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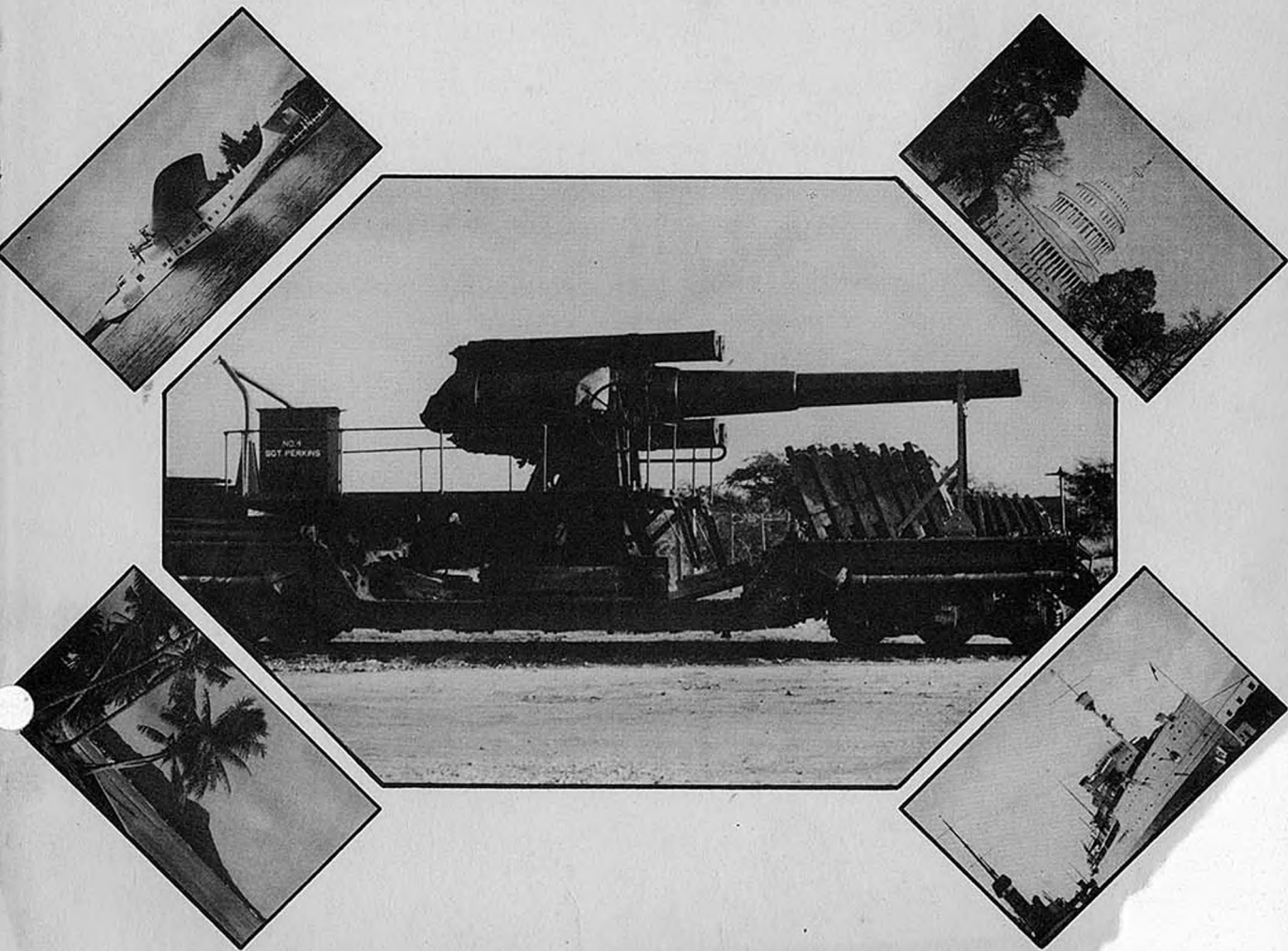
ORDNANCE SERGEANT



Volume I

March, 1941

Number 3



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Volume I

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The Cover Pictures

Center

8" Railway Gun, Seacoast Artillery.
M1888, A1, M1, M1A1, M11, M11A1

Upper left

Philippine Clipper in
waters of Pearl Harbor,
Honolulu

Lower left

"Diamond Head, familiar
Honolulu landmark

Upper right

The Capitol Building,
Washington, D. C.

Lower right

Flagship of Mine Force,
U.S.S. Oglalla, at dock
at Honolulu, T. H.

All photos by Technical Sergeant E. R. Manfrin, Ord. Dept.

EDITORIAL

"THE MOVING FINGER WRITES, AND HAVING WRIT--MOVES ON".

-----Omar

There is something prophetic in the words of the learned Persian poet, mathematician, and astronomer. He wrote them more than eight centuries ago, based upon his knowledge of countless other centuries of history before his time. Yet they hold a certain prophetic something in this century -- in our own time.

"and having writ -- moves on".

The pen of Omar failed to suggest that "having writ" the "moving finger" would halt. That is well, for even in our day the "moving finger" of fate still writes, and writes with vigor. Hopeless indeed would be our future if this writing came to a halt.

What has been the story of history written before the present? It is the story of one phase of civilization's development after another, the rise of one great nation after another, the development of one theory of government after another. It is the story of Babylon, Nineveh, Tyre, Greece, Egypt, Rome, the Middle Ages, the Napoleonic Empire, the world which preceded World War I, and that world which we have known between World War I and World War II. We of today are writing the story of the present. The story of the future lies yet ahead, but it is very much dependent upon us for its substance.

You may say that history is the story of the fall of great civilizations which have toppled over in their greatness, and you may predict that our own increasing greatness foretells the same disaster. Men of learning, and experience, today, may cry that in the light of current history civilization is doomed. I say, though, that history is the story of continuous and never-ending advance of civilization. I say that each destroyed civilization has been followed by another even greater, which derived much of its substance from the remains of that which had gone before. I say that civilization is not, and never will be, doomed so long as men live upon this earth. That is one thing we MUST believe.

We are engaged in a profession which some say will be the ruination of the good features of civilization. Don't believe it. Our profession is one which, we intend shall perpetuate the best features of civilization -- The Arts, Religion, Science, good Government. We train for conflict not because we are antagonistic, nor because we wish to destroy that which is good. We train to fight because we know that we must constantly be ready to defend those precious ideals upon which the civilizations of tomorrow must stand.

Civilization is not doomed, because you and I, and many thousands like us, must and will insist upon its continuous advance. We must BELIEVE this ourselves. If we hold this thought within us we can pass it on to younger men who follow in our footsteps, and they in turn to others. This process, or the finger of fate, must never halt. Some day, centuries after 1941, someone must recall that a Persian poet once wrote:

"The moving finger writes, and having writ -- moves on".

ORDNANCE TRAINING CENTER PERSONNEL

THE ORDNANCE TRAINING CENTER, which was activated on January 1, 1941, is organized to train the ever-increasing number of officers and men who will be required to maintain the fighting equipment of the new streamlined, highly mechanized Army of the United States. The facilities of this Training Center have been arranged to accommodate approximately 11,500 officers and men at one time. This entirely new development in the training technique will undoubtedly become as permanent as mechanization, for mechanization is dependent upon it. In view of its consequent importance, THE ORDNANCE SERGEANT believes that a brief biography of the Commanding Officer, and also of the leading personalities in the component segments of his command, will be of interest to all Ordnance personnel.



COL. J. S. HATCHER

From time to time, therefore, this publication will bring you a story of one of these officers so that you may have a better conception of the background and the qualifications which enable them so adequately to administer the policies of THE ORDNANCE TRAINING CENTER.

The Commanding Officer of THE ORDNANCE TRAINING CENTER is Colonel Julian S. Hatcher, chosen by the Chief of Ordnance for the highly difficult and important task of organizing and activating the Training Center from its inception, and subsequently of administering its policies and exercising its command.

Colonel Hatcher's personality, background, and experience suit him particularly for the leadership in this enterprise. He is pre-eminently a gracious gentleman. He is tall and imposing in stature, courtly in bearing and possessed of the most disarming smile and gentleness of manner. His natural cordiality makes a visitor feel at home and welcome immediately. He is a man of inconceivable energy and unmistakable force. In his presence it is hard to decide whether he is the most gentle or the most powerful man you ever met. Probably because he is both. He has an incisive type of mind. His thinking is judgmatical and his decisions are crystal clear. His general fund of knowledge is amazing.

He has not only had a distinguished career as a military officer, but has found time to bring credit to himself and the Service by his numerous excellent writings. He is a consultant member of the Board of the Federal Bureau of Investigation. He has been a member of the United States Olympic Games Committee for several years. He is particularly interested in the organization, training, and participation of the United States Rifle Teams.

Colonel Hatcher was born in Virginia on July 26, 1888. He began his military career as an officer in the Navy. He was appointed a Midshipman of the United States Naval Academy and graduated in June, 1909. As an ensign he served as navigation officer and instructor in rifle practice with the Marine Corps.

He resigned in 1910 to accept an Army commission, as Second Lieutenant, and was assigned to the Coast Artillery. Shortly thereafter, in the year of 1911, he saw his first action, in the Mexican Revolution. As a First Lieutenant in 1913, he was transferred to the Ordnance Department and stationed at Watervliet Arsenal. After two years of duty there, he entered the Ordnance School and graduated in the year of 1916 as a Captain.

During the same year, he saw action in the Mexican Border Expedition. As Ordnance Officer of the "Pershing Expedition into Mexico", he established several machine gun schools on the Border and gained valuable field experience. Later, he was designated as Commanding Officer of the Brownsville Ordnance Depot, where he assisted in the design of the first Ordnance Maintenance trucks, for field service.

Establishing the Ordnance Machine Gun School at Springfield Armory at the outbreak of the World War in 1917, he supervised the training of several hundred officers and a large number of enlisted men as machine gun instructors. These men established the Small Arms Repairs Centers in the A. E. F. in France.

He received his Majority in February, 1918, and was ordered to Washington as Chief of the Small Arms Division. During the same year he was promoted to Lieutenant Colonel and sent to France to serve on the staff of General Pershing at HQ AEF, Chaumont.

After the war he returned to Washington and served as a member of the Infantry and Cavalry Board. Since that time he has served successively as Works Manager, Springfield Armory; Ordnance Officer, First Division; Third Corps Area Ordnance Officer; Officer in charge of Small Arms Ammunition manufacture, Frankford Arsenal; Chief of Small Arms Division, Technical Staff, Washington, D. C.; Chief of Small Arms Division, Office of Chief of Ordnance; and Executive Officer, Baltimore Ordnance District.

In 1937 he was ordered to Aberdeen Proving Ground to serve as the active head of The Ordnance School. Later he was appointed as Commanding Officer of the Ordnance Training Center by General J. B. Rose, Commanding General of the Aberdeen Proving Ground, Maryland.

His numerous writings have appeared in such noteworthy publications as the "Saturday Evening Post", "Scientific American", and various other magazines. The "Encyclopedia Britannica" has recognized Col. Hatcher's ability by using his writings.

Among his published books are included, "Machine Guns"; "Pistols and Revolvers and Their Use"; "Text Book of Pistols and Revolvers"; and "Text Book of Firearms Investigations, Identifications, and Evidence." The latter book is one of the largest works of its kind known today. It contains a foreword by J. Edgar Hoover, Director of the Federal Bureau of Investigation, and consists of 872 pages and 400 illustrations. At present the book is widely used as a textbook in police and legal schools. At the request of Mr. Hoover, Col. Hatcher was designated by the War Department as special investigator on Firearms for instruction of agents assigned to criminal investigations. Later, when the Department of Justice organized the National Police Academy, for the training of specially picked men from various police departments in the country, Col. Hatcher was enrolled as a member of its board.

With officers of this type and character formulating the policies of our Ordnance Training Center, the success of this project is assured.

In the picture at the right Col. Hatcher is shown going over some important details with his "right-hand man", Major H. J. Conway, the Executive Officer of the Ordnance Training Center.





SAFETY FIRST

IT'S BETTER TO BE SAFE THAN SORRY (OR DEAD)

A COMPOSITE ARTICLE

INTRODUCTION

by Technical Sergeant Hugh E. Martin, Ord. Dept.

You've never been killed in an accident, have you? Of course not. That's just a silly question. Yet one can never tell how soon you might be the next person who will no longer be able to answer this inquiry. I suggest that you hesitate before you brand this a silly question. There is an old saying that "He who hesitates is lost." But that has to do with love, and the Ordnance Department entirely reverses the meaning of this phrase and treats it from a different viewpoint. "He who hesitates -- to be sure he is safe -- is NOT lost." He lives to be careful again.

There is another saying in the Army, "Regulations are made to be broken." This deserves no comment here, but it calls attention to the fact that SAFETY RULES are made to be OBSERVED. Safety rules are not the hobby of some person who devotes his spare time to thinking of needless ones. They might well be made the hobby of every man who engages in a profession such as ours. Every safety rule is in itself a common sense idea. Most of them are based upon real experiences; and few are theoretical. Many are the results of sacrificed lives of men who were careless, or who had careless companions.

No one will deny the fact that it is often inconvenient to observe all safety rules. It is also inconvenient to lose one's eyesight, or an arm or a leg, or one's life. A clever man may break a safety rule and get away with it, but most of us have heard of clever men who weren't quite clever enough. They broke safety rules -- and were buried. The common sense viewpoint is careful observance of EVERY safety rule. Each one has a good reason behind it.

SAFETY - THE INSTRUMENT SECTION

by Technical Sergeant J. P. Rigg, Ord. Dept.

The average instrument man will usually treat any discussion of personal safety as a matter that has but remote connection with his particular work. A few minutes thought will show the obvious fallacy of this assumption. By merely relegating all thought of personal safety to the background, the individual assumes an attitude that is in itself one of the biggest contributing causes of accidents.

Contrary to the general conception, the major cause of most accidents is not inexperience. The inexperienced man will treat his work and his tools with the respect that they deserve, and approach an operation with the realization that he is inexperienced, and consequently will proceed with a caution that will minimize the possibility of injury.

The man who is most commonly involved in an accident that might have been prevented is the experienced, overconfident type of individual.

The two most common causes of all accidents are carelessness and over-familiarity. The old adage that "familiarity breeds contempt" has within itself dangerous implication, and could aptly be changed to read "familiarity may cause death or injury".

Carelessness and overconfidence can be just as deadly in the Instrument Section as in any other phase of Ordnance activities. The possibilities for personal injury are just as unlimited, if proper precautions are not observed. To cite an example:

While the use of aviation gasoline as a metal cleaning solvent is suggested in several publications with which we have to deal in the Instrument Section, the fire regulations of practically all Army posts sensibly prohibit its use in this manner. Metal cleaning solvents of a less volatile and non-inflammable nature are authorized instead. The violation of these regulations, or the use of unauthorized solvents for any purpose whatsoever, constitutes not only direct disobedience of orders, but is in addition a hazard which is bound, sooner or later, to cause serious injury, and perhaps death, to one or more men who are working with them.

