one-half years expanded into the Ordnance Training Center, consisting of the Ordnance Replacement Training Center, The Ordnance School, and the Ordnance Base Shop School. This was its first real open house since its mushroom growth began.

Upon arrival at the gate civilian visitors were given their first taste of military precautions, for although the public was invited to attend the affair, all were required to obtain passes before entering the grounds. But they came in droves, in spite of these necessary precautions.

The major portion of the demonstration was staged in the area of the Ordnance Replacement Training Center. Here tanks of several types, scout cars, half tracks, and self-propelled guns and gun carriages were displayed for the inspection of the guests. There were also numerous displays of small arms weapons, ammunition of all types, and bomb trucks loaded with their deadly missiles.

After viewing this basic display the guests were invited to ride "jeeps" on several planned tours of the Ordnance Training Center. The response almost overwhelmed these tiny vehicles which have been much publicized but seldom ridden by civilians.

At the obstacle course (see THE ORDNANCE SERGEANT for October, 1941) Replacement Center personnel were put through the paces throughout most of the day. In the automotive, artillery and machine shops the spectators were shown how uninitiated youths are remade into expert Ordnance technicians. One novel phase of these demonstrations was a group of enlisted men who mingled with the crowds while talking through portable loud-speakers, offering explanations regarding the materiel and methods being displayed, giving directions, and generally making the visitors feel at ease.

Many groups of the guests encountered an overturned truck in a field and were shown how it was returned to an upright position by means of ropes and manpower. Manpower was also displayed here using an A-type frame to remove a truck from a helpless position in a large ditch. Equally interesting was a heavy duty wrecker which boasted its ability to lift ten tons, and proved its point by raising and lowering a "baby" tractor many times during the day.

During the afternoon 6000 Ordnance trainees, armed with the familiar 1903 rifle, paraded before the Commanding Generals of Aberdeen Proving Ground, the Ordnance Training Center, and the Ordnance Replacement training Center and their party, which included Mayor Bernard Samuel, of Philadelphia, as well as a number of other Philadelphia officials. Here, too, the public was permitted to see the O.R.T.C. Band in action, the only Ordnance band in American history.

Great interest was shown by the public in the transition of a man from his entry into the service until he becomes a real Ordnance soldier. They saw him as

(Continued on page 445)

"FREE MEN IN ACTION"

Twice in recent weeks, the construction force employed on a new Ordnance plant at Little Rock, Ark., has contributed a Sunday's work without pay in their desire to help accelerate war effort.

Characterizing the action as "a splendid example of free men in action", the Chief of Engineers, in charge of construction, wired a message of congratulations to the workers.

The telegram sent the construction force read in part: "The Army commends you for the rapid construction of your Ordnance plant. We are proud of American workers for contributing their free time without pay to the great task which involves us all. This sacrifice of your hard-earned rest is a splendid example of free men in action."

The action of the Arkansas Ordnance workers is one example of voluntary contribution to advancing the war effort which should be an inspiration to American workers in every section of the country.

In addition to their all-out production of guns and shells, tanks and trucks, airplanes and other vital material for the armed forces of the nation, General Motors employees on April 16 launched an all-out drive among

(Continued on page 445)

Nation hears address to graduates

Ordnance School graduates
95 in Candidate Class

As reported by
Corporal Bob Lemar
Editor, The Flaming Bomb
(Additional pictures on next page)

With the attention of the nation focused upon them via the Blue Network of the National Broadcasting System, 95 graduates of the Officer Candidate Course of the Ordnance School, Saturday received their commissions and a congratulatory handshake from the hands of the Vice President of the United States, Henry A. Wallace. Gathered in the huge auditorium of Theater No. 3 were relatives, friends and erstwhile classmates yet to be graduated, who loudly cheered the newly-commissioned lieutenants as they received their warrants.

Representatives of the major news syndicates and other newspapers were also on hand to give their millions of readers firsthand accounts of the impressive ceremonies at the Aberdeen Proving Ground.

Salutes 95

Among the 95 graduating officers was the son of Mr. Wallace, now 2nd Lt. Robert F. Wallace. Setting the pace in salutes, the Vice President snappily saluted every one of the candidates as they stood before him on the platform, nor did his cordial smile and military snap falter, even with the last man of the 95.

Col. G. W. Outland, Commandant of the Ordnance School, acted as chairman as he introduced Brig. Gen. R. W. Case and Brig. Gen. J. W. Hatcher, Commanding Generals of the Aberdeen Proving Ground and the Ordnance Training Center. General Hatcher introduced the Vice President as a man "high in the councils of the government"

(Continued on page 445)



Col. Outland administering oath of office to Officer Candidates, April 18, 1942



Lt. Wallace, son of Vice President, receiving diploma and hearty handshake from his father



Ordnance Training Center band at graduation of Officer Candidates



General Case congratulating Lt. Wallace upon graduation while Mother, Vice President Wallace and General Hatcher look on



Vice President and Mrs. Wallace pinning lieutenant's bars on their son



Vice President Wallace addressing audience at graduation of Officer Candidates

ARMY DAY, 1942

ORDNANCE TRAINING CENTER



Left to right: Gen. Case, Gen. Hatcher, Gen. Simpson, Mayor Samuel, of Philadelphia



Food for the field pieces



They pass in review



Inspection



Up she goes!

VICE-PRESIDENT LAUDS

NEW OFFICERS

(Continued
from page 442)

... fully cognizant of the problems of Ordnance and of the responsibilities of the officers who will serve in the field against the enemy."

Call to Arms

Vice President Wallace gave the new officers their call to arms as he said: "These are days of planning for action. You who are graduating today have already proved yourselves to be men of initiative and action. It takes more ability to graduate from an officers' training school than to graduate from college."

Adding that he had authority for his statement from his son, the Vice President said, "I know you come from every walk of life and that the only qualities which count are intelligence, leadership and drive . . . This is the first completely mechanized war in history, and it is up to you men in Ordnance to see that the machines are kept going . . . each hour of your effort in the field will save us hundreds of hours of effort back in the United States."

"... Now that we have to fight we are going to fight with enthusiasm, doing the job more whole-heartedly than either the Germans or the Japs. We shall beat them at their own game, so that we can earn the right to live peacefully, so that the children of the next generation can grow up in a world of sunshine without the black cloud of dictatorial militarism forever threatening free nations and peaceful human beings."

