Improvised Munitions
Black Book
Volume 2

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Improvised Munitions
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All information compiled by
Frankford Arsenal
Philadelphia, Pennsylvania

Section IV
No. 1

RECOILLESS LAUNCHER

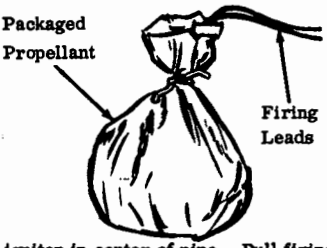
A dual directional scrap fragment launcher which can be placed to cover the path of advancing troops.

MATERIAL REQUIRED:

Iron water pipe approximately 4 ft. (1 meter) long and 2 to 4 in. (5 to 10 cm) in diameter
Black powder (commercial) or salvaged artillery propellant about 1/2 lb. (200 gms)
Safety or improvised fuse (Section VI, No. 7) or improvised electrical igniter (Section VI, No. 2)
Stones and/or metal scrap chunks approximately 1/2 in. (1 cm) in diameter - about 1 lb. (400 gms) total
4 rags for wadding, each about 20 in. by 20 in. (50 cm by 50 cm)
Wire
Paper or rag

NOTE: Be sure that the water pipe has no cracks or flaws.

PROCEDURE:

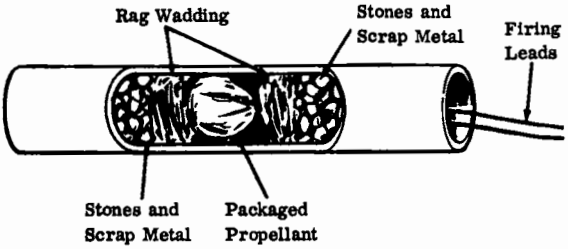


1. Place propellant and igniter in paper or rag and tie with string so contents cannot fall out.

2. Insert packaged propellant and igniter in center of pipe. Pull firing leads out one end of pipe.

3. Stuff a rag wad into each end of pipe and lightly tamp using a flat end stick.

4. Insert stones and/or scrap metal into each end of pipe. Be sure the same weight of material is used in each side.



5. Insert a rag wad into each end of the pipe and pack tightly as before.

HOW TO USE:

1. Place scrap mine in a tree or pointed in the path of the enemy. Attach igniter lead to the firing circuit. The recoilless launcher is now ready to fire.

2. If safety or improvised fuse is used instead of the detonator, place the fuse into the packaged propellant through a hole drilled in the center of the pipe. Light free end of fuse when ready to fire. Allow for normal delay time.

CAUTION: Scrap will be ejected from both ends of the launcher.

SHOTGUN GRENADE LAUNCHER

This device can be used to launch a hand grenade to a distance of 160 yards (150 meters) or more, using a standard 12 gauge shotgun.

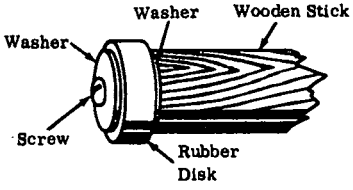
MATERIAL REQUIRED:

Grenade (Improvised pipe hand grenade, Section II, No. 1, may be used)
12 gauge shotgun
12 gauge shotgun cartridges
Two washers, (brass, steel, iron, etc.), having outside diameter of 5/8 in. (1-1/2 cm)
Rubber disk 3/4 in. (2 cm) in diameter and 1/4 in. (6 mm) thick (leather, neoprene, etc. can be used)
A 30 in. (75 cm) long piece of hard wood (maple, oak, etc.) approximately 5/8 in. (1-1/2 cm) in diameter. Be sure that wood will slide into barrel easily.
Tin can (grenade and its safety lever must fit into can)
Two wooden blocks about 2 in. (5 cm) square and 1-1/2 in. (4 cm) thick
One wood screw about 1 in. (2-1/2 cm) long
Two nails about 2 in. (5 cm) long
12 gauge wads, tissue paper, or cotton
Adhesive tape, string, or wire
Drill

PROCEDURE:

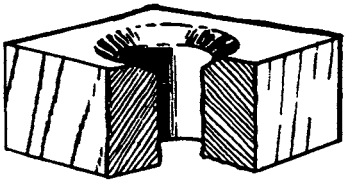
1. Punch hole in center of rubber disk large enough for screw to pass through.

2. Make push-rod as shown.



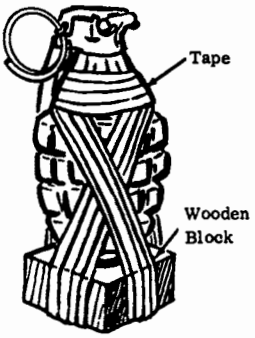
NOTE: Gun barrel is slightly less than 3/4 inch in diameter. If rubber disk does not fit in barrel, file or trim it very slightly. It should fit tightly.

3. Drill a hole through the center of one wooden block of such size that the push-rod will fit tightly. Whittle a depression around the hole on one side approximately 1/8 in. (3 mm) and large enough for the grenade to rest in.



4. Place the base of the grenade in the depression in the wooden block. Securely fasten grenade to block by wrapping tape (or wire) around entire grenade and block.

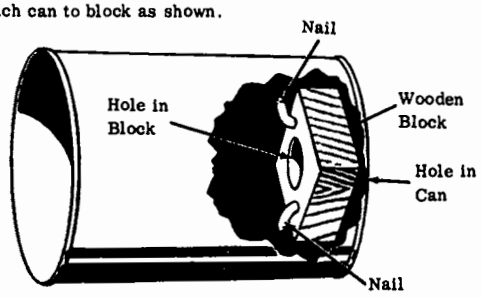
NOTE: Be sure that the tape (or wire) does not cover hole in block or interfere with the operation of the grenade safety lever.



