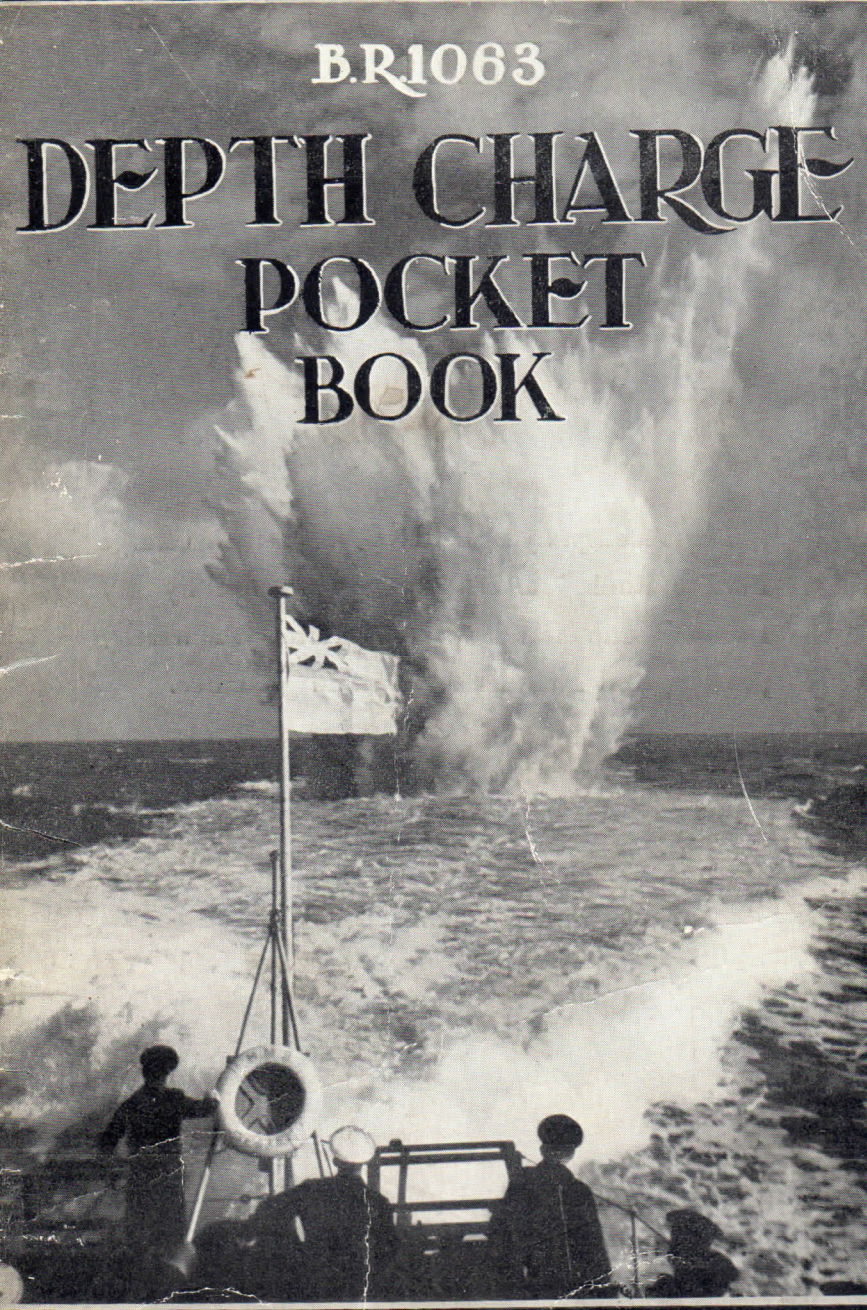
B.R.1063

DEPTH CHARGE POCKET BOOK



ADMIRALTY, S.W.1.

September 1944.

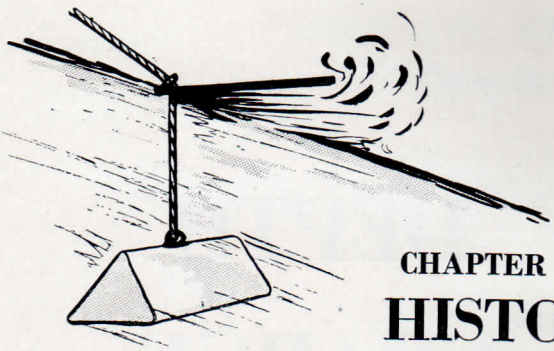
The accompanying B.R.1063, "Depth Charge Pocket Book," having been approved by My Lords Commissioners of the Admiralty, is hereby promulgated for information and guidance.

BY COMMAND OF THEIR LORDSHIPS,

H. V. Markham

Admiralty,
Torpedo and Mining Dept.,
T.612/44.

DEPTH CHARGE POCKET BOOK 1944



CHAPTER ONE

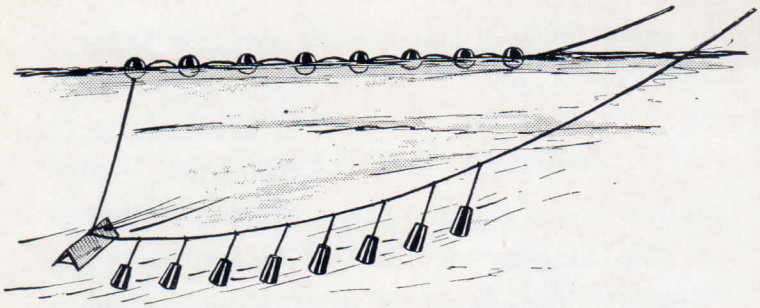
HISTORY

AT the commencement of the last war the only underwater anti-submarine device available was the "Single Sweep." This consisted of a solid metal kite containing 100 lb. of explosive. It was towed by an electric armoured cable, and kept from diving deep by a skid on the surface. It was fired by order of the Captain.

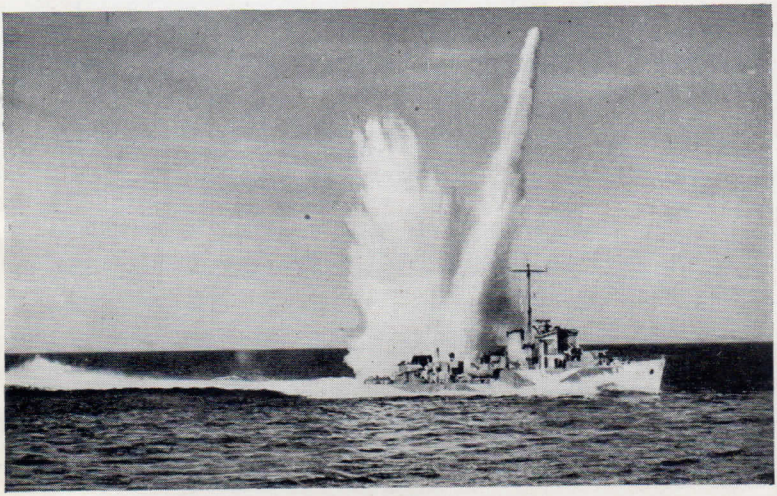
A "Modified Sweep" was under development and came to sea at the end of 1914. This consisted of a loop of electric cable which was towed astern of the ship, and kept under water by a kite. The top half of the loop had floats attached, and the bottom half many charges of explosives.

