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FIELD ENGINEERING (ALL ARMS)

MILITARY TRAINING PAMPHLET No. 30

PART VI: DEMOLITIONS

1945

Prepared under the direction of
The Chief of the Imperial General Staff

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21579

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LIST OF FIGURES IN TEXT

DISTRIBUTION

RE	Scale B
RA, Inf (incl motor and MG units), Recce and Pioneer units	" B
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GLOSSARY OF TECHNICAL TERMS USED IN DEMOLITION WORK

Blind. Ammunition which has failed to explode. Applied to projectiles, grenades, demolition charges.

Charge. The term used to indicate a quantity of explosive used in a demolition. Also used to indicate the quantity of propellant in a cartridge when applied to projectiles.

Combustion. A rapid process of burning. Applied to *low explosives*. *See* Sec 3, para 1.

Crimping. The method of fastening one object to another by squeezing with fluted pliers. Applied particularly to fixing detonators on to safety fuze.

Detonation. The process whereby a *high explosive* (HE) is converted in a minute fraction of a second into a volume of gas at very high temperature and pressure. The detonating wave travels through materials at speeds up to 200 miles a minute. *See* Sec **3**, para 1.
NOT a form of burning. *See Combustion.*

Explosion. Literally the rapid *combustion* or burning which takes place in *low explosives*. Also applied loosely to *detonation* which only takes place in *high explosives*.

Firing. The process whereby an explosive train is initiated and the HE charge finally detonated. *See Initiation* and Sec **3**, para 1 (last sub-para).

Fuze. Applied to two different types of equipment :—

(*a*) A ready-made continuous train of explosive contained in a fabric tube and capable of being cut into appropriate lengths. *See Safety Fuze, Instantaneous Fuze* and *Detonating Fuze*, in text (Sec **5**).

(*b*) The component in any round of ammunition that initiates the explosive train, by a combination of mechanical and explosive devices.

Igniter. Any device used to initiate safety fuze. Also loosely used to denote the initiating device in mines or grenades.

Initiation. Literally the process of "starting" an explosive action. Applied either to the *detonation* of *HE* or the ignition of safety fuze, etc., *e.g.*, safety fuze may be "initiated" (or "ignited") by an igniter, detonating fuze "initiated" by a detonator and a charge "initiated" by a primer.

Ring Main. A circuit of detonating fuze used when it is desired to initiate several charges simultaneously. *See* Sec **5**, para 5, sub-para (*e*).

T[illegible]ng. The use of earth or sandbags around a charge to reduce waste of explosive effort.

MILITARY TRAINING PAMPHLET No. 30

FIELD ENGINEERING

(ALL ARMS)

PART VI

DEMOLITIONS, 1945

CHAPTER 1

GENERAL

SECTION 1.—INTRODUCTION—SCOPE OF PAMPHLET

1. This pamphlet is intended to assist in the training of arms other than the RE in the elementary use of the explosives with which they are issued or to which they may have access. For this reason the scope is limited, and if demolition tasks which are outside this scope are allotted to other arms, engineer advice should be sought.

2. Engineer officers and NCOs, who are concerned with the demolition training of other arms, will notice that at certain points the demolition practice laid down in this pamphlet differs slightly from that in Military Engineering, Volume IV, Part I (1942), *e.g.*, the use of the clove hitch on cordtex connections. The reason for this is that it is not envisaged that other arms will normally be concerned with anything but hasty demolitions which will be blown as soon as the charges are prepared or very shortly afterwards. For this reason the standard engineer technique can be simplified.

SECTION 2.—SUPPLY OF EXPLOSIVES IN THE FIELD

1. Explosives are an ordnance supply obtained in the field from the supply companies, RASC, who carry them on standard-loaded explosive lorries. Demands are submitted through "Q" channels as for ammunition. Table I shows the present G.1098 holding of an infantry pioneer platoon. CE/TNT demolition slabs, wet gun-cotton or explosive "808" may be issued for demolition purposes in lieu of 75 grenades in an emergency.

TABLE 1.—SCALE OF EXPLOSIVES CARRIED BY INFANTRY PIONEER PLATOON

NOTE.—This table is correct at time of going to press. Variations are made to the scales from time to time, but it is not proposed constantly to amend the table.

Grenades, No. 75	108		
Fuze, safety, Mk 2	292		
Igniters, safety fuze, percussion	20		
Igniters, safety fuze, striking	1		
Matches, fuzee	12		
Detonators, No. 27, Mk 1	100		
Detonating fuze (primacord or cordtex)	2,000	ft	
Primers, 1-oz CE	120		
Tape, adhesive, 1-in	8	rolls	
Tubes, fuze, sealing	100		
Compound, sealing	1	tin	
Crimpers	2	pairs	
Twine, seaming medium, natural	2	skeins	
Torpedoes, bangalore, 1¼-in (6 ft lengths)	24		(8 sets
Torpedoes, bangalore, noses	2		of 4)

CHAPTER 2

EXPLOSIVES

SECTION 3.—THEORY OF EXPLOSIVES

1. Low and high explosives.—Low explosives are made of a mixture of substances which when ignited will *burn* extremely fast, producing as they do so a volume of gas at high temperature and pressure which expands very rapidly and tends to remove any solid obstacle in its path. This process is known as *combustion*. Low explosives have a high content of oxygen and they do not therefore require air for combustion, like wood or coal. Gunpowder or cordite are examples of this type of explosive; cordite is used mainly as a propellant charge for shells, bullets, etc., gunpowder as an igniting agent for propellant charges and also as a delay train in fuzes, *e.g.*, safety fuze.

High explosives (HE) are composed of some chemically unstable substance which can be *detonated* by friction, shock, or heat. Detonation is the practically instantaneous conversion of the entire substance into gas and is carried through its bulk by a detonation or shock wave which travels at a speed of about 200 miles a minute. This is a far more rapid process than the combustion of low explosives, and the effect produced is a very violent shattering blow in addition to the pushing effect of the gases produced. Thus a pound of TNT (which is a high explosive) *detonated* in contact with a steel rail will produce a blow strong enough to cut the rail, while any quantity of gunpowder similarly placed and *ignited* will not cut the rail though it may lift it and propel it for a considerable distance.

An HE shell is propelled from a gun by a low explosive charge of Cordite. When it strikes the target the high explosive charge carried in the shell is detonated by a fuze and shatters the steel casing.

All service bulk explosives used in demolitions are high explosives but their contents are stabilized so that a very considerable shock is required to detonate them. In practice they are detonated by a primer which is a small, more sensitive charge, itself requiring to be initiated by a detonator or detonating fuze. (See Sec 5.) Thus, the initiation of an HE charge may be compared to the lighting of a coal fire, with the paper corresponding to the detonator, the wood to the primer, the coal to the charge.

High explosives will burn slowly in an unconfined space, if in small quantities. If set alight in a confined space or in large quantities they will probably eventually detonate.

Details of the explosives likely to be used by arms other than RE are given in Sec 4.

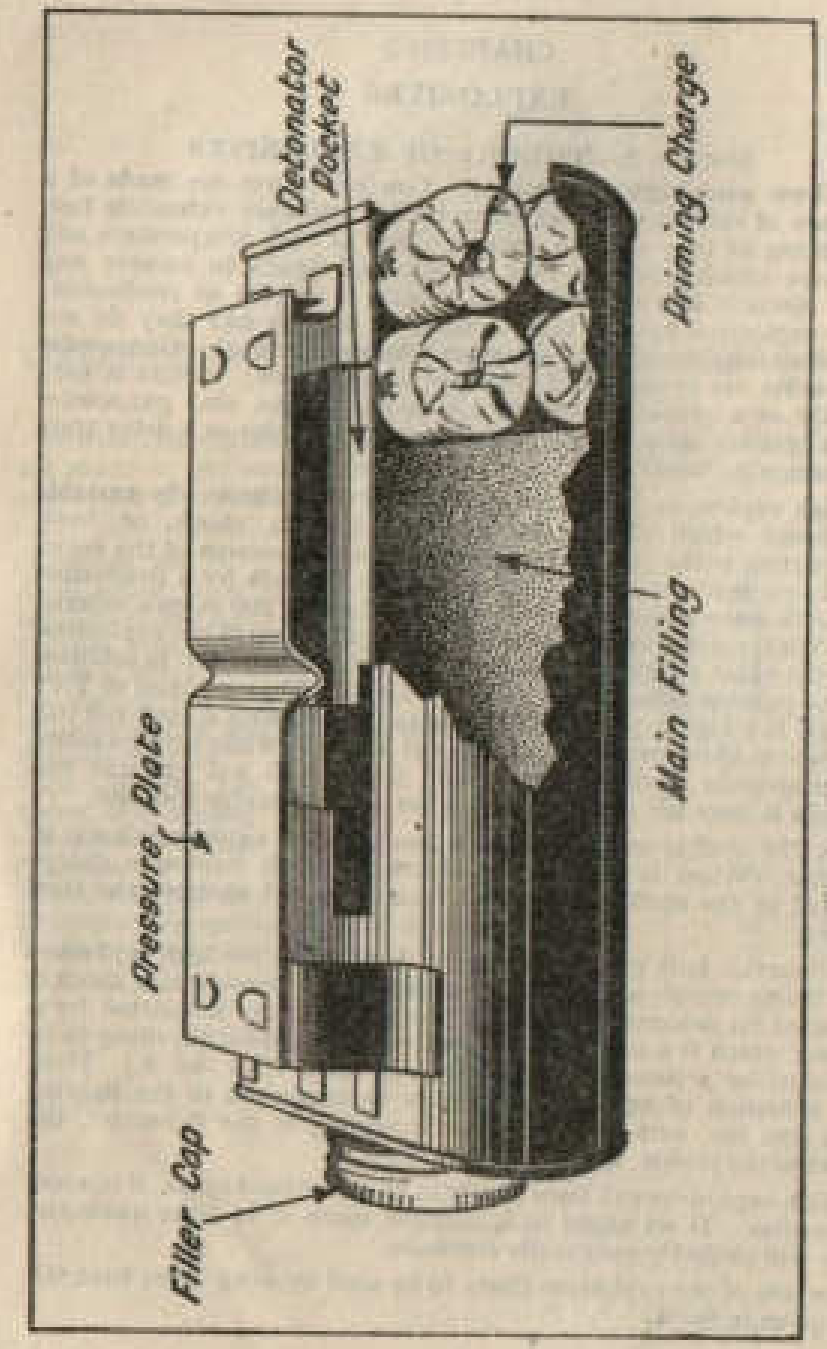

Fig. 1. 75 grenade Mark 1, sectional view

Section 4.—SERVICE BULK EXPLOSIVES (likely to be available to arms other than RE)

1. No. 75 grenade (*See* Fig 1)

(*a*) *Description.*—This is a screw cap metal container filled with 1¼ lb of HE with a special primer inside the container at the opposite end to the screw cap (*see* Fig 1). On top of the container is a pressure plate with special pockets underneath for the detonator and igniter sets used when the grenade is employed as an anti-tank mine (*see* Military Training Pamphlet 40, Part I). Twelve grenades are packed in a tin box with 24 detonator and igniter assemblies.