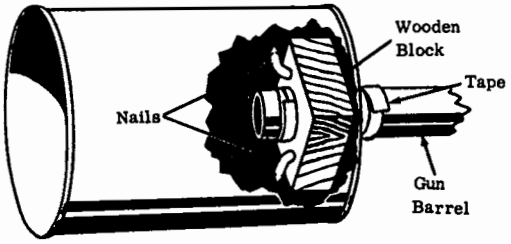
5. Drill hole through the center of the second wooden block, so that it will just slide over the outside of the gun barrel.

6. Drill a hole in the center of the bottom of the tin can the same size as the hole in the block.

7. Attach can to block as shown.

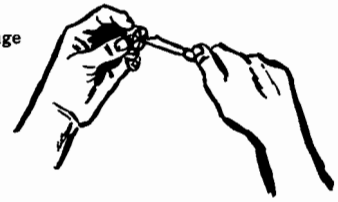


8. Slide the can and block onto the barrel until muzzle passes can open end. Wrap a small piece of tape around the barrel an inch or two from the end. Tightly wrapped string may be used instead of tape. Force the can and wooden block forward against the tape so that they are securely held in place. Wrap tape around the barrel behind the can.

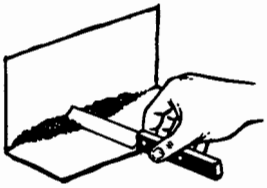


CAUTION: Be sure that the can is securely fastened to the gun barrel. If the can should become loose and slip down the barrel after the launcher is assembled, the grenade will explode after the regular delay time.

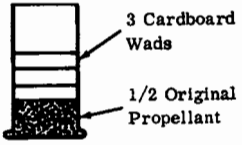
9. Remove crimp from a 12 gauge shotgun cartridge with pen knife. Open cartridge. Pour shot from shell. Remove wads and plastic liner if present.



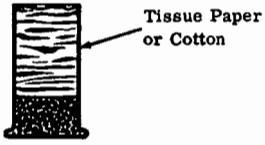
10. Empty the propellant onto a piece of paper. Using a knife, divide the propellant in half. Replace half of the propellant into the cartridge case.



11. Replace the 12 gauge cardboard wads into cartridge case.



NOTE: If wads are not available, stuff tissue paper or cotton into the cartridge case. Pack tightly.



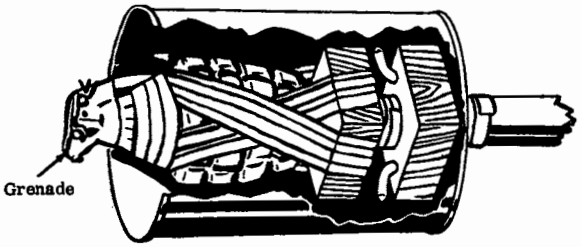
HOW TO USE:

Method I - When ordinary grenade is used:

1. Load cartridge in gun.

2. Push end of push-rod without the rubber disk into hole in wooden block fastened to grenade.

3. Slowly push rod into barrel until it rests against the cartridge case and grenade is in can. If the grenade is not in the can, remove rod and cut to proper size. Push rod back into barrel.



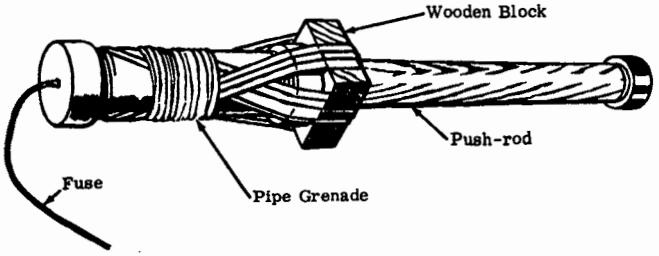
4. With can holding safety lever of grenade in place, carefully remove safety pin.

CAUTION: Be sure that the sides of the can restrain the grenade safety lever. If the safety lever should be released for any reason, grenade will explode after regular grenade delay time.

5. To fire grenade launcher, rest gun in ground at angle determined by range desired. A 45 degree angle should give about 150 meters (160 yds.).

Method II - When improvised pipe grenade is used:

An improvised pipe grenade (Section II, No. 1) may be launched in a similar manner. No tin can is needed.



1. Fasten the grenade to the block as shown above with the fuse hole at the end opposite the block.

2. Push end of push-rod into hole in wooden block fastened to grenade.

3. Push rod into barrel until it rests against cartridge case.

4. Load cartridge in gun.

5. Follow step 5 of Method I.

6. Using a fuse with at least a 10 second delay, light the fuse before firing.

7. Fire when the fuse burns to 1/2 its original length.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Section IV
No. 3

GRENADE LAUNCHER (57 MM CARDBOARD CONTAINER)

An improvised method of launching a standard grenade 150 yds. (135 meters) or an improvised grenade 90 yds. (81 meters) using a discarded cardboard ammunition container.