Chaplain Russel E. Young gave the invocation during the opening exercises. Among those attending the ceremonies was Mrs. Wallace, who afterward had the pleasure of pinning her son's newly-earned bars on the shoulders of his uniform.

Music was furnished by the ORTC band, under the direction of M/Sgt William Krushinski.

FREE MEN IN ACTION

(Continued from
page 442)

themselves to back up the armed forces further with their dollars.

This means that the 220,000 workers of the Corporation in the 87 plants and numerous offices of the Corporation in cities from New York to San Francisco are out 100 percent to invest in savings bonds to help finance America's mighty war effort.

The campaign is known as "The General Motors Employees Bond Drive for Victory". The slogan is "Save and Serve for Victory."

ARMY DAY

PLEASES PUBLIC

(Continued from
page 442)

he was classified immediately after his arrival, they saw him at work, at drill, and at play. They watched him pass

through the gas chamber as a part of his training, and saw him master the obstacle course as a part of his physical development. They ate a meal prepared by army cooks in one of his mess halls, they visited his Service Club with its recreational facilities, and they rested to the soothing melodies of organ concerts in his chapels. In short, they watched Mr. Average Young America, both white and colored, become in a surprisingly short time one of the men behind the men behind the guns.



THE

SERVICE

(Continued from
page 391—

PLATOON

begins on page 382)

cisions as are necessary in accordance with the known policies of the platoon commander. His routine duties include the following:

Pass on requests for transportation and labor.

Supervise the guard.

Make a continuing study of traffic conditions, including the conditions of roads, and make recommendations to the platoon commander in regard to same.

Supervise ammunition handling and truck unloading during replenishment.

The section chief of the shipping and receiving section is responsible for all minor shipments of ammunition to and from the ASP. All administrative work in this connection is done under his direct supervision. He insures that incoming shipments are unpacked, checked and delivered to the proper destination. He insures that outgoing shipments are checked, packed, labeled and delivered to the carrier. In replenishment, he supervises the work of the checkers.

The section chief of the guard, guide and traffic section posts guards and traffic directors and dispatches guides and labor parties. During replenishment he supervises traffic control.

The assistant section chief of the transportation section dispatches the platoon's vehicles, supervises gassing of the vehicles, makes such inspections as are necessary to determine their condition, and reports any requirements for maintenance or repair to the platoon commander. During replenishment by rail, he operates a liaison service between the railroad siding and the depot.

The section chief of the service section supervises the work of the mechanics of his section. He assigns the work to the individual man. He supervises the installation of the ASP telephone system and assigns personnel to operate it. During replenishment he may assist the chief clerk in the supervision of the handling of the ammunition. His men may serve as checkers. One or two carpenters with tools will always be available to remove shoring, braces, etc., placed in the car to protect the ammunition during shipment.

COMMUNICATIONS ZONE DEPOTS

(Continued from
page 395)

AA Artillery	1325
75mm Howitzer	166
105mm Howitzer	2486
155mm Howitzer	2133
155mm Gun	494
Fuzes and Primers	31

Based on the above, the following assignments of calibers to sections might be used: (Note: The last column is given for use later in the discussion).

(1) Sect.	(2) Kind of Ammunition	(3) Tons per U/F	(4) Tons on Req. 3B179 1 U/F for Inf. Div.
A	Small Arms Gren., Mines, Sigs.	2614 201 2815	140.1 10.2 150.3
B	Mortar AT Artillery AA Artillery	1296 588 1325 3209	133.9 31.8 - 165.7
C	75mm Howitzer 105mm Howitzer	166 2486 2552	- 257.2 257.2
D	155mm Howitzer 155mm Gun Fuzes, Primers	2133 494 31 2658	102.8 - Incl. 102.8

The assignment of ammunition to sections given above is arbitrary. Aside from giving sections of approximately equal size, it was made largely on the basis of the size and weight of the weapon for which intended. The assignment of ammunition to sections should be studied in the light of existing conditions from every important angle. Thus, an issue to an ASP serving an infantry division requires action by all four sections. If this is the only issue being made at the time, and speed is important, this may be an advantage. Under other conditions, it may be a distinct disadvantage.

For purposes of illustration, assume that a requisition for ammunition as shown in column (4) above is to be filled. This requisition totals 676 tons and will require 14 50-ton cars. From column (4) above, the requirements of the different sections are found to be:

- Section A - 3 cars
- B - 3 cars plus 15.7 tons
- C - 5 cars plus 7.2 tons
- D - 2 cars plus 2.8 tons

The loading sheets were prepared calling for 3 cars to Section A, 3 to Section B, 5 to Section C, and 3 to Section D. The extra car was ordered to Section D because this section has the lightest load and should complete its loading before the other sections. The car was then switched to Section B, and finally to Section C.

COMMUNICATIONS ZONE AMMUNITION DEPOT NO. 33

Beige, Va.

Loading Sheet

Date Nov. 1 Req. No. 3 B 179

To Serv. Sect.: Spot 3 cars 50 T each at Sect. B at 9:30 AM

Move 1 car from Sect. D to Sect. B at when called

Remarks Car to be moved originates at Sect. D

V Z Ch. Clerk Time 8:10 AM

Cars spotted 1C 1897 0 IC 77896 - LN 4532

K L Serv. Plat. Time 11:40 AM

Cars have been loaded as follows:

Car No.	Code	Lot	Cont.	Tons	Car No.	Code	Lot	Cont.	Tons
IC 1897	R4CAA	CW10432	1234	50.0	SF 15638	RILFX	PBA2345	360	12.2
IC 77896	R4CAA	CW10432	366						
	R4CAA	CW10879	200 566	22.9					
	R1QJA	LTA 87	405	25.7					
	RILDA	PBA1567	40	1.4 50.0					
LN 4532	R4FBA	CW10643	1260	37.2					
	R4FLA	CW12367	360	7.6					
	T2AAA	FA41678	78	4.3					
	T2APA	FA42364	2	.1 49.2					

Q R Sect. B Time 1:35 PM

In emergencies, requisitions will be transmitted by telegraph. In order that the depot may proceed immediately with loading operations, a suitable number of empty cars should be available at the depot at all times. This must be authorized by the regulating officer. Otherwise, it will be necessary to wait until the regulating officer locates the empties and the military service moves them to the depot. Much valuable time may be lost. The number to be kept on hand will depend upon:

(1) The maximum expected demand which will depend upon the extent of operations and will vary widely. It can only be pointed out here that the transportation of 1 U/F for a type field army requires 226 50-ton cars.