75 grenades do not readily deteriorate in temperate climates. In a tropical climate deterioration is more rapid. The grenade measures 7 ins by 3¼ ins by 2 ins and weighs 3 lb.

The Mk 2 grenade should be used exactly as the Mk 1 in demolition work.

The grenade is the demolition charge which will be mainly used by arms other than the RE. The other bulk explosives described below may be issued as replacements.

(*b*) *Initiation.*—The grenade will be initiated by wrapping three turns of detonating fuze (*see* Sec 5) round the end containing the primer, as shown in Fig 6. It is NOT to be detonated by the igniter set supplied for use when it is employed as an anti-tank mine. If an attempt is made to initiate it with detonator and safety fuze or detonating fuze in one of the normal detonator holes, failures up to 50 per cent may result. There are two reasons for this. First, when the detonator is fired by the igniter set (*i.e.* when in use as an anti-tank mine), the pressure on the plate tends to press the detonator down on to the priming charge. This does not occur when the grenade is used as a demolition charge. Secondly, the safety fuze may contract in length as it burns and draw the detonator back so that it is not directly over the priming charge when it explodes.

2. Demolition Slab. CE/TNT

(*a*) *Description.*—This is a millboard container measuring 4½ ins by 2½ ins by 1¼ ins filled with a yellow high explosive. The total weight is 1 lb. It has two holes for the special 1-centimetre primer, which will not be issued with the slab when it is used by arms other than the RE. Fourteen slabs are packed in a wooden box or a guncotton tin box (*see* para 3 below). The slab has excellent keeping qualities in all climates, and is not affected by moisture.

(b) *Initiation.*—The slab is satisfactorily initiated with a 1 oz. primer lashed on as shown in Fig 4.

3. Guncotton (wet) slab

(a) *Description.*—This slab is composed of a fibrous substance, dirty white in colour, measuring 6 ins by 3 ins by 1½ ins, weighing 19 ozs in all. This includes 3 ozs of water, which is the correct water content. Fourteen slabs are packed in a sealed tin box inside a wooden crate. In temperate climates guncotton is very stable and safe to use, *provided* the water content is kept correct. This can only be done by keeping the tin sealed until the slabs are to be used. If allowed to absorb too much water (from the air or in other ways) the slabs will become inert and useless. In hot, dry weather the slabs tend to lose their water content and become flaky. In this condition they are dangerous to use, and they are therefore not suitable for use in very hot climates. In very cold weather the water in these slabs will freeze, and the slabs will stick together in the tin, being dangerous and difficult, if not impossible, to extract.

(b) *Initiation.*—The slab has a tapered hole to take the normal 1-oz primer, *see* Sec 5, para 1, and will *always* be initiated by this primer.

4. Explosive "808" (plastic)

(a) *Description.*—This explosive is issued in 4-oz cartridges 3 ins long by 1¼ ins in diameter, wrapped in paper. The cartridge is light blue in colour and plastic like plasticine. 5 lbs are packed in a cardboard box and four boxes are packed in a wooden box approximately the same size as the guncotton crate. "808" is a very stable high explosive with a wide range of uses. It has good keeping qualities in cold or temperate climates, but is affected *slowly* by moist tropical heat. It can be used under water. It is very inflammable and may be set alight by small arms fire. If the cartridges are handled with the bare hands they may cause a temporary headache. They should not therefore be unwrapped. Earlier issues of "808" were not plastic but rubbery in composition and were coloured yellow, green or purple. This form is not so easily handled and is no longer being made.

(b) *Initiation.*—"808" will always be initiated by a 1-oz primer, which should be lashed firmly to the end of one cartridge in the centre of the charge.

5. General.—The following points should be noted with regard to service high explosives.

(a) They are perfectly safe to handle so long as normal care is exercised as with ammunition.

(b) Weight for weight all service bulk explosives already described may be taken as having the same power, the 75 grenade being taken as the equivalent of one CE/TNT or guncotton slab or 4 cartridges of "808".

(c) For cutting charges (*see* Sec 8) on uneven surfaces use plastic "808" if available as this explosive can be moulded against the surface to be cut. For examples *see* Secs **8**, **9**, and **10**.

(d) For charges to be fired under water or in damp situations avoid using guncotton except in unbroken sealed tins, unless it is to be fired immediately. Explosive "808", CE/TNT slabs or 75 grenades can be fired under water without the charge being waterproofed so long as the firing arrangements are waterproofed. *See* Sec **6**.

(e) A rifle bullet striking a charge of guncotton, CE/TNT or "808" will probably not detonate it, but there is a strong chance that "808" will be set on fire. A 75 grenade may detonate if a bullet hits the end containing the primer.

Primers (*see* Sec **5**, para 1) may be set on fire or detonated by a rifle bullet.

Section 5.—FIRING ACCESSORIES

1. Primers.—Owing to the insensitivity of all British service explosives they require a small charge of a more sensitive explosive to detonate them. This charge is known as a primer, and itself requires to be initiated by a standard detonator (*see* para 2) or detonating fuze (*see* para 5). In certain made-up charges, such as the 75 grenade, special primers are incorporated, and such charges do not require one of the primers described below in addition.

Two types of primer are generally used:—

(a) *CE primer.*—This is a tapered 1-oz "cylinder" of Composition Exploding encased in a waxed paper covering, which will fit into the hole in a guncotton slab. It has an axial hole to take a service detonator. The waxed paper covering, so long as it is kept intact, makes this primer waterproof.

(b) *1-oz dry guncotton primer.*—This is the same size and has the same general appearance as the CE primer but is composed of dry guncotton coated in acetone to make it waterproof. This acetone covering is very easily chipped and broken, and if this occurs moisture will get into the primer and make it inert. For this reason CE primers should be used in preference to guncotton primers where possible.

(c) *General.*—Both types of primers are normally packed 10 in a tin or cardboard cylinder, and 6 cylinders in a wooden box. Primers are considerably more sensitive to shock than bulk HE, but at the same time they are perfectly safe to handle if reasonable care is exercised. As already noted they may be set on fire or detonated by a rifle bullet.

NOTE.—For fixing and initiation of primers *see* Figs 3 and 4.

2. Detonators.—The standard service detonator is the No. 27 Mk 1, which is used for initiating service primers and detonating fuzes. It consists of a small metal tube 1¼ ins long, closed at one end, and will fit into the axial hole in the service primers described above. The tube is half filled with sensitive HE which will detonate when initiated by safety fuze or instantaneous fuze. No. 27 detonators are packed in special tins, 25 in a tin. The tins may also contain a rectifier, which is a small wooden tool used for increasing slightly the size of the hole in Mk I guncotton primers when the detonator will not fit. It is unlikely that there are any of these primers still in operational use.

No. 8 commercial detonators may be issued in lieu of the service No. 27, and have identical properties. Commercial detonators are packed in sawdust, 100 in a square tin. Care must be taken to empty sawdust from the detonator before using.

When inserted into the primer the closed end of the detonator should be about ¼ in short of the far end of the axial hole, the object being to get the filling of the detonator in the centre of the primer. It is IMPORTANT that the detonator should not protrude on the far side of the primer. This may cause failure.

Occasionally detonators are extremely sensitive and may detonate even if dropped on hard ground. They should be treated therefore with care. In particular NEVER APPLY PRESSURE TO THE SEALED END OR POKE THE FILLING WITH ANYTHING HARD SUCH AS A PIN OR MATCH STICK. The explosion of a detonator in a man's hand is sufficient to blow off several fingers.

Fig 2. Safety fuze, No. 27 detonator and 1 oz. primer

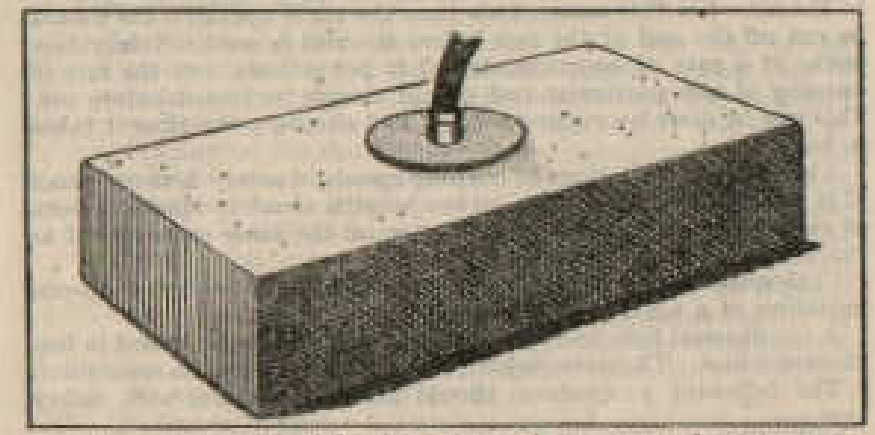

Fig 3. Gun-cotton slab with primer, detonator and safety fuze

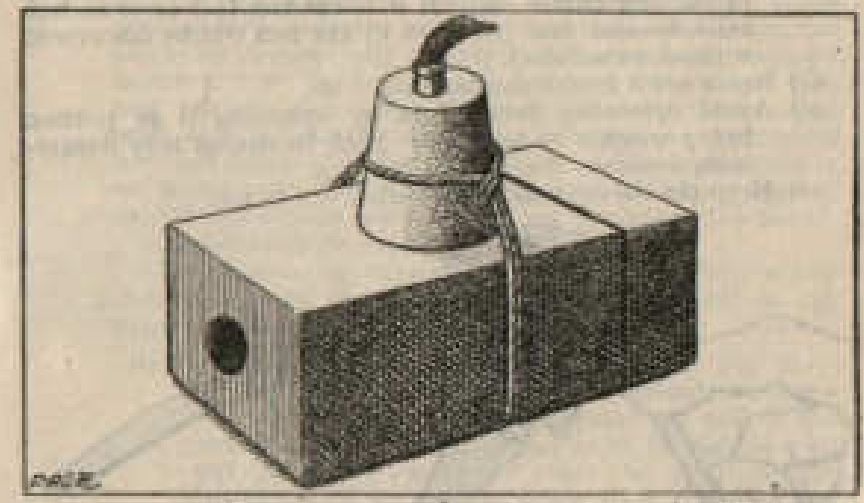

Fig 4. CE/TNT slab with primer, detonator and safety fuze

For special notes on storage of detonators *see* Sec 7. Fig 2 shows the normal method of initiating the detonator with safety fuze. This is fully described in para 4 below.

3. Safety fuze.—The standard British service safety fuze No. 11 Mk 1 has a black gunpowder core in a black waterproof cover. The fuze is packed 48 ft in a sealed circular tin. If the sealing of the tin is found to have been broken the fuze should be treated with suspicion as it may have been affected by damp. The gunpowder core is extremely susceptible to damp and quickly becomes useless if exposed

to the air. For this reason each time the tin is opened 6 ins should be cut off the end of the reel before the reel is used. Safety fuze burns at a rate of approximately 2 ft per minute, but the rate of burning of any particular reel should always be tested before use. This can be done by cutting off 1 ft and checking the time it takes to burn.

Although the variations in burning speeds of safety fuze are small (2 ft per minute ±7 seconds), no two lengths of safety fuze ever burn at *exactly* the same speed even if taken off the same reel and cut as exactly to length as possible.