There is no excuse for a hazard of this sort. If such a condition exists beneath your supervision, it is up to you to eliminate it.

While personal safety is in itself primarily the responsibility of the individual, it is the duty and the responsibility of the Ordnance Sergeant to see that existing orders pertinent to his activities are enforced. He is directly charged with this responsibility and should have a full realization of what this responsibility means, and see that he discharges his duties in a manner that will eliminate the probability of accidents among men in his section.

He should know, for instance, that certain bluing solutions with which he deals, are capable of potential deadliness, and violent explosion if they are stored in a hot place. This is one of the many points with which he should be familiar. He should study existing publications and references and guide himself thereby. The OFSB series are invaluable for this purpose. Every Ordnance Sergeant should be acquainted with their contents, and have a file of them on hand.

Remember that the authorized way of doing a thing, is the best and the safest way; that is the very reason why it is authorized.

In instrument work, as in any precision work, the importance of adequate lighting facilities cannot be emphasized too much. Improper lighting can be a cause of accidents, regardless of how much care is exercised by personnel. In addition, and especially due to the exacting requirements of instrument work, improper lighting jeopardizes the most precious thing that any man possesses -- his eyesight.

Good vision is a necessary requisite in a good instrument man. It is important to any man for that matter -- just ask a blind man what he thinks of eyesight. Yet most of us take our vision for granted, little realizing that our eyes are just as subject to accident and impairment as any other part of our bodies.

Yet, improper lighting can ruin any man's eyes over an extended period of time. Your eyes will suffer, your work will suffer in quality, and the possi-

(Continued on page 99)

for the

M-1 Rifle

by Technical Sergeant H. L. Bagley, Ord.Dept.



The gas cylinder of the M-1 Rifle has been changed considerably since the first M-1's came off the production line at the Springfield Armory.

The change to a new type gas cylinder necessitated the redesigning of the barrel. The old barrel was 21.600" in length, while the new barrel is 1.71" longer and is rifled full length. The new barrel extends completely through the gas cylinder. A gas port has been placed in the new type barrel 1.5"

Conducted by
Master Sergeant C. G. Goodman

in rear of the muzzle, the port is 0.075" in diameter, and enters the bore between the lands.

The length of the new barrel, from the receiver to the muzzle, is 23.31". The outer surface of the barrel from the muzzle to a point 0.750" to the rear is smooth. At this latter point we come in contact with a threaded surface. This threaded area is 0.5625" dia., 32th. per in., and is 0.317" long. At this point, on the outer surface of the barrel, are found three grooves or splines running lengthwise of the barrel. The splines start at the forward edge of the threaded section and extend to the rear a distance of 1.560". They are 120 degrees apart, 0.124" in width, and 0.041" deep. The top spline is located at twelve o'clock on the barrel.

The new style gas cylinder is made of non-corrosive metal which is Parkerized the same as the rest of the rifle. The rear end of the gas cylinder forward to a point just in front of the bayonet lug is similar in design to the old type gas cylinder. The front end of the gas cylinder has been changed considerably from the old design. The cylinder does not screw on the barrel as it did on the old style, but is forced on the barrel over the three splines, the cylinder having three feathers that match with the spline. This is the new method of holding the cylinder in alignment with the barrel and receiver.

The cylinder is then locked in place with the gas cylinder lock, B147426 (See drawing on page 98), which screws on the threaded section of the barrel and is brought in alignment with the cylinder proper, thus forcing the gas cylinder firmly on the splined section of the barrel. The lock is held in place by the gas cylinder screw, B147428. This part passes through the gas cylinder lock and screws into the gas cylinder proper, securing the lock to the cylinder and preventing unscrewing of the lock from the barrel. The gas cylinder screw is slotted to receive the screwdriver blade of the combination tool for this rifle. The gas cylinder screw is threaded on one end to screw into the cylinder; the threads are 9/16", 32 threads per inch.

The front sight on the new front end is a great improvement over the old style. The new front sight is clamped onto a dovetail lug on top of the gas cylinder. The front sight is clamped to this lug by means of a front sight screw, A152853, which enters the sight from the rear and extends through to the threaded section in the front part of the sight. The screw is turned by means of a 3/8" Allen set screw wrench. The sight has a transverse slot to allow the

(Continued on page 98)

(ARTILLERY)

Conducted by Master Sergeant W. C. Minshaw

HISTORY OF THE DEVELOPMENT of the FRENCH 75-mm. FIELD ARTILLERY MATERIEL

The French 75-mm. Field Gun is returned to battery after firing by the action of compressed air expanding against a floating piston, which exerts pressure on the oil column, which in turn acts on the head or piston of the recoil piston rod.

A German Field Artillery officer first conceived the idea of using compressed air in the recoil mechanism of a field gun; thus, eliminating the use of steel springs. His idea, however, was not well received in Germany. As a result, in order to advance the development, he took his plans to France and submitted them to the Commanding Officer of the French Arsenal at Bourges.

The Commanding Officer at Bourges, after examining the design, summoned a number of officers under his command, (who were working on the development of Field Artillery materiel) and asked their opinion. It was unanimously agreed by these officers that the system, though very attractive, was not feasible, and that it would be hopeless to attempt to maintain a high pressure of air in a cylinder behind a moving piston. The Commanding Officer then dismissed these assistants and sent for another young officer under his command by the name of Capt. DePort. Being a good executive, the Commanding Officer told Capt. DePort what had just taken place, and then said to him:

"Now, I do not ask your opinion. I order you to develop this pneumatic recoil system. You will report to me every eight days on the progress you have made."

This is how the development of the present 75-mm. gun was initiated.

Capt. DePort labored earnestly on the design and carried it to a fairly advanced stage. He also built a carriage which was tested and gave very favorable results. Soon, however, the work was terminated by his resignation from the French Army.

At the same time that this work was going on, A Major Ducrot was working on the design of an entirely different style of brake. His idea was to develop a very rigid carriage with little or no recoil. There was considerable rivalry between the different designers, and between this arsenal and the one at Putcu.

At the time of Capt. DePort's resignation, the Commanding Officer at Bourges was badly in need of an officer to carry on his work. He finally selected a young captain by the name of St. Claire de Ville, and appointed as his assistant another young officer, Captain Rimailho. Major Ducrot was very much perturbed because he was not selected to carry on this work, and succeeded in persuading Capt. Rimailho to desert St. Claire de Ville. Rimailho made an agreement to first learn all about the DePort carriage and then assist Major Ducrot on the rigid design if necessary.

Work went on for about a year, and certain officials became impatient because definite results had not been attained. Certain criticisms which were made of the officers charged with the work pleased Major Ducrot a great deal. He told the authorities that if this work had been assigned to him, a satisfact-

(Continued on page 92)

AUTOMOTIVE

Conducted by Master Sergeant J. W. Winslow

THE CARBURETOR

by Technical Sergeant H. C. Hansen, Ord. Dept.

The carburetor as well as any other unit of the engine will gradually wear out due to the fact that there are numerous moving parts which are not lubricated and the jets which are constantly being worn away by fuel rushing through them at a high rate of speed. The fuel will wear away the jets just as water passing over stone will gradually change the contours of the stone, consequently the enlarging of the jets will cause the fuel air ratio to change and the mixture becomes too rich and fuel is wasted and the engine becomes "rough" running. On the other hand, gum in the fuel will be deposited on the jets and restrict the passages and cause the mixture to "lean out" and consequently cause a loss in power and burned valves and valve seats.

Inasmuch as a rich mixture wastes fuel and a lean one reduces power, and causes damage to the engine by burning the exhaust valves and valve seats, a compromise mixture is used. For part throttle and full throttle operation a mixture ratio of approximately 13 parts of air to 1 part of fuel is used, while a mixture ratio of 10 parts of air to 1 part of fuel is used for smooth idling. If the present fuel used could be vaporized and burned in the short space of time allotted, a leaner mixture of about 16 to 1 could be used. This would be 100% combustion efficiency, as compared to about 83% combustion efficiency of the 13 to 1 fuel-air ratio.

In looking over a modern carburetor, we find that it has to provide various fuel-air mixtures for varying conditions; such as for idling, part throttle at cruising speed and full throttle operation. When idling a rich mixture must be taken into the cylinders because the tendency of the exhaust gases, left in the cylinders as a result of incomplete scavenging from the previous power stroke, to lean out the mixture would cause slow burning, provided a rich mixture was not furnished. At part throttle during cruising speed, where economy is a prime factor, a fairly lean mixture must be furnished. At full throttle operation, when power is the deciding factor, a richer mixture must be used to bring about faster burning. In air cooled engines it is especially desirable to use a rich mixture at full throttle operation to aid in keeping the metal parts within the cylinder cool.

In addition to the above mentioned mixtures, an over-rich mixture is used for sudden acceleration. This over-rich mixture must be quickly furnished to provide fast burning, which in turn gives a fast pick-up of engine speed under load.

From the above factors it can be seen that the carburetor must be equipped with numerous devices to satisfy the range of conditions. Inasmuch as modern carburetors are too numerous and of varying design, no attempt can be made in this article to go into any great length describing these features. In general, it can be said that the following devices will be found in one form or another on the modern carburetor: A throttle by-pass idling jet, a main jet, an acceleration pump, and may or may not have a power jet for full throttle operation.

(Continued on page 104)

(ADMINISTRATION)

Conducted by Technical Sergeant C. K. Harper

"SOURCES OF INFORMATION"

The Unit of the Non-commissioned Officers' Course, "Sources of Information", is regarded as one of the most important in the course of instruction for Non-commissioned Officers conducted at The Ordnance School. In this Unit we strive to familiarize the student with the contents and use of the various "Sources of Information" covered. These "sources" include:-

- Army Regulations.
- Field Service Regulations.
- Training Regulations. (Such few as are still in effect. These are graded.)
- Technical Regulations. (usually being eliminated by the publication of their contents in other training publications.)
- Basic Field Manuals.
- Field Manuals.
- Technical Manuals.
- Orders, Circulars, Bulletins and Memoranda.
- Ordnance Field Service Bulletins.
- Standard Nomenclature Lists.
- Tables of Organization.
- Tables of Basic Allowances.
- Tables of Allowances.
- Manual for Courts-Martial.

The basic principle upon which the instruction in this Unit is based is the statement of a well-known educator:- "There are two kinds of knowledge of a given subject. First, a complete knowledge of the subject, and second, a knowledge of where to go to secure information concerning the subject." Of these two types of knowledge it is unquestionably of much more importance to an Ordnance Sergeant to know how and where to obtain the source or sources of information that he desires, rather than relying upon his acquaintance with the factual details involved (no man living has a complete knowledge of every subject). For example, it is much more important to know where to find the information relative to the number of rifles authorized an Infantry Rifle Company than to know off-hand the exact figure itself. Why? -- because if the source of this information is known the same knowledge will exist relative to related items, such as arms racks for storing and safeguarding the rifles; the spare parts set issued for maintenance; articles issued for instructional purposes; and a great deal of additional data. Thus; the Ordnance Sergeant may determine quickly the quantity of any item or number of items authorized for any unit or organization through the medium of knowing where to look in a relatively small number of "Sources of Information".

The knowledge of where to look, how to look, and what to do when you find it, is the goal we strive to attain in the instruction of our students.

An interesting and very useful "Source of Information" was published by the War Department on October 1, 1940, in the "Basic Field Manual" entitled "List of Publications for Training", FM 21-6. This useful little Field Manual is an in-

(Continued on page 91)

Part 3



Conducted by
R. L. Johnson

In Part 2 of this series, published in THE ORDNANCE SERGEANT for February, the double convex lens was discussed and the paths of various rays of light were traced through this type of lens. From Figure 11, Part 2, it can be seen that there are two more converging lenses, the plano convex and the meniscus converging. The path of a ray of light through any of the converging lenses can be easily traced by applying the law of refraction, and erecting a perpendicular at the point of incidence and the point of exit. Reference: Law of refraction, Part 1, this series.

Second Lieutenant, Ord. Dept. Figure 13 shows three converging lenses all having the same radius of curvature on the left side. It can be clearly seen that when parallel rays of light enter each of these three lenses, the rays of light will pass through the lenses and converge at a point on the axis of the lens, at the point of principal focus for that lens. The point of principal focus differs for each of these types of lenses. The double convex lens has the longest focal length; the meniscus converging lens having the shortest focal length.

The type of lenses that have been considered so far have been the converging lenses. That is, those that are thickest at the center, and thin out toward their edges.

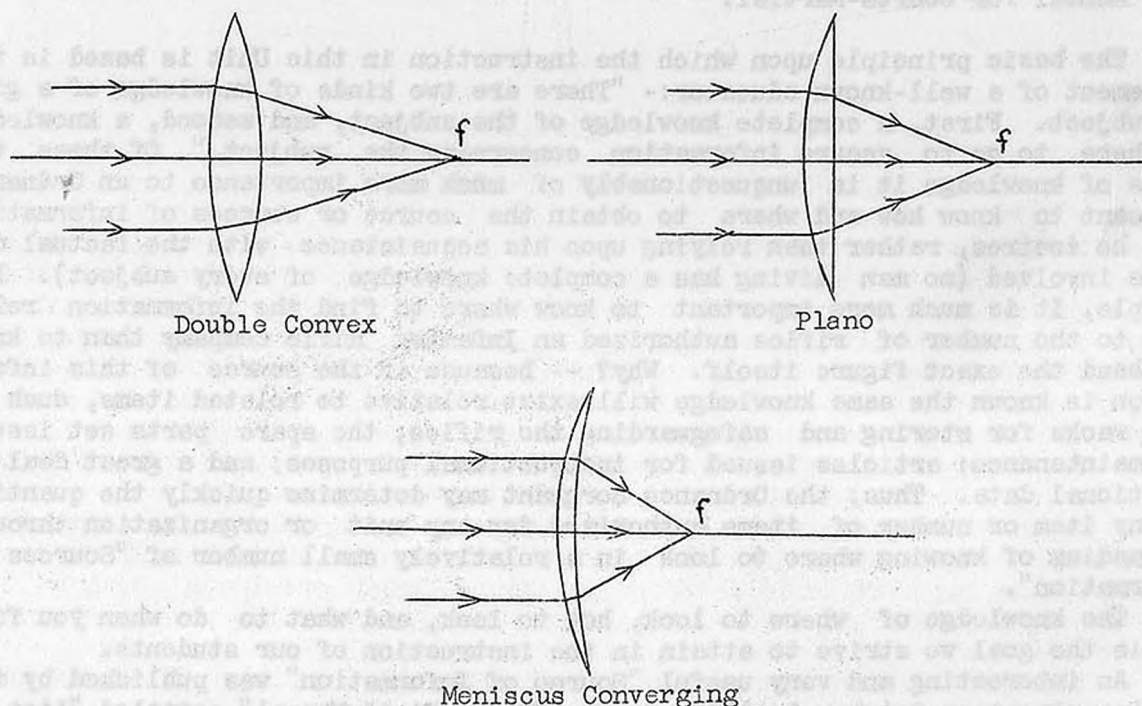


Figure 13

To illustrate the action of rays of light passing through the diverging lenses, two prisms, placed apex to apex, will serve as an ideal illustration. (See Figure 14).