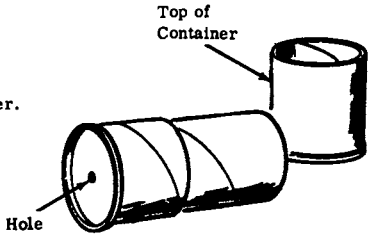
MATERIAL REQUIRED:

Heavy cardboard container with inside diameter of 2-1/2 to 3 in. (5-1/2 to 8 cm) and at least 12 in. (30 cm) long (ammunition container is suitable)
Black powder - 8 grams (124 grains) or less
Safety or improvised fuse (Section VI, No. 7)
Grenade (Improvised hand grenade, Section II, No. 1 may be used)
Rag, approximately 30 in. x 24 in. (75 cm x 60 cm)
Paper

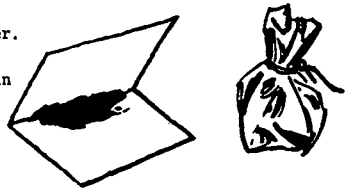
CAUTION: 8 grams of black powder yield the maximum ranges. Do not use more than this amount. See Improvised Scale, Section VII, No. 8, for measuring.

PROCEDURE: METHOD I - If Standard Grenade is Used.

1. Discard top of container. Make small hole in bottom.

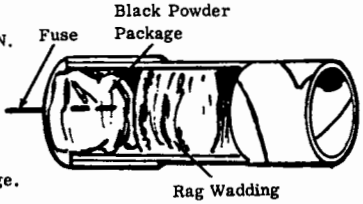


2. Place black powder in paper. Tie end with string so contents cannot fall out. Place package in container.



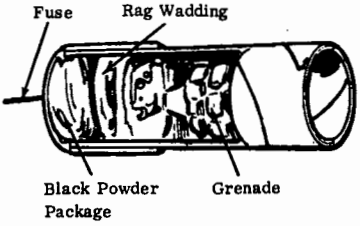
3. Insert rag wadding into container. Pack tightly with CAUTION.

4. Measure off a length of fuse that will give the desired delay. Thread this through hole in bottom of container so that it penetrates into the black powder package.



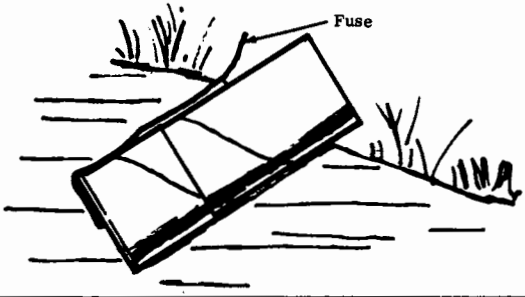
NOTE: If improvised fuse is used, be sure fuse fits loosely through hole in bottom of container.

5. Hold grenade safety lever and carefully withdraw safety pin from grenade. Insert grenade into container, lever end first.



CAUTION: If grenade safety lever should be released for any reason, grenade will explode after normal delay time.

6. Bury container about 6 in. (15 cm) in the ground at 30° angle, bringing fuse up alongside container. Pack ground tightly around container.

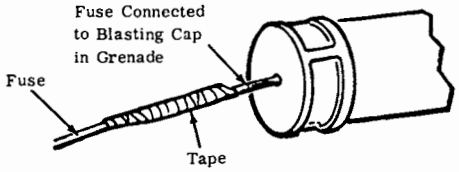


CAUTION: The tightly packed dirt helps to hold the tube together during the firing. Do not fire unless at least the bottom half of the container is buried in solidly packed dirt.

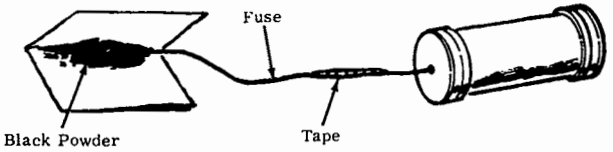
METHOD II - If Improvised Pipe Hand Grenade is Used.

1. Follow step 1 of above procedure.

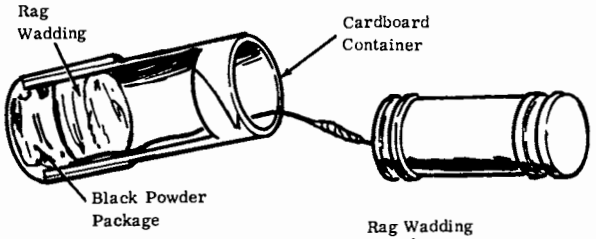
2. Measure off a piece of fuse at least as long as the cardboard container. Tape one end of this to the fuse from the blasting cap in the improvised grenade. Be sure ends of fuse are in contact with each other.



3. Place free end of fuse and black powder on piece of paper. Tie ends with string so contents will not fall out.

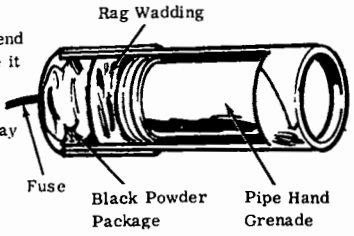


4. Place package in tube. Insert rag wadding. Pack so it fits snugly. Place pipe hand grenade into tube. Be sure it fits snugly.



5. Insert fuse through hole in end of cardboard container. Be sure it goes into black powder package.

NOTE: Cardboard container may be used for only one firing.



6. Follow step 6 of Method I.

HOW TO USE:

Light fuse when ready to fire.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FIRE BOTTLE LAUNCHER

A device using 2 items (shotgun and chemical fire bottle) that can be used to start or place a fire 80 yards (72 meters) from launcher.