Consequently safety fuze should NOT be used for the simultaneous initiation of a number of charges.

A commercial fuze known as "Blue Sump" may be issued in lieu of service fuze. The cover is blue, but its other properties are similar.

The following precautions should always be taken with safety fuze :—

(*a*) ALWAYS cut off and test a short length of fuze for rate of burning before use. If it burns too fast or is in fact *instantaneous fuze* (*see* para 6) the fact will be discovered without an accident.

(*b*) Never use a length shorter than 6 ins.

(*c*) Avoid deforming safety fuze by squeezing it or putting heavy weights on top of it. Such treatment may dangerously increase the rate of burning.

(*d*) Keep the tin shut and sealed when not in use.

Fig 5. Crimping Pliers
Inset shows method of crimping detonator on to safety fuze

4. Use of safety fuze

(*a*) *Inserting safety fuze into detonator.*—Cut one end of the fuze with a *sharp* knife on a hard surface, taking care to make a clean cut; take a detonator from the box and empty any sawdust or other foreign matter out of it by tapping on the thumbnail. Insert the squared end of the safety fuze into the detonator and push it gently but firmly as far as it will go. Do NOT employ any screwing action. Hold the safety fuze between the third finger and thumb and crimp the detonator on to the fuze near the open end with a pair of crimping pliers, holding the detonator in place with the forefinger while doing so (*see* Fig 6); or use the marlin spike of a jack knife. The use of the teeth is not recommended. NEVER CRIMP THE DETONATOR NEAR THE CLOSED END.

(*b*) *Igniting safety fuze.*—Safety fuze can be ignited with ordinary matches, matches fuzee (a special demolition store), or one of the types of igniter described below. When igniting with ordinary matches or matches fuzee, cut the end to be lit diagonally (*see* Fig 2). Then, if using ordinary matches, bury the head of the match in the exposed core and rub the box along the match head. When using matches fuzee, simply light the match head in the normal way and apply it to the core. Where safety fuze is not to be lit for some time after the charge has been prepared special precautions against damp must be taken (*see* Sec 6).

Matches must be kept dry at all times.

The following igniters may be used for lighting safety fuze. For both igniters the end to be lit should be cut square, and inserted as far in as it will go.

(i) *Igniter, safety fuze, percussion Mk* 3 (*see* Fig 6).—Crimp the small brass tube which extends from one end of the igniter on to the square-cut end of the safety fuze. When the fuze is to be lighted pull out the safety pin at the other end of the igniter by means of the ring attached to it. Pulling out the safety pin releases the striker which fires the cap and ignites the safety fuze.

These igniters are issued packed in sealed tins of 10. The caps are easily damaged by damp, so that tins should not be unsealed until the igniters are to be used. Always use up all the igniters in one tin before opening another. Keep the tin shut when not in use.

(ii) *Igniter, safety fuze, striking.*—This is a small copper cap with some match composition at the end;

25 are packed in a small tin. This cap is crimped over the end of the safety fuze, which is cut square. To light the safety fuze rub the match composition along the outside of a safety match box or special brassard. These igniters are also very susceptible to damp, the composition on the end being similar to that on a safety match. Therefore keep the tin shut and use up one tin before opening another.

NOTE.—In addition to the igniters described above, the pull switch described in Military Training Pamphlet No. 40, Part I, may be used for igniting safety fuze, *but only in emergency*, as up to 25 per cent failures may be expected. It is crimped onto the fuze in the same way as the percussion igniter.

(iii) *Safety precautions when using igniters.* NEVER use less than 6 ins of safety fuze. Always crimp the igniter *firmly* on to the fuze.

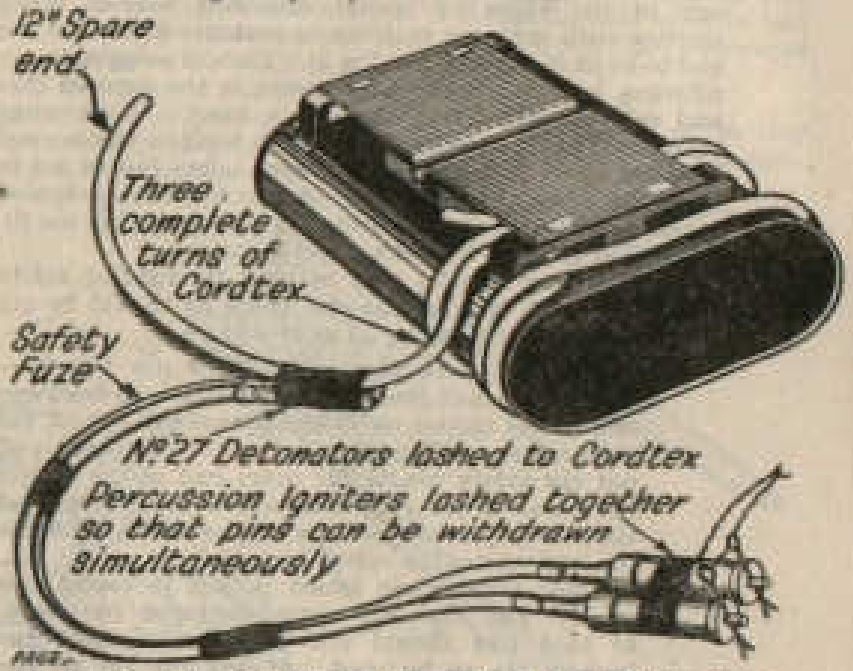

Fig 6. No. 75 grenade prepared as a demolition charge

(*f*) *Initiation of charges with safety fuze and detonators.*—There are several common causes of failure with a safety fuze and detonator initiating set. These are:—

Failures at the detonator end of the safety fuze, caused by:—

(i) The end of the fuze being roughly cut, resulting in either the gunpowder core being spilled out of the end, or the covering being frayed and blocking the "spit" of flame from the fuze on to the detonator.

(ii) The end of the fuze being damp, resulting in the fizzling out of the gunpowder core. This may be caused by the end of the fuze being damp to start with, or by the detonator containing a few drops of moisture which damp the end of the fuze after insertion, or by the fuze becoming damp after assembly through lack of protection.

(iii) The end of the fuze not being hard up against the filling of the detonator, either because it was not pushed home originally, or because it has been pulled back slightly after poor crimping, or because of failure to remove sawdust or other foreign material from the detonator.

Failures at the igniting end of the safety fuze, caused by:—

(iv) The end of the fuze being damaged as in (i) above.

(v) The end of the fuze being damp when inserted into the igniter or becoming damp after insertion, as in (ii) above.

(vi) The fuze not being hard up against the cap as in (iii) above.

All these failures can be avoided by taking particular care:—

To use dry stores.

To make up the sets, in accordance with para 4 (*a*), using a sharp knife, cutting on a firm surface, etc.

To protect the sets from rough handling and damp after assembly.

All ranks concerned must understand the possible causes of failure and must also realize that however much care is taken, no initiating set can ever be guaranteed as 100 per cent certain. The set cannot be tested, as the only test is to fire it. Consequently on all important demolition work, particularly assault work, and preferably *always*, TWO INITIATING SETS SHOULD BE USED. This gives a reasonable guarantee against failure. The use of two sets, whatever the importance of the job, is a good habit to form (*see* Fig 6).

It must be realized that a successful demolition depends primarily on successful initiation of the detonators, and that the safety fuze is the weakest link in the chain.

It is emphasized again that damp is the chief enemy.

5. **Detonating fuze.**—Safety fuze is unsuitable for setting off several charges simultaneously (*see* para 3 (*a*)), or for a charge which is remote from the firing point, owing to the very long lengths which would be required and the time involved. In such cases therefore detonating fuze is employed. The speed of detonation of this fuze is approximately 200 miles per minute. Detonating fuze is described in sub-para (*a*) below. British detonating fuze is known as Cordtex.

(*a*) *Description.*—Cordtex is a white flexible cord about ¼ in in diameter with a high explosive core. It will fit into a detonator. The explosive core is a white powder.

Cordtex is supplied on wooden reels carrying 500 ft. The covering of the fuze is waterproof, but the core is rendered insensitive by damp which may enter through the end. For this reason 12 ins should always be cut off the reel and discarded before use, and a 12-in spare end left on joints. Detonating fuze should be handled with care in the same way as bulk high explosives.

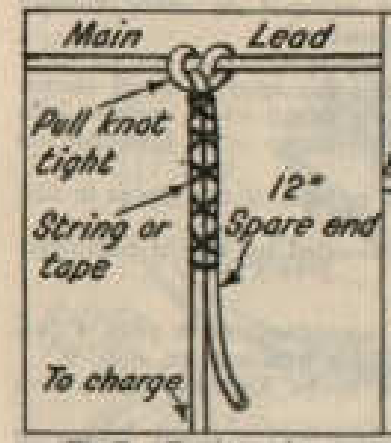

Fig 7. Cordtex clove hitch joint

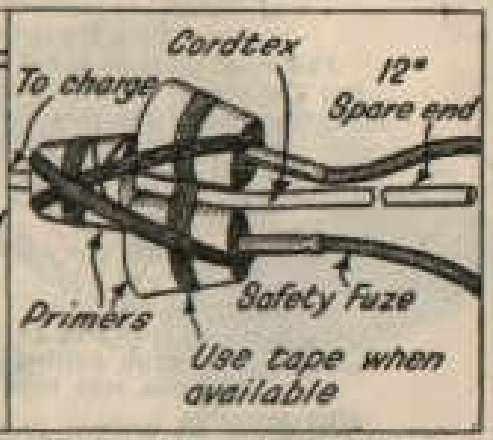

Fig 8. Alternative initiation of cordtex

(*b*) *Initiation.*—Cordtex can be initiated by one detonator, but for the reasons given in para 4 (*c*) above two detonators should normally be used each with its own safety fuze. Lash the detonators firmly to the fuze as shown in Fig 11. See that the detonators are in good contact with each other as well as with the detonating fuze. It is particularly important that the closed ends of the detonators are lashed on in good contact with the fuze. The smallest gap may well cause failure. In emergency one detonator and safety fuze may be used. Where the detonating fuze is suspected