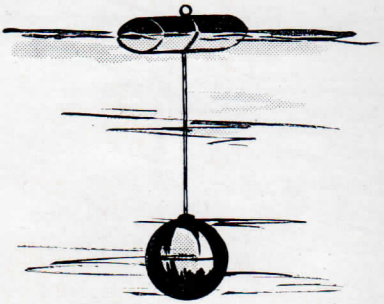
The ends of the loop were attached to a beam on the ship. On meeting a submarine the beam swung and fired the charges.

Both these devices were difficult to stream, and more difficult to pick up. Their efficiency was low and their use limited.



In October 1914 the C.-in-C. Grand Fleet wrote to the Admiralty pointing out that heavy ships—he mentioned a battleship and a cruiser—had tried to ram a submarine. They had no other method of offence against a submerged submarine and he therefore asked that a submerged charge operated by hydrostatic pressure should be developed.





This letter started the train of development of the depth charge as we now know it.

Types A, B and C were adaptations of existing material and consisted of a large float attached to the explosive charge by a length of line. When the line tautened, it pulled out the plunger of a simple pull-out pistol and fired the charge.

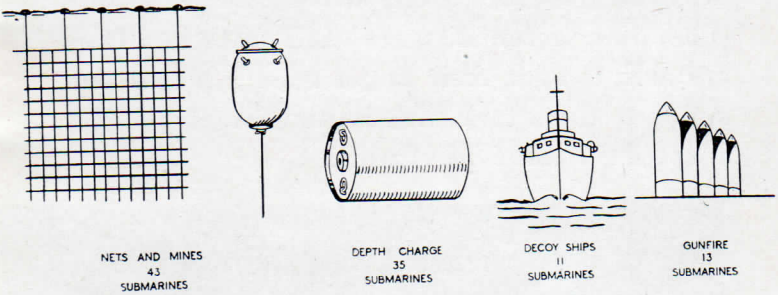
Type D was the first charge expressly designed for the purpose and was of the same size and weight as our present Mark VII depth charge.

The pistol has been greatly improved—the original pistols were not inertia proof and might fire when the charge struck the water. Primer safety gear has appeared and disappeared from time to time.

The original pistol was a pure hydrostatic type with two depths of firing, attained by using one or two hydrostatic springs. With the requirement for greater depths the leakage (or time) principle was introduced. In this type a small hole is presented to the water and water enters the primer tube. The rate of sinking of

a depth charge is known, and the time taken to build up the firing pressure in the primer tube is calculated. This is the principle used for firing depth charges at the present time.

In the last war depth charges accounted for 35 submarines, mines and nets 43, decoy ships 11, gunfire 13. It must, however, be remembered that methods of offence were very primitive. Submarines worked far closer inshore than nowadays which gave mines, nets and surface attack



more opportunities than they get now with submarines working far afield.

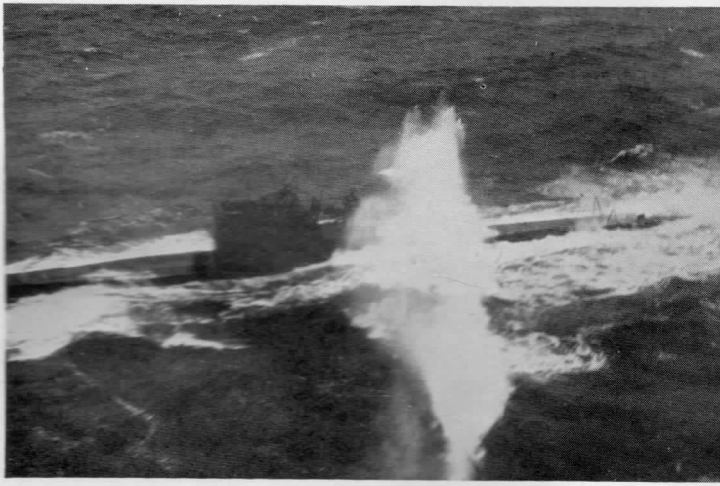
It must also be realised that any method of locating submarines, except by sight or being attacked by torpedo, was lacking, and modern methods of locating submarines were only developed after 1920. This development greatly increased the scope and power of the attacking

ship and reversed the position, making the submarine the hunted instead of the hunter.

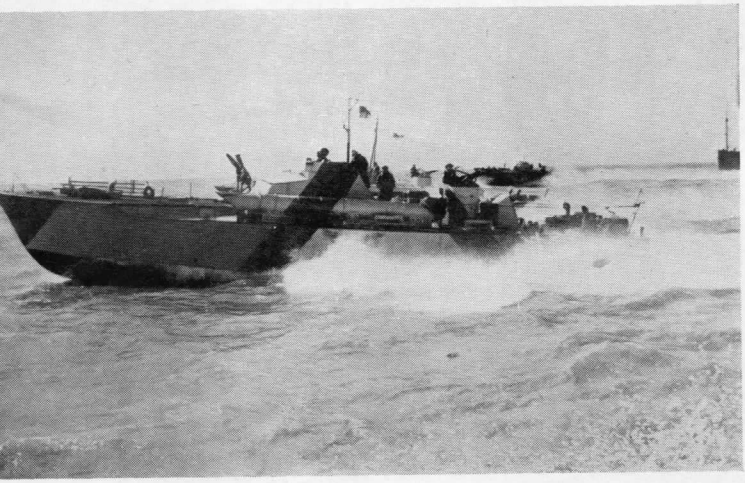
Modern warfare has made the need of modern weapons one of vital importance, whilst speed of attack and the covering of wide fields of operation also become an urgent necessity.

The depth charge, together with its equipment, has been, in consequence, developed and adapted to meet these advanced requirements.

Aeroplanes were fitted with depth charge dropping gear and soon played a large part in submarine reconnaissance and attack. They are able to spot their target from a height and swoop to the attack with depth charges specially adapted for this type of work.



Fast-moving coastal force craft are also fitted with depth charge equipment and their speed enables them to effectively operate against submarines.

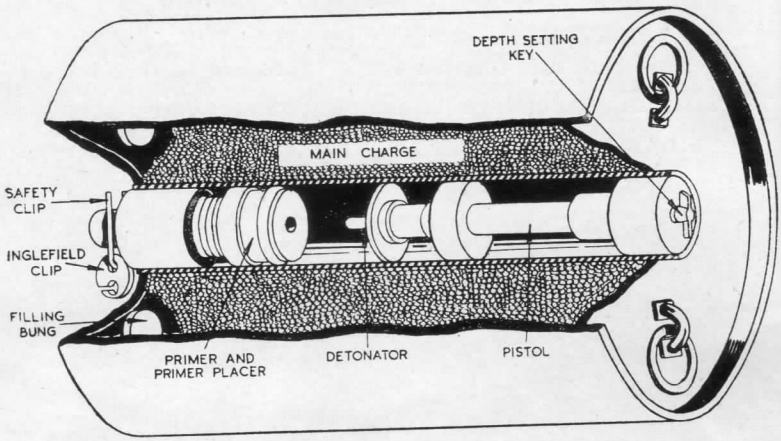


CHAPTER TWO

DEPTH CHARGES

Mark VII Type for Surface Craft

THE depth charge is a cylindrical steel drum, of mild steel, welded down the side, with a cover at each end. Through the centre passes a steel tube $3\frac{1}{2}$ inches in diameter, welded to the cover at each end. This is known as the primer tube. Three slots are cut in each end of the tube. These slots locate at one end the depth



adjuster and pistol and at the other end the primer safety gear.

Two lifting eyes are welded to the cover at the pistol end and one at the primer end.

Two filling holes are provided at the primer end for filling the case with the main explosive charge.