MATERIAL REQUIRED:

Standard 12 gauge or improvised shotgun (Section III, No. 2)
Improvised fire bottle (Section V, No. 1)
Tin can, about 4 in. (10 cm) in diameter and 5-1/2 in. (14 cm) high
Wood, about 3 in. x 3 in. x 2 in. (7-1/2 cm x 7-1/2 cm x 5 cm)
Nail, at least 3 in. (7-1/2 cm) long
Nuts and bolts or nails, at least 2-1/2 in. (6-1/2 cm) long
Rag
Paper
Drill

If Standard Shotgun is Used:

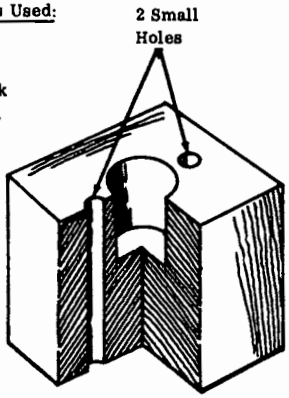
Hard wood stick, about the same length as shotgun barrel and about 5/8 in. (1-1/2 cm) in diameter. Stick need not be round.
2 washers (brass, steel, iron, etc.) having outside diameter of 5/8 in. (1-1/2 cm)
One wood screw about 1 in. (2-1/2 cm) long
Rubber disk, 3/4 in. (2 cm) in diameter and 1/4 in. (6 mm) thick, leather, cardboard, etc. can be used.
12 gauge shotgun ammunition

If Improvised Shotgun is Used:

Fuse, safety or improvised fast burning (Section VI, No. 7)
Hard wood stick, about the same length as shotgun barrel and 3/4 in. (2 cm) in diameter
Black powder - 9 grams (135 grains). See Section VII, No. 8.

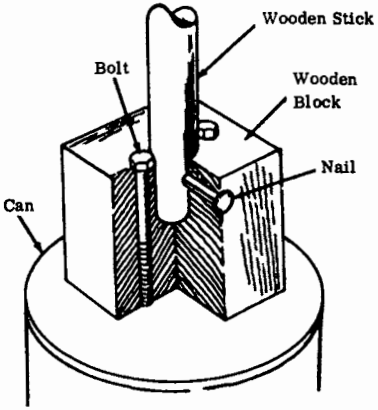
PROCEDURE:

METHOD I - If Improvised Shotgun is Used:



1. Drill hole in center of wood block approximately 1 in. (2-1/2 cm) deep. Hole should have approximately the same diameter as the wooden stick.

2. Drill 2 small holes on opposite sides of the wooden block. Hole should be large enough for bolts to pass through.

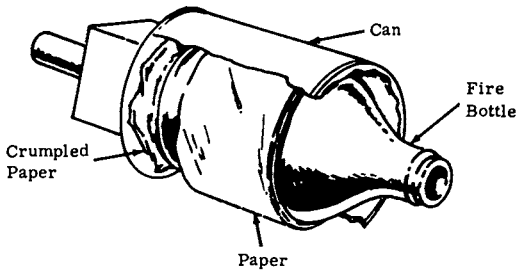


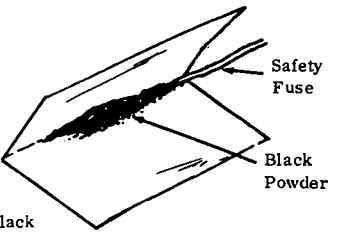
3. Fasten can to block with nuts and bolts.

NOTE: Can may also be securely fastened to block by hammering several nails through can and block. Do not drill holes, and be careful not to split wood.

4. Place wooden stick into hole in wooden block. Drill small hole (same diameter as that of 3 in. nail) through wooden block and through wooden stick. Insert nail in hole.

5. Crumple paper and place in bottom of can. Place another piece of paper around fire bottle and insert in can. Use enough paper so that bottle will fit snugly.

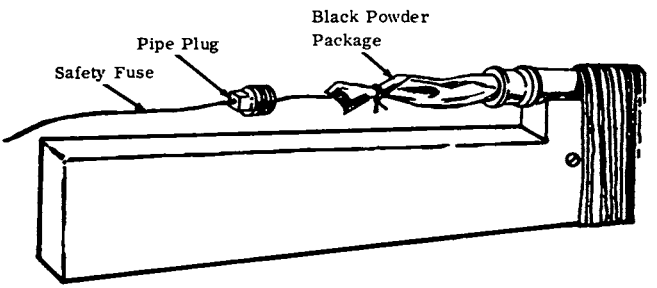




6. Place safety fuse and black powder on paper. Tie each end with string.

7. Thread fuse through hole in plug. Place powder package in rear of shotgun. Screw plug finger tight into coupling.

NOTE: Hole in plug may have to be enlarged for fuse.



8. Insert rag into front of shotgun. Pack rag against powder package with stick. USE CAUTION.

METHOD II - If Standard Shotgun is Used:

1. Follow Steps 1 and 2, Shotgun Grenade Launcher, Section IV, No. 2.

2. Follow procedure of Method I, Steps 1 - 5.

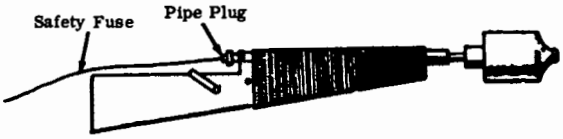
3. Follow Steps 9, 10, 11, Shotgun Grenade Launcher, Section IV, No. 2, using 1/3 of total propellant instead of 1/2.

4. Load cartridge in gun.

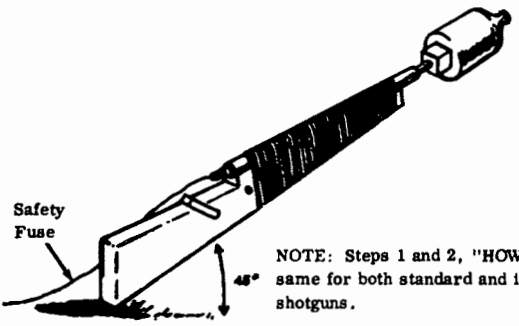
HOW TO USE:

1. Insert stick and holder containing chemical fire bottle.

CAUTION: Do not tilt muzzle downward.