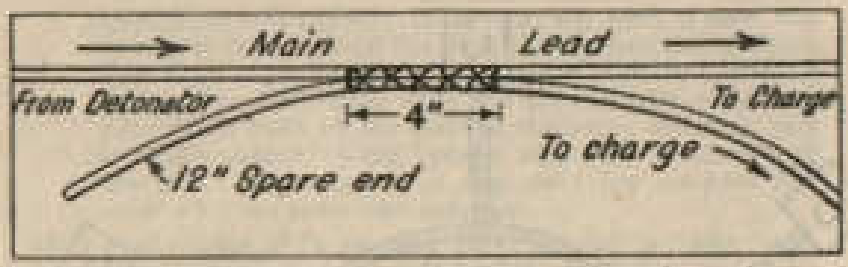

Fig 9. Cordtex lap joint—*Not* to be used on ring main

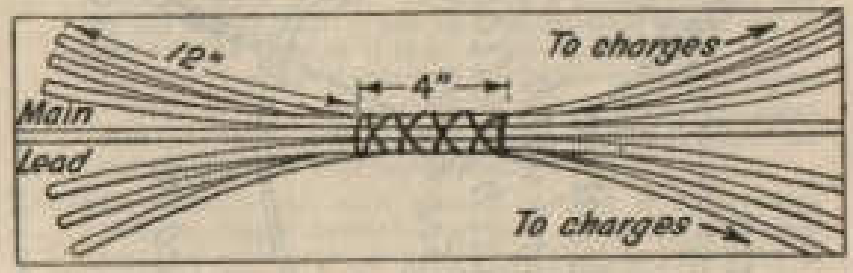

Fig 10. Cordtex junction box

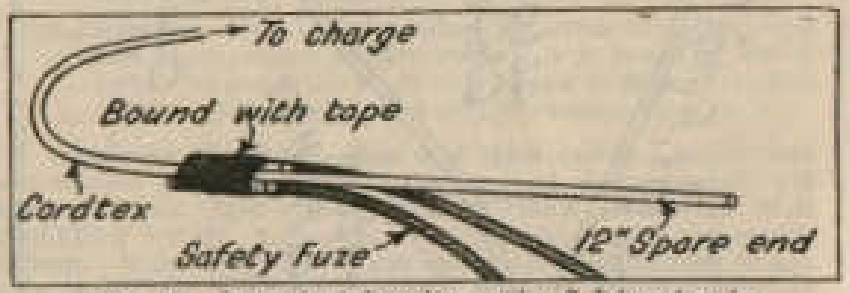

Fig 11. Initiation of cordtex (using 2 detonators to minimise risk of failure).

of being damp or where the demolition is very important initiate the fuze with 3 primers, 2 detonators and 2 lengths of safety fuze as shown in Fig 8.

(*c*) *Joints.*—The detonating wave will pass from one cordtex lead to another if there is sufficient contact. Such contact can be achieved by tying the branch lead round the main lead with a clove hitch (*see* Fig 7). This knot must be pulled tight. Alternatively, joints can be made by lashing the two leads concerned together so that they are in good contact for at least 4 ins (*see* Fig 9). Multiple junction boxes can also be made up in this way (*see* Fig 10). MAKE ALL SPARE ENDS IN JOINTS OF ANY KIND AT

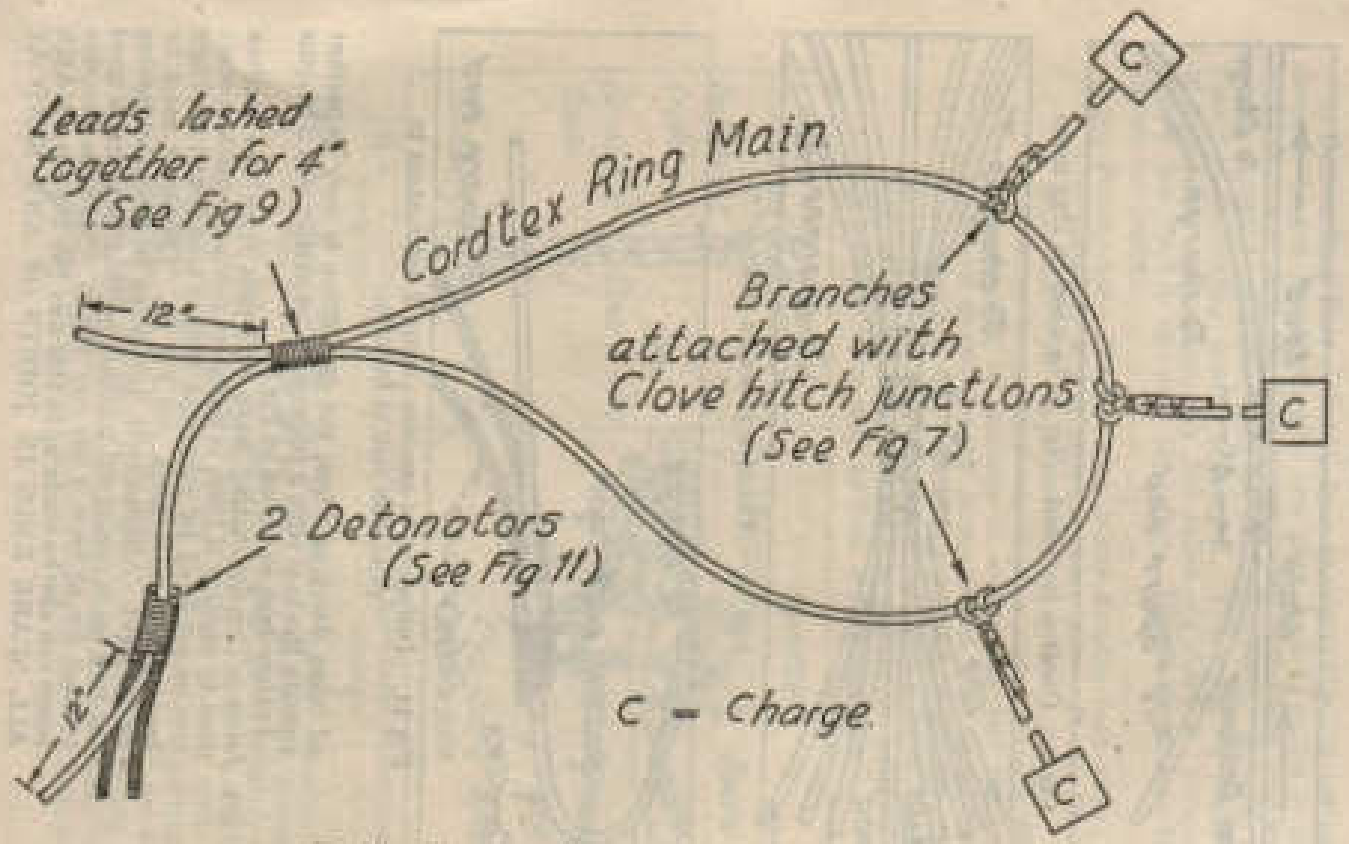

Fig 12. Simple cordtex or primacord ring main

LEAST 12 INS LONG. If the 4-in lap joint is used the branch should come off the main in the direction in which the detonating wave will travel, like the points on a railway track. The detonating wave will not normally cross a lap joint which leads off the main in the wrong direction, just as a train cannot "jump" points which are in the wrong direction. *In the case of a ring main (see sub-para (e)) ALWAYS use clove-hitch junctions.*

(d) *Firing charges of 75 grenades, CE/TNT, GC or "808" with detonating fuze.*—As already stated, all charges should be initiated by a primer. To initiate a primer run the end of the fuze through it and tie a thumb-knot in the end of the fuze to prevent it from coming out. If this is not convenient, wedge it in with a small piece of wood or paper.

NOTE.—The 75 grenade has a special primer incorporated in it and is initiated with 3 turns of cordtex round the end opposite the filler cap as shown in Fig 6.

(e) *Ring mains.*—The most efficient method of firing more than one charge simultaneously is by the use of a ring main made up with detonating fuze (*see* Fig 12). The main is initiated with two detonators and two lengths of safety fuze as already described.

(f) *Primacord.*—This is the standard American detonating fuze and has a yellow braided cover. It is issued in 100 ft reels. Its properties are exactly similar to those of cordtex and it should be used in exactly the same way.

6. **Instantaneous fuze.**—This is a thick orange-coloured fuze with a black gunpowder core which burns at approximately one mile per minute. It is NEITHER A DETONATING FUZE NOR A SAFETY FUZE. Like safety fuze the core is very susceptible to damp. It can be ignited by any ignitor already described, or any of the booby trap switches described in Military Training Pamphlet 40, Part I. NEVER ATTEMPT TO IGNITE THIS FUZE BY HAND, but always by remote control, *e.g.*, percussion igniter and trip wire, etc. Attempts to ignite by hand will cause at least severe burns, and if there is a charge at the other end of the fuze serious accidents may result. INSTANTANEOUS FUZE IS TOO THICK TO INSERT INTO A DETONATOR UNLESS THE OUTER COVERING IS STRIPPED BACK.

Use this fuze for booby trap training ONLY (*see* Sec 17).

NOTE.—Avoid confusing with "*Fuze Instantaneous Detonating*" (FID) which is an obsolescent detonating fuze in a lead tube. Also avoid confusing with American service safety fuze, which also has an orange cover and which, like British safety fuze, will fit into a detonator without any stripping.

Section 6.—PRECAUTIONS AGAINST DAMP

1. When charges are to be fired some time after they have been made up, either because they are left in position or are being carried by the unit until required, or when they are to be placed in situations which are wet or may become so, the following precautions should be taken :—

(*a*) Have all lengths of safety fuze 6 ins longer than required and sealed as described in sub-para (*b*) below. Immediately before firing cut off 6 ins. If sealing caps and compound are not available the end of the safety fuze may be protected from damp by placing it inside an empty 303 cartridge case bound on with insulating tape. Safety fuze with igniters striking crimped on the end should be protected from damp in the same way. The cartridge case will fit over the igniter.

(*b*) Seal all spare ends of cordtex (or primacord) by crimping a tube, fuze sealing, on to the end and dipping twice into sealing compound. Tubes, fuze sealing and the sealing compound are supplied in the G.1098 explosives stores of the infantry pioneer platoon.

(*c*) Seal igniters and detonators on to the safety fuze by dabbing compound round the joint between the two. Do not dip detonators into the compound otherwise it will be too tight a fit for a primer. If no compound is available bind the joint with insulating tape.

(*d*) Avoid using guncotton slabs.

(*e*) Use CE primers in preference to guncotton primers.

Section 7.—STORAGE OF EXPLOSIVES

The following precaution should be taken when storing explosives.

1. Store in a dry cool place with good cover and ventilation.

2. See that the explosive store is at least 200 yds away from other buildings.

3. Keep the explosives above floor level on shelves or duck boards.

4. Keep detonators well away from other explosives, if possible in another building or with a blast-proof sand bag wall between them and the main explosives store. On the move keep detonators in a separate truck from other explosives if possible—if not, keep them separated on the truck.

5. Do not remove explosives from their boxes or packages until they are about to be used. Avoid having several half empty boxes.

Note.—These precautions are the practical minimum for active service conditions.

CHAPTER 3.—TYPICAL USES OF EXPLOSIVES

Note.—In the following examples the quantity of explosives required is given in numbers of 75 grenades, as these are most generally available. One slab of guncotton or CE/TNT or four cartridges of "808" may be taken as roughly equivalent to one grenade. If "808" cartridges are used lash them firmly together and initiate with a primer in the centre of the charge. As already mentioned, Plastic "808" can be moulded to the shape required.

Section 8.—CUTTING CHARGES—GENERAL

1. 75 grenades or slabs of guncotton or CE/TNT or cartridges of "808", placed end to end and across the object to be attacked, and in good contact, will cut through the thicknesses shown in Table 2.