It will be noted that when rays of light which are parallel to the axis of the two prisms, enter the prisms, they will be refracted according to the laws

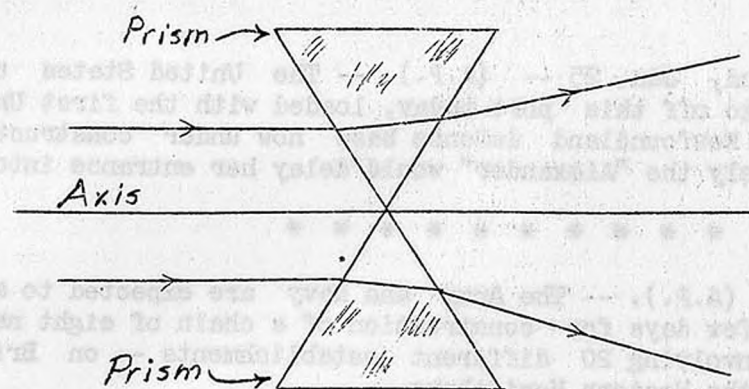


Figure 14

of refraction; i.e., the light passing from a less dense to a more dense medium will be bent toward the perpendicular, and will be bent away from the perpendicular when passing into a less dense medium. It is then clearly seen that the parallel rays of light, that, entered the prism are bent toward the thickest part, and when they leave the prism they do not intersect the axis at a point to the rear of the lens, but diverge from the axis.

Compare Figure 14 with Figure 9 (in part 2).

Again, assume that the surfaces of these two prisms have been made curved. The result will be that of a double concave lens. (See Figure 15).

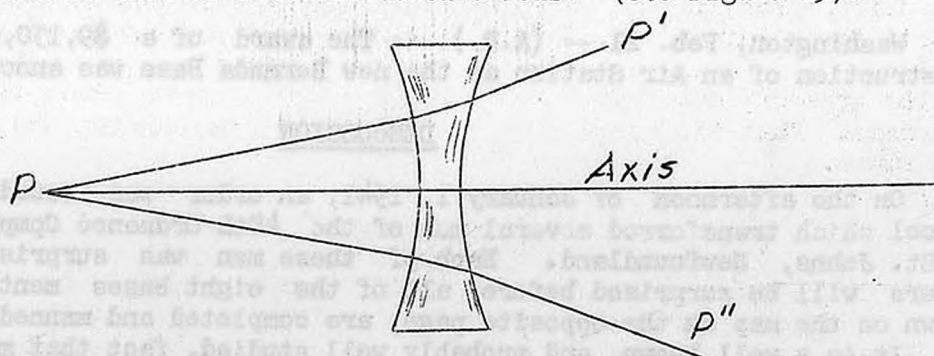


Figure 15

The action of rays of light emanating from a point, P, on the axis of the lens, will pass through the lens and diverge to the points P' and P''. The rays of light can be clearly traced by remembering the laws of refraction. Also, the rays of light are always bent towards the thickest portion of the lens.

By application of the law of refraction, we could easily trace the path of a ray of light through the other types of diverging lenses, viz: the plano concave, and meniscus diverging lens.

The divergent lenses have a point of principal focus, as does the convergent lenses. Figure 16 (see page 103) illustrates this point.

As rays of light parallel to the axis of a double concave lens pass through the lens the rays diverge, but if the divergent rays are extended to the left side of the lens (the side at which the rays of light originate), they will converge at a point P', on the axis of the lens, or, at the point of principal focus.

Thus far we have dealt with single lenses, and rays of light passing through such lenses. All mathematical explanations and calculations, have been

(Continued on page 103)

"THE ORDNANCE VIEWPOINT"

(As announced in the February issue, the purpose of this page is to stimulate thought among Ordnance Sergeants on subjects in the News which may be of vital importance to them in the not too distant future.)

St. Johns, Newfoundland, Jan. 25 -- (A.P.). -- The United States troop transport "Alexander" hove to off this port today, loaded with the first United States troops to man the Newfoundland defense base now under construction. Stormy weather made it likely the "Alexander" would delay her entrance into the harbor.

* * * * *

Washington, Jan. 25 -- (A.P.). -- The Army and Navy are expected to award contracts within the next few days for construction of a chain of eight naval, military and air bases -- involving 20 different establishments -- on British islands and territories in the Western Hemisphere.

Contracts for construction to start immediately at nearly all the bases are under negotiation. Dirt will fly as soon as the contracts are signed and equipment can be shipped to the sites.

* * * * *

Washington, Feb. 21 -- (A.P.). -- The award of a \$9,150,000 contract for construction of an Air Station at the new Bermuda Base was announced today.

DISCUSSION

On the afternoon of January 1, 1941, an order was issued at the Ordnance School which transferred several men of the 40th Ordnance Company (Tng) to duty at St. Johns, Newfoundland. Each of these men was surprised, just as many others will be surprised before all of the eight bases mentioned above, and shown on the map on the opposite page, are completed and manned.

It is a well known, and probably well studied, fact that many Ordnance Sergeants will receive assignments which will require them to take an active part in the forming and training of new organizations. But it is doubtful if many have given much thought to the problems involved in setting up an Ordnance establishment at a new base outside the United States.

Invest a few minutes of your time now and then by thinking about how you would meet such a situation. Study the subject from

"THE ORDNANCE VIEWPOINT"

You may be called upon to serve in the jungles of equatorial South America, or on the stormy coasts of Newfoundland, or at some intermediate point. One guess is as good as another. Make your thinking flexible. What are the rudiments of shop administration? Have you copies of the forms which would help you administer a shop efficiently? What will be required of an Ordnance Sergeant at a base garrisoned by infantry and artillery and antiaircraft artillery and Air Corps units? What problems might you meet at any such new establishment, isolated from the rest of the Army? Have you a collection of Technical and Training Regulations, or other reference books, in your possession? You may need them!

Give a little thought to these questions. Try to imagine what problems you

might meet. Consider them from

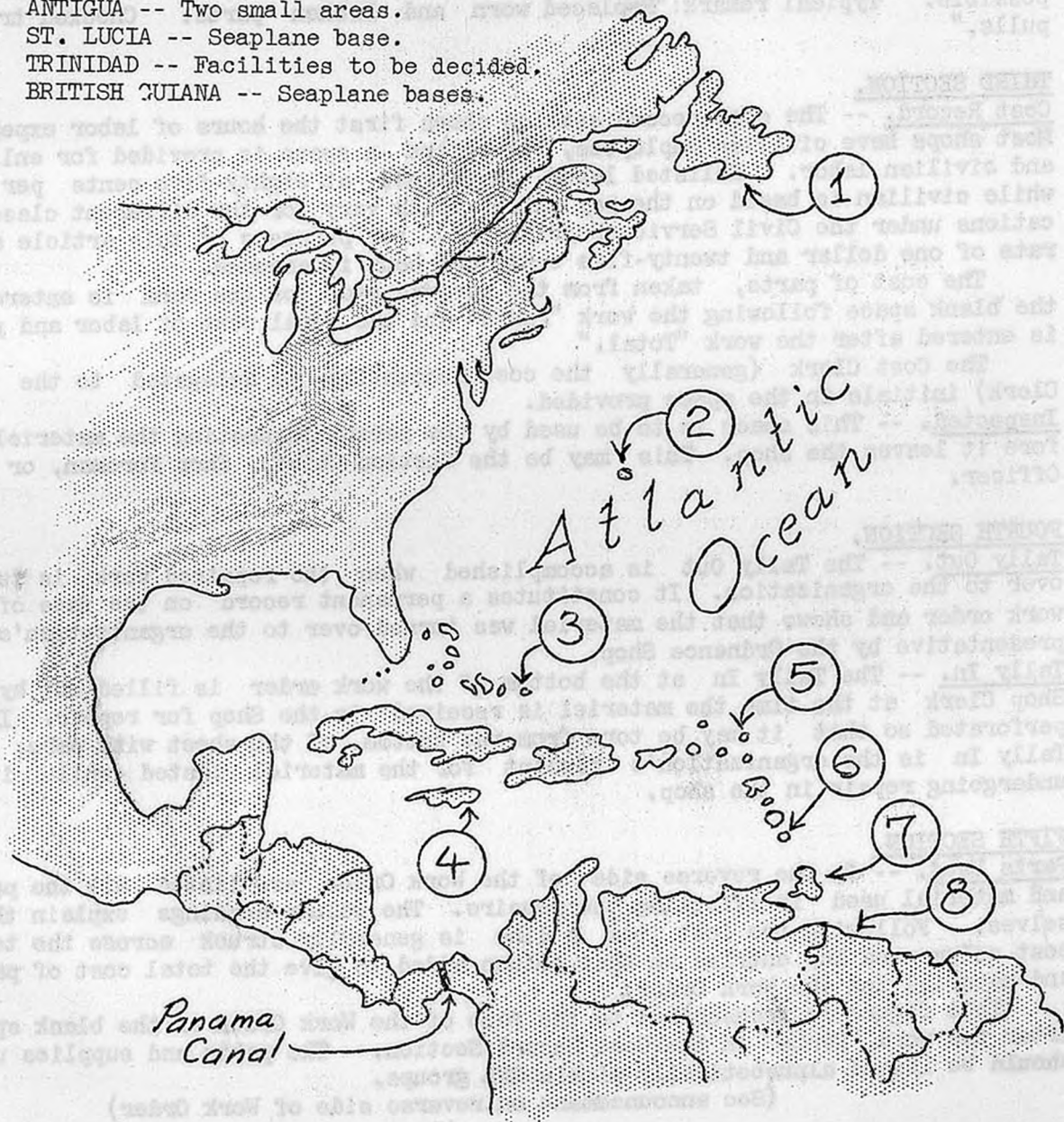
"THE ORDNANCE VIEWPOINT"

and draw your own conclusions. Your success or your failure may depend to a great extent upon those -- your own -- conclusions.

* * * * *

BASES ACQUIRED FROM BRITAIN

1. NEWFOUNDLAND -- Air base and Army training ground.
2. BERMUDA -- For landplane, seaplane and naval bases and garrison.
3. BAHAMAS -- U. S. to have use of Abraham Bay and part of Mayaguana Island.
4. JAMAICA -- Fleet anchorage, defense batteries, recreational area, hospital, mess, auxiliary landing ground.
5. ANTIGUA -- Two small areas.
6. ST. LUCIA -- Seaplane base.
7. TRINIDAD -- Facilities to be decided.
8. BRITISH GUIANA -- Seaplane bases.



(THE ORDNANCE SHOP)

Conducted by
Tech. Sgt. G. A. Orsino, Ord. Dept.

(This article is a continuation of that published in the February issue. It continues the explanation of a shop "Work Order", which is shown on the next page. The reverse side of a "Work Order" is shown on the reverse side of the next page.)

* * * * *

SECOND SECTION.

Date. -- The Section Chief enters in this space the date the work was completed in his section.

Work Done. -- Filled in by Section Chief and is his narrative report covering, all work done on the materiel. The report must be brief, yet as complete as possible. Standardized remarks peculiar to the section should be used wherever possible. Typical remark: "Replaced worn and broken parts. Checked trigger pulls."

THIRD SECTION.

Cost Record. -- The cost record section shows first the hours of labor expended. Most shops have civilian employees, therefore a space is provided for enlisted and civilian labor. Enlisted labor is charged at eighty-five cents per hour while civilian is based on the pay rates which vary for the different classifications under the Civil Service Regulations. For purposes of this article a pay rate of one dollar and twenty-five cents per hour is assumed.

The cost of parts, taken from the reverse side of the form is entered in the blank space following the work "Parts" and the total cost of labor and parts is entered after the work "Total."

The Cost Clerk (generally the cost accounting is delegated to the Shop Clerk) initials in the space provided.

Inspected. -- This space is to be used by the person inspecting the materiel before it leaves the shop. This may be the Section Chief, Shop Foreman, or Shop Officer.

FOURTH SECTION.

Tally Out. -- The Tally Out is accomplished when the repaired work is turned over to the organization. It constitutes a permanent record on the face of the work order and shows that the materiel was turned over to the organization's representative by the Ordnance Shop.

Tally In. -- The Tally In at the bottom of the work order is filled out by the Shop Clerk at the time the materiel is received in the Shop for repair. It is perforated so that it may be torn from the bottom of the sheet with ease. The Tally In is the organization's receipt for the materiel listed while it is undergoing repair in the shop.

FIFTH SECTION.

Parts Used. -- On the reverse side of the Work Order are listed all the parts and material used in effecting the repairs. The column headings explain themselves. Following the last item a line is generally struck across the total cost column and the entries in that column added to give the total cost of parts and material for the Work Order.

This figure is transcribed to the face of the Work Order in the blank space after the word "Parts" in the Cost Record Section. The parts and supplies used should be listed alphabetically within SNL groups.

(See announcement on reverse side of Work Order)

WORK ORDER

No. 14-41Date January 6, 1941For Battery B, 121st Field ArtilleryMateriel 5 ea pistols, cal..45, M1911, Serial Nos. 14631-24611-

*

33661-45451-67063Work to be done RepairF. GORDEN,Capt., Ord. Dept.Shop OfficerDate 1-9-41Work done ----- Replaced worn and broken parts. Checked trigger pulls.Jos. Jones, Sgt., 21st Ord. Co.
(Chief of Section)

COST RECORD

E-2	(Enlisted	<u>\$1.70</u>		
Labor <u>C-3</u>			Parts \$2.40	Total \$7.85
	(Civilian	<u>\$3.75</u>		

P.J.O.
(Cost Clerk)Inspected Jos. Jones
(Inspector)

TALLY OUT

Received the foregoing materiel from the Ordnance Shop.

Peter Ruskin, Sgt., Btry B, 121st F.A.
(Name) (Organization)

TALLY IN

W. O. No. 14-41Date January 6, 1941Materiel 5 ea, Pistols, cal..45, M1911, Serial Nos. 14631--24611-33661-45451-67063J. D. O.
(Shop Clerk)

1941

PARTS USED

Work Order No. 14-41

Date	Quantity	Unit	Name of Part	Unit Cost	Total Cost
			<u>SNL B-6</u>		
1-9-41	1	ea	Bushing, barrel	\$.41	\$.41
"	2	ea	Hammer	.88	1.76
"	1	ea	Link, barrel	.12	.12
"	2	ea	Spring, magazine	.03	.06
"	3	ea	Spring, recoil	.05	.15
In the April issue we will describe the Cost Record Sheets to be used in conjunction with the Work Order. It is our earnest hope that this series of articles will be of benefit to the personnel of new maintenance organizations. Suggestions for future articles are in order. If there is any particular phase of Shop Administration that you desire discussed, don't hesitate to let us know. Everyone knows that field condition generally calls for unusual maintenance methods and unusual maintenance methods are what we want to hear about. Write in yours so that we can pass it on to others.					