Modifications are made from time to time to this more or less standard type of depth charge, to suit various operational requirements or to incorporate improvements. Some of the modified types of depth charges are :—

Mark VII Heavy Type for Surface Craft

This charge is the same as the charge described above except that a cast-iron weight is secured to the pistol end of the depth charge by two hook bolts attached to the lifting eyes at the pistol end.

Marks VIII and XI for Aircraft

These are the depth charges used by aircraft, and differ only in that the Mark VIII has a convex end and the Mark XI a concave end. The Mark VIII has had a " spoiler nose " added, so that both Marks are now interchangeable and have the same performance.

The depth charge consists of a cylindrical charge case, to one end of which is welded a dished end cover which protrudes beyond the case. At the other end is an end filling cover, carrying the closed primer tube, two filling bungs and six lugs.

As originally fitted with a convex nose, the charge, entering the water at a high speed, used to carry its way under water, with the result that there was an air bubble behind it. As the pistol is dependent on water pressure to operate it, the air bubble prevented water from having access to it, with the result that the pistol did not fire until the depth charge had lost its way

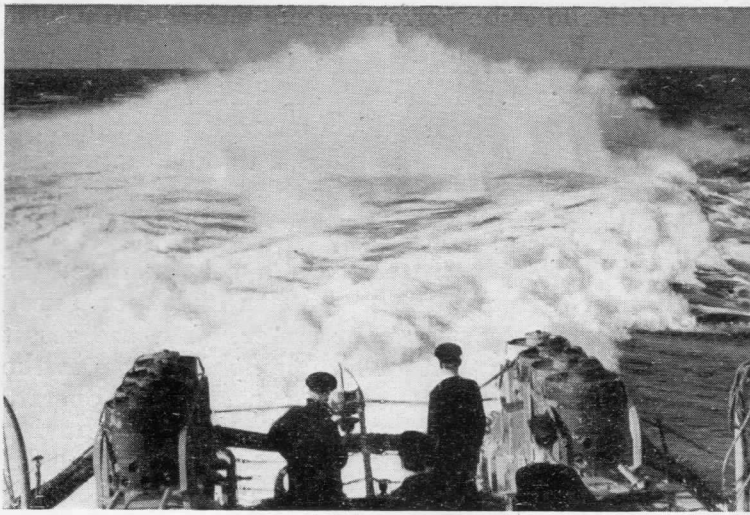
and was just sinking. This resulted in delayed and deep firing.

To obviate this, a concave nose (spoiler nose) was added to the Mark VIII charge and the Mark XI had a spoiler nose incorporated.

To further reduce the speed of the charge on entering the water a " break off " tail was added. This tail is very lightly attached to the depth charge and breaks off on the depth charge striking the water, and broadsides the charge. In these two ways the speed of the depth charge in water is quickly reduced and water has immediate access to the pistol.

The primer tube of this depth charge is blind, the primer being inserted before the pistol.

Suspension lugs are welded to the casing for securing the depth charge in the bomb racks of the aircraft.



CHAPTER THREE

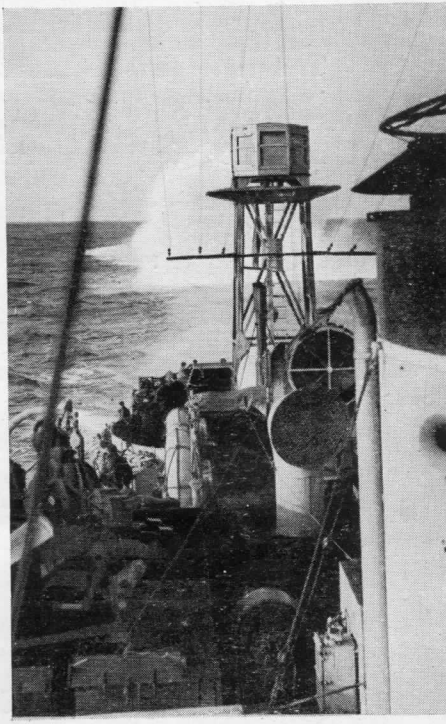
PISTOLS

CERTAIN requirements are essential effectively to operate a depth charge at sea and these are briefly as follows :—

(i) To explode at a predetermined depth, *i.e.*, approximately corresponding to the depth of the submarines.

(ii) To be "safe" until the depth charge is well clear of the firing ship and under water.

(iii) To be "safe" should the depth charge become subject to water pressure either through



(*a*) A ship sinking with depth charges on board.

(*b*) Accidentally being released by heavy seas or faulty release gear.

(*c*) In the case of aircraft carrying depth charges, by crashing in the sea.

The " Pistol " is the device which is used to meet these requirements. Primer safety gear is also used in addition to give further safety measures and this is dealt with in a later chapter. The pistol fires the depth charge when it reaches the required depth and gives the necessary intermediate safety measures.

The pistol consists essentially of the following components :—

(i) Firing gear.

(ii) Depth setting gear.

(iii) Safety gear.

FIRING GEAR

The two following types of firing gear have been used in the service.

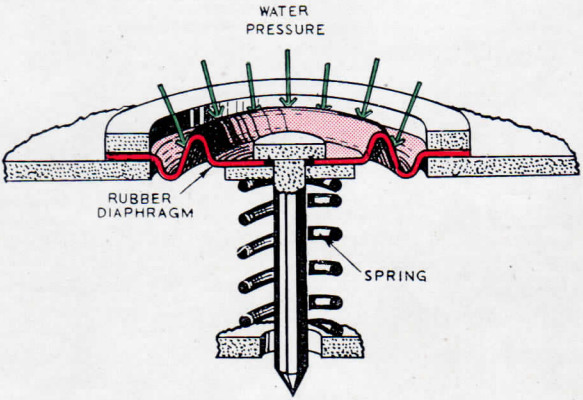
(i) Hydrostatic.

(ii) Leakage and Hydrostatic or Time Device.

Hydrostatic

The hydrostatic pistol was the first type used, and is at present in use by our Allies.

In this type water has direct access to a hydrostatic valve, and exerts pressure upon it. The valve in turn compresses a spring. As the depth charge sinks, the water pressure upon the surface



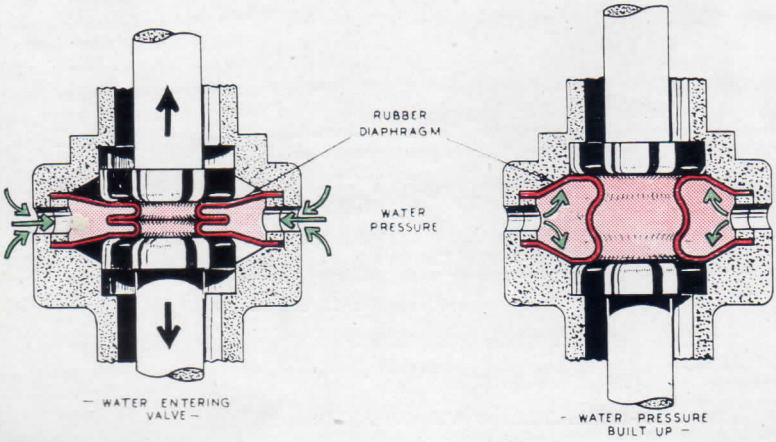
of the hydrostatic valve increases, and when the pistol arrives at a set depth the spring is sufficiently compressed to cause the valve spindle to operate the firing mechanism. That is to say, the direct pressure of the water upon the hydrostatic valve fires the pistol.