TABLE 2.—CUTTING CHARGES

Effective thickness			No. of slabs, etc., in cross-section of charge	Cross section of charge		
Mild Steel	Timber	Masonry or brickwork		75 grenades	Slabs GC or CE/TNT	Cartridges of "808"
1 in	9 in	18 in	1 slab or grenade 2 cartridges "808"			
2 in	18 in	36 in	4 slabs 6 cartridges "808"	Not applicable*		

* Owing to the lower velocity of detonation of the explosive used in 75 grenades it is recommended that they are NOT used for thicknesses greater than those shown in the first line of the table.

2. The following points are important in connection with cutting charges :—

(*a*) *Line charges.*—The charge must be *continuous* over the length of the cut. Thus, to cut a steel plate 2 ins thick and 18 ins wide the following will be required :—

12 GC slabs (length of slab 6 ins).

16 CE/TNT slabs (length of slab 4½ ins).

48 cartridges "808" (length of cartridge 3 ins).

Note.—An exception to this rule is the charge given in Sec 12 for brick walls up to 9 ins thick.

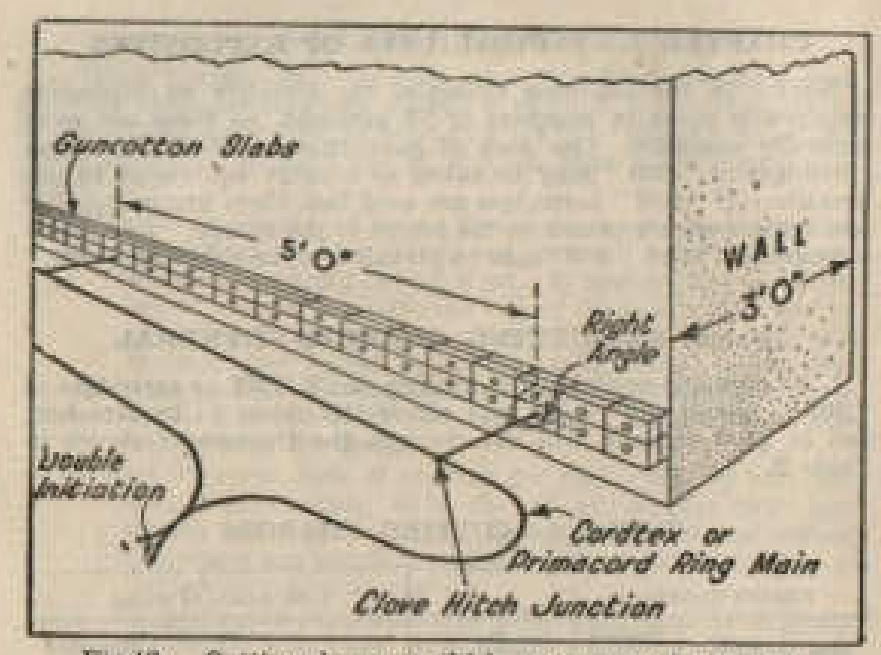

Fig 13. Cutting charge on thick masonry wall, showing points of initiation. (Fixing omitted for clarity)

(*b*) Long *continuous* cutting charges should have points of initiation (primers fired by cordtex, etc., as already described) every 5 ft of their length (*see* Fig 13). Grenades, however, should be placed flat end to flat end, with every other grenade initiated by cordtex. Where possible initiation should be on the surface of the charge furthest from the face of the object attacked and at right angles to it (*see* Fig 13).

(*c*) *Contact.*—The importance of good contact has already been mentioned. Charges should be in contact with the surface attacked and voids underneath should be filled with clay or moist earth. Sand is not a good material for packing. The packing should only be thick enough to fill the voids. If it is thicker it will absorb some of the shock of detonation and reduce the cutting effect of the charge. Charges should be lashed or strutted firmly to hold them in position. Windlassing with wire is often the most convenient method of securing a charge.

Section 9.—CUTTING STEEL RAILS

For attacking rail obstacles use one 75 grenade or one slab of CE/TNT or GC placed on the rail as shown in Fig 14. These charges if placed in good contact will be sufficient to cut the heaviest rail normally used. Note the importance of packing in this case. If plastic "808" is available 6 cartridges (two extra for convenient fixing) can be used and no packing is necessary.

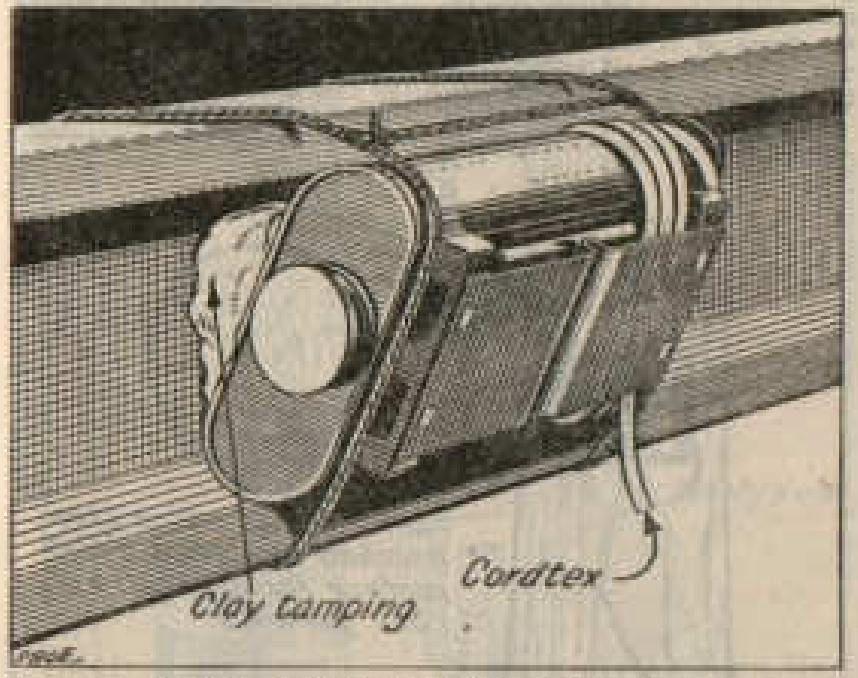

Fig 14. No. 75 grenade fastened to cut rail
Note: If slabs are used place across rail

Section 10.—FELLING SMALL TREES OR TELEGRAPH POLES

Small trees or telegraph poles up to 12 ins diameter may be felled by blowing two 75 grenades or the equivalent placed as shown in Fig 15. If time permits the tree or pole should be notched to give better contact for the charge. If plastic "808" is available this will not be necessary. The tree will fall towards the charge unless it is already leaning in the opposite direction. If necessary the direction of fall can be controlled by attaching a rope to the top of the tree and pulling in the required direction, the charge being placed on the side to which the tree is required to fall.

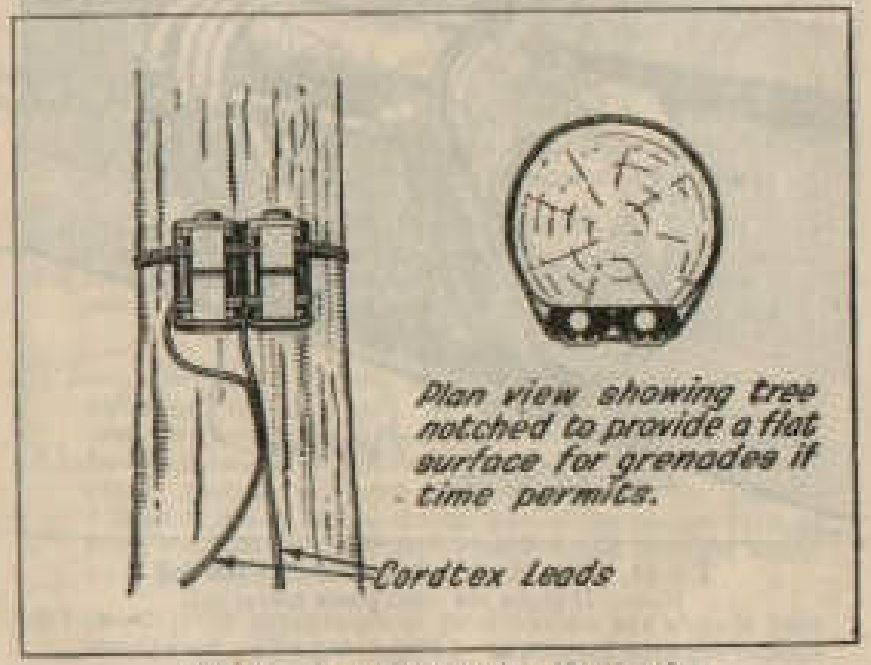

Fig 15. Tree felling using 75 grenades

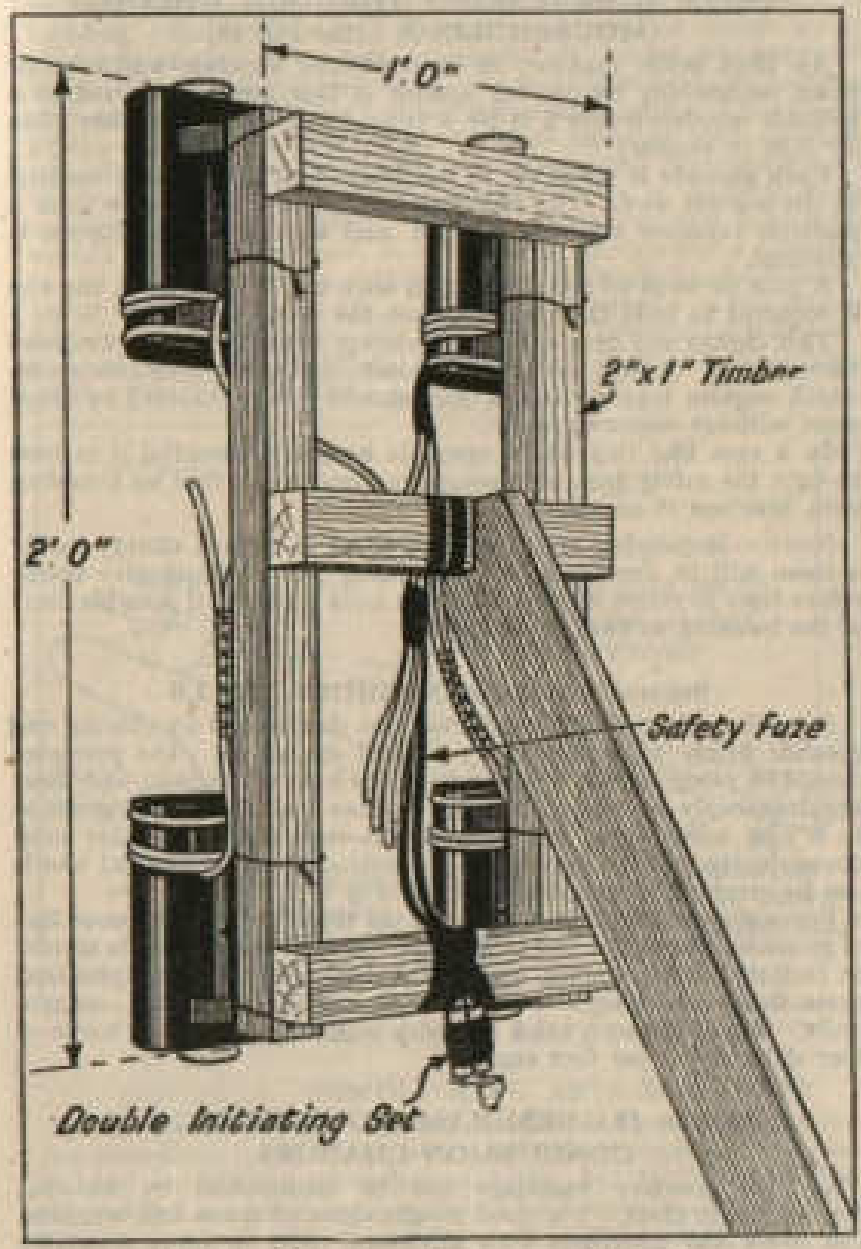

Fig 16. Pole charge for "mouseholing"

Section 11.—BREAKING THROUGH WALLS—(MOUSEHOLING) (*See* Fig 16)

An 18-in brick, masonry or un-reinforced concrete wall may be holed successfully by placing against it four grenades lashed to a suitable wooden frame 2 ft by 1 ft made up of light timber (2-in by 1-in or similar).