(2) The length of time required to get additional empties to the depot. - This will depend on local conditions.

(3) The number of cars that can be loaded by the depot during the above interval of time, which will depend on:

- (a) Number of loading points.
- (b) Amount of labor available.
- (c) Amount of mechanical equipment available.

In any situation, this number can be estimated by the depot office as outlined in preceding articles of this series.



If you can't tell where your organization is going until it gets there, at least furnish a correct mailing address after you reach your destination.

TECHNIQUE of the CAMOUFLEUR

(Continued from
page 401)

fields present a regular surface and photograph light. Camouflage must match the texture of the surrounding natural features so that it will photograph the same shade.

Color. - In panchromatic photographs, variation in color has little effect on the resulting shade of gray as long as the color contrast is not marked. With infrared and color photographs, and direct observation, the exact matching of colors becomes more important. Camouflage materials must then match the surrounding color both in visible and infrared color components so that no contrasting pattern results.

Camouflage can be accomplished by any one or more of the following methods:

Hiding. - Completely concealing an object by constructing overhead cover or lateral screening.

Blending. - Making an object indistinguishable from its surroundings by breaking up its form and shadow. This method is particularly valuable where the terrain pattern is intricate.

Deceiving. - This method includes -

(1) Making an object appear to be something else, for example, constructing an airplane hangar or a warehouse so that it looks like a barn.

(2) Using dummies to mislead the enemy as to dispositions and to draw his attention away from actual installations.

The method of camouflage employed depends on a number of factors, including the size, location, and lay-out of the object to be concealed; the nature of the surrounding terrain; the type of camouflage materials available; the type of enemy observation; and, most important, whether or not the area has been photographed by the enemy. If it has not been photographed, any method can be used; if it has been photographed, that method which offers least disturbance to the existing pattern should be used.

The requirements for successful camouflage, listed in order of importance, are -

- (1) Proper choice of position.
- (2) Good camouflage discipline.
- (3) Proper erection of camouflage material.
- (4) Proper choice of camouflage material.

Choice of position. - The points to be considered include -

(1) Mission. - Location such that occupying troops can accomplish their mission.

(2) Access. - Ease of access without making tell-tale tracks either during installation, supply of food and ammunition, or relief of personnel.

(3) Concealment. - Natural concealment or ease

of concealment by camouflage.

(4) Defilade. - Prevention of enemy ground and balloon observation.

(5) Lay-out. - Suitable locations for auxiliaries to the main position, easily camouflaged and easily accessible yet not so close as to give away the main position. The discovery of one accessory may draw attention to the area and force the removal of the entire installation. The lay-out should be planned in detail before the position is occupied.

Camouflage discipline. - Camouflage discipline has two objectives:

(1) The prevention of any change in the appearance of the visible terrain by personnel, for example, making paths or tracks, cutting trees or sod, or leaving any foreign objects exposed, in the vicinity of the position.

(2) The maintenance of camouflage material, for example, repairing it when damaged, and keeping it up to date by changing its appearance or color as that of the terrain changes with the season.

Erection. - Camouflage material should be so erected that -

(1) It does not have a regular form or cast either a regular or well-defined shadow.

(2) It conceals the form and shadow of the object camouflaged.

(3) It hides the tracks of constructing personnel.

Materials. - Materials chosen should -

(1) Match the surrounding terrain in color and texture.

(2) Be easy to maintain, considering the length of time the position will be occupied.

The drawings reproduced with this article are extracted from FM 5-20 to illustrate some of the types of camouflage which might be useful to the camouflage personnel of an ammunition company or battalion.



REMINGTON SHOTGUN

(Continued from
page 406)

A slot, *f*, cut through the lower edge of the cocking head body, is provided to enable the assembly of the sear pin through the cocking head, and still allow travel of the cocking head in its functioning. A short inclined surface, *g*, starting from the sear notch and terminating at the rear of the firing pin boss, acts as a cam surface in directing downward movement of the sear when the cocking head moves forward.

SEAR. - The sear (Figure 8) is irregularly shaped. The hole, *a*, in the front end of the sear, is for the sear pin which fastens the sear to the breechblock. On the surface normally upward when it is assembled in the

weapon are: the sear shoulder, *b*, which engages the cocking head when the gun is cocked; and the small ridge, *c*, which prevents excessive upward travel of the sear during engagement between the sear and the cocking head. A comparatively large ridge, *d*, follows, and is acted upon by the inclined surface on the firing pin boss.

On the under surface are two arm-like projections, the largest of which, *e*, is acted upon by the trigger when the piece is fired. The short arm, *f*, has a cut, *g*, into which the ledge of the action bar engages when the sear is cammed down as the cocking head moves forward.

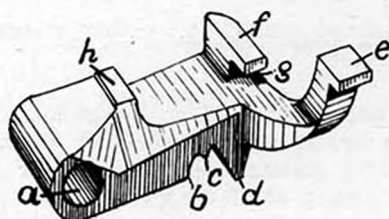


Figure 8 - Sear

Spring tension for the sear is provided by a leaf-type spring, secured at one end to the breechblock by the sear spring screw, and with its free end exerting force on the sear on the surface *h*.

ACTION BAR LOCK. - The action bar lock (Figure 9) consists of a straight rectangular bar, with two legs at right angles, one at each end. The front leg is cylindrical, the other formed irregularly. About midway of the bar a boss is formed, and through this is drilled the hole, *a*, for the pivot pin lock. The cylindrical leg, *b*, fits transversely through the breechblock and is the portion of the lock which acts on the action bar. The tip of the cylindrical leg is beveled to facilitate engagement.

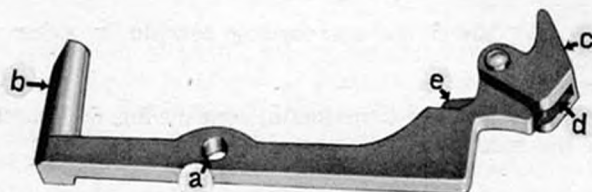


Figure 9 - Action Bar Lock

On the irregularly formed leg is assembled the action bar shoe, *c*, by means of a riveted-over pivot pin. Between the shoe and the action bar proper is inserted a small helical spring, *d*.