ORDNANCE TRAINING ACTIVITIES

Prepared by Major John D. Billingsley
Assistant Commandant, The Ordnance School

ORDNANCE SCHOOL PROPOSED TRAINING PROGRAM

Effective July 1, 1941

(Continued from THE ORDNANCE SERGEANT for February)

ALLOCATIONS OF STUDENTS BY ARMY AND CORPS AREA TO THE ORDNANCE SCHOOL

FIRST ARMY

(Officers)	10 monthly, beginning 7-1-41	(1 mo. General Refresher Course)
	5 monthly, beginning 7-1-41	(1 mo. Amm. & Auto. Course)
	5 monthly, beginning 7-1-41	(1 mo. Depot & Supply & Arty. Course)
	5 monthly, beginning 7-1-41	(1 mo. Mess Management & Small Arms Course)
	3 bi-monthly, beginning 7-1-41	(8 wks. AA Fire Control Course)
(N.C.O. or	2 monthly, beginning 7-1-41	(3 mo. Amm. Course)
N.C.O. mater-	9 monthly, beginning 7-1-41	(3 mo. Dep. & Supply Course)
ial)	12 monthly, beginning 7-1-41	(3 mo. Maintenance Course)
	3 bi-monthly, beginning 7-1-41	(8 wks. AA Fire Control Course)
(E.M.)	3 monthly, beginning 7-1-41	(3 mo. Armorer Course)
	3 monthly, beginning 7-1-41	(3 mo. Artillery Course)
	4 monthly, beginning 7-1-41	(3 mo. Auto. Course)
	1 monthly, beginning 7-1-41	(3 mo. Carpenter Course)
	8 monthly, beginning 7-1-41	(3 mo. Clerk Course)
	6 monthly, beginning 7-1-41	(3 mo. Cook Course)
	2 monthly, beginning 7-1-41	(3 mo. Instrument Repair Course)
	4 monthly, beginning 7-1-41	(3 mo. Munition Worker Course)
	2 monthly, beginning 7-1-41	(3 mo. Welder Course)
	5 tri-monthly, beginning 8-1-41	(3 mo. Machinists' Course)

SECOND ARMY

(Officers)	10 monthly, beginning 7-1-41	(1 mo. General Refresher Course)
	5 monthly, beginning 7-1-41	(1 mo. Amm. & Auto. Course)
	5 monthly, beginning 7-1-41	(1 mo. Depot & Supply & Artillery Course)
	5 monthly, beginning 7-1-41	(1 mo. Mess Management & Small Arms Course)
	3 bi-monthly, beginning 7-1-41	(8 wks. AA Fire Control Course)

(Continued on page 108)



Conducted by
Technical Sergeant G. W. Akers

order that they may secure this equipment as soon as possible, they would place with the Regimental Supply Officer either a formal or an informal request for these items, depending on local rules. The Supply Officer is also vitally interested in supplying the organizations within the Regiment all the equipment they are authorized, so would check his records to ascertain whether or not there are any excess rifles in the regiment, which might be transferred to those organizations made short by the changes in the Table of Basic Allowances. Finding none in excess, he would then prepare a requisition for the items required--in triplicate, and address it to the Post Ordnance Officer. This requisition would be signed by the Supply Officer as the requisitioner, and prepared for the signature of the Regimental Commander as the approving authority, who will check it against allowances, and to see if it is properly prepared. One copy is then retained as a file copy in the Supply Office and the other two copies are sent to the Post Ordnance Officer.

The Post Ordnance Officer, upon receipt of the requisition, will study the remark, and check it against allowances, and finding everything in order, would check his records to see if this equipment could be furnished from stock, and if not, will determine if any should be added to the requisition he will have to submit in order to have them on hand for replacement purposes. He is now ready to prepare a requisition on QMC Form No. 400, so would make an entry on the next number shown on the requisition register, indicating the date, and that the requisition was forwarded to the Commanding General of his Corps Area, also a brief statement of the contents of the requisition and reason. The requisition will be addressed to the Commanding General of his Corps Area on the first line, and the fact that it consists of one sheet will be indicated, also that it is sheet number one. On the second line will be placed the requisition No. as taken from the requisition register. This number will include the station number as assigned by the Adjutant General, and the fiscal year for which it pertains as follows: 768-1-41. The date and the period for which the requisition is to cover will also be placed on this line, which in this case will be a special requisition to meet a requirement which could not have been foreseen. On the next line will be placed the "Ship to" address which will be the official address of the requisitioner. The form will be prepared for the signature of the requisitioner, in this case the Ordnance Officer, and to the right of his signature it will be prepared for the signature of the Post Commander, as the approving authority. In the body of the form will be shown the nomenclature of

(Continued on page 95)

The basic forms used in property accounting were mentioned in this column in the February issue. Now, let's take the first of those mentioned, the Requisition, from the time of its inception, through the various offices through which it is routed until it eventually serves its purpose.

Let's assume, for example, that the Table of Basic Allowances for the Infantry Regiment at our station has been changed by increasing the number of rifles by ten (10) Authorized each rifle company, and that this equipment cannot be furnished anywhere short of the Corps Area supply point for this type of equipment.

The persons most interested in this increase would very likely be the company commanders of the nine rifle companies, and in

To: COMMANDING GENERAL, 3rd Corps Area, No. of Sheets 1 Sheet No. 1
Baltimore, Md.

SHIP TO ORDNANCE PROPERTY OFFICER, Fort Blank, Maryland.

APPROVED BY:

JOHN SMITH,
Col., Infantry,
Commanding.

[illegible]

AN INTRODUCTION
TO
AVIATION ORDNANCE

by
by Sergeant T. C. Bailey, Ord. Dept.



Conducted by
H. M. Randel
Second Lieutenant, Ord. Dept.

In the year 1908 an allotment was made by the United States War Department which provided for the purchase of a Wright airplane for \$25,000; if it demonstrated that it could carry a passenger besides the pilot for one hour, and if it had a speed of at least 40 MPH and carried enough fuel for 125 miles. It was arranged that a demonstration would be held at Fort Meyer, Virginia, in September, 1908. This official demonstration was a success and proved that a practical flying horseless carriage was a cold reality. Leap- ing Lena had conquered gravity and opened another realm of warfare for the mili- tary tacticians to grapple with; namely, third dimensional warfare.

The role of the sky buggy in national defense, and perhaps offense, remain- ed a controversial issue until World War Number One, when it proved its worth as an integral cog of a modern military machine. However, it remained for "Little Mighty" to give to the world a prevue of just what to expect from the metallic vultures of Mars in modern warfare, when he dispatched his angels of devastation not in flights, squadrons or groups, but in swarms, to totally annihilate the City of Warsaw during the Nazi Polish War. The planes rained a weird symphony of death and destruction for less than an hour, then returned to their bases leaving the once proud city an area of desolation and ruins.

Probably the outstanding lesson of World War Number Two, thus far, is the tremendous importance of the airplane. A few months ago when President Roose- velt suggested a United States air force of 50,000 planes, John Jay Citizen thought the President was either joking, or the figure was a typographical error and perhaps it should have read 5000 instead. However, today, 50,000 planes are considered by some authorities as a very conservative estimate for the total de- fense of the United States and her possessions.

Now that the modern air armadas have established their right to a "place in the sun" as combatant units, it might be well to introduce into the picture the function and purpose of the Ordnance as a necessary service to the Airforce. Ordnance Aviation exists solely as a service to the Airforce. As military avia- tion increases in size and importance, so does the Ordnance in an equivalent ration. Ordnance in respect to the Airforce may be considered as still in the adolescent stage, so we find little standardization of the practices as yet. A- viation Ordnance, for the most part, is still in the tentative era. Hence, due the above reasons, a great amount of definite information on this subject is not readily available to date.

Some one once remarked that "Two Gun Pete" wasn't such a "bad egg"; but it was his guns that caused all the trouble. The unloaded bomber itself is a very innocent chap, but with a cargo of bombs and its many loaded machine guns, its destructive powers are unlimited. Besides ammunition and guns, the mechanical aerial fowls need various types of flares for signaling, illuminating their tar- get at night, and for emergency night landings. The chief function then, of Aviation Ordnance is the supply and maintenance of combatant weapons and mater- (Continued on page 94)



Prepared by
2nd Lt. W. L. Boland, Asst. Secy.,
The Ordnance School.

placement Center in the near future.

* * * * *

STREAMLINING TECHNIQUE AT THE ORDNANCE TRAINING CENTER

STREAMLINED COMMUNICATIONS

One of the telephone operators experienced a bit of embarrassment the other day when he tried to take a hand in efficiently speeding up communications for the Army in timeliness with all the other activity that is taking place here at Aberdeen Proving Ground. This may be best illustrated by listening in on the conversation, which went something like this:

One of the Captains picked up the telephone and before he had an opportunity to put in his call:

Operator: "THE LINE IS BUSY".

Captain: "For Pete's sake, I didn't even give you the number yet".

Operator: "I'm sorry, sir, what number did you wish?"

Captain: "178 please".

Operator: "Right, sir, the line is busy".

The Captain walked off muttering some words which are not suitable to relate here.

* * * * *

Read another "STREAMLINING TECHNIQUE" item on page 112

The Ordnance Replacement Center, Aberdeen Proving Ground, Maryland, has in the past month activated the following companies and battalions:

Headquarters Company, 1st Ordnance Training Group, activated February 1, 1941.

Headquarters, First Ordnance Training Battalion, activated February 1, 1941.

Headquarters, Second Ordnance Training Battalion, activated February 1, 1941.

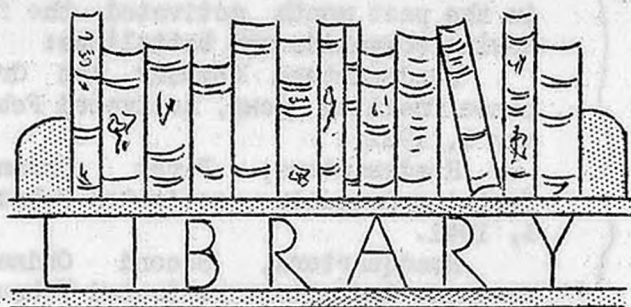
Companies A, B, C and D, of 1st Ordnance Training Battalion, activated February 10, 1941.

Companies A, B, C and D, of 2nd Ordnance Training Battalion, activated February 10, 1941.

Headquarters, 3rd Ordnance Training Battalion, activated February 10, 1941.

Headquarters, 6th Ordnance Training Battalion, activated February 10, 1941.

It is anticipated that approximately 1,000 Selectees will be added to the personnel of the Ordnance Re-



Conducted by
Technical Sergeant E. R. Manfrin

to keep the trucks in condition to perform the necessary tasks assigned to them. Several new manuals have reached The Ordnance School Library and are available upon requisition. They will benefit the mechanic and the Ordnance Sergeant (who might be tearing his hair for some reason, or reasons unknown). Two of the new manuals are Technical Manuals 10-550, "Fuels and Carburetion" (12/27/40) and 10-540, "Automotive Lubrication". Both of these manuals were prepared under the direction of the Quartermaster General, and contain excellent information on the upkeep and care of trucks and cars.

Technical Manual 10-540 is divided into various sections dealing with theories of lubrication, sources and types of lubricants, their properties and characteristics, and problems in lubrication. The appendix of this manual contains, a general lubrication and service chart, as well as a general servicing and lubrication check sheet.

TM 10-550, "Fuels and Carburetion", covers in general the internal combustion engine fuels, the fuel system, physics and principles of carburetion, the various carburetors, and a discussion on the intake and exhaust systems. Although this manual is a digest of text material and illustrations, taken from various books and reference texts, it still can be used to advantage by those who wish to check up on the different subjects. Beginners in the Automotive branch will benefit by use of such a manual.

Amidst all the oil and grease, we should not pass or slight a publication edited by the Motor Transport School at the Holabird Quartermaster Depot, in Baltimore, Md. This little booklet contains comments of current technical magazines, as well as sound advice in the operation and care of motor vehicles.

Even though winter is practically gone, there is still danger of a good snowstorm with its hazards of icy roads. An article in the 'AM magazine delves into the various do's and don'ts on icy roads. "AM, by the way, is the official abbreviation for Army Motors (the name of the magazine). This magazine even publishes methods for testing leaks in welding equipment. (Welders, please note!) Since there is no charge for The 'AM, it may be obtained by a written request; this request to be signed by the Commanding Officer of the organization desiring them.

The same holds true for THE ORDNANCE SERGEANT. Any Ordnance unit may obtain THE ORDNANCE SERGEANT by simply requesting this magazine.

Passing from the Automotive Section, we find that the publications on Small Arms, Technical Manuals 9-280, 9-225 and 9-226, are now available upon request.

TM 9-280, "U. S. Rifle, Caliber, .22, M1922, M1922M1 and M2", published October 1, 1940, supersedes TR 1300-22A (12/10/36). This manual deals with a detailed description of assemblies, groups and parts, mechanical operation, disassembling and assembling, and the care of this rifle. The ammunition for this

(Continued on page 111)

Is an ammunition man interested in the automotive end of the Ordnance Department? I should think not, except to worry about transportation of explosives and ammunition to and from the refilling, distributing point or ammunition depot. On the other hand, the automotive specialist is even less interested in what the purpose of the ammunition is or what effect it may have on either side. All that the "grease monkey" worries about is how

"SOURCES OF INFORMATION"

(Continued from page 77)

dex to all Mobilization Regulations, Mobilization Training Programs, Tables of Basic Allowances, Training Films and Film Strips (both sound and silent), Field Manuals, Basic Field Manuals, Field Service Regulations, Technical Manuals and such Technical and Training Regulations as still remain in effect and in use. The list of these latter publications is growing shorter and shorter because the information that they contain is included in some other form of training publication. One very interesting paragraph in FM 21-6 is paragraph 7b relative to distribution, which reads as follows:

"Individuals, headquarters, and offices may, on showing need therefor, obtain any printed pamphlet by applying to the distributing agency serving them regardless of whether the desired pamphlet is one that is designated herein for distribution to that individual, headquarters, or office."

If your Ordnance Office does not possess a copy of this FM 21-6 get one -- Ordnance Sergeant -- it is useful! This manual will provide, for the publications listed above, the same data (and more) that Army Regulations 1-10 furnishes for Army Regulations.

We are all more or less familiar with the old "Field Service Regulations, 1923". How many of us today are familiar with the new regulations that have superseded those old Field Service Regulations, the new "Tentative Field Service Regulations -- Operations -- FM 100-5", of October 1, 1939? Our purpose here is to bring to your attention the fact that FM 100-5 exists. FM 100-5 informs us that it is to be used in conjunction with FM 100-10, "Field Service Regulations -- Administration" and FM 100-15, "Field Service Regulations -- Larger Units." However, our FM 21-6 (Index to Training Publications) makes no mention of either one of these two latter regulations (FM 100-10 and 100-15), which indicates that at the time of the publication of FM 21-6 (October 1, 1940) these two FMs had not been published. To date there is nothing to indicate that they have "come off the press". At least your writer has not yet seen such a copy. Have you?