Each grenade is wired on to the frame and initiated by corditex in the normal way. The four leads are lashed together to form a multiple junction box (*see* Fig 10), and a double initiating set is attached.

A pole or strut of suitable length with a "V" notch at the top is required to hold the frame against the wall.

This charge will give a hole sufficiently large for a man to crawl through. It cannot be used against reinforced concrete walls, which require bigger charges, and should not be tackled by other arms without engineer advice.

In a case like this where speed is normally essential it is best to light the safety fuze with percussion igniters so that no fumbling with matches is necessary.

NOTE.—Remember that the blast effect of such a charge inside a room will be considerable. The firing party should give themselves time to retire at least behind a *solid* wall and if possible clear of the building, in case it collapses.

Section 12.—DEMOLISHING WALLS

A brick wall up to 9 ins thick may be demolished by placing one grenade firmly against it every 2 ft of its length. The grenades should be placed about 6 ins up from the base of the wall and fired simultaneously by connecting the corditex lead from each grenade to a ring main along the base of the wall. The grenades may conveniently be held in position by lashing them to a board which can be strutted against the wall (*see* Fig 17).

For walls over 9 ins and up to 18 ins thick use a continuous line of grenades placed flat end to flat end. Every other grenade should be initiated with corditex as already described. It is emphasized again that such charges are NOT sufficient for reinforced concrete walls. Fig 13 shows a thick masonry wall with a cutting charge of four slabs of GC per foot run.

Section 13.—DEMOLISHING BUILDINGS—CONCUSSION CHARGES

Brick or masonry buildings can be demolished by blowing charges inside them. For good results close all doors and windows and block any apertures with sandbags, cloth or other available material. Use one grenade or the equivalent in anti-tank mines

or bulk explosive for every 100 cu ft of volume in the room or building. For walls over 1 ft thick multiply this charge by the thickness of the wall in feet. Detonate all charges simultaneously by the use of a corditex ring main. In weakly constructed buildings (*e.g.*, modern "jerry-built" villas) the actual position of the charges in the rooms is not important. In more strongly built structures split up the charges and place them against the strongest parts in the walls, *e.g.*, external corners, chimney stacks, or (in large rooms) supporting pillars or piers. In bulk charges of this kind where several grenades are used in one charge, the grenades should be lashed firmly together and the two most centrally placed should be initiated. It is unnecessary to initiate each grenade, as the detonating wave will pass from one to another. For the destruction of reinforced concrete buildings, pillboxes and emplacements, engineer advice should be obtained.

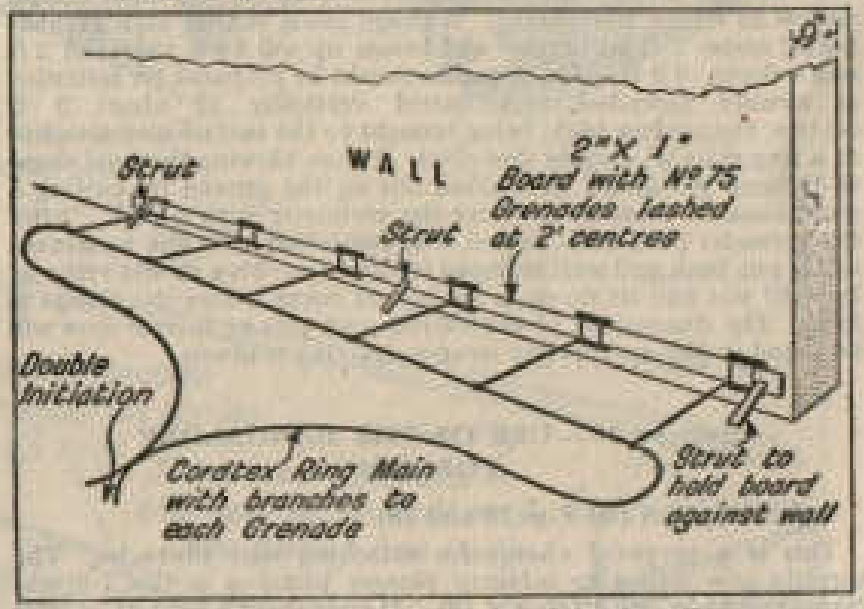

Fig 17. Demolishing a 9 inch brick wall

Section 14.—DEMOLISHING AFVs AND GUNS

A concussion charge consisting of a box of twelve 75 grenades or the equivalent in anti-tank mines or bulk explosive placed inside will put out of action any known AFV. Initiate two grenades in the box with corditex leads attached to a main lead which MUST be long enough *to allow the safety fuze to be lit outside the tank*. Close all hatches and other apertures. If it is not possible to place the charge inside place it outside against the turret ring and under the gun

Small field pieces, howitzers, anti-tank guns, etc., are best demolished with " 808 " packed inside the breech. If this explosive is not available insert one round of ammunition nose first into the muzzle and load another into the breech. Then fire the gun by remote control using a long cord or long lanyard. The firer should be behind cover. Methods of disabling guns, etc., when explosives are not available are given in Military Training Pamphlet No. 58 (1943).

Section 15.—CONSTRUCTION OF GUN PITS

Explosives may be used for loosening up hard or stony soil for the excavation of gun pits, mortar sites, etc. This method is NOT applicable to weapon slits, because the resulting excavation will be too wide and the loosening of the surrounding soil will make the pit useless as refuge from tanks. A rough guide is that each grenade buried about 2 ft will crater and loosen up soil for a radius of 2 ft and a depth of 3 ft. The grenades should be prepared for initiation as already described and buried vertically at about 3 ft centres, the cordtex leads being brought to the surface and attached to a ring main as already described. Before blowing the final shape of the gun pit should be marked out on the ground by cutting a small channel 4 ins deep round the perimeter with a pick. After the grenades have been buried it is important that the excavated soil is put back and well stamped in the hole. Men should retire at least 50 yds and lie down or be behind cover before the charge is fired. The dimensions of the various gun pits or mortar sites will be found in the appropriate weapon training manuals.

Section 16.—USE OF THE BANGALORE TORPEDO

1. Description (*see* Figs 18 and 19)

This is a prepared charge for attacking wire obstacles. The torpedo now issued to infantry pioneer platoons is the Torpedo Bangalore 1¼-in, Mk 1 (*see* Fig 19). It consists of a light 1¼-in steel tube filled with HE and is supplied in 6-ft lengths weighing 14 lb each. Each tube has a male and female end with a single spring clip joint so that it can be made up into the length required. A detachable bullet-shaped nose fits on to the front end of the torpedo to assist movement along the ground. The maximum length which can be conveniently pushed by hand is 100 ft.

The 2-in torpedo formerly issued weighed 25 lb per 5-ft length. Owing to its weight it has now been replaced by the 1¼-in. The 2-in torpedo may still be met in training and is illustrated in Fig 18.

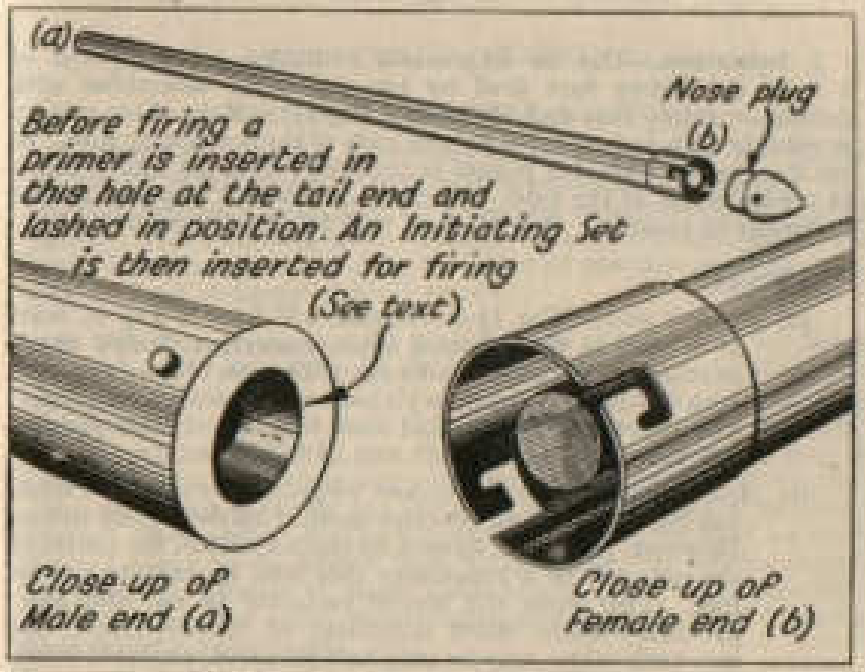

Fig 18. 2 in. bangalore torpedo, Mk. 1

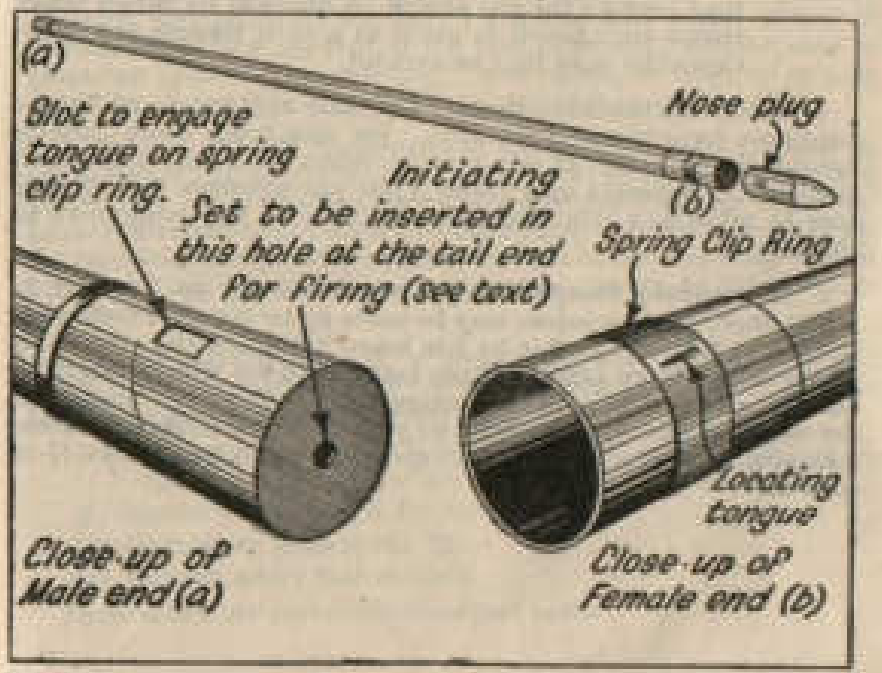

Fig 19. 1¼ in. bangalore torpedo, Mk. 1

2. **Initiation.**—Use an improvised initiating set composed of 1 ft of detonating fuze fired by two detonator assemblies with detonator, safety fuze and igniter (*see* Fig 11). Make these sets up previously with sealing tubes at both ends of the detonating fuze. In the 2-in torpedo Mk 1 a primer is required; this fits into a recess at the male end of the tube. In the 1½-in torpedo a special primer is already in position; it contains a hole for the detonating fuze.