The small shelf-like projection or ledge, *e*, formed in the action bar proper, just in front of the action bar shoe, acts in conjunction with the sear during the functioning of the action bar.

The shoe is the means through which the action bar receives its spring tension. This is achieved through the action of the cocking head on the shoe as the action bar is operated.

FIRING PIN. - The firing pin (Figure 10) is a straight cylindrical piece, with the front end enlarged to form a shoulder, *a*, against which one end of the mainspring rests when assembled over the firing pin.

The forward edge of the shoulder also acts on the extractor when the firing pin is in the forward position,



Figure 10 - Firing Pin

camming the extractor upward and away from the cartridge. The notch, *b*, at the rear end is for the cocking head pin, which secures the firing pin to the cocking head.

FIRING PIN BUSHING. - The firing pin bushing (Figure 11) is a hollow cylindrical piece which assembles over the rear end of the firing pin and against the forward end of the firing pin boss on the cocking head. The upper side of the bushing is notched, *a*, to permit passage of the firing pin bushing pin, which anchors it in the walls of the breechblock. This causes the firing pin bushing to remain stationary while the cocking head moves.



Figure 11 - Firing Pin Bushing

MAINSRING. - The mainspring, 4.1" long, is assembled over the firing pin, between the firing pin bushing and the shoulder on the front end of the firing pin. It is partially compressed at assembly. The complete compression of the mainspring is accomplished when the cocking head is moved to the rear, due to the fact that the bushing is pinned to the walls of the breechblock and can not move, while the firing pin, being pinned to the cocking head, must of necessity move with it through the hollow bushing.

EXTRACTOR. - The extractor (Figure 12) is formed from a solid piece and has the extracting claw, *a*, on the front end, with the other end formed to accommodate the long leaf of the double leaf-type extractor spring. The pivot hole, *b*, is situated near the lower rear end.

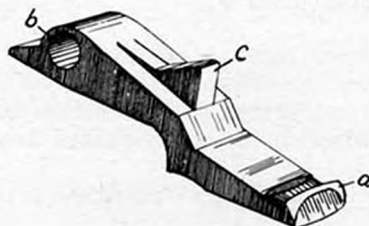


Figure 12 - Extractor

A projection, *c*, extends downward from about the middle of the extractor. This projection is acted upon by the shoulder on the firing pin when it is forward, camming the extractor upward and holding it there until the firing pin is retracted.

COUNTERRECOIL SYSTEM 155-MM HOWITZER

(Continued from
page 407)

the pressure before opening the valves in the filling line so that the gauge will show the rise in pressure. Then open the filling needle valve of the sleigh fully, and slowly turn the handwheel of the compressed gas cylinder valve, very gradually opening that valve until the desired pressure is shown on the pressure gauge. Then close the valve of the compressed gas cylinder tightly.

Check the pressure gauge reading, and if it is too high see that the gauge cock pointer stands at "1" and open the adapter needle valve. Get the pressure in exact accord with the correction pressure plate, then close the filling needle valve and gauge cock valve. Put on the gauge cock body head, the filling valve, and the filling needle valve caps and close the cradle bottom cover.

There will be no use in connecting a gas cylinder in which the pressure has been reduced below 525 pounds per square inch (47 kg. per sq. cm.)

ESTABLISHING A VOID IN THE RECOIL CYLINDER

To establish the void in the modified recoil cylinder with the filling holes in the left side of the sleigh, the following special tools are necessary:

- 1 ea. FUNNEL, #SFAXIA.
- 1 ea. PLUG FILLING, #B141095.
- 1 ea. PLUG VENT, #B141687.
- 1 ea. PIPE FUNNEL, #B1458731.
- 1 ea. WRENCH FILLING PLUG, #B109057.

These tools are listed in SNL C-28 under equipment.

Proceed as follows:

Elevate the mechanism approximately 5 degrees. Remove the front filling plug, using the filling plug wrench. Assemble and tighten the vent plug vent closed.

Remove the rear filling plug, using the filling plug wrench; assemble and tighten the filling plug.

Assemble funnel pipe and funnel to filling plug.

Open the vent in vent plug, pour liquid in funnel until liquid runs out of vent plug, (this insures a full recoil cylinder). Close vent in vent plug.

Remove funnel and funnel pipe.

Open vent and allow 100 cubic centimeters or approximately 1/4 pint of liquid to flow out of the filling plug. Close the vent, remove filling plug and replace rear filling plug. Remove vent plug and replace front plug.

Note: (Mechanism filled with recoil oil will have 400 cubic centimeters drained off.)

Instructions for filling the old type mechanism and establishing the void will be found in Technical Regulations 1305-155A, page 63, paragraph 49.

DIRECTOR, M4

(Continued from
page 411)

2. Unmesh bevel gear at the bottom of the Rp vertical shaft. (41 on Figure 4, TM 9-1655). This breaks the connection between the dial and disc and the cam, leaving the cam set at 6000 yards as in Figure 2.

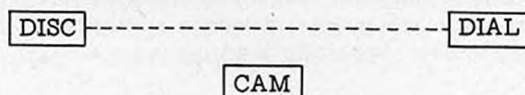


FIGURE 2.

3. Make change to Rp dial as indicated in final contact check. This sets the disc and dial in agreement as in Figure 3.

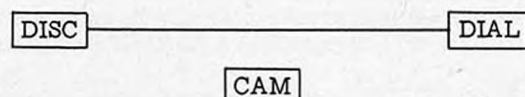


FIGURE 3.

4. By turning the vertical Rp shaft, set Rp to 6000 yards and remesh bevel gear. Thus the dial, disc and cam are all three set in agreement as in Figure 4, eliminating the need for resetting the cam with the cam setting fixture.

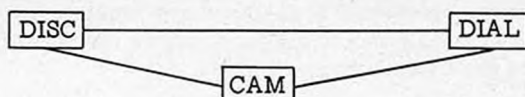


FIGURE 4.