Another new publication that must not be omitted is our new Technical Manual "Administration", TM 12-250, May 1, 1940. This manual covers such subjects as military correspondence, company management, service records, morning reports, sick reports, duty rosters, rations, unit and similar funds, supplying and equipping an organization, allotments of pay, pay rolls, rail transportation, etc. It is a very well prepared manual with a wealth of illustrations of model forms as guides. This manual is one of our texts at The Ordnance School. It is well worth having available for ready reference.

Have you any questions on Administration, or any suggestions for an article on a particular phase that you would like to have explained in this publication? We are counting on you to present your problems so that "The Ordnance Sergeant" may better serve you in your daily work. This is your magazine -- make the best use of it! Let us hear from all of you -- Ordnance Sergeants!!!

Save your copies so that you can refer to them later. An accumulation of copies will become a valuable source of information. After the first volume (six issues) there will be an index for those who want it.

"DEVELOPMENT OF THE FRENCH 75"

(Continued from page 75)

ory carriage would have been completed, by this time. At this time, however, a letter was received from DePort (now a colonel in the Italian Army) stating that he had discovered an entirely new system of long recoil, which in reality is the present DePort type of differential spring recuperator. Colonel DePort elaborated on the new system and stated that he had overcome all the many defects which existed in the pneumatic recuperator at the time of his resignation. On seeing this list of defects, the authorities became aware of the magnitude of the obstacles against which the two young captains had been working, and realized that a year wasn't too much time spent in overcoming them.

A sample gun of the DePort type was received at the Bourges arsenal and the Commanding Officer called his officers together to witness some firing. At the conclusion of the test he asked their various opinions. Said Major Ducrot:

"The principle is wrong, and the system can never be perfected. The development of a rigid carriage such as I am now designing should be continued."

"You are right," said the Commanding Officer, "go back to your work and continue the development of your carriage."

Captain St. Claire de Ville said:

"I never would have believed that the long recoil spring system could be carried to such a degree of perfection, but now that I see it with my own eyes, I must concede it is possible. I recommend that all the money which has been assigned to the development of my carriage be transferred and used for the perfection of the DePort carriage."

"You are right," replied the Commanding Officer, "and so I relieve you from your present work and assign you to the supervision of all the designs under study at this arsenal. Since you are severe with yourself, you will be severe with others and criticize their designs closely."

The development of the pneumatic recuperator continued under Captain Rimailho. Firing tests of the various guns were conducted in a well guarded polygon on different days. A clever arrangement was made by the advocates of the pneumatic system to allow the guard to be more relaxed on the days when Ducrot's carriage was being tested. This was done with the full knowledge that German spies, having learned of the development of new materiel by the French officers, were active in the vicinity of the arsenals. When the German spies saw the Ducrot gun in action, it was only a matter of time until they secured a complete set of the drawings and turned them over to the German government. The Germans received the design with great Thanksgiving. When it was learned that the German spies had stolen the designs of a French carriage, and that the German government had adopted the materiel outright as their standard equipment, the matter was published in one of the French newspapers. Captain Rimailho, seeing the news article, called upon Major Ducrot and greeted him with the words:

"My dear Major, the Germans are lost."

Major Ducrot, turning in his chair, inquired, "Why do you say that?"

"Because, my dear major, they have adopted your carriage."

At about this time, as a result of some comparative tests, it was suddenly announced that the pneumatic recoil and other materiel of the 75-mm. battery, as developed by Captain St. Claire de Ville and Captain Rimailho, had been adopted as the standard equipment for the French Field Artillery. The Commanding Officer of Puteau Arsenal was so disappointed because none of his officers had had a hand in the design that he committed suicide at once.

The success of this materiel is not entirely due to the recoil mechanism, but is due to all the various elements which make up the battery. The design,

as undertaken, was not that of a gun alone, but of a complete battery equipment; including the gun, the recoil mechanism, the carriage, the sights, the fuze setter, the caisson, the limber, the ammunition, and, in fact, all the vital features.

For some time it was quite unknown to whom was due the credit for the design, as both Capt. St. Claire de Ville and Capt. Rimailho were young officers and not very well known. It was really not until the Battle of the Marne that the 75-mm. gun came into its own. But after that great victory the inventors of the famous "Soixante Quinze" were legion. Inventors of all the various parts, sprang into existence throughout France, but it is now generally known that the credit is rightly due to Captains DePort, St. Claire de Ville, and Rimailho; and perhaps, even more to that unnamed Commander of the Bourges Arsenal.

* * * * *

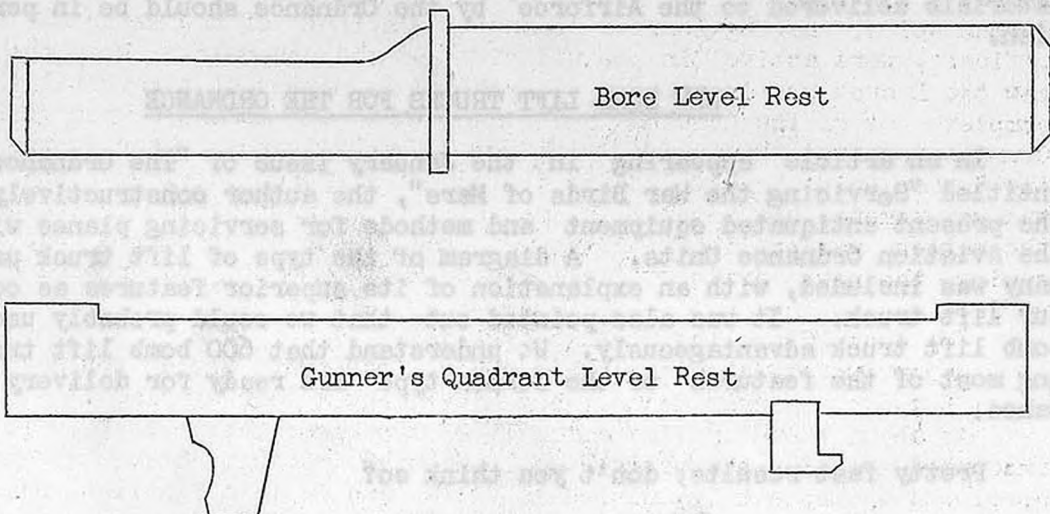
SPECIAL SIGHT TESTING TOOLS, 37MM GUN, ANTI-TANK, M4

by Technical Sergeant C. C. Ruehle, Ord. Dept.

A combination bore level rest (muzzle) for the 37mm Gun, M3 and a gunner's quadrant level seat designed to fit in the M19 Telescope Mount in the same manner as the M6 Telescope, has been developed, and completed for test at The Ordnance School to facilitate adjustment of the telescope mount M19 to the gun.

The use of this combination special sight testing tool permits rapid and accurate adjustment and eliminates the constant errors attained when adjustment is made in accordance to instructions contained in existing maintenance publications covering this materiel.

Constructive criticism, helpful suggestions, and comments with aspect as to the requirements of such special tools for the Ordnance Maintenance Companies will be needed and appreciated, to further develop and produce such tools as standard if its usefulness can warrant production for issue to Ordnance Maintenance Companies.



"AN INTRODUCTION TO AVIATION ORDNANCE"

(Continued from page 88)

ials to the Airforce with its attendant problems of supply and storage of these items. To carry out this assignment in the field, the Ordnance Company is organized into platoons. The platoons are usually divided into the following sections: Headquarters, Maintenance and Supply, and Ammunition. For each Airforce Squadron in the field, whether it be bombardment, reconnaissance, pursuit, etc., the Ordnance assigns a platoon of the necessary size and training to efficiently perform the Ordnance services required by that particular type of squadron. The platoon is designed to be a very flexible unit. The Ordnance is ever on the alert to adapt its organization to effectually meet the changing needs of the Airforce.

At an Air Base, chiefly due to the many and varied tactical units stationed there, the organization of Ordnance service will vary somewhat from that of the field organization. The Company at an Air Base functions as a complete unit and contains the following sections: Company Headquarters; Ordnance Section, Air Base Headquarters; Maintenance and Supply; Ammunition, and Airdrome.

Some may contend that the responsibility of Ordnance service to aviation is much greater than that to other combatant arms. For instance, the ammunition section must inspect and belt all small arms ammunition and then personally deliver it to the Air Corps. If by some mistake there are defective rounds or perhaps some rounds improperly linked, either may cause a malfunction of a gun. Then comes the crucial moment when a split second separates life from death, or the fate of the sleek war bird; whether it will safely return to its nest to sail forth to battle another day. Again, a squadron of heavy bombers carrying trained crews of from five to nine men, are assigned a long dangerous mission over hostile territory, gambling with their lives and planes, in order to destroy important military objectives. Chancing the enemy fire, they make a level run over the area to get a true setting on their targets and then drop their bombs. Suppose, due to improper servicing, the bombs drop as duds. The failure of the mission may necessitate the changing of the tactical plans of an entire army unit. Thus we see that it is of the utmost importance that all weapons and materials delivered to the Airforce by the Ordnance should be in perfect condition.

NEW BOMB LIFT TRUCKS FOR THE ORDNANCE

In an article appearing in the January issue of "The Ordnance Sergeant", entitled "Servicing the War Birds of Mars", the author constructively criticized the present antiquated equipment and methods for servicing planes with bombs by the Aviation Ordnance Units. A diagram of the type of lift truck used by Germany was included, with an explanation of its superior features as compared with our lift truck. It was also pointed out that we could probably use a similar bomb lift truck advantageously. We understand that 600 bomb lift trucks embodying most of the features of the German type are ready for delivery to the Ordnance.

Pretty fast results; don't you think so?

* * * * *

STOP!!

If you passed up the article on page 70, turn back and read it. It may save your life, or that of a friend. You can't afford to overlook it.

"DEPOT AND SUPPLY"

(Continued from page 86)

the articles required, amount on hand and due, amount consumed, and finally, the amount required. Following the last item will be placed a basis, or in other words a reason, for the requisition, together with authority, if applicable. This requisition will be prepared in sextuplicate (one original and five copies) one copy of which will be held in the Ordnance Office as a file copy, and the original and four copies forwarded direct to the Ordnance Officer of the Corps Area.

We now move to Corps Area Headquarters along with the five copies of the requisition, and find that it arrives in the "Mail and Record" Section, where, the hour and date received are stamped on it. From there it is sent to the Supply Section, where it is casually checked and given to the requisition clerk who will register it on a requisition register pertaining to the station where it originated. Here it is checked carefully as for nomenclature, being within allowances, and the source of supply is decided upon. This clerk is in a position to know the status of stocks on hand at other stations under the control of the Corps Area, and would check to ascertain whether or not any Post, Camp, or Station within the Corps Area had an excess of this equipment which could be transferred to our station before calling on a depot. In this case we have already assumed that the only source of supply will be the depot, so it would be necessary to consult OFSB 2-1 to determine the supply point for this particular item, which we will say (for example) is to be Raritan Arsenal, Metuchen, N. J. Therefore a stamp indorsement will be placed on the requisition, addressing it to the Commanding Officer, Raritan Arsenal, Metuchen, N. J., and in the first paragraph state "Approved for Issue", and the second paragraph will quote the procurement authority to which transportation will be chargeable. With the exception of placing another stamp in the approved column, which will read "As Called For", the requisition is ready for the signature of the Ordnance Officer, or his duly authorized assistant, and distribution follows as: Two copies withdrawn, one of which is for file, and the other to be used as a tracer copy in case the request is not acted upon in a reasonable length of time; two copies sent to the supply point (Raritan Arsenal); and the remaining copy sent to the requisitioner so that he will know what action has been taken.

The requisition has finally reached a supply point where there are sufficient articles on hand to fill it. Here the Ordnance Provisioning System commences to operate in the following manner: The paper is first noted in a register which is the master file, and a depot number is assigned it. This number will appear on all copies of the requisition received and any other papers such as shipping ticket or any correspondence which might originate as a result of this requisition. This operation is accomplished by a control clerk, who also informs the shipping department as to any pertinent information, such as authorized substitutions, etc. It is then routed to the stock clerk who will check to see if the items are on hand, and if necessary prepare any extracts that might be necessary, red-lining those articles extracted on the original requisition. It is then given a credit voucher number and turned over to the Elliot Fisher Machine operator, who will take steps to prepare papers necessary for the transfer of this property from the depot to our station. Thus we have received results on the requisition which started as an informal request by a Company Commander and the requisition prepared in the Ordnance Office, Fort Blank, Md., has served its purpose.

The steps in transferring this equipment to Fort Blank will be taken up in the April issue of THE ORDNANCE SERGEANT.

(AMMUNITION)

Conducted by Technical Sergeant L..I. Dance

PROJECTILES

In considering projectiles for Field Artillery weapons, it is first necessary to give a brief history of their development. Prior to the War of 1914-1918, our projectiles were principally Shrapnel and base fuze, thick walled, common steel shell. The Shrapnel was then, as now, for use against personnel and animals using a time fuze to function the projectile filler above ground. As this type ammunition is no longer standard for manufacture, a lengthy discussion will not be undertaken.

The base fuze High Explosive shell was designed for a dual purpose; i. e., fragmentation and demolition. The thick walls made it suitable for use against hard surfaces such as brick walls, concrete emplacements, etc. However, these thick walls almost defeated the purpose of fragmentation due to the very small cavity and correspondingly small bursting charge.

At the time this country entered the war of 1914-18, the French were using a point fuze, high capacity shell which had a decided advantage over the base fuze, thick walled shell. Consequently, this type was adopted as the standard High Explosive Shell for Field Artillery weapons by our armed forces.

Following the war, the desire for projectiles with greater range and less dispersion resulted in the development of the present standard types. These types are streamlined projectiles with tapered (boat-tailed) bases, and long tapered ogives. It is point fuze for functioning above the ground and streamlined to give greater ballistic accuracy.

In the 75mm. to the 155mm. the streamlining of the nose is fully accomplished by fitting them with contour type fuzes. This type fuze continues the ogive to the point of the fuze, thereby reducing wind resistance at this point.

Another method of streamlining the forward end of a projectile is by fitting it with a "false-ogive" or windshield. The M1903, 8" High Explosive shell is an example of this method of streamlining.

Some of the older Mark series of shell have been streamlined at the forward end, notably those of 155mm. This has been accomplished on those shells by replacing the old adapter-booster assemblies with new adapters to receive the M21 booster with the contour type fuze, M51 or M55.

Sketches opposite show the M48, 75mm.; M103, 8"; and MKIAI, 155mm. High Explosive Shell.

DO YOU WANT TO DIE YOUNG?

Or would you prefer to live to a ripe old age? If you've read the article beginning on page 72, read it again. You may have missed the very thing which will endanger your life, or that of a friend.