Leakage and Hydrostatic or Time Type

As this is the type now in use in the British

service, the action of this type will be discussed here.

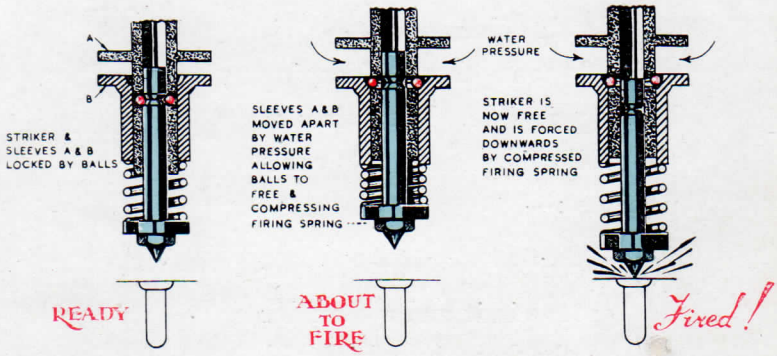
In this case, instead of a direct water pressure, the water is allowed gradually to enter a confined space in the primer tube surrounding the pistol, until this space has been completely filled with water. A water pressure is thus built up sufficient to operate the firing mechanism. The rate



at which water enters the primer tube is controlled by varying the size of the admission hole, so controlling the " time of operation " of the pistol.

Its operation is shown opposite, from the " ready " position until it is just about to explode the detonator.

From the diagrams it will be seen that, when the opposing sleeves are at the "ready" the balls anchor the striker to the inner sleeve, whilst the inner and outer sleeves are held together by the firing spring. The sleeves are of nearly



equal weight and have to move in opposite directions to fire the pistol; any end shock will therefore move the striker and sleeves as one unit, and will not move the sleeves apart and so fire the pistol. This design is therefore seen to be inertia proof.

FIRING MECHANISM

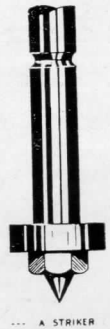
The firing gear, as described, operates the firing mechanism. The firing mechanism used in all depth charge pistols is worked on the " Escaping Ball " principle. It consists of the following essential components :—

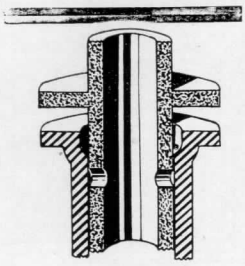
(i) A striker, with an annular groove in it and a shoulder at the base on which the firing spring bears.

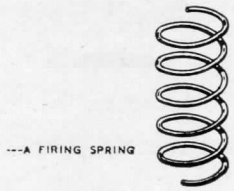
(ii) Two concentric sleeves which slide inside each other as shown.

(iii) A firing spring.

(iv) Balls.







These are assembled together and we get the complete firing mechanism.

As water pressure is admitted to the space between the sleeves, they move apart, thus compressing the firing spring.

Eventually the space in the outer sleeve comes opposite the balls. The pressure of the firing spring forces the balls outwards into the space presented to them in the outer sleeve, and the striker is freed. The firing spring asserts itself and the striker is driven into the detonator.

DEPTH SETTING

We have the following known factors to help us in considering depth setting :—

(i) The rate of sinking of a depth charge (normal or heavy) to any depth is a known fixed value.

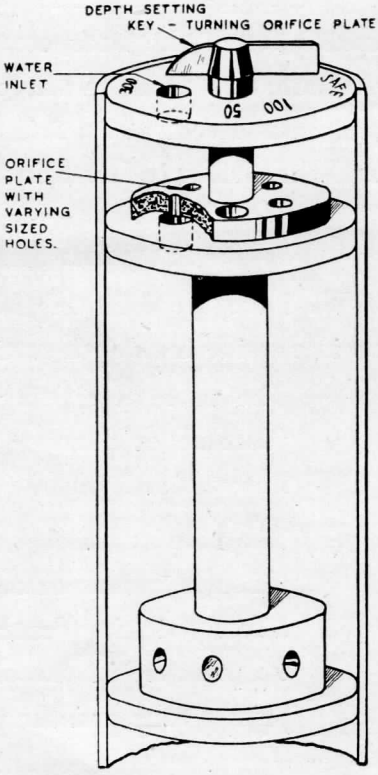
(ii) The rate at which water pressure passing through a hole or orifice of given area in a freely sinking depth charge and building up pressure in the air space between the primer tube and the pistol body, is known.

(iii) The pressure necessary to force the sleeves apart and fire the pistol is a fixed value.

We see that (i) and (iii) are fixed values and do not vary, so that the only way we can alter the

depth of firing is by altering the area—or size—of the orifice.

This is done by an orifice plate in the base of the adjuster body on the top of the pistol. This orifice plate is circular, being kept on its seating by a spring, and connected to the depth adjuster key spindle. Drilled into the orifice plate are holes of varying sizes and by revolving the adjuster key the orifice of required size is brought in line with the hole in the base of the depth adjuster body. This hole connects with the pistol-primer air space, and so admits the necessary water pressure to fire the pistol.



There are two " safe " positions in the depth adjuster. When the key is set to either of these

a solid portion of orifice plate blanks the hole in the base of the depth adjuster, and the key is locked to the adjuster body and cannot be removed.

It is therefore seen that this type of pistol is really a time pistol and if used with a depth charge that sinks more quickly than the normal type, *i.e.*, the heavy type, the pistol will fire deeper than the depth set, because the charge has sunk to a greater depth in the " time " of the pistol.

It should also be noted that a certain pressure, corresponding to a somewhat shallow depth, say 40 feet, is necessary to fire the pistol. Therefore, should the pistol be set to a depth of, say, 400 feet, and fired in 100 feet, it will sit on the bottom for a little while before firing.

Should a depth charge be released in 36 feet at low water it will not fire until the tide rises to 40 feet, assuming a 40 feet firing spring.

SAFETY GEAR

The next step is to see how the *safe* position on the pistol works.

There are two forms of safety gear at present in use :—

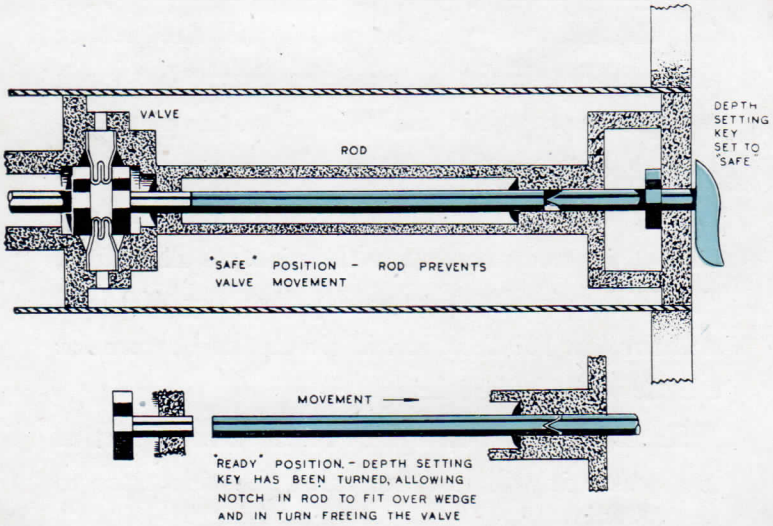
(i) Rod safety gear.

(ii) Back flooding safety gear.