"NOTES IN BRIEF"

TELESCOPE, PANORAMIC, (GERMAN). - At the present time Ordnance personnel may encounter organizations which are equipped with a panoramic telescope of German design and manufacture. The design, construction, care, and maintenance of this instrument are very similar to its American counterpart. One point should be kept in mind. Care must be exercised in re-engaging the azimuth mechanism to prevent damage. Also, some of these instruments have a locking device (for azimuth) to insure stability during firing.

BINOCULAR, M3 -A WARNING. - Great care must be exercised in handling (for maintenance purposes) the new Binocular, M3 which is beginning to appear in the field in a sizable number. The construction of the reticle does not permit its cleaning in the ordinary manner. Alcohol, or even a slight amount of rubbing with lens tissue, may cause the reticle etching to entirely disappear. This should be kept in mind if it becomes necessary to clean or repair these instruments.

BINOCULAR, M3. - Collimation. - The design of the new M3 binocular has greatly simplified the instrument man's job. Collimation of this instrument is accomplished by rotating the eccentric objective cell, and not by adjusting the porro prisms as on the type EE field glass. Do not attempt to adjust the prisms on this instru-

ment to eliminate double vision.

B. C. SCOPE, FRENCH. - Some of the old French B.C. Telescopes are now in service. Examination will show that there is apparently no method of eliminating double vision by means of the erecting system (in the lower elbow) since the prisms are usually cemented together. However, double vision can be eliminated by manipulation of the upper (90 degree reflecting) prism in the top elbow. Adjusting screws will be found that permit this, and a little practice will soon make the entire procedure apparent. A testing target of the usual nature is used.

HELP WANTED. - The instrument repair section of the Ordnance School is very anxious to secure information on the use of the instrument truck under actual field conditions. What suggestions can you offer regarding its use? What are its disadvantages? Advantages? How it can be utilized to best advantage under specialized adverse conditions, etc. Any information at all will be appreciated. Send your letters in care of THE ORDNANCE SERGEANT.

SUGGESTION. - Checked your stock of available reference material? Recently? There is a wealth of technical material for reference now available for the use of the instrument section. New technical manuals, and training literature of a similar nature, are appearing daily. This is in decided contrast to the situation a year ago. These books and manuals are of great help, both for training new personnel and for daily use in various maintenance operations. Refer to FM 21-6 and see what manuals you need. 21-6 is an index to all publications for training. Be sure you get a late copy.

ODDS AND ENDS. - This page is for your benefit. If you care to contribute any short cuts, new ideas, etc. which will improve the efficiency of instrument work please send them in. Ideas for articles, long or short, are always welcome. The editor does not know what you want to read unless you write and tell him. Let's hear from all of you.



FILING (Continued from page 413)

spondence should be filed. NO ATTEMPT SHOULD BE MADE TO ASSIGN NEW NUMBERS TO THE SYSTEM. It is absolutely forbidden and would result in a paper having a number that would not correspond with those of some other file and would result in confusion at the time the paper is transferred from one office or one set of files to another to be placed in that file. However, alphabetical filing within a classification number may be resorted to when the papers under that number are so numerous that they cannot be readily found.

A great deal of correspondence will be found that pertains to individuals; officers, enlisted men and employees of the War Department. One number has been assigned for correspondence of this type, namely 201. Under this number guide cards will be placed and arranged alphabetically behind which the folders (one for each name) containing correspondence relative to the individual will be placed in alphabetical order, by the names of the individuals.

The correspondence filed under 201 should be cross

indexed to the proper subject. The paper is placed under 201 as the individual is the important object of the communication.

Whenever the names of several individuals are mentioned in the same paper, it will be properly classified and filed under the subject of the paper, and proper cross-references or indexes will be made under each of the mentioned individuals names in the file.

The 201 file has an advantage, in that everything relating to a particular person can be found under his name in this file.

A precedent file will be established in each office, in which will be filed copies of all decisions, opinions, and unusual cases which may be of value in the future for the guidance of the office in similar cases. The number "008" has been set aside for this precedent file. Decisions and opinions may arise under any or all subjects covered by the file, and when they do, a cross index of these papers should be made to the precedent file - 008.

On incoming mail, after the subject of the communication has been determined, the proper classification number will be entered in the upper right hand corner, about 1 or 1-1/2 inches from the top and along the right hand edge of the paper and also to any inclosures thereto. Preceding the classification number there will be entered the office designation and immediately below it, the date the classification was made. A two line rubber stamp with changeable dates will prove quite satisfactory for this purpose. Following these instructions, the file number of a communication would appear as follows:

Hq. "E"	Jones, John, 1st Lt. C.A.C.
Mar. 23, 1942	

Therefore, the file number of a particular communication not only consists of the Arabic numerals, but all the initials, explanatory phrases or words used therewith, all of which must be stated when a reference is had to a file number.

In one file drawer there will be placed copies of letters and indorsements requiring replies or action thereon at some future date. These copies will be arranged under the names of months and within the months by days thereof between appropriate guide cards. Each day this file should be examined, checked and the necessary replies made or action taken.

In filing the following points should be remembered:

1. Examine records and documents to be sure that all necessary action has been taken.
2. Examine records and determine that all necessary cross-indexes or cross references have been made.
3. If it is determined that the paper is a suspended case, and if so, see that the necessary suspension has been prepared and filed.
4. File no papers unless such action has been indicated thereon by a duly authorized executive.
5. In filing, see that the folder is properly numbered and located in its proper place in the file.

6. If a paper on record is removed from the files, charge it to the person to whom it is delivered on forms provided for that purpose, or on some sheet of paper that can be placed in the file to denote the absence of the paper or record that was removed.

Specific blank forms and other equipment are provided for use with this system. These are described and listed in the "War Department Correspondence File" book together with more detailed instructions as to the use of the system. In conclusion, one thing should be remembered, NO ATTEMPT should be made to classify correspondence under this system or to use the system itself without the aid and guidance of the book, "War Department Correspondence File".

The Company Correspondence File

The Correspondence file for use by companies and similar organizations and detachments will consist of a series of ordinary 9-1/2 by 12-1/2 inch manila envelopes. Each envelope will contain the original copy or summary of all correspondence received or sent by the company during the period designated on the outside of the envelope.

All correspondence will be numbered serially for each calendar year. Its serial or file number will be placed in the upper right hand corner of each separate piece of correspondence.