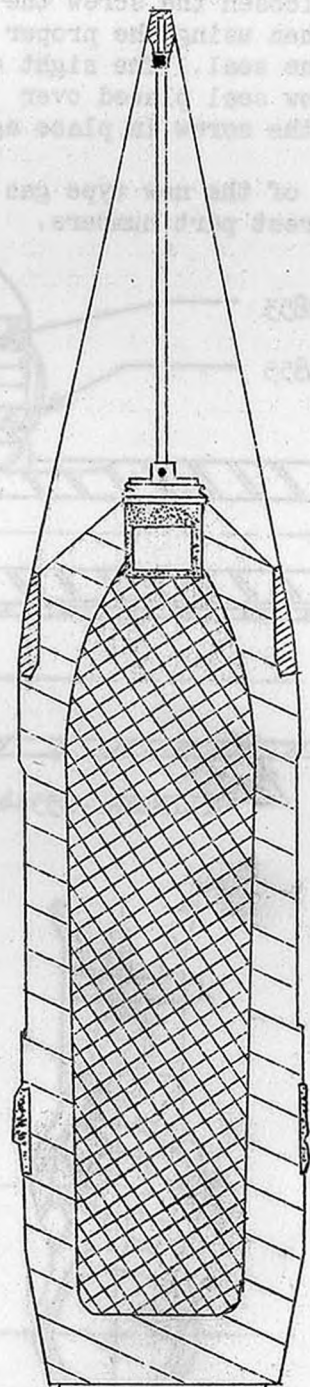
GAS CYLINDER FOR THE M1 RIFLE

(Continued from page 76)

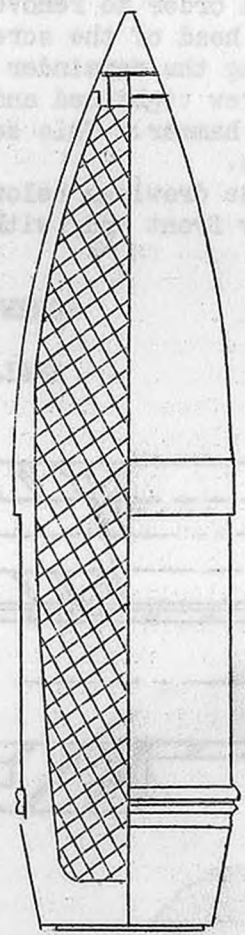
right to be placed on the top in an inverted position so that the gas will flow out of the rifle. The neck must be covered with a cap or plug and the gas will flow out of the rifle.



M48



M103



MKIAI

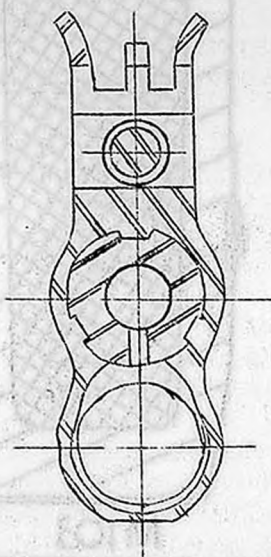
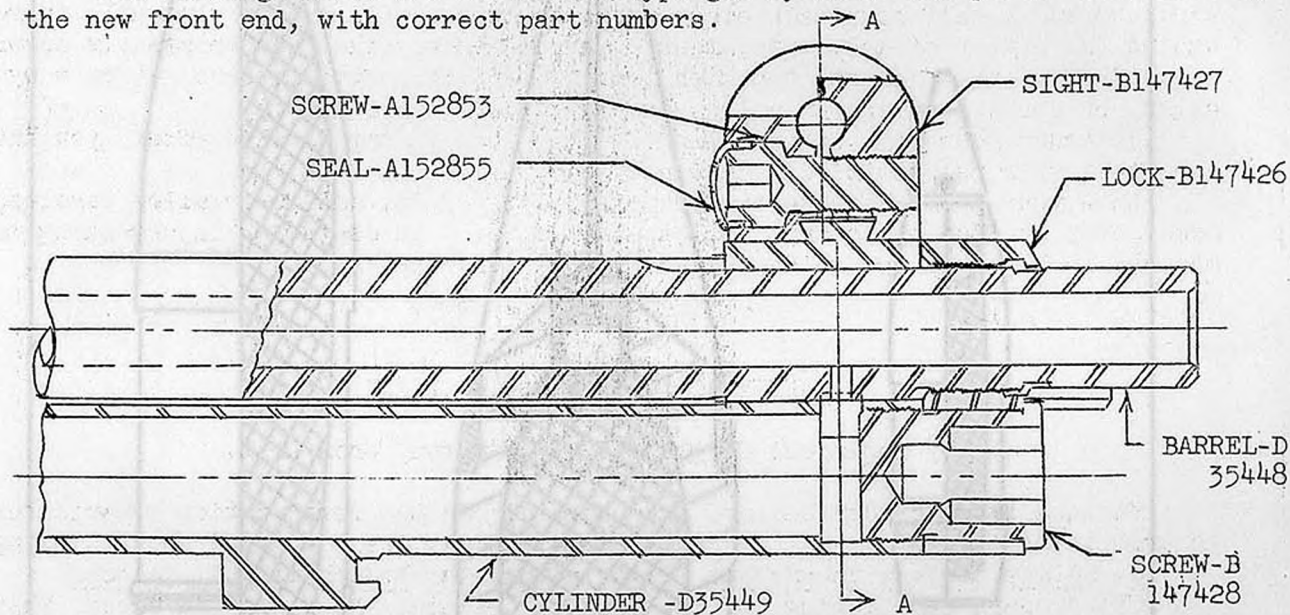
"GAS CYLINDER FOR THE M1 RIFLE"

(Continued from page 74)

sight to be clamped on the lug in any lateral position to bring about zero windage of the rifle. The screw head is covered with a cupped-shaped seal that prevents the screw from being tampered with by unauthorized persons.

In order to remove or loosen the screw the seal must be filed off to uncover the head of the screw, then using the proper wrench back the screw out, thus removing the remainder of the seal. The sight can then be adjusted or repaired, the screw tightened and a new seal placed over the screw and seated down firmly with a hammer. This seals the screw in place again so that it cannot be tampered with.

The drawings below are of the new type gas cylinder and parts that make up the new front end, with correct part numbers.



SECTION A-A

"IT'S BETTER TO BE SAFE THAN SORRY"

(Continued from page 73)

bility for a serious accident to occur is heightened.

No man with poor eyesight should be in the Instrument Section in the first place. If he comes to the Section with good eyesight, every precaution should be taken to see that it remains good.

The explosion of an unauthorized cleaning compound or solvent; or the explosion of an unauthorized solvent stored in an improper manner may blind, if not kill, anyone in the vicinity.

The Instrument Section can be a safe place in which to work. It should be. But it is up to the Ordnance Sergeant in charge to make it so.

Men should be instructed in the principles of safety and the hazards of their work. A half hour talk every week, or month, will aid tremendously in reducing the number of accidents, minor and otherwise, that are constantly occurring. Surely, this is not too much trouble, if it serves to save a man's eyesight, or perhaps an arm or a leg, or even save a man's life.

Instruct your men in this manner. But don't forget that after you have done this your responsibility does not cease.

Know your job. Realize the responsibility of it, and never allow carelessness, overconfidence, or anything to take a toll in death or injury among the men who look to you for guidance and supervision.

SAFETY AS APPLIED TO ARTILLERY

by Technical Sergeant H. D. Hampton, Ord. Dept.

Various types of devices are incorporated in the construction of artillery to promote safety in firing and in transit. Among these we find the following:

a. Safety devices to prevent firing before the breech is fully closed.

The proper functioning of this device is most important in cases where breechblocks of the interrupted screw type are used. This is true due to the fact that it is impossible to obtain percussion on the primer when using breechblocks of either the eccentric screw or sliding wedge types until the breech is fully closed, as the firing pin will not be in proper alignment with the primer.

b. Safety devices to prevent firing of the piece when piston rods are not coupled to the gun.

This probably represents the most important safety device incorporated in any artillery weapon. It is easy to foresee the consequence if a gun were fired without being coupled to the piston rods.

c. Traversing and elevating limit stops.

Traversing limit stops are particularly important in cases where pintle type traversing mechanisms are used. The function of traversing stops is to prevent over-traverse and thereby prevent recoiling parts from striking parts of the bottom carriage when the piece is fired at high angles of quadrant elevation and to prevent the carriage from overturning due to the line of recoil energy falling outside the limits of the firing platform.

Elevating stops are intended to prevent disengagement of the elevating rack at maximum elevation eliminating a possible hazard due to "whip up" when the piece is fired and also to eliminate the possibility of equilibrators (when used) becoming disengaged and causing possible injury to both personnel and materiel.

All of the above mentioned safety devices should be inspected frequently by

the using personnel and faults corrected or, if not permitted by the using personnel, turned over to the proper Ordnance Maintenance Unit for repair. No weapon should ever leave an Ordnance Establishment without the safety devices having first been carefully checked. Of course there are many other safety devices that should receive the same care, such as: The functioning of brake mechanisms, break-away devices, etc. The inspection of these devices should be routine.

Probably a word regarding safety in the Ordnance Maintenance Shop is not untimely. A mechanic should never attempt to disassemble a mechanism about which he is in doubt as to the safety precautions to be observed. Probably the most important point to be observed in the disassembly of weapons is in the case where equilibrators are used. Great care should be exercised to insure that the energy of the equilibrator is controlled before disconnecting trunnions, elevating mechanisms or the equilibrator itself. Serious injuries have occurred to both men and materiel due to failure to observe this point.

Another point to be observed in safe handling of materiel is the care in rigging. Many serious injuries have occurred due to negligence or ignorance, concerning its application. Personnel should be familiar with instructions contained in TR 185-5 relative to rigging. After rigging has been applied a "test" lift should be made by causing ropes and/or cables to be pulled taut and all hitches and knots carefully inspected before the load is actually lifted.

To sum up: For safety in handling artillery materiel it is imperative that we know the materiel: that we proceed using care and common sense and always take sufficient precautions to insure against injury to personnel and materiel.

SAFETY IN THE AUTOMOTIVE SECTION

by Staff Sergeant James E. Veech, Ord. Dept.

Safety regulations are of no value unless they are strictly obeyed by every individual in the section. If an adequate set of safety regulations are strictly enforced and each man in the section is aware that they are enforced for his personal safety, as well as for the safety of those working with him, there will be little or no use for the "shop-first-aid-kit".

Soldiers are human beings and it is necessary to constantly remind them of the importance of the safety regulations and have no mercy on the man that is caught breaking any safety regulation.

A mechanic who is in the hospital due to his disregard for safety regulations tends to cause the other men in his section to be reluctant to do certain types of work. This also throws more work on them, and as a result he is directly responsible for lowering the morale and efficiency of the section.

The efficiency of a shop may be judged by the number of accidents resulting in injury to personnel.

By strict compliance with the safety regulations, such as listed below, accidents in the automotive shop will be kept to a minimum.

Properly block up any vehicle before working under it with the wheels removed.

Comply with all fire prevention regulations, especially with regard to gasoline.

Replace guards or other safety devices before testing an engine or complete vehicle, especially on tanks.

Wear goggles when using grinding wheels.

Keep floors free from oil and grease.

Use tools properly and sensibly.

Conscientious and continued enforcement of safety regulations will tend to eliminate accidents in our "Automotive Shops".

SMALL ARMS SAFETY

by Technical Sergeant M. F. Medlin, Ord. Dept.

Accidents caused by Small Arms weapons can usually be traced to the following: "Carelessness", "The ignorance of, or ignoring of, Safety Rules", or - "Failure to use common sense".

Common sense gives us a number of rules which may be useful to any Ordnance man, and especially those in the field who are engaged in training new men at this time. These rules may be tabulated as follows:

1. Assume that a weapon is loaded, and YOU inspect it.
2. Do not fail to inspect a weapon each time you pick it up; fools may have been around.
3. Remember that a weapon should only be pointed at another person when the intention is to kill.
4. Weapons and ammunition one meeting place only -- "The Firing Line".
5. NEVER carry live ammunition on your person or in your tool box; it might get mixed with your dummy ammunition.
6. When working with or on a weapon, use your HEAD, not a hammer.

Remember accidents always happen with an "empty gun" and a little straight thinking at times may save a lot of repentance -- trying to live down a mistake.

Compressed springs must be given their due respect. Where they may never take a life, they can cause serious and permanent injury. Never allow an inexperienced man to disassemble compressed springs until instructed in a safe method of doing it. As for the experienced man: Never get careless in releasing springs, the next one might get you.

All Small Arms Weapons have one or more safety features. It is highly essential that they are used properly by the using arm as well as by Ordnance personnel.

SAFETY PLANNING FOR THE SHOP EXECUTIVE

by Technical Sergeant G. A. Orsino, Ord. Dept.

The Shop Executive should consider the safety program in his shop with just as much care as he considers the daily production schedule.

The reasons for such consideration are many. We admit that the paramount interest in accident prevention should be humane. But let us disregard this factor for the moment and we shall find that accidents slow down production by tying up machinery; very often machines as well as personnel are damaged so that repairs necessary add to the cost of production; accidents tend to have a disquieting effect on other workmen to the extent that it slows down their working pace for a while; this again affects production. Hence, in addition to the humane element, accidents mean loss in dollars and cents. Since the executive is vitally interested where money is involved, it follows that it pays him to save the lives and limbs of his workmen through well-planned and supervised accident prevention in his shop.

In a shop of any kind the safety program may be considered as consisting of three distinct phases; namely, the planning necessary to eliminate all conceivable hazard factors prior to starting operations; the methods used to inculcate in workmen the desire to promote safety for their own good; and the steps taken to insure that proper care is rendered those injured, since we are going to take the fatalistic viewpoint that accidents will occur regardless of the care taken towards their prevention.

Regarding the elimination of hazards the Shop Executive may consider some of the following accident causes; it has been found that they are the greatest contributors to high accident rates: Poor lighting, improperly guarded machines, careless workmen, insufficient space, slippery floors, and lack of instructions.

Recognized methods of safety promotion are: Periodic safety talks; accident prevention posters; conspicuously posted and plainly worded safety regulations; periodic safety inspections.

The fact that workmen will be injured or killed despite the efforts made towards prevention must be recognized and therefore provisions should be made for prompt and effective First Aid. This means that the shop must be equipped with standard First Aid kits, and must have available qualified personnel to administer to the injured. Very often ignorantly applied First Aid causes more harm than the original injury.

- AMMUNITION -

by Technical Sergeant Edwin C. Moore, Ord. Dept.

A new and inexperienced driver does not try to beat a red light. He has just learned what he may do and what he may not do. With experience comes confidence, which in many cases, grows into over-confidence. The rules of safety, and even common sense, are now far behind him. He is out of the inexperienced class. Safety rules are for novices. His graduation from the over-confident class comes suddenly, one day, when he attempts something he would not dare do in the old days as a novice. He now has the dubious privilege of being referred to as "the deceased".