Rod Safety Gear

In describing the firing gear we saw that the inner sleeve moved upwards and the outer sleeve downwards, and at the extremity of the travel the balls freed the striker, and the pistol fired.

To stop the pistol firing we therefore have a *safety rod*, which homes on top of the inner



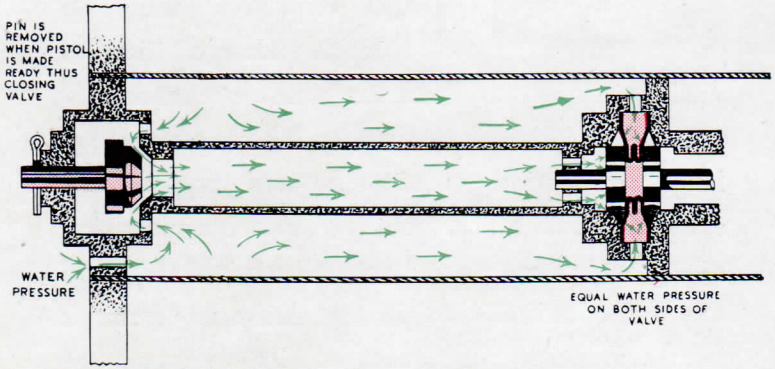
sleeve, and is kept from moving upwards when pistol is set to *safe*. When a depth is set, the safety rod is freed and allowed to move upwards.

Back Flooding Safety Gear

The pistol of a depth charge is located in one end of the primer tube, and the primer at the other. Both are screwed hard home, so as to present watertight joints at all depths.

This gives us an air space between the pistol and primer gear to which water has access through the orifice plate. It is the pressure built up in this space, which forces the two sleeves apart, to fire the pistol.

Now should a valve be fitted in the top of the pistol in such a position that it gives direct water



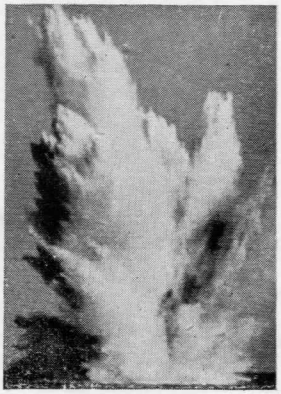
access to the inside of the pistol body, we get equal pressure on either side of the sliding sleeves, and there is no tendency for the pistol to fire.

This device is fitted in certain pistols, mainly for use from aircraft which have only one firing depth, in the space normally occupied by the depth adjuster. The valve is held off its seat by a safety clip. When the charge is dropped the safety clip is withdrawn and the valve closes and the pistol will fire normally.

CHAPTER FOUR

EXPLOSIVES AND FITTINGS

THE explosive used in depth charges is of various types, and all are what are generally termed High Explosives. They contain a large proportion of nitrogen and oxygen in a stable (or safe) state. On the sudden application of great force or heat the nitrogen and oxygen combine and instantaneously form a vast quantity of gases which expand at a very high rate and produce detonation.



This is the phenomenon we have experienced during enemy attacks from the air on surface craft.

The explosive used in a gun is a Low Explosive and is termed a propellant, as it propels the projectile.

It differs from High Explosive in that the combustion of the charge is much slower and can be regulated or controlled.

The term *Explosion*, as opposed to detonation, signifies a less virulent form of combustion than detonation.

There are three explosive units in the " explosive train " of a depth charge. They are :—

(i) The detonator fired by the pistol.

(ii) The primer.

(iii) The main explosive charge.

Before the explosive train can be initiated or detonated it is necessary to bring all three into correct relative position with each other.

The main explosive with which depth charges are filled must be such that filled charges are safe to handle, hoist inboard, stow in magazines, and load on rails and throwers, and also reasonably safe from explosion due to being struck by enemy shells, bomb fragments, etc. In fact, we have a mass of explosive which requires no tests or particular care onboard.

The next thing we have to consider is the method of " initiating " the explosion of the main charge.

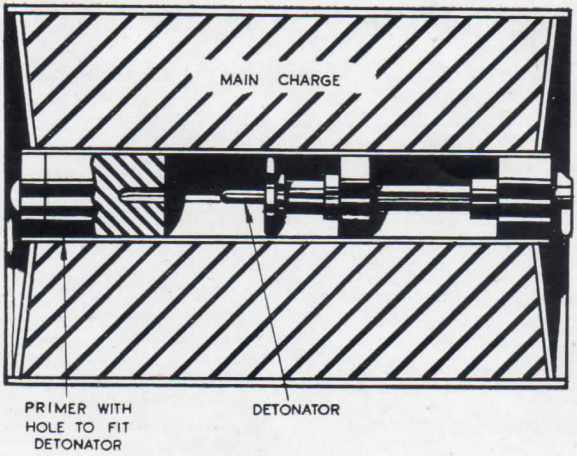
The firing mechanism of the pistol fires a " detonator." The detonator is a tube containing a small quantity of very high explosive, actually about 60 grains. It is so sensitive that dropping the detonator on the deck, or any rough usage, will set it off. Great care is therefore necessary in stowing them and in handling. Carelessness may cause the loss of an eye, hand, or foot.

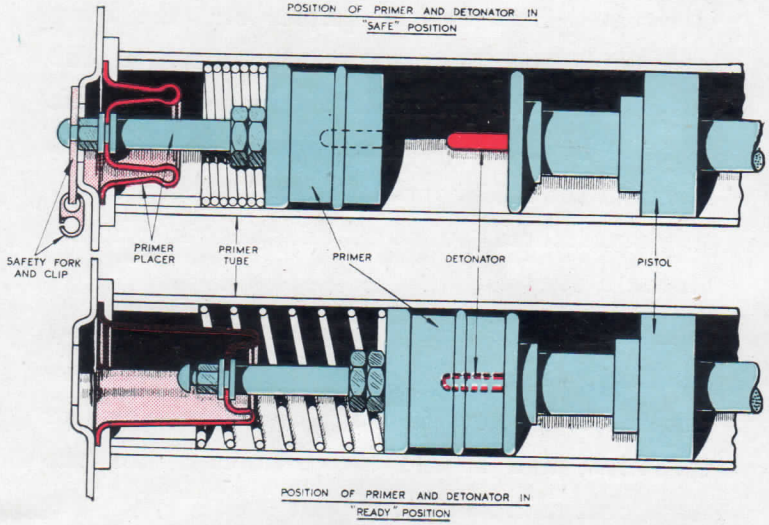
In a depth charge the detonator is secured to the pistol, and when not in the " ready " position is isolated from its primer by an air space sufficient to dissipate the force of the explosion should the detonator for any reason be accidentally fired. This prevents the main charge being detonated.

The middle charge in the initiation train is the *Primer*. This is a high explosive more sensitive than the main charge but much less sensitive than the detonator. Its weight is $1\frac{1}{4}$ lb. and it must be handled with care but is safe to reasonable rough handling.

The position of explosives in a charge on the rails, or throwers, is as shown opposite.

Should the detonator fire, its energy is dissipated harmlessly in the primer tube.


MAIN CHARGE
PRIMER WITH HOLE TO FIT DETONATOR
DETONATOR


POSITION OF PRIMER AND DETONATOR IN "SAFE" POSITION
SAFETY FORK AND CLIP
PRIMER PLACER
PRIMER TUBE
PRIMER
DETONATOR
PISTOL
POSITION OF PRIMER AND DETONATOR IN "READY" POSITION

Primer Safety Gear

The primer is kept well away from the detonator, when the charge is inboard, by the Primer Placer.