Correspondence will be placed in numerical order

in the envelopes without folding. As each communication is numbered, the corresponding file number on the envelope will be underscored: thus the highest number underscored on the outside of the envelope will correspond with the highest numbered communication filed therein.

Additional envelopes will be added as needed and numbered serially for each calendar year. The first communication in the second envelope will carry the number following that of the last communication in the first envelope, continuing for the calendar year when the file will be started again with the number "1".

An alphabetical index will be improvised and maintained for ready reference. This index will be used for each calendar year and filed with the envelopes for that particular year.

An inspection will be made annually of the correspondence files of the organization by the Commanding Officer of the Post, Camp or Station, or by an officer designated by him. At this time, the inspecting officer will eliminate all paper, etc., which have become obsolete or unnecessary for future reference. He will cross off and initial, on the outside of the envelope, all file numbers corresponding with the papers removed from the file. He will also cross off and initial the proper entries in the index.

Great care should be taken not to remove any paper or other document relating to the history of the organization or of individuals or to records of future value.

STANDARD NOMENCLATURE LIST

(Continued from page 416)

The parts lists of SNL's of Groups A to G inclusive are arranged in tabulated form to show all the parts required to make a complete item. The tabulated matter is divided into seven columns. In the first column, "Note Symbol", symbols are given for reference to notes found in the back of the SNL and the number of the SNL under which the part is stored and issued if it is common to more than one SNL. The next column, "Plate No." refers to the plate which shows the listed part and its relation to other parts, thus by reference to this column a part can be identified and its correct nomenclature determined for property records and requisitioning purposes. The third column, "Item Stock No.", gives the number assigned to provide the arsenals and depots with a uniform system of identification for reporting. The fourth column, "Piece Mark or Drawing No.", gives the part's piece mark or indicates the drawing on which the manufacturing details of the part will be found. The fifth column, "Item", gives the name of the item. The name of the item as given here is THE STANDARD NOMENCLATURE of that item and should always be used in connection with property records and requisitions. In some cases, in addition to the nomenclature of the item, there will be a brief note of further identification. The sixth column, "Quantity per Unit Assembly", gives the number of the particular parts needed for one complete item. The seventh column, "Unit Price", gives the established price of the item for property accountability, surveys, etc. (For reimbursable prices for other than

the Regular Army see AR 45-75. The reimbursement price of ammunition is published in Ordnance Field Service Bulletin 3-7).

In connection with the "Note Symbol" column — most of the SNL's in current service designate expendable items by use of the symbol "X" or "R". However Ordnance Field Service Circular No. 192, dated May 17, 1941 designates all items listed in the Standard Nomenclature Lists as expendable with the following exceptions.

- a. Major items (indicated in SNL's by symbol)
- b. Items in Group J.
- c. Items whose unit cost is more than \$1.00.
- d. Ammunition.

This OFSC also states that all SNL's will be changed to meet this policy as they are compiled or revised.

It will be noted that in the column "Quantity per Unit Assembly" figures in very small type are sometimes shown in connection with certain items. These small figures refer the reader to footnotes at the bottom of the page. The footnotes usually give the basis of issue for that item. For example: A small figure (2) is shown in the "Quantity per Unit Assembly column" following the item "LANYARD, pistol, M1" in SNL B-6. Reference to footnote (2) at the bottom of the page reveals that this item

is to be issued only to Enlisted men of Cavalry and mounted engineers armed with the pistol.

In regard to the system of cross reference mentioned earlier in this article, some facts should be first pointed out concerning the first word in the nomenclature of any item. The first word in the standard nomenclature of an item is known as the "basic noun" and is printed in all capital letters. Since the SNL for any specific major item lists most of the things used in conjunction with that major item regardless of whether or not those things belong in that classification, some means had to be devised to differentiate between those items belonging in that classification and those that do not. One method of accomplishing this is to print the basic noun of items belonging to a given list in verticle letters and to print the basic noun of items listed there but actually classified in some other group in italics (slanted letters). Where the basic noun is printed in italics the proper SNL for that group is indicated in the "Note Symbol" column. For example: The item "RACK, arm, pistol, M1920" is listed in the SNL B-6 which is the SNL for the major item "PISTOL, automatic, M1911". The basic noun "RACK" is printed in italics and the "note symbol" column shows that the RACK actually belongs in Group B-16. SNL B-16, however, has not been published.

Some SNL's, instead of being printed from set type, are reproduced in typewritten form. Since italics cannot be used with a typewriter, underscoring is used instead of italics. Italics, underscoring, and all symbols used in a SNL are explained in the "Note" section of that SNL.

The supplements to those SNL's that have them usually consist of addenda giving such information as standard packing, weight, measurements, and cubic displacement of the standard package. This information is valuable in estimating shipping requirements. Also an addenda may give the weight of such groupments as would normally be supplied in making initial issues under mobilization or war plans such as sets of spare parts, etc. In certain SNL's there is also an addenda showing the major items and basic spare parts required by an Ordnance Company (maintenance) for the maintenance of a specific number of major items for a specific period of time. In the older SNL's this period of time is seven days intensive fire while in SNL's of later issue the quantity is based on twelve months in the theater of operations. This information is useful in planning large scale supply operations and may be also used to compute the basic spare parts loads for Ordnance Companies (Maintenance).

Much of the descriptive matter in this article was taken from the Ordnance Publications for Supply Index (OPSI) and Ordnance Field Service Bulletin (OFSB) 1-8. It is realized that not all men have ready access to the various publications of the Ordnance Department. That is the reason for the writing of this article. A thorough study of the OPSI will give a good general picture of the classification system used in the Ordnance Catalog. OFSB 1-8 gives a very good description of various other Ordnance Department publications such as Ordnance Storage and Shipment Charts, Ordnance Field Service Circulars, Ordnance Field Service Technical Bulletins, Ordnance Equipment Charts, etc. OFSB 1-8 and the OPSI are suggested reading for the new Ordnance soldier who is not yet familiar with the various "sources of information."

SAFETY PRECAUTIONS IN WELDING

(Continued from
page 422)

6. Welding generators should be so located that dust, water or other foreign matter cannot enter the electrical windings or bearings.