A new and inexperienced ammunition man does not try to beat a red light, when handling ammunition. He has been taught just what he may do and have ammunition remain his servant. He has been taught that if he does not do these things, ammunition will become his master, and that his period of servitude will be a very short one.

As his experience grows, it is often true that his former great care and strict observance of safety rules seem to disappear. He takes stock of himself, finds himself still in one piece, and decides that he is now an experienced man. As such he considers safety rules, which he formerly followed so religiously, as being only for a class of men to which he, at one time, belonged -- the novice "Look at me," he says, "I've been handling it for years." He has now arrived at the final stage -- not only loss of regard for safety but total loss of common sense.

The past is not a guarantee for the future. Getting by with something today does not assure you that you will get by with it tomorrow. Don't point to the people who disregarded a rule of safety, or failed to use common sense, and got by with it. Point to those who didn't get by.

Through many years men have been working to discover just how ammunition

should be handled, and now we have rules of safety which are the result of years of study and observation. Disasters have been studied, to determine the cause, with a view to preventing a recurrence of that type of disaster. It is better to benefit by rules obtained from the study of past disasters than to have someone else also benefit by a study of your carelessness.

Experience, together with a careful observance of all rules of safety, is an ideal combination, a combination that should be the goal of every ammunition man. Experience, however, will not save a man whose carelessness makes him disregard the unfortunate experiences of others.

Beginners are almost always careful. Why not remain that way as experience grows? Carelessness may rob the Service not only of your experience but also of you.

"Familiarity breeds contempt" -- trite, but true.

CONCLUSION

Probably the best safety rule of all is to "be sure you're right, then go ahead". If you are not sure you are right, ask someone. You may expose your ignorance, but you protect your life. By living you still have time to learn and reduce your ignorance; by being careless you may die an ignoramus. Most tragic of all, your carelessness or neglect may endanger the lives of others who are neither careless nor neglectful. "It's better to be safe than sorry" -- or careless and dead!

"ELEMENTARY OPTICAL PRINCIPLES"

(Continued from page 79)

purposely omitted for the sake of clarity. The purpose of this brief article is to bring out the basic principles of optics in as simple a manner as possible,

and is not aimed at making an optical designer of the reader. It is suggested that the advanced student consult some of the more complete texts if he desires additional information, with mathematical background and proof.

In further study it is intended to carry on the discussion in as simple a manner as possible, so that the average man may gain a better concept of optical principles.

In Figure 12 (Part 2), it was shown that when rays of

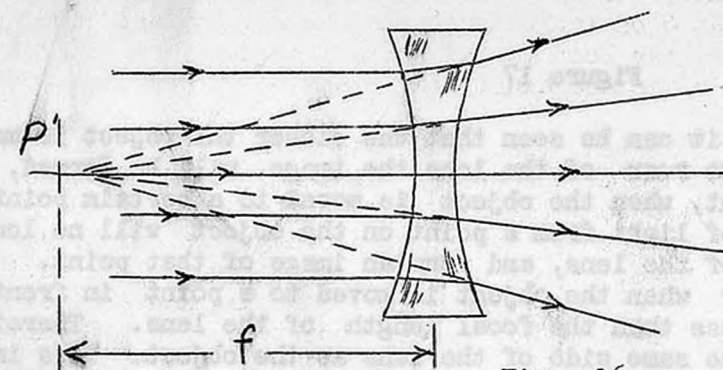


Fig. 16

light, parallel to the axis of a converging lens, pass through the lens they will converge at a point O back of the lens. This point O , being the point of principal focus. Such rays of light passing through a lens either are light rays from a light source, or are light rays reflected from an object. Then, an image will be formed of the object at a distance f in back of the lens. This image is real, inverted, and smaller than the object.

If the object is moved closer to the lens and the rays of light that enter, the lens are not parallel, the object will be formed back of the focal point as shown in Figure 17. The object represented by PO is assumed to be reflecting rays of light in all directions, part of these rays are reflected toward and pass through the lens. Selecting the point O, we shall trace the path of three rays of light, a, b, c, respectively, through the lens.

It can be seen that although these rays of light strike the surface of the lens at different points, they will be refracted, pass through the lens, and converge at the point O'. The sum total of all the rays of light that could possibly be reflected from the point O, and pass through the lens, would all converge at the point O', and form an image of that point. Since the intersection of any two rays of light from O locate the point O', similarly by selecting any point on the object PO and passing the rays of light from that point through the lens, these rays would converge at a respective point in rear of the lens and form an image of that point.

In Figure 17, only three rays of light have been traced from the points O and P through the lens to the Points O' and P' respectively, forming an image of that point of the object. Therefore, it can be noted that the image is on the opposite side of the lens from the object, it is smaller than the object, and it is inverted. This is called a real image. This image could be projected upon a screen.

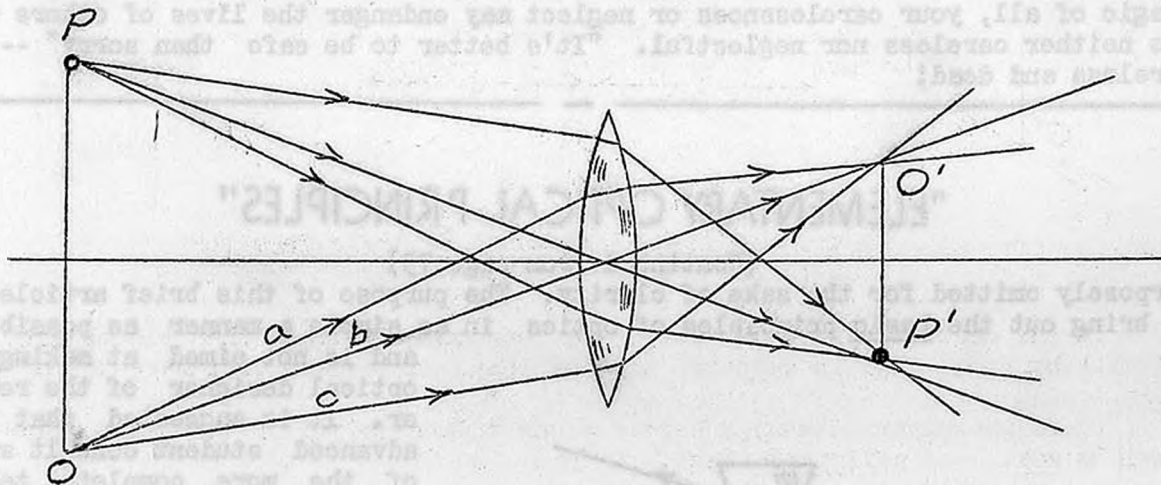


Figure 17

By a study of Figure 17, it can be seen that the closer the object is moved to the lens, the further to the rear of the lens the image will be formed, and the larger it will become. But, when the object is moved to a certain point in front of the lens, the rays of light from a point on the object will no longer intersect at a point in rear of the lens, and form an image of that point.

This condition will occur when the object is moved to a point in front of the lens which distance is less than the focal length of the lens. Therefore the image will be formed on the same side of the lens as the object. This image will be larger than the object, and erect. This is termed a virtual image. Figure 18 will illustrate this point.

To observe this virtual image it will be necessary to look through the lens towards the object. The image of the object will appear to be at the point P'O' greatly enlarged and erect. This illustrates the action of a magnifying lens, or reading glass.

The virtual image is on the same side of the lens as the object, larger

than the object and erect.

Similarly, if the object were moved yet closer to the lens, the image would increase in size. This experiment can be carried out by use of any ordinary, reading glass. From the above deduction it can be stated that the ratio of the length of the image to the length of the object is the linear magnification.

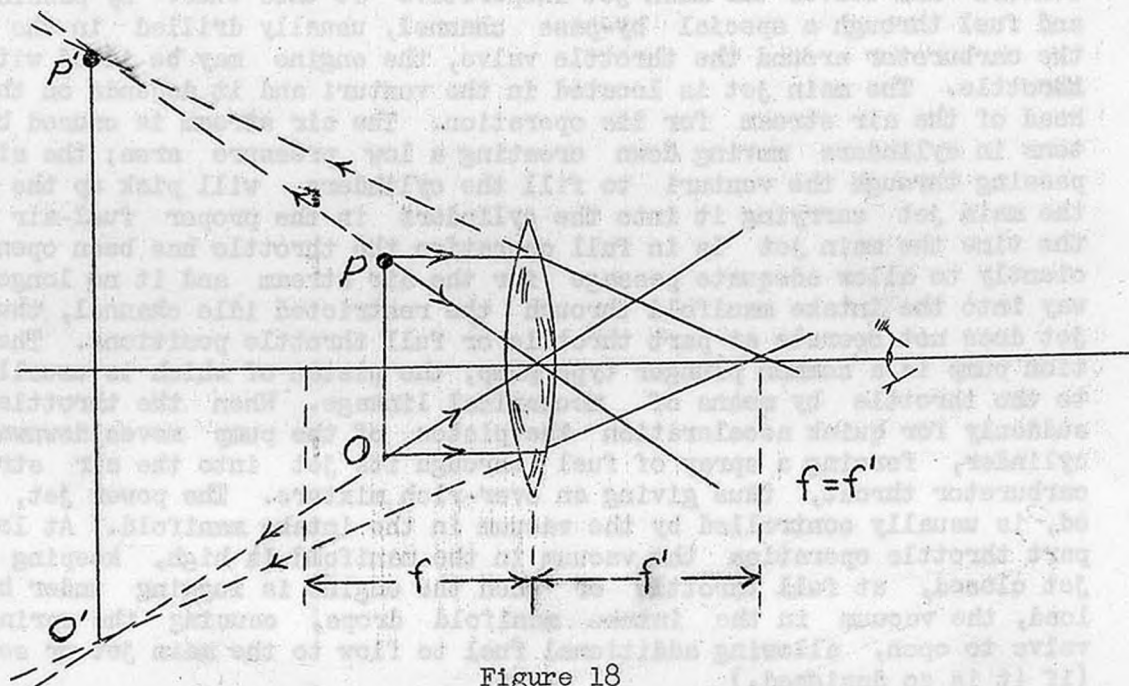


Figure 18

$$\frac{\text{Length of image} - \text{Distance of image from lens}}{\text{Length of object} \quad \text{Distance of object from lens}}$$

In the case of Figure 17, the image was much smaller than the object, but it will be found that in a future part of this series, we will make use of this fact.

It is important that you have a clear understanding of the difference between a real, and a virtual image.

This ends Part 3 of this series.

Save your copies of THE ORDNANCE SERGEANT, as sketches in previous parts of this series will often be referred to. They will, in addition, serve as a constant source of reference.

LIFE BEGINS AT 40

And death may begin immediately after you begin to be careless. If you doubt this, read the article beginning on page 72. It is good advice for YOU.

Don't overlook the "Fire Control" NOTES IN BRIEF on page 107.

"THE CARBURETOR"

(Continued from page 76)

The idling jet is of a by-pass design because closing the throttle valve in the throat of the carburetor causes a static head of air to be set up in the venturi and leaves the main jet inoperative at this time. By passing the air and fuel through a special by-pass channel, usually drilled in the housing of the carburetor around the throttle valve, the engine may be idled with a closed throttle. The main jet is located in the venturi and it depends on the velocity head of the air stream for its operation. The air stream is caused by the pistons in cylinders moving down creating a low pressure area; the air stream passing through the venturi to fill the cylinders, will pick up the fuel from the main jet carrying it into the cylinders in the proper fuel-air ratio. By the time the main jet is in full operation the throttle has been opened sufficiently to allow adequate passage for the air stream and it no longer seeks a way into the intake manifold through the restricted idle channel, thus the idle jet does not operate at part throttle or full throttle positions. The acceleration pump is a common plunger type pump, the piston of which is usually attached to the throttle by means of mechanical linkage. When the throttle is opened suddenly for quick acceleration the piston of the pump moves downward in its cylinder, forcing a spray of fuel through its jet into the air stream in the carburetor throat, thus giving an over-rich mixture. The power jet, if employed, is usually controlled by the vacuum in the intake manifold. At low speed or part throttle operation the vacuum in the manifold is high, keeping the power jet closed, at full throttle or when the engine is lugging under high torque load, the vacuum in the intake manifold drops, causing the spring loaded valve to open, allowing additional fuel to flow to the main jet or separate jet (if it is so designed.)

Before attempting carburetor repair, or even blaming the carburetor for poor engine performance or low gasoline mileage, check all other operations of the engine units; such as the compression of each cylinder, the ignition circuit, fuel feed system, etc. When this has been done and it is evident that the carburetor is at fault and repair of this unit is necessary, remember that regardless of the design of the carburetor, it must satisfy the conditions enumerated above. Before disassembly of the unit, determine how the carburetor satisfies the various conditions imposed upon it and the location of the various passages and jets of each circuit.

In conclusion, the carburetor, as well as any other unit of the engine, must be adjusted correctly, so that when the carburetor repair or adjustments are made, get the correct specifications for adjustment and repair from the shop manual, or from a carburetor handbook.

If you have questions send them in, and THE ORDNANCE SERGEANT will provide correct answers. If you want to discuss something which would be of interest to others, or if you think some particular subject should be discussed in an authoritative article, send this information to THE ORDNANCE SERGEANT. Address all communications to:

THE ORDNANCE SERGEANT,
The Ordnance School,
Aberdeen Proving Ground, Md.

"NOTES IN BRIEF"

(FIRE CONTROL SECTION)

When occasion warrants the removal of the reticles from their cells in the TELESCOPE, M5 & TELESCOPE, M5A1, extreme caution must be observed. It has been noted that the edges of these reticles appear to chip very easily. It is well to keep this point in mind.

In the event you missed it, your attention is invited to OFSB 6-F-1 (tentative), October 11, 1940. It embodies a change in lubricants used for Fire Control Instruments, no change being prescribed for lubricating methods.

Petrolatum and similar petroleum jellies will no longer be used as lubricants. A substitute is prescribed, Royco 6A, which is procured from Rock Island, San Antonio, and Benicia Arsenal. All fire control instruments lubricated with oil will be so lubricated only, with the Oil, lubricating for aircraft instruments and machine guns.

The use of Royco, 6A, is not required for the AA Director and other Sperry instruments.

Reference to this bulletin is advised as soon as practicable.

The Fire Control Section of The Ordnance School recently catalogued all F5 screws, in one complete list. They were listed according to the alphabetical sequence of their drawing numbers, and had after each, all the instruments that it is used on, and the identifying nomenclature. It shows at a glance how many groups use the same screw.

It has proved invaluable for making out estimates of parts needed, consolidating procurement requests, serving as a general reference, etc. Many times the number of hours spent in this development have been saved by its use.

It has been found that such a catalogue can be consulted in a fraction of the time it would take to wade through a dozen SNL's for the same information.

You may have noted an admonition in the series of articles on ELEMENTARY OPTICAL PRINCIPLES, now running in THE ORDNANCE SERGEANT, that if you desired more advanced information, it could be obtained in many different textbooks.

The following list of books is recommended for this purpose. They can be obtained from any well equipped library.