2. Hold gun against ground at 45° angle and light fuse.



NOTE: Steps 1 and 2, "HOW TO USE," same for both standard and improvised shotguns.

CAUTION: Severe burns may result if bottle shatters when fired. If possible, obtain a bottle identical to that being used as the fire bottle. Fill about 2/3 full of water and fire as above. If bottle shatters when fired instead of being launched intact, use a different type of bottle.

Section IV
No. 5

GRENADE LAUNCHERS

A variety of grenade launchers can be fabricated from metal pipes and fittings. Ranges up to 600 meters (660 yards) can be obtained depending on length of tube, charge, number of grenades, and angle of firing.

MATERIAL REQUIRED:

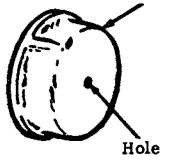
Metal pipe, threaded on one end and approximately 2-1/2 in. (6-1/4 cm) in diameter and 14 in. to 4 ft. (35 cm to 119 cm) long depending on range desired and number of grenades used.
End cap to fit pipe
Black powder, 15 to 50 gm, approximately 1-1/4 to 4-1/4 tablespoons (Section I, No. 3)
Safety fuse, fast burning improvised fuse (Section VI, No. 7) or improvised electric bulb initiator (Section VI, No. 1 Automobile light bulb is needed)
Grenade(s) - 1 to 6
Rag(s) - about 30 in. x 30 in. (75 cm x 75 cm) and 20 in. x 20 in. (55 cm x 55 cm)
Drill
String

NOTE: Examine pipe carefully to be sure there are no cracks or other flaws.

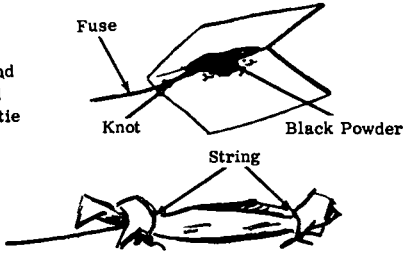
PROCEDURE:

METHOD I - If Fuse is Used:

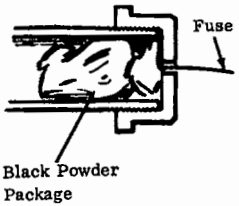
1. Drill small hole through center of end cap.



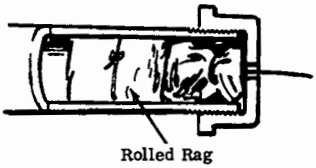
2. Make small knot near one end of fuse. Place black powder and knotted end of fuse in paper and tie with string.



3. Thread fuse through hole in end cap and place package in end cap. Screw end cap onto pipe, being careful that black powder package is not caught between the threads.



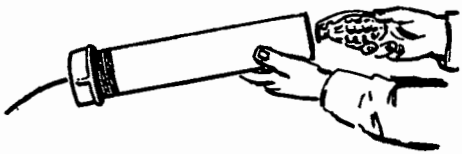
4. Roll rag wad so that it is about 6 in. (15 cm) long and has approximately the same diameter as the pipe. Push rolled rag into open-end of pipe until it rests against black powder package.



5. Hold grenade safety lever in place and carefully withdraw safety pin.

CAUTION: If grenade safety lever is released for any reason, grenade will explode after regular time. (4 - 5 sec.)

6. Holding safety lever in place, carefully push grenade into pipe, lever end first, until it rests against rag wad.



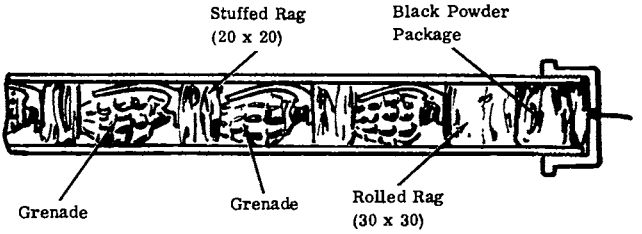
7. The following table lists various types of grenade launchers and their performance characteristics.

DESIRED RANGE	NO. OF GRENADES LAUNCHED	BLACK POWDER CHARGE	PIPE LENGTH	FIRING ANGLE
250 m	1	15 gm	14"	30°
500 m	1	50 gm	48"	10°
600 m [(a)]	1	50 gm	48"	30°
200 m	6 [(b)]	25 gm	48"	30°

(a) For this range, an additional delay is required. See Section VI, No. 11 and 12.

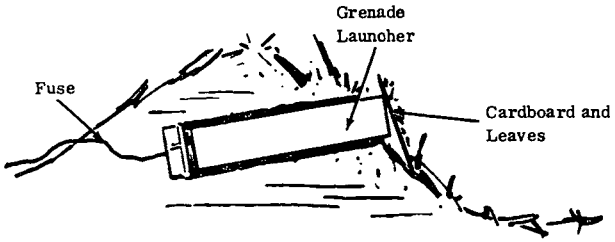
(b) For multiple grenade launcher, load as shown.

NOTE: Since performance of different black powder varies, fire several test rounds to determine the exact amount of powder necessary to achieve the desired range.