WELDING OPERATIONS

1. Never look at an electric arc with the naked eye.
2. Insure that the colored glass plates are not cracked and are of the proper shade.
3. Always use a protecting cover glass over the colored plates to avoid damage from metal spatter.
4. Do not weld with cracked or defective helmets or shields as stray radiations from the arc may cause serious burns.
5. All arc welding should be performed with proper clothing to prevent burns to the operator from the rays of the welding arc or from hot metal spatter.
6. Don't strike an arc on compressed gas cylinders. A serious explosion or fire may result.
7. Use portable screens to enclose all welding operations performed in open areas to shield the arc rays from any persons nearby. As arc welding operations give off an intense light, portable screens forming a light-proof enclosure should be used to avoid detection when welding at night.

GENERAL SAFETY PRECAUTIONS

1. Wear safety goggles when chipping, peening, removing slag or grinding metal surfaces or welds.
2. Do not weld in places where dust or combustible particles are suspended in the air. Either move the work to a safe place or make special provisions for proper ventilation, shielding the work and for fire prevention.
3. Do not leave hot rejected electrode stubs, steel scrap or tools on the floor or in the booth. These interfere with good progress in welding and may cause accidents or fires.
4. Never strike an arc or weld on sealed containers, clutch or gear housings, or enclosed structures without checking the nature of their contents. Sealed containers should be vented and thoroughly cleaned. Care should be taken to remove all traces of fuel gases, grease, oil or other lubricants before welding. These are a fire hazard and may cause an explosion when confined. Remove all assembled parts from structures to avoid warpage, damage to heat-treated parts, or melting of low melting point alloys.
5. Welding operators should wear suitable helmets

to prevent injury to face and eyes from hot metal spatter, and the injurious heat and light rays given off by the arc.

6. Leather gloves, and protective sleeves should be worn to protect the hands and arms from the heat of welding, molten or hot metal spatter, and injurious rays.

7. Leather gloves and jackets should be worn to prevent fires in clothing or flesh burns when welding with large electrodes, or when welding in vertical or overhead positions.

8. It is recommended that woolen clothing be worn instead of cotton as the former are less easily burned or damaged by weld metal spatter.

9. Do not allow oil or grease to come in contact with or still the leather gloves, aprons or clothing as they can easily be ignited or charred by molten or hot metal spatter.

10. All welding on brass, bronze, galvanized iron, painted surfaces or alloys containing lead, zinc or tin should be done in well ventilated places. These elements are volatilized by the heat of the arc and may cause nausea or serious irritation to the nose, throat and eyes of the operator. Relief from prolonged exposure to these fumes can be had by drinking milk.

THE FORGE FIRE

(Continued from page 423)

If the work varies in cross section, the larger part should be heated first, and then the smaller part, as the larger requires a longer time to reach the desired temperature. This may be accomplished by shifting the work in the fire. Also, in order to obtain more uniform heating, the work should be turned over in the fire occasionally.

TABLE I
Temperature Colors (approximate)
Color °F

Faint red, visible in dark	750
Faint red	900
Blood red	1050
Dark cherry	1175
Medium cherry	1250
Cherry or full red	1375
Bright red	1550
Salmon	1650
Orange	1725
Lemon	1825
Light yellow	1975
White heat	2200

The experienced workman must be able to judge the temperature of a piece of work by the color. If a piece of iron or low carbon steel is put in the fire and slowly heated, its color will change as the temperature increases. When it has been heated to a temperature which appears as a dull red color when viewed in a dark place, but is black when seen in open daylight, it is said to be black hot. As the heating proceeds, the piece shows a dull red color in the light, and is said to be red hot. Further heating

changes the color to cherry red, or bright red, when seen in the light. As more heat is applied, the metal changes to an orange and then to a lemon color, and finally begins to spark. Just before it reaches this point it is said to be white hot, and has a dazzling white glow. If heating is continued beyond this point the metal will be burned. As a guide to temperature control the temperature color chart shown under TABLE I should be consulted.

TRENCH MORTAR AMMUNITION

(Continued from page 428)

on the ends of the bundle give information as to number of rounds, nomenclature, shipping name, etc.

Shell, Practice, M50A2. - This shell is exactly the same as the M49A2, except that it has an inert filler and a smoke producing pellet of black powder (.05 lb.) under the booster of the M52 fuze. The color marking of the body is blue with white stenciling. Packing is the same as the M49A2.

Shell, Training, M69. - This shell is designed to give the mortar crew practice in firing under conditions that will not permit firing in more than the first zone.

The body of the shell is of cast iron and has no filler, fuze, or propellant increments. It conforms in size, shape, and weight with the high explosive shell M49A2. Several ignition cartridges are provided with each round so that the shell can be fired several times in the first zone of fire.

The body of the shell is painted black with white stenciling.

Information as to the packing of this shell is not available at the present time.

TOOLS FOR 20-MM AIRCRAFT GUN

(Continued from page 437)

and the lug engages the front face of the right hand breechblock slide. The rear lever lies on top of the bolt body with the brass stud in the forward end bearing against the rear face of the tube. The handle is pushed forward causing forward lever to move to the rear, thereby pulling the breechblock slide to the rear, unlocking the gun.

Tool, Driving Spring Assembling, B163497. - The tool is a straight rod with a split stud fixed in the forward end and knurled at the rear end. The tool is inserted into the driving spring guide and driving spring until the split stud is inserted into the hole in the rear of the driving spring guide plunger. This group is inserted into the rear buffer assembly and into the axial hole in the bolt body. The rear buffer wrench is used in conjunction with this tool in order to compress the driving spring and screw the driving spring guide head into the rear buffer housing. The tool is also used to a good advantage in the disassembly of the driving spring group. Figure 4 shows the driving spring assembling tool with a wooden handle on the rear end and a small tip machined on the forward end. The handle is not necessary but makes the tool easier to use. A standard file handle is the most convenient to use. A