3. **Effect**

(*a*) *Against wire.*—The 1½-in torpedo will blow a gap at least 10 ft wide in the standard triple concertina, double apron or standard German wire fences. The size of the gap varies with the distance between pickets along the line of the fence. Torpedoes should be placed close to a line of main pickets. 1 ft should project on each side of the fence.

(*b*) *Against mines.*—The bangalore torpedo after repeated trials has NOT proved an effective method of destroying mines. However, the crater formed by the torpedo in the centre of the gap will be a reasonably safe lane for men to use on foot. Trip wires will almost certainly be cut and anti-personnel mines either detonated or thrown clear; but anti-tank mines may be only half-actuated, rendered much more sensitive, and so act as anti-personnel mines. If time permits the gap should be searched for mines before troops are allowed to use it as a path through the fence. Casualties may thus be avoided.

4. **Safety distances.**—Most of the blast and fragments from a bangalore torpedo travel sideways. For men lying down directly behind the torpedo, 20 yds may be taken as a safe operational distance. Fragments may travel 1,000 yds sideways but 100 yds may be taken as a safe operational distance for men lying down to the side.

5. **Improvised bangalores.**—For wire fences up to 20 ft in width improvised torpedoes may be made up by lashing 75 grenades flat end to flat end to a 3-in by 1-in board 2 ft longer than the width of the fence, every other grenade being initiated with a length of cordtex attached to a main running the length of the board and detonated as already described (*see* para 2). This torpedo is rather awkward to push into place, but gives as good a gap as the 1½-in torpedo.

CHAPTER 4.—TRAINING

SECTION 17.—BATTLE NOISES

1. **General.**—It is not intended to lay down here the tactical setting for battle noises or the standing orders covering them, since these are normally dealt with by formation or battle school standing orders. The following notes describe suitable charges which can easily be prepared to simulate the effect of mortars, shell fire, etc., and the best methods of firing them.

2. **Suitable charges.**—75 grenades are not suitable for battle noises because fragments of the metal case and cover plate may fly a considerable distance. Use the standard 2-lb battle noise or alternatively two slabs of CE/TNT or guncotton or 2 lb of "808" lashed together and fired by a 1 oz primer. Such charges may be fired individually or simultaneously by detonating fuze or together from one firing point by the electrical method described in para 5 below. They should not be buried in or placed on hard or stony ground owing to the danger from flying stones. If smaller charges are required, primers or single cartridges of "808" initiated by a primer, detonator and a short length of safety fuze (NOT shorter than 6 ins) may be used.

3. **Booby traps.**—Any of the switches described in Military Training, Pamphlet No. 40, Part I (with a short length (6 ins) of instantaneous fuze inserted in the fuze extension) may be used in preparing harmless booby traps. These should be fixed up as they would be in operations, in buildings or dumps or on souvenirs.

4. **Damp.**—It will frequently be necessary to take precautions against damp in preparing battle noises and mock-up booby traps (*see* Sec 6). Every care must be taken to seal the ends of instantaneous fuze and connections with booby trap switches, using insulating tape and sealing compound, the free end of the fuze being capped by either a cap fuze sealing and compound or an empty 303 cartridge case and tape.

5. **Electrical firing.**—It is frequently more effective to fire battle noise charges electrically by remote control. For this purpose the following stores will be required:—

(*a*) Car batteries (lorries and 15-cwt trucks have 12-volt batteries. Light cars and motor cycles have 6-volt batteries).
(*b*) Signals cable electric 10,002 single low.
(*c*) Detonators electric No. 33.
(*d*) Igniters safety fuze electric.

These stores are separately described below.

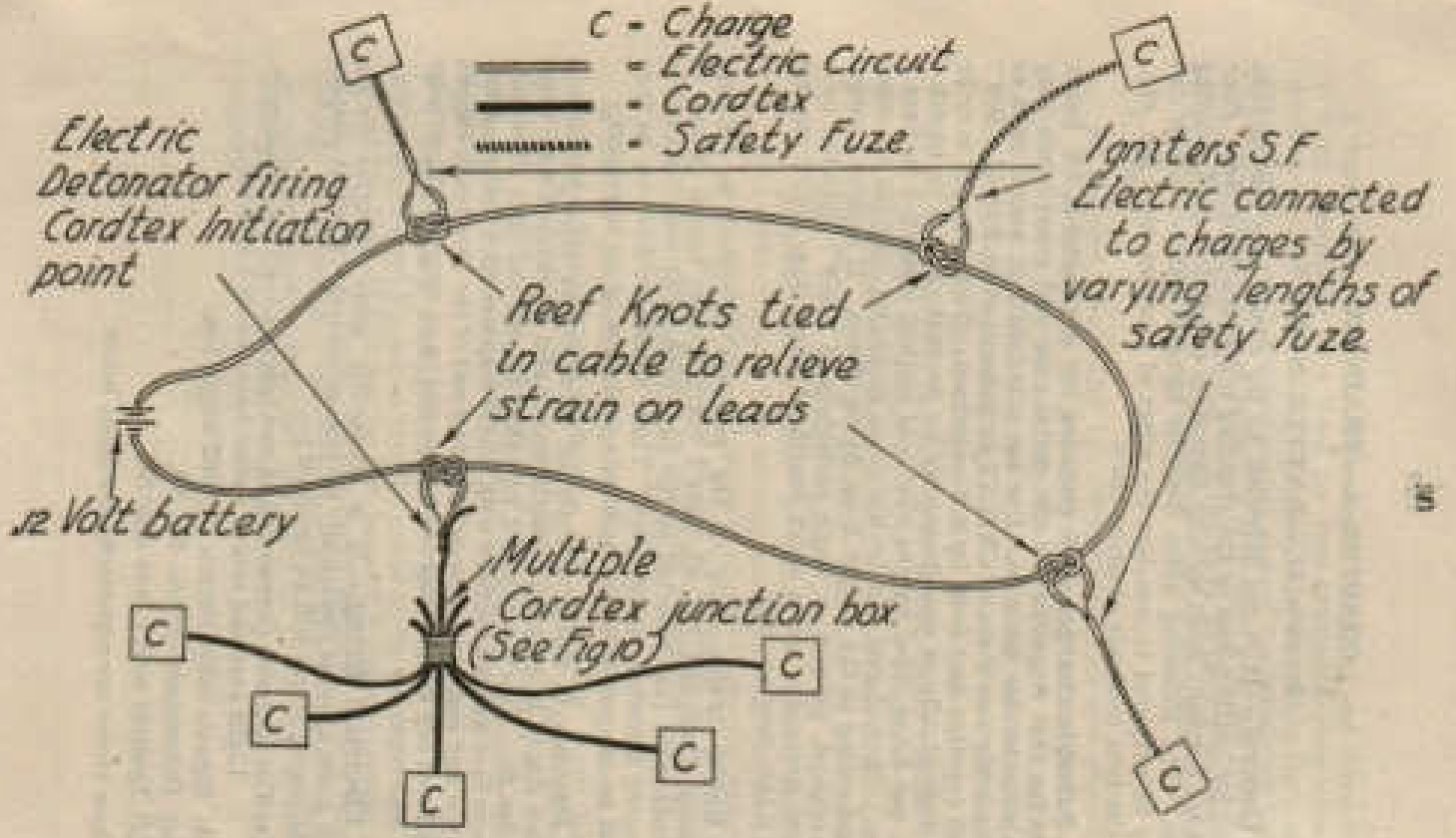

Fig 20. Diagrammatic layout of electrical circuit for battle noises

6. **Detonator electric No. 33.**—This consists of a No. 27 detonator (*see* Sec 5) with an electric firing head on the top. When an electric current of sufficient strength is passed through the head a flash occurs which fires the detonator. A fully charged battery will produce sufficient current to fire a certain number of detonators connected in series with the battery through a given length of cable. The term "in series" means that the detonators are connected up by lengths of cable, the circuit starting at one terminal of the battery, passing through each detonator in turn and finishing at the other terminal (*see* Fig 20). Table 3 shows the number of No. 33 detonators or igniters which can be fired by standard 6- and 12-volt batteries through different lengths of cable, assuming batteries FULLY CHARGED.

TABLE 3

Capacities of batteries, firing electric detonators in series.

One 6-volt battery		One 12-volt battery	
Length of DOUBLE cable electric "10,000 single low"	Number of detonators No. 33 or igniters safety fuze electric	Length of DOUBLE cable electric "10,000 single low"	Number of detonators No. 33 or igniters safety fuze electric
50 yds 100 yds	4 3	50 yds 100 yds 150 yds 300 yds	4 3 2 1

One electric detonator may be used to fire several charges if the detonator is employed to fire a cordtex main (*see* Sec 5). Branches to the various charges can be taken off this main by using the type of clove hitch joint shown in Fig 7. In the case of battle noises a ring main is not necessary.

7. **Igniter safety fuze electric.**—This is an electrical device for igniting safety fuze by remote control and is used mainly for battle noises. It consists of an electric firing head covered with match compound crimped into one end of a copper tube. Insert the safety fuze into the other end and crimp the tube on to the fuze. When the current from the battery passes through the igniter head the match compound is ignited and a flash is produced which in turn ignites the safety fuze. If a number of such igniters are connected up in series with a battery as already described for detonators, and different lengths of safety fuze are attached to each igniter, a series of intermittent explosions will result.

8. **Jointing electric cable**

(*a*) Tie the two ends of the cable together with a reef knot, leaving the spare ends about 6 ins long. This relieves strain on the joints.

(*b*) Strip the insulation off these ends for a length of about 2 ins.

(*c*) Place the two ends across each other at right angles, and twist them firmly together.

(*d*) Bind the joint with insulating tape.

9. **Joining electrical detonators with electric cable**

(*a*) Carry out instructions (*a*) and (*b*) in para 8 above.

(*b*) Join the two ends of the cable to the two detonator leads by twisting them together to form two good joints.

(*c*) Bind the two joints with insulating tape.

10. **Firing electrical circuits.**—The following precautions will always be taken.

(*a*) Never insert electric detonators into charges until immediately before firing.

(*b*) See that the batteries to be used for firing are kept in the control of some responsible person.