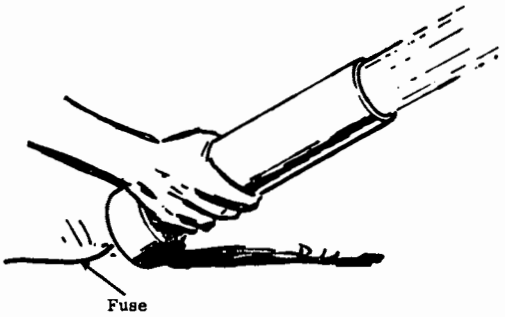


HOW TO USE:

1. Bury at least 1/2 of the launcher pipe in the ground at desired angle. Open end should face the expected path of the enemy. Muzzle may be covered with cardboard and a thin layer of dirt and/or leaves as camouflage. Be sure cardboard prevents dirt from entering pipe.



NOTE: The 14 in. launcher may be hand held against the ground instead of being buried.



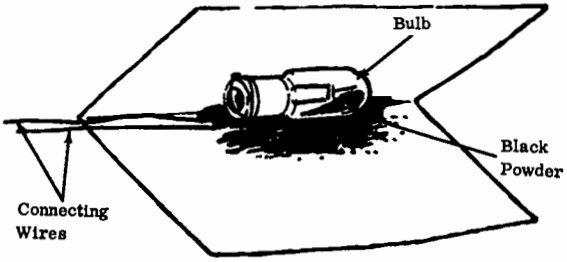
2. Light fuse when ready to fire.

METHOD II - If Electrical Igniter is Used:

NOTE: Be sure that bulb is in good operating condition.

1. Prepare electric bulb initiator as described in Section VI, No. 1.

2. Place electric initiator and black powder charge in paper. Tie ends of paper with string.



3. Follow above Procedure, Steps 3 to end.

HOW TO USE:

1. Follow above How to Use, Step 1.

2. Connect leads to firing circuit. Close circuit when ready to fire.

Section IV
No. 6

60 MM MORTAR PROJECTILE LAUNCHER

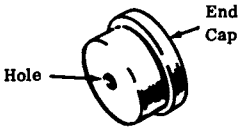
A device to launch 60 mm mortar rounds using a metal pipe 2-1/2 in. (6 cm) in diameter and 4 ft. (120 cm) long as the launching tube.

MATERIAL REQUIRED:

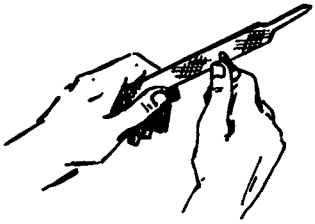
Mortar, projectile (60 mm) and charge increments
Metal pipe 2-1/2 in. (6 cm) in diameter and 4 ft. (120 cm) long, threaded on one end
Threaded end cap to fit pipe
Bolt, 1/8 in. (3 mm) in diameter and at least 1 in. (2-1/2 cm) long
Two (2) nuts to fit bolt
File
Drill

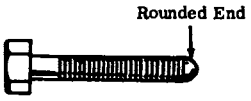
PROCEDURE:

1. Drill hole 1/8 in. (3 mm) in diameter through center of end cap.

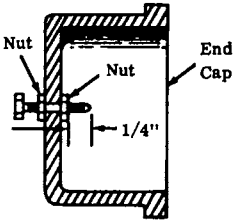


2. Round off end of bolt with file.

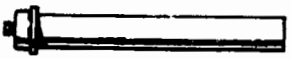




3. Place bolt through hole in end cap. Secure in place with nuts as illustrated.

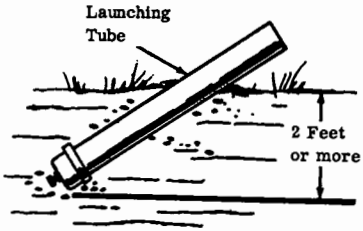


4. Screw end cap onto pipe tightly. Tube is now ready for use.

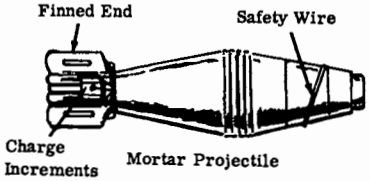


HOW TO USE:

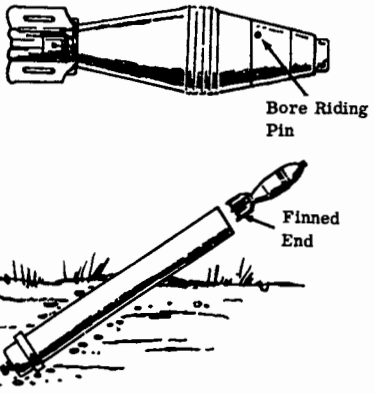
1. Bury launching tube in ground at desired angle so that bottom of tube is at least 2 ft. (60 cm) underground. Adjust the number of increments in rear finned end of mortar projectile. See following table for launching angle and number of increments used.



2. When ready to fire, withdraw safety wire from mortar projectile. Drop projectile into launching tube, FINNED END FIRST.



CAUTION: Be sure bore riding pin is in place in fuse when mortar projectile is dropped into tube. A live mortar round could explode in the tube if the fit is loose enough to permit the bore riding pin to come out partway.



CAUTION: The round will fire as soon as the projectile is dropped into tube. Keep all parts of body behind the open end of the tube.