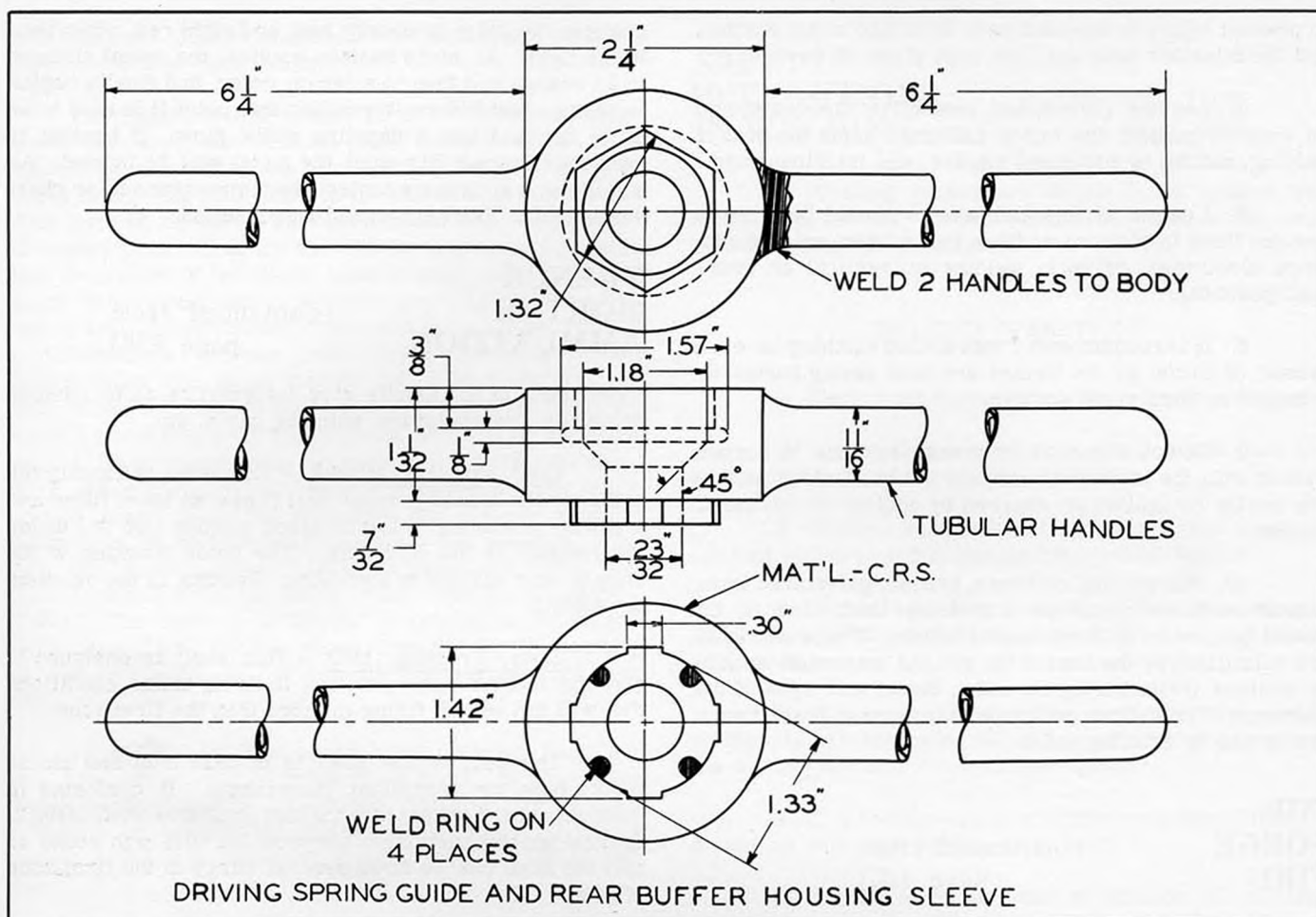
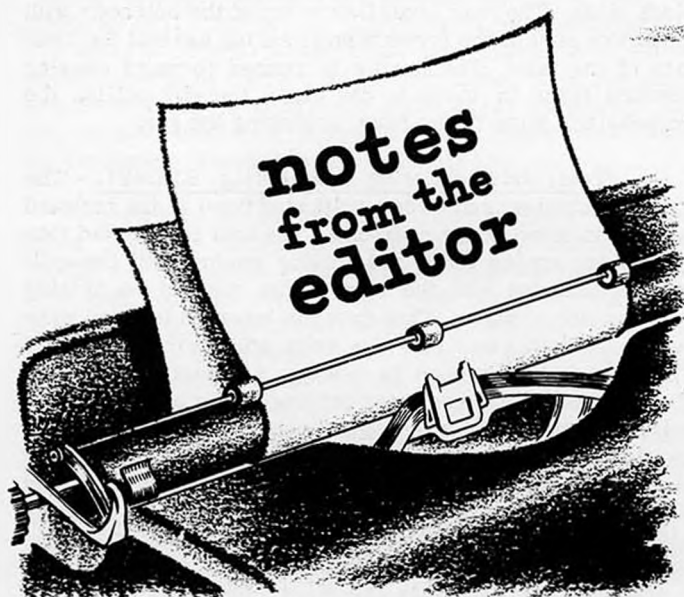


Figure 5

split stud, fixed at the forward end, is better than the machined tip, but the latter is easier to make and can be used effectively.

Wrench, Rear Buffer, C70605. - This wrench is used to assemble and disassemble the rear buffer assembly and to screw the driving spring guide head in and out of the rear buffer housing. The tool is a flat socket type wrench with two handles extending from the center portion in op-

posite directions as shown in Figure 5. The center portion is drilled in order that the wrench can be slipped over the driving spring assembling tool. One side of the wrench forms a hex socket that fits the hex head of the driving spring guide, while on the other side there is a circular projection with four (4) equi-spaced lugs on its circumference. These lugs fit into the four (4) notches in the front end of the rear buffer sleeve. By engaging the lugs into the notches, the rear buffer sleeve may be screwed out, releasing the rear buffer spring and rear buffer washer.



A Slip of the Lip may Sink a Ship

FORECAST

Automotive equipment is becoming more and more important every day, and Ordnance personnel may expect to hear a lot about it in the future. THE ORDNANCE SERGEANT for June will present "An Introduction to Automotive Theory" which will be just what the title implies.

If you are interested in the Field Artillery, you will find the July issue of THE ORDNANCE SERGEANT of special interest. It will be a special Field Artillery-Ordnance issue.

An acquaintance with all phases of Fire Control will be made possible by the August issue of THE ORDNANCE SERGEANT. The Fire Control Section of The Ordnance School is working on a splendid issue.