A Primer Placer consists essentially of a primer, a cylindrical brass case filled with priming composition, with an envelope in the base to house the detonator in the "ready" position, and a spindle attached to the case. This spindle, which has an annular groove in it to hold the safety fork, projects through a bung which is secured to the primer tube. A spring is situated between the primer and the bung and tends to press the primer home on the detonator. The primer is retained in the safe position by a safety fork. When the charge is released, the safety fork which is attached to the ship's structure is pulled off, and the primer homes on the detonator.

The explosive train, from the comparatively insensitive main charge to the very sensitive detonator, is now in its correct position for initiation, and should the detonator fire the main charge detonates.

The earlier form of primer safety gear was worked by hand, and consisted of a primer tube

stopper attached to the primer. This stopper could be screwed up in any position. In harbour and when minesweeping the primer was secured by the stopper well away from the detonator. On all other occasions at sea the primer was entered right home on the detonator and the stopper screwed up hard to make a watertight joint.

Primer safety gear is not fitted in aircraft depth charges.

CHAPTER FIVE

RELEASE AND DISCHARGE GEAR

DEPTH charges can be rolled over the stern or fired from throwers.

Rails

In practice they are not treated like beer barrels and rolled about, but stowed on rails which slope aft and lead to a trap. This is a simple mechanical device of rods and levers which allows depth charges to be released singly. The release traps can be operated by hydraulic gear from a distance or locally by a hand lever.

Stop bars are fitted at the forward end of the rails and abaft the trap, and between every three charges. These stop bars prevent the charges surging and taking charge in a seaway. The after bar has to be removed before releasing a charge.

The trap is locked when the ship is in harbour, and accidental release at sea is prevented by a stop pin which prevents the trap being worked.

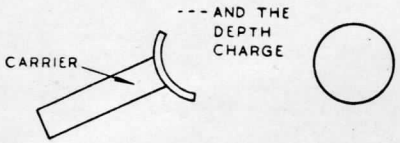
Spare charges are stowed in racks on deck and in the depth charge room.

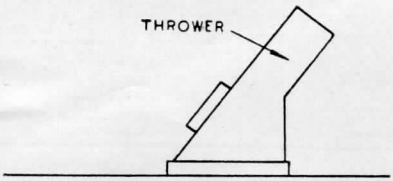
The depth charges are loaded on the rails by means of a " Parbuckle," which is a small hand winch, secured to the forward pillar of the rails, which carries two wire pendants.

Throwers

Throwers are fitted to project depth charges and are capable of throwing the charges some 50 yards from the ship.

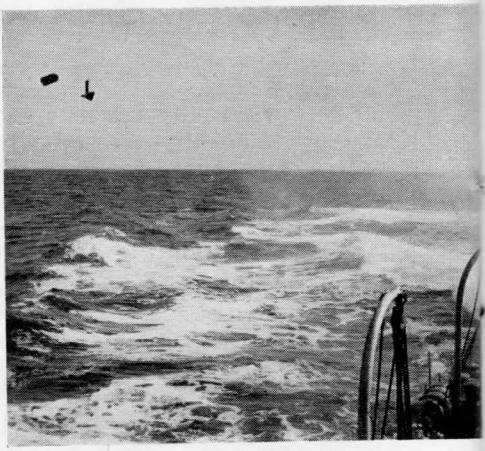
One type of thrower projects both the depth charge and carrier (or arbor) and they separate before striking the water. A carrier is thus





"ONE TYPE PROJECTS BOTH THE DEPTH CHARGE AND CARRIER TOGETHER AND THEY SEPARATE BEFORE STRIKING THE WATER"----

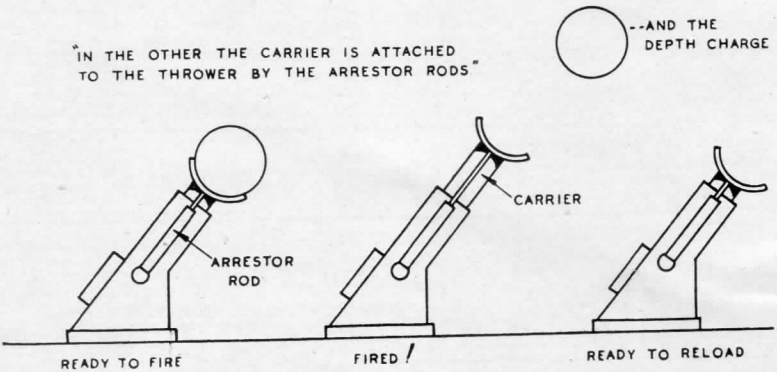
expended with every charge fired, and carrier and depth charge have to be loaded for every shot.

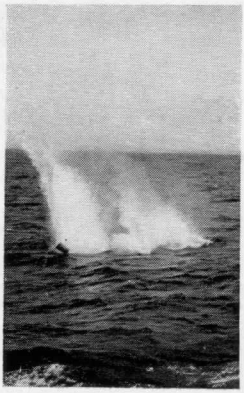


In the other and later type the carrier is attached to the thrower by "arrestor rods," so that only the depth charge is fired. The arrestor rods hold the carrier to the thrower, and the carrier falls back into the barrel of the thrower.

Quicker loading is attained by this type as only the depth charge has to be loaded.

To enable the correct depth to be set on the

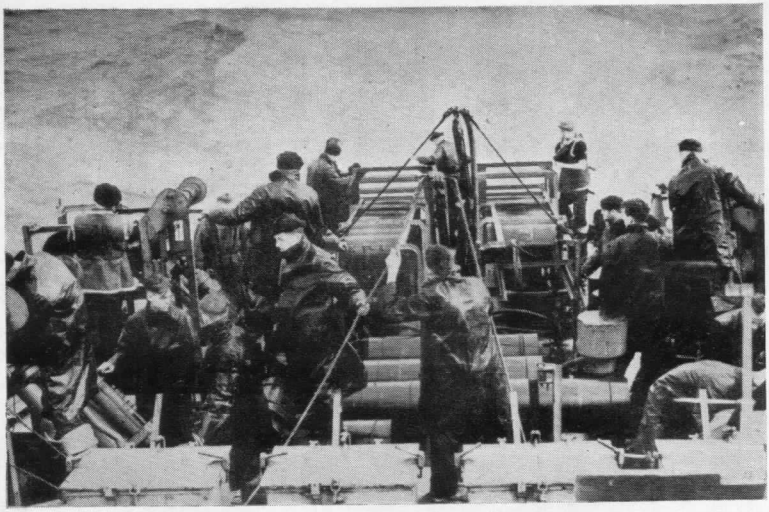




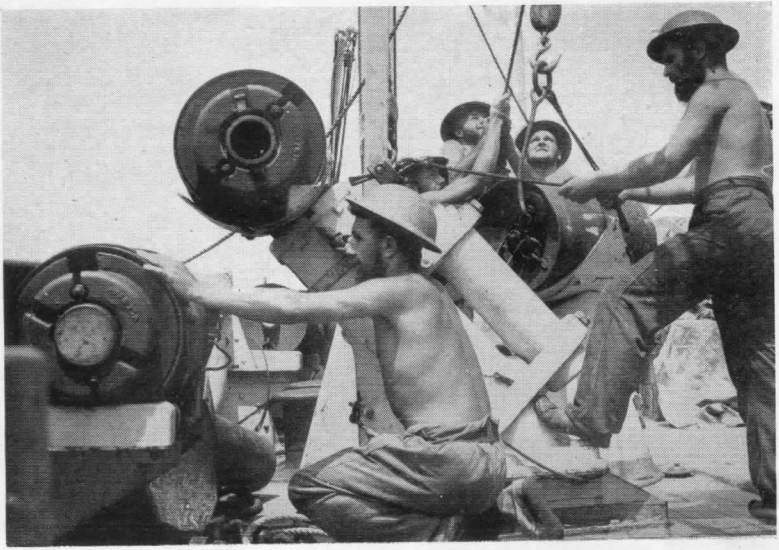
depth charge during an attack an order instrument is fitted near trap or thrower. This instrument indicates to the responsible member of the crew the correct depth to set on the depth charges at that position.