DESIRED RANGE (YARDS)	MAXIMUM HEIGHT MORTAR WILL REACH (YARDS)	REQUIRED ANGLE OF ELEVATION OF TUBE (MEASURED FROM HORIZONTAL DEGREES)	CHARGE - NUMBER OF INCREMENTS
150	25	40	0
300	50	40	1
700	150	40	2
1000	225	40	3
1500	300	40	4
125	75	60	0
300	125	60	1
550	250	60	2
1000	375	60	3
1440	600	60	4
75	100	80	0
150	200	80	1
300	350	80	2
400	600	80	3
550	750	80	4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CHEMICAL FIRE BOTTLE

This incendiary bottle is self-igniting on target impact.

MATERIALS REQUIRED

	How Used	Common Source
Sulphuric Acid	Storage Batteries Material Processing	Motor Vehicles Industrial Plants
Gasoline	Motor Fuel	Gas Station or Motor Vehicles
Potassium Chlorate	Medicine	Drug Store
Sugar	Sweetening Foods	Food Store

Glass bottle with stopper (roughly 1 quart size).
Small Bottle or jar with lid.
Rag or absorbent paper (paper towels, newspaper).
String or rubber bands.

PROCEDURE

1. Sulphuric Acid Must be Concentrated. If battery acid or other dilute acid is used, concentrate it by boiling until dense white fumes are given off. Container used should be of enamelware or oven glass.

> **CAUTION**
>
> Sulphuric acid will burn skin and destroy clothing. If any is spilled, wash it away with a large quantity of water. Fumes are also dangerous and should not be inhaled.

2. Remove the acid from heat and allow to cool to room temperature.

3. Pour gasoline into the large (1 quart) bottle until it is approximately 2/3 full.

4. Add concentrated sulphuric acid to gasoline slowly until the bottle is filled to within 1" to 2" from top. Place the stopper on the bottle.

5. Wash the outside of the bottle thoroughly with clear water.

> CAUTION
>
> If this is not done, the fire bottle may be dangerous to handle during use.

6. Wrap a clean cloth or several sheets of absorbent paper around the outside of the bottle. Tie with string or fasten with rubber bands.

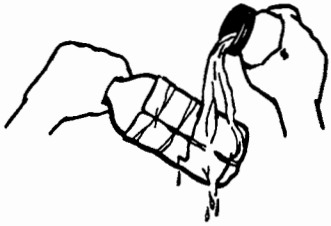
7. Dissolve 1/2 cup (100 gm) of potassium chlorate and 1/2 cup (100 gm) of sugar in one cup (250 cc) of boiling water.

8. Allow the solution to cool, pour into the small bottle and cap tightly. The cooled solution should be approx. 2/3 crystals and 1/3 liquid. If there is more liquid than this, pour off excess before using.

> CAUTION
>
> Store this bottle separately from the other bottle.

HOW TO USE

1. Shake the small bottle to mix contents and pour onto the cloth or paper around the large bottle.



Bottle can be used wet or after solution has dried. However, when dry, the sugar - Potassium chlorate mixture is very sensitive to spark or flame and should be handled accordingly.

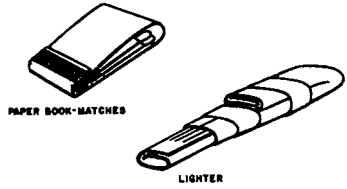
2. Throw or launch the bottle. When the bottle breaks against a hard surface (target) the fuel will ignite.

IGNITER FROM BOOK MATCHES

This is a hot igniter made from paper book matches for use with molotov cocktail and other incendiaries.

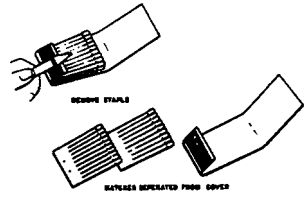
Material Required

Paper book matches.
Adhesive or friction tape.

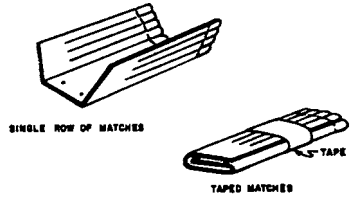


Procedure

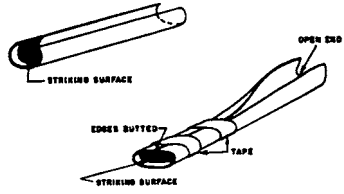
1. Remove the staple(s) from match book and separate matches from cover.



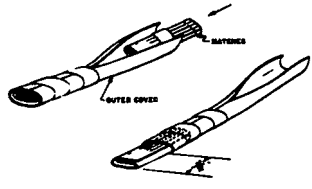
2. Fold and tape one row of matches.



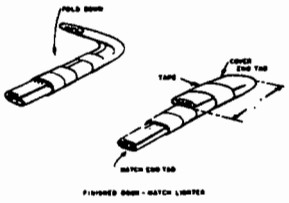
3. Shape the cover into a tube with striking surface on the inside and tape. Make sure the folded cover will fit tightly around the taped match heads. Leave cover open at opposite end for insertion of the matches.



4. Push the taped matches into the tube until the bottom ends are exposed about 3/4 in. (2 cm).

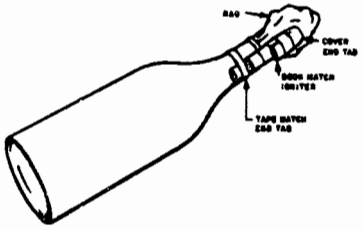


5. Flatten and fold the open end of the tube so that it laps over about 1 in. (2-1/2 cm); tape in place.



Use With Molotov Cocktail

Tape the "match end tab" of the igniter to the neck of the molotov cocktail.



Grasp the "cover end tab" and pull sharply or quickly to ignite.

General Use

The book match igniter can be used by itself to ignite flammable liquids, fuse cords and similar items requiring hot ignition.