(*c*) Do not bring the batteries near the firing cables until the charges are about to be fired.

NOTE.—Firing will be simplified if an improvised switchboard is incorporated in the circuit.

SECTION 18.—SAFETY PRECAUTIONS IN TRAINING

These precautions will always be followed in demolition training. In operations they will be followed as far as practicable; in departing from them the officer in charge will be responsible for providing adequate protection against injury to personnel.

1. At every practice or demonstration with live explosives an officer will be detailed who will be responsible for the practice and for the strict observance of all necessary safety precautions. If an officer cannot be present a fully qualified NCO instructor must be detailed.

2. For every such practice or demolition a danger area of adequate extent will be established and will be protected by sentries provided with red flags. Such sentries will be sufficiently numerous to prevent the entry of persons or livestock into the danger area. In addition, warning sentries will be posted on roads passing through the area to warn motorists, etc., of the position of the look-out sentries.

3. The officer in charge of the practice will ensure that the sentries understand their duties, that they can hear or see the signals from the control point, and that the area is clear before charges are connected up.

4. The following will be the normal extent of the danger area for various typical classes of practice with high explosives:—

(*a*) For the firing of detonators, detonating fuze and primers:—

If in the open	20 yds radius

(*b*) For small charges up to 5 lb:—

In the open	50 yds radius
Buried	100 yds radius

(*c*) For 75 grenades:—

In the open or buried	100 yds radius

(*d*) For the firing of charges for cutting trees:—

300 yds radius

(*e*) If cutting metal girders, rails, steel plates, etc., fragments may fly up to 1,000 yds in all directions from quite small charges. This radius should clearly be taken as the danger area unless the demolition is carried out in a covered pit.

(*f*) Bangalore torpedoes. For operational safety distances *see* Sec 16. Fragments fly chiefly at right angles to the axis of the torpedo up to 1,000 yds. 200 yds may be taken as safe when standing in line with the axis of the torpedo, and 100 yds lying down.

5. The above danger areas will apply to all troops and spectators in the open. Troops and authorized spectators may be allowed within the danger area only where adequate cover, proof against all splinters and ricochets, is provided.

Frequently in training it is not convenient to accept the delay involved in withdrawing personnel to the distances given above. Natural cover will usually be available and should of course be used. The safety distances for personnel (but not property, livestock, etc.) may be reduced according to the nature of the cover, and safety distances for all purposes may be reduced according to the degree of risk which can be accepted under different conditions. In selecting cover due consideration must be given to the probable angle of descent and the size of the fragments anticipated.

6. The following precautions will be taken before the beginning of the practice:—

(*a*) A length of safety fuze from each tin to be used will be tested for rate of burning.

(*b*) All explosives, detonators, etc., will be placed under charge of a NCO with adequate assistance, who will be responsible

that they are not approached by unauthorised persons, that they are issued only as and when required and that the balance is placed in a position of safety before the charge is fired.

(*c*) Sentries will be posted and instructed in their duties; the danger area will be cleared and closed.

(*d*) All troops and spectators, as well as explosives, detonators, etc., other than those required for preparing the demolition, will be moved to a safe place.

(*e*) Smoking within the "danger area" during the course of the practice will be forbidden.

(*f*) All personnel will be warned that, when the charge is fired, they must, if in the open, look upwards for falling fragments, so that they can avoid any that fall in their vicinity.

7. The following precautions will be taken during preparation of the charge:—

(*a*) The minimum number of persons will be employed for preparing the charge.

(*b*) No instrument of iron or steel will be employed for tamping or otherwise loading the charge.

(*c*) Detonators, before and after attachment to fuzes and pending insertion in the charge, will never be left unattended.

(*d*) Every man, as he can be spared, will join the party at the place of safety.

(*e*) When the charge is ready, all personnel, other than the officer or NCO/IC and the man detailed to fire the charge, will withdraw to the place of safety, to which all spare explosives will be sent.

(*f*) Where several charges are to be fired separately by safety fuze, fuzes will be arranged to fire at intervals of not less than 10 seconds. In such cases, two NCOs or men will be detailed to count the explosions. If a misfire is suspected the officer in charge will follow the procedure laid down in para 10.

(*g*) Batteries must be kept away from cables, and under guard, until the moment of firing.

8. The following will be the procedure before firing:—

(*a*) The officer in charge will satisfy himself that the sentries are on the look-out, that the area is clear and that all troops and spectators are outside the danger area or under cover.

(*b*) He will then signal visually or by whistle that firing is about to begin.

(*c*) On the acknowledgment of this signal by the sentries, he will give the signal to fire.

(*d*) All personnel will wear steel helmets during firing of charges.

9. After the signal to fire:—

(*a*) No person will enter the danger area or move from the place of safety until the officer in charge gives the "all clear" signal.

(*b*) Where several charges are to be exploded simultaneously, the officer in charge will not give the "all clear" signal until he has personally inspected the site and has ascertained that all charges have fired.

10. In the event of a misfire, the following precautions will be taken:—

(*a*) No one will normally be permitted to approach the charge until at least ten minutes have elapsed from the time of attempting to fire.

(*b*) The misfire will then be dealt with as a blind by the minimum number of personnel necessary. The charge will not be removed or touched unless it is absolutely necessary to do so.

(*c*) If accessible, a charge which has misfired should be rendered harmless by placing and detonating a fresh charge close to it.

(*d*) The "danger area" will remain closed and all spectators, etc., under cover until the "all clear" is signalled on the completion of the removal or destruction of the misfire.

11. Four further rules should be observed at all times, particularly during instruction:—

(*a*) *All stores and exhibits will be treated as "live"* unless clearly marked "INERT" or "DUMMY."
All personnel must be made aware of the rule.

(*b*) A list of exhibits will be kept and checked before and after using. Every item will be accounted for before the class leaves.

(*c*) All actions will be performed deliberately, and the reasons stated. Personnel learn more quickly by eye than by ear; good habits will therefore be taught by example from beginning of training.

(*d*) "Dummies" will never be mixed with "live."

CHAPTER 5.—DESTRUCTION OF BLINDS

SECTION 19.—GENERAL TECHNIQUE

1. **General.**—The object of this chapter is NOT to give detailed instructions on the destruction of all types of blinds or unexploded projectiles which may be encountered in the field, which is a subject far beyond the scope of this pamphlet. Nor is it intended to deal with unexploded aircraft bombs, which are an RE responsibility. Special instructions for dealing with grenades and mortar bombs which fail to explode, are normally laid down in the various weapon training pamphlets and local range standing orders, etc., which should be read in conjunction with this chapter.

2. **Charges to be used.**—In the case of grenades use one primer laid alongside and in contact with the grenade and initiated with detonator and safety fuze. In the case of anything larger use two CE/TNT or guncotton slabs or 2 lb of " 808 " (but NOT 75 grenades) initiated by a primer, detonator and safety fuze.

3. **Method of disposal.**—In all cases place the charge so that it will detonate the filling rather than attempt to actuate the firing mechanism, *e.g.*, in the case of anti-tank mines, place the charge in good contact with the side of the case rather than on top of the striker mechanism.

In the PIAT bomb a specially sensitive fuze is used, and the charge should not be placed directly in contact with the bomb for fear of disturbing it (*see* Small Arms Training, Vol I, Pamphlet No. 24, Projector, Infantry, Anti-Tank (PIAT), 1943, for details).

4. **Safety precautions** (*see* also Sec **18**, para 10)

(*a*) Normally only one man will be required to deal with a blind. Therefore one man, preferably an officer, should deal with it, and other personnel should withdraw to a place of safety until the blind has exploded and the officer has given the " all clear " signal.
(*b*) Where possible avoid moving blinds, etc., before destruction.
(*c*) If blinds are well apart destroy them ONE AT A TIME.
(*d*) If they are so close together that the blowing of one may cover others in debris or actuate them by blast, destroy them simultaneously by firing the charges with cordtex leads initiated together as already described in Sec **5**.
(*e*) See that all personnel, military or civilian, within range are warned beforehand and are under cover or out of range when the blinds are destroyed.
(*f*) Unless orders are received to the contrary do NOT attempt to remove fuzes from blinds.

(*g*) IF IN DOUBT LEAVE BLINDS UNTOUCHED BUT MARKED CLEARLY WITH A FLAG AND OBTAIN REASSISTANCE.

CHAPTER 6.—ENEMY EQUIPMENT

SECTION 20.—GERMAN EQUIPMENT

1. **General.**—Occasions may arise in operations when our own supplies of explosives are short but large supplies of enemy equipment are available. Normally enemy equipment will be dealt with by the RE, but in case no engineer advice is available the following notes will be of assistance to other arms.

2. **Bulk explosives.**—These are in the form of prepared charges of high explosive, those most frequently met being the 100 gramme (¼ lb), 1 kilogramme (2¼ lb) and 3 kilogramme (6⅔ lb). They are made up in rectangular blocks with a black metal casing which has threaded holes which will take the German detonator-igniter assemblies. *Initiate as taught in this pamphlet* for British explosives, using a 1 oz primer.

In emergency they may be initiated without a primer by using German detonators, which are more powerful than the British No. 27, and fit into a small Bakelite or metal detonator holder which can be screwed into the charge.

3. **Detonators.**—These are very similar in appearance to, and practically the same size as, the British No. 27. As already noted the filling is more powerful. They will fit into a British primer after it has been rectified.

4. **Safety fuze.**—This has a smooth black or chocolate cover and a black gunpowder core. Like British safety fuze it burns at approximately 2 ft per minute. ALWAYS test the rate of burning before use. This fuze is in all respects except thickness interchangeable with British fuze; the outer covering must be stripped back to fit it into a British No. 27 detonator.

5. **Detonating fuze.**—This has a pale green or chocolate cover and a pale pink powder core. It is nearly the same diameter as cordtex and the two fuzes are interchangeable.

NOTE.—(i) IN CASE OF DOUBT WITH ENEMY EQUIPMENT ASK FOR ENGINEER ADVICE.

(ii) Cases have been discovered recently of German demolition equipment being defective as a result of sabotage presumably in manufacture. All German demolition equipment, particularly fuzes, should therefore be carefully examined and tested before use.

SECTION 21.—JAPANESE EQUIPMENT

1. **Bulk explosives.**—Most Japanese bulk explosive is in the form of small slabs 2 ins by 2 ins by 1 in. Ten slabs are packed in a paper package 21 ins long. Alternate blocks in the package have a hole for a detonator marked on the paper wrapping by a black spot. There is also a type of plastic explosive made up in 4-oz cartridges which is similar to "808."

Initiate as taught in this pamphlet for British explosives, using a 1-oz primer.

2. **Detonators.**—There are three sizes, the smallest corresponding in size and power to the British No. 27.

3. **Safety fuze.**—Japanese safety fuze is unreliable and should NOT be used.

4. **Detonating fuze.**—This fuze has a brown fabric cover with a diameter nearly the same as that of cordtex. In emergency it may be used in lieu.

NOTE.—(i) Japanese accessories are NOT so reliable as British and German equipment and their use should be avoided except in emergency.

(ii) IN CASE OF DOUBT ASK FOR ENGINEER ADVICE.

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