When making an attack, the object is to drop charges as close as possible to the submarine. But charges must not be dropped so close together that the detonation of one will damage another. To space the depth charges at a distance from each other so as to avoid damage to the pattern, a "Depth Charge Firing Clock" is fitted. The Clock is started on information obtained from the Asdic instruments. It then lights a lamp at each position to indicate the correct moment when the depth charge at the position should be released.

The firing number must watch the lamp and pull the release lever or firing lanyard as soon as the lamp burns. He receives no other order to fire, but has a warning buzzer which sounds a few seconds before the firing lamp burns.



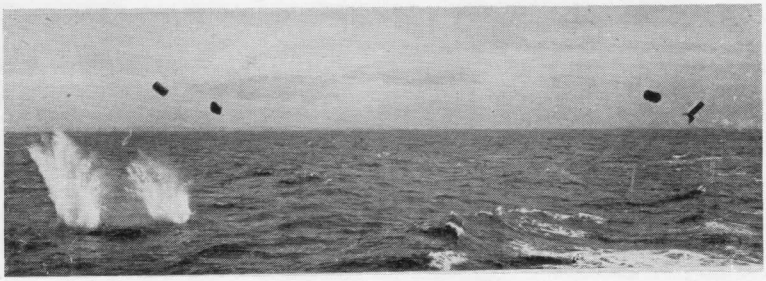
Depth Charges can be rolled over the stern . . . .



. . . . or thrown from throwers

The old arrangement . . . .

. . . . and its modern counterpart



CHAPTER SIX

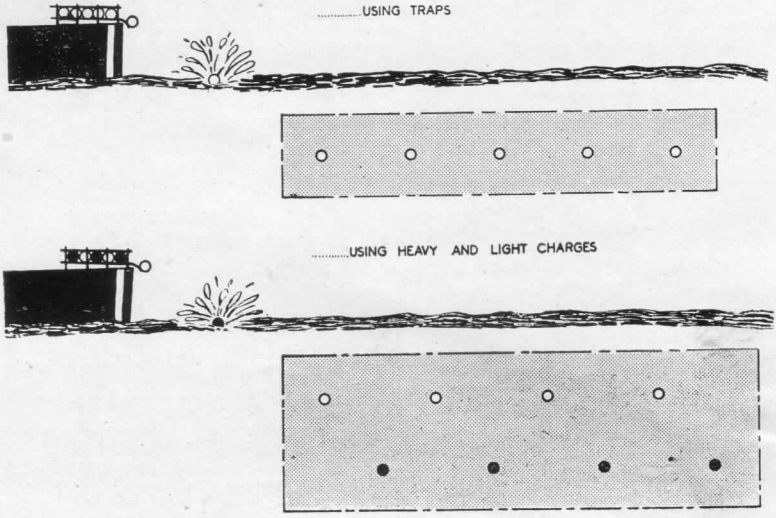
PATTERNS

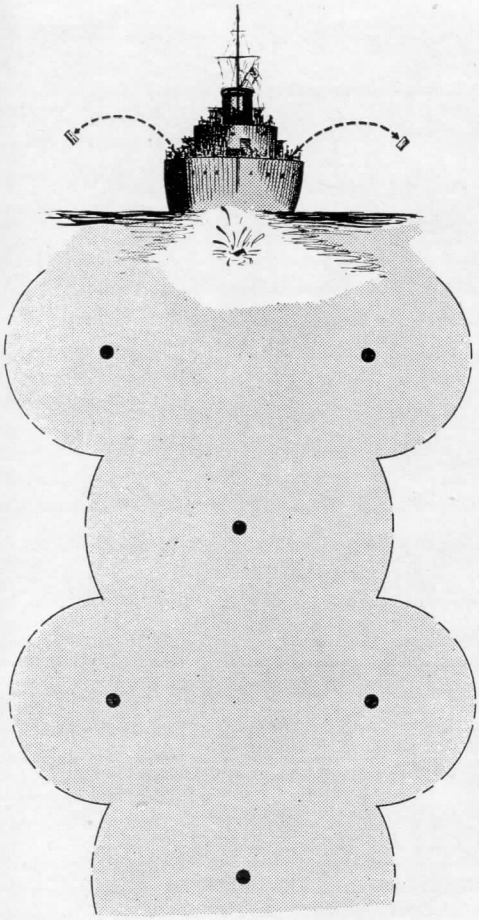
WHEN making an attack we use :—

Normal depth charges from traps and throwers.

Heavy depth charges from traps and throwers.

If we only use traps we search a rectangular area as shown.



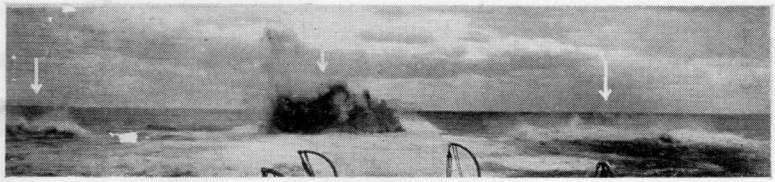


.....USING THROWERS

By using heavy and light charges we search an area of greater depth.

By using throwers we search a wider area, like this.

So what we do is to combine all four types and get as wide and deep a pattern as we can. The depth order instruments automatically give the correct depth to set on each charge, whether light or heavy, and the depth charge firing clock indicates when to fire.



CHAPTER SEVEN

DRILL

Introduction

EFFICIENCY of Depth Charge attacks depends on a well drilled Depth Charge party as much as on the skill of the Asdic team. Efficiency can be obtained only by constant and realistic practice. Valuable training can be carried out on board in the form of dummy runs. Officers and Petty Officers should exercise Depth Charge Crews at every opportunity.

The exercise will produce better results if times are taken and positions compete against each other. A lag of three seconds at 18 knots will produce an error of 30 yards sufficient to ruin an otherwise perfect attack. A seemingly trivial mistake in drill can cause delays of more than one second; it is, therefore, essential that the drill be carried out correctly to the smallest detail.

The O.O.Q. or Petty Officer detailed for training of the Depth Charge Crews should frequently ask himself the following questions, and each man should ask himself those questions which apply to himself :—

(i) Can the closing up of the Depth Charge Crews be speeded up ?

(ii) Are the communication numbers passing the orders clearly, and are the proper reports being made ?

(iii) Were the ordered depths set correctly ?

(iv) Were all possible preparations made for reloading ?

(v) Were the pistols and primers tightened up as much as possible ?

(vi) Was a hand spike ready to hand at the

rails to clear any charge which failed to roll ?

Control Systems

There are two main Depth Charge Control Systems fitted to H.M. ships.