Physical Optics.....Wood.
Principles of Optics.....Hardy & Perrin
Mirrors, Lenses and Prisms.....Southall
The Telescope.....Bell
Geometrical Optics.....Southall

Also: Elementary Optics and Application to Fire Control Instruments.....
Government Printing Office (Prepared under direction of the
Chief of Ordnance)

Many an apparently hopeless case of injured threads on an instrument can be corrected by use of an appropriate thread chaser. These handy tools are not used to the extent that they should be. An outstanding instance is the threads, internal, that hold the field glass eyepiece to the body. Being of aluminum, they are easily injured. In most cases a 40 thread per inch, internal thread chaser will remedy these threads, in a half hour. Thus a job is accomplished, that would otherwise be relegated to arsenal maintenance facilities.

WARNING; In using a thread gauge, be sure to ascertain the correct number

of threads per inch, and select the proper thread chaser for the job.

SPECIAL NOTICE TO AA MAINTENANCE MEN

The AA Section, of Fire Control Instruments, at The Ordnance School, is very anxious to hear from men in the field who have had actual experience with maintenance problems, on the AA Director, Height Finder, and Data Transmission System.

It would be very much appreciated if such men would drop a line to the Fire Control Section, outlining in as much detail as possible, the problems they have encountered, and how they have overcome them.

Just send your letters in care of THE ORDNANCE SERGEANT.

Not only AA Maintenance Men, but every instrument man has his own pet jigs, fixtures, ideas, etc., many of which are highly helpful and unusually efficient.

If you have any special ways of doing things, any special fixtures, or pet idea-----

If you have at any time encountered interesting and unusual defects and malfunctions in Fire Control Instruments-----

If you know of any unusual ways of remedying ordinary defects-----

Please, drop us a line, and give us all the information you can.

The rest of the instrument men will be interested, and your information, will be passed on to them. Full credit will be given to you for your idea. So don't forget.....

The address is the same as that of THE ORDNANCE SERGEANT.

"ORDNANCE TRAINING ACTIVITIES"

(Continued from page 85)

(N.C.O. or N.C.O. Material)	2 monthly, beginning 7-1-41	(3 mo. Amm. Course)
	9 monthly, beginning 7-1-41	(3 mo. Depot & Supply Course)
	12 monthly, beginning 7-1-41	(3 mo. Maintenance Course)
	3 bi-monthly, beginning 7-1-41	(8 wks AA Fire Control Course)
E.M.	3 monthly, beginning 7-1-41	(3 mo. Armorer Course)
	3 monthly, beginning 7-1-41	(3 mo. Artillery Course)
	4 monthly, beginning 7-1-41	(3 mo. Auto. Course)
	1 monthly, beginning 7-1-41	(3 mo. Carpenter Course)
	8 monthly, beginning 7-1-41	(3 mo. Clerk Course)
	6 monthly, beginning 7-1-41	(3 mo. Cook Course)
	2 monthly, beginning 7-1-41	(3 mo. Instrument Repair Course)
	4 monthly, beginning 7-1-41	(3 mo. Munition Worker Course)
	2 monthly, beginning 7-1-41	(3 mo. Welder Course)
	5 tri-monthly, beginning 8-1-41	(3 mo. Machinists' Course)

THIRD ARMY

(Officers)	10 monthly, beginning 7-1-41	(1 mo. General Refresher Course)
	5 monthly, beginning 7-1-41	(1 mo. Amm. & Auto. Course)
	5 monthly, beginning 7-1-41	(1 mo. Depot & Supply & Artillery Course)
	5 monthly, beginning 7-1-41	(1 mo. Mess Management and Small Arms Course)
	2 bi-monthly, beginning 7-1-41	(8 wks. AA Fire Control Course)
(N.C.O. or N.C.O.2 Material)	2 monthly, beginning 7-1-41	(3 mo. Amm. Course)
	9 monthly, beginning 7-1-41	(3 mo. Depot & Supply Course)
	12 monthly, beginning 7-1-41	(3 mo. Maintenance Course)
	2 bi-monthly, beginning 7-1-41	(8 wks. AA Fire Control Course)
(E.M.)	3 monthly, beginning 7-1-41	(3 mo. Armorer Course)
	3 monthly, beginning 7-1-41	(3 mo. Artillery Course)
	4 monthly, beginning 7-1-41	(3 mo. Auto. Course)
	1 monthly, beginning 7-1-41	(3 mo. Carpenter Course)
	8 monthly, beginning 7-1-41	(3 mo. Clerk Course)
	6 monthly, beginning 7-1-41	(3 mo. Cook Course)
	2 monthly, beginning 7-1-41	(3 mo. Instr. Repair Course)
	4 monthly, beginning 7-1-41	(3 mo. Munition Worker Course)
	2 monthly, beginning 7-1-41	(3 mo. Welder Course)
	5 tri monthly, beginning 8-1-41	(3 mo. Machinists' Course)

FOURTH ARMY

(Officers)	10 monthly, beginning 7-1-41	(1 mo. General Refresher Course)
	5 monthly, beginning 7-1-41	(1 mo. Amm. & Auto. Course)
	5 monthly, beginning 7-1-41	(1 mo. Depot & Supply & Artillery Course)
	5 monthly, beginning 7-1-41	(1 mo. Mess Management & Small Arms Course)
	2 bi-monthly, beginning 7-1-41	(8 wks. AA Fire Control Course)
(N.C.O. or N.C.O.2 Material)	2 monthly, beginning 7-1-41	(3 mo. Amm. Course)
	9 monthly, beginning 7-1-41	(3 mo. Depot & Supply Course)
	12 monthly, beginning 7-1-41	(3 mo. Maintenance Course)
	2 bi-monthly, beginning 7-1-41	(8 wks. AA Fire Control Course)
(E.M.)	3 monthly, beginning 7-1-41	(3 mo. Armorer Course)
	3 monthly, beginning 7-1-41	(3 mo. Artillery Course)
	4 monthly, beginning 7-1-41	(3 mo. Auto. Course)
	1 monthly, beginning 7-1-41	(3 mo. Carpenter Course)
	8 monthly, beginning 7-1-41	(3 mo. Clerk Course)
	6 monthly, beginning 7-1-41	(3 mo. Cook Course)
	2 monthly, beginning 7-1-41	(3 mo. Instr. Repair Course)
	4 monthly, beginning 7-1-41	(3 mo. Munition Worker Course)

5 tri-monthly, beginning 8-1-41 (3 mo. Machinists' Course)

1st CORPS AREA

(N.C.O.)	1 monthly, beginning 7-1-41	(3 mo. Depot & Supply Course)
	1 monthly, beginning 7-1-41	(3 mo. Armorers Course)
	1 monthly, beginning 7-1-41	(3 mo. Artillery Course)
	1 monthly, beginning 7-1-41	(3 mo. Auto. Course)
	2 monthly, beginning 7-1-41	(3 mo. Clerk Course)
	2 monthly, beginning 7-1-41	(3 mo. Cook Course)
	1 monthly, beginning 7-1-41	(3 mo. Munition Worker Course)
	1 tri-monthly, beginning 8-1-41	(3 mo. Machinists Course)

2nd CORPS AREA

(N.C.O.)	1 monthly, beginning 7-1-41	(3 mo. Depot & Supply Course)
	1 monthly, beginning 7-1-41	(3 mo. Auto. Course)
	2 monthly, beginning 7-1-41	(3 mo. Clerk Course)
	1 monthly, beginning 7-1-41	(3 mo. Munition Worker Course)
	1 tri-monthly, beginning 8-1-41	(3 mo. Machinists' Course)

4th CORPS AREA

(N.C.O.)	1 monthly, beginning 7-1-41	(3 mo. Depot & Supply Course)
	1 monthly, beginning 7-1-41	(3 mo. Amm. Course)
	1 monthly, beginning 7-1-41	(3 mo. Maintenance Course)
(E.M.)	1 monthly, beginning 7-1-41	(3 mo. Armorers Course)
	1 monthly, beginning 7-1-41	(3 mo. Artillery Course)
	1 monthly, beginning 7-1-41	(3 mo. Auto. Course)
	2 monthly, beginning 7-1-41	(3 mo. Clerk Course)
	2 monthly, beginning 7-1-41	(3 mo. Cook Course)
	1 monthly, beginning 7-1-41	(3 mo. Instr. Repair Course)
	1 monthly, beginning 7-1-41	(3 mo. Munition Worker Course)
	1 monthly, beginning 7-1-41	(3 mo. Welder Course)
	1 tri-monthly, beginning 8-1-41	(3 mo. Machinists' Course)

8th CORPS AREA

(N.C.O.)	1 monthly, beginning 7-1-41	(3 mo. Amm. Course)
	1 monthly, beginning 7-1-41	(3 mo. Depot & Supply Course)
	1 monthly, beginning 7-1-41	(3 mo. Maintenance Course)
(E.M.)	1 monthly, beginning 7-1-41	(3 mo. Armorers Course)
	1 monthly, beginning 7-1-41	(3 mo. Artillery Course)
	1 monthly, beginning 7-1-41	(3 mo. Auto. Course)
	1 monthly, beginning 7-1-41	(3 mo. Carpenter Course)
	2 monthly, beginning 7-1-41	(3 mo. Clerk Course)
	2 monthly, beginning 7-1-41	(3 mo. Cook Course)
	1 monthly, beginning 7-1-41	(3 mo. Instr. Rep. Course)

1 monthly, beginning 7-1-41 (3 mo. Welder Course)
1 tri-monthly, beginning 8-1-41 (3 mo. Machinists' Course)

ORDNANCE PERSONNEL SERVING WITH AIR CORPS UNITS

(Officers) 40 monthly, beginning 7-1-41 (1 mo. Aviation Ordnance Course.)

"LIBRARY"

(Continued from page 90)

particular weapon, and its accessories, are discussed in the last pages of the field manual. An appendix lists the various references that can be used with this TM.

TM 9-225, "Browning Machine Gun, Caliber .50, M2, Aircraft, fixed and flexible", (11/8/40), and TM 9-226, "Browning Machine Gun, Caliber .50, M2, water-cooled, and mounts", discuss in detail all the nomenclature and operation pertinent to these guns. These manuals contain all the essential information of a technical character required for the identification, use, and care of the particular materiel described. In addition to this they contain information required to identify spare parts and accessories, and data concerning the use and care of ammunition, as well as cleaning and preserving materials. The sighting and Fire Control equipment of the water-cooled guns and mounts is also discussed in TM 9-226.

The old familiar Browning Machine Gun, Model 1917, caliber .30, is discussed in Basic Field Manual 23-55.

Anyone interested in the Tables of Organization of the Ordnance Department, or any department, may be pleased to know that a new table titled "List of Tables of Organization" has been published by the War Department, dated January 1, 1941. The tables are as follows:

9-7	(11/1/40)	and Cl	Ord. Co. (MM)
9-9	(11/1/40)		Ord. Co. (HM)
9-15	(11/1/40)		Ord. Bn. Amm.
9-17	(11/1/40)		Ord. Co. Amm.
9-18	(11/1/40)		Ord. Co. Depot
9-47	(11/1/40)		Ord. Co. Maint., Ry. Arty.
9-65	(11/15/40)		Ord. Bn., Maint., Armored Div.
9-66	(11/15/40)		Ord. Hqrs. and Hqrs. Co., Bn., Armored Div.
9-67	(11/15/40)		Ord. Co., Maint., Bn., Armored Div.
9-75	(11/1/40)		Ord. Bn., Maint.
9-115	(11/1/40)		Ord. Bn., Maint. & Supply
9-157	(12/16/40)		Ord. Co., Avn., (Bomb. or Pursuit)
9-510-1	(11/25/40)		Hqrs. & Hqrs. Co., Replacement Center
9-515	(11/25/40)		Ordnance Replacement Bn.

Training Circular #5, dated February 1, 1941, lists the publications and changes which have been published since October 1, 1940, and which are not shown in Field Manual 21-6 ("List of Publications for Training"). (A more detailed discussion of FM 21-6 will be found on the Administration pages in this issue).

Technical Manual 9-235, "37mm. AA Gun materiel, M1A2, Carriage M3", recently published, is the most complete Ordnance publication to date that contains descriptive information on the operation of the Gun and Carriage M3. This manual also includes a description, method of operation, and sight testing of the "Sighting and Fire Control Equipment (Sighting system M2, and Telescope M7)".

Compilation of further pertinent information on this gun and carriage will be published in the near future.

Small Arms enthusiasts who delve into the intricacies of lands and grooves and enjoy matching the various projectiles with different weapons, will find enjoyable evenings spent in reviewing a book written by the Commanding Officer of the Ordnance Training Center at Aberdeen Proving Ground. The book in question is "Textbook of Firearms Investigation, Identification and Evidence", which was written by Colonel J. S. Hatcher, Ordnance Department.

There are all types of pistols, revolvers and ammunition discussed in the text. Learning how to shoot and the art of self defense are additional items that Col. Hatcher has entered in the book. The chapters dealing with the various articles are clearly illustrated by pictures. Where pictures will not suffice to tell the story, the articles are further illustrated by pen drawings for the purpose of clarifying the story.

Even though the book seems to deal mostly with law and for law-abiding agencies, a Small Arms Section could digest a vast amount of facts and figures upon referring to the book.

Among some of the tables found in the book are the recoil table of the .30 cal. Mauser to the .45 Colt New Service; a penetration table from the .22 Long Rifle, Outdoor Projectile, to the .45 cal. bullet; a cartridge case capacity chart from the .25 A.C.P. cart to the .45 A.C.P.; velocity curves of the .22 cal. rifle, the .32.20 revolver and the .38 special pistol.

Several pages deal with the principal dimensions of various makes of pistols and revolvers (this table includes the caliber and name of the arm described), pitch of rifling, number of lands and grooves, diameter across the lands, plus the width, and the diameter, width and depth of the grooves. Some of the weapons falling in this table are the Luger automatic, The Remingtons and Savages, the Mauser automatic, the Smith and Wesson, and miscellaneous arms.

This book, as J. Edgar Hoover states, "is a comprehensive and accurate treatise" of the subject.

STREAMLINING TECHNIQUE AT THE ORDNANCE TRAINING CENTER

STREAMLINED ADMINISTRATION

In the Ordnance Unit Training Center there exists a unique situation. Original plans called for the activation of a Headquarters Detachment and thirteen companies for training in February. The Headquarters Detachment was activated and is functioning normally, with First Lieutenant James D. Sutton as its Company Commander, and Corporal Louis A. Kimball as its Acting First Sergeant.

But because of a shortage of adequate barracks, and the absence of Selectees or other personnel, it was not possible to organize the thirteen companies at their normal strength. However, the activation was accomplished, and the thirteen companies now exist -- in skeleton form.

Lieutenant is also the Company Commander of each of these thirteen companies, and Corporal Kimball is also the Acting First Sergeant of each company. Corporal Kimball, among other duties, is charged with the preparation of fourteen Morning Reports, fourteen sick books, etc.

Read another "STREAMLINING TECHNIQUE" item on page 89.