(i) Ships fitted with Depth Charge Firing Clocks and Mk. II or IV Throwers. In this case the firing number fires or releases the Depth Charge on seeing a lamp burn at the Depth Charge position. The buzzer is only used as a warning and is sounded for three seconds at the " Stand-by " only. In the near future electro-hydraulic release gear will be fitted to ships and the Depth Charge Firing Clocks will be made to release a pattern of Depth Charge automatically.

(ii) In ships not fitted with Depth Charge Firing Clocks, the buzzer is the main communication and is sounded from the bridge as the executive order to fire one or more charges, but for no other purpose. Firing numbers fire or release their charges on hearing the buzzer.

Loading Rails

Loading Throwers

Duties of the Crew

The main duties of the Depth Charge Crews are as follows :—

RAILS

(i) *O.O.Q.* in charge of the Depth Charge armament gives all orders on the Quarterdeck ; checks the Depth Setting as far as possible. He is supplied with a whistle and stop watch so as to be ready to take over the firing of a pattern if communications with the bridge fail. During reloading he superintends all reloading operations.

(ii) *No.* 1 *of the Rails* is the firing and depth setting number. On closing up removes pistol covers and sets depth ordered. Sees that safety pin is free for withdrawing, and reports position ready and depth set to O.O.Q. On the order " Stand-by " removes adjuster key from Depth Charge and withdraws safety pin from trap. Reports " Pin Out " and stands by to pull release lever when buzzer sounds or light burns. During reloading, removes second stop bar. Removes pistol covers and stands by to set depths ordered.

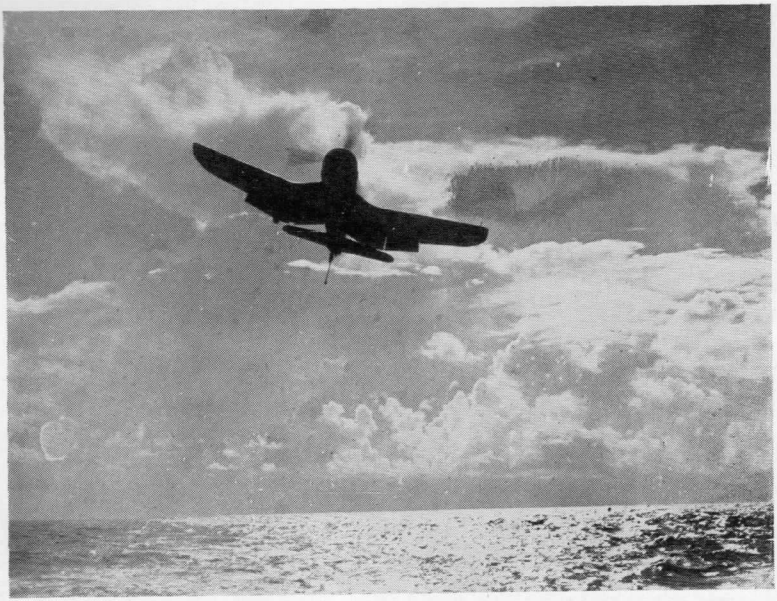
(iii) *No.* 2 *of the Rails* is the primer number. Secures primer in armed position or connects up Inglefield Clips when primer safety gear is used.

He sees that charges are free to roll, assists No. 1 in setting depths ordered. Clears any charges which fail to roll. When reloading, rolls down three charges, easing gently on to trap.

MARK II THROWERS

(i) *No. 1 of the Thrower* is Captain of Thrower, depth setter and firing number. On closing up, removes pistol cover and sets depth ordered. Sees safety pin is free for withdrawing and reports position ready to O.O.Q. When " Stand-by " is given, he removes adjuster key, withdraws safety pin and reports " Pin Out " to O.O.Q. Then stands by to withdraw firing wedge when buzzer sounds or light burns. When reloading, he removes breech block, inserts cartridge, replaces breech block and screws up, inserts wedge and safety pin and stands by to set depth ordered. He then reports position reloaded.

(ii) *No. 2 of the Thrower* is loading and primer number. On closing up, he helps No. 3 to cast off securing wires and manhandle carrier from stowage position at base of Thrower. When reloading, helps No. 3 to lift and place carrier in Thrower, secures primer in armed position or connects up Inglefield Clips when primer safety gear is used.



(iii) *No.* 3 *of the Thrower* is loading number. Assists No. 2 to cast off securing wires and manhandle carrier from stowage position to position on deck at base of Thrower. When reloading, he assists No. 3 to lift and place carrier in Thrower. He assists Nos. 2 and 4 to hoist Charges into Thrower. Then passes and secures lashings if required.

(iv) *No.* 4 *of the Thrower* is loading and slings and tackle number. On closing up, overhauls loading tackle and hooks on to spare charge. When reloading, assists Nos. 2 and 3 to hoist

charge into Thrower, secure block and tackle to ship's structure in rear of Thrower. Assists No. 3 on completion.

(v) *No. 5 of the Thrower* is additional loading number. When reloading assists Nos. 2, 3 and 4 as necessary.

MARK IV THROWERS

(i) *No. 1 of the Thrower* is Captain of the Thrower and firing number. On closing up, he sees safety pin is free for withdrawing. Then reports position ready and depth set to O.O.Q. When " Stand-by " is given, on receiving adjuster key from No. 3, withdraws safety pin, grasps wedge handle and reports " Pin Out," stands by to fire when firing buzzer sounds or light burns, depending on the type of control system fitted. When reloading, removes breech block, inserts cartridge, replaces breech block and screws up. Inserts wedge and safety pin, and reports position reloaded.

(ii) *No. 2 of the Thrower* is the loading and primer number. When reloading, he forces back carrier if necessary. He then assists No. 3 to launch charge from rack into carrier, and secures primer in armed position or connects up Inglefield Clips when primer placer gear is used. He

then assists Nos. 3 and 4 to hoist charge into " Stand-by " position on rack.

(iii) *No. 3 of the Thrower* is the depth setting and loading number. On closing up, No. 3 removes pistol cover, sets depth ordered. When " Stand-by " is given he removes adjuster key and hands it to No. 1. When reloading, assists No. 2 to launch charge from rack into carrier and secures release strop. Stands by to set depths ordered.

(iv) *No. 4 of the Thrower* is the loading number. When reloading, he secures release strops, hooks up parbuckling gear ready to hoist next charge into " Stand-by " position in rack.

(v) *No. 5 of the Thrower* is the additional loading number, assists loading as necessary.

Note.—In the event of a cartridge falling into the open breech of a Mark II Thrower, the cartridge will be blown up enough for No. 1 to get hold of it when the new carrier is loaded into the Thrower by Nos. 2 and 3.

If this occurs with a Mark IV Thrower, Nos. 2 and 3 should lift the carrier and push it home as quickly as possible, thereby causing a pumping

motion which will blow out the cartridge far enough for No. 1 to get hold of it.

Cruising Watches

The duties just described are carried out by the Action Crews. When the ship is cruising at sea, there is a Depth Charge Party of the Cruising Watch, and this Party must be able to fire a pattern at short notice. When Action Alarm is sounded and the Action Depth Charge Crew are ordered to close up, they are not to take over from the Depth Charge Party of the Cruising Watch until the first pattern has been fired, unless specifically ordered by the bridge. This is to prevent confusion with consequent failures to fire or release charges.

SAFETY

The depth charge is intended to kill the enemy and not the user. To this end, there have been incorporated in the design of the modern depth charge, with its pistol and primer gear, several safety features. But good design cannot alone ensure absolute safety. The weapon must be handled in a reasonably intelligent way. The correct way to fit and handle a depth charge (or any weapon) is laid down in the drill. The correct