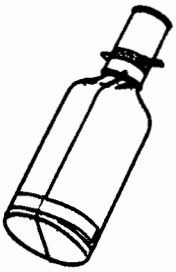
> CAUTION
>
> Store matches and completed igniters in moistureproof containers such as rubber or plastic bags until ready for use. Damp or wet paper book matches will not ignite.

MECHANICALLY INITIATED FIRE BOTTLE

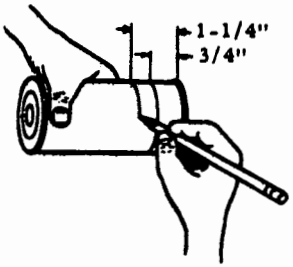
The mechanically initiated Fire Bottle is an incendiary device which ignites when thrown against a hard surface.

MATERIALS REQUIRED

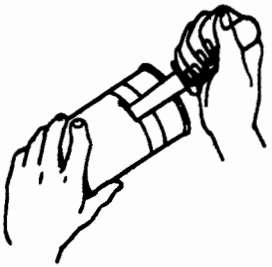
Glass jar or short neck bottle with a leakproof lid or stopper.
"Tin" can or similar container just large enough to fit over the lid of the jar.
Coil spring (compression) approximately 1/2 the diameter of the can and 1 1/2 times as long.
Gasoline
Four (4) "blue tip" matches
Flat stick or piece of metal (roughly 1/2" x 1/16" x 4")
Wire or heavy twine
Adhesive tape



PROCEDURE

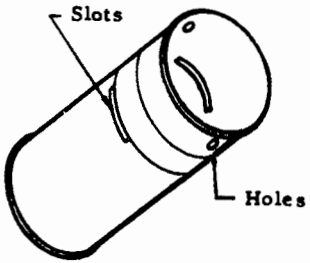


1. Draw or scratch two lines around the can - one 3/4" (19 mm) and the other 1 1/4" (30 mm) from the open end.

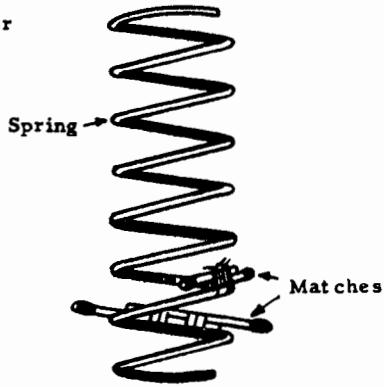


2. Cut 2 slots on opposite sides of the tin can at the line farthest from the open end. Make slots large enough for the flat stick or piece of metal to pass through.

3. Punch 2 small holes just below the rim of the open end of the can.

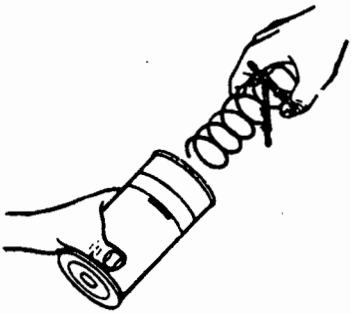


4. Tape blue tip matches together in pairs. The distance between the match heads should equal the inside diameter of the can. Two pairs are sufficient.

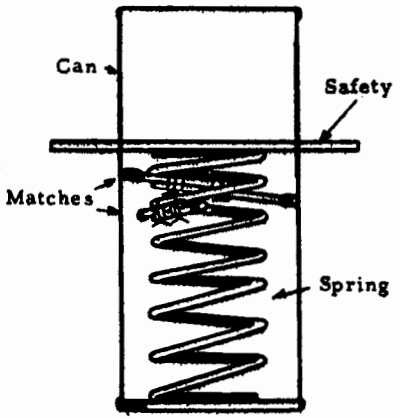


5. Attach paired matches to second and third coils of the spring, using thin wire.

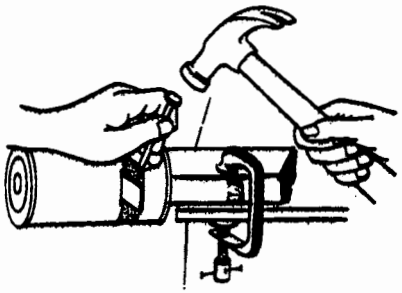
6. Insert the end of the spring opposite the matches into the tin can.



7. Compress the spring until the end with the matches passes the slot in the can. Pass the flat stick or piece of metal through slots in can to hold spring in place. This acts as a safety device.



8. Punch many closely spaced small holes between the lines marked on the can to form a striking surface for the matches. Be careful not to seriously deform can.



9. Fill the jar with gasoline and cap tightly.

10. Turn can over and place over the jar so that the safety stick rests on the lid of the jar.

11. Pass wire or twine around the bottom of the jar. Thread ends through holes in can and bind tightly to jar.

12. Tape wire or cord to jar near the bottom.

HOW TO USE

1. Carefully withdraw flat safety stick.

2. Throw jar at hard surface.

CAUTION:

DO NOT REMOVE SAFETY STICK UNTIL READY TO THROW FIRE BOTTLE.

The safety stick, when in place, prevents ignition of the fire bottle if it should accidentally be broken.

GELLED FLAME FUELS

Gelled or paste type fuels are often preferable to raw gasoline for use in incendiary devices such as fire bottles. This type fuel adheres more readily to the target and produces greater heat concentration.

Several methods are shown for gelling gasoline using commonly available materials. The methods are divided into the following categories based on the major ingredient:

4.1 Lye Systems

4.2 Lye-Alcohol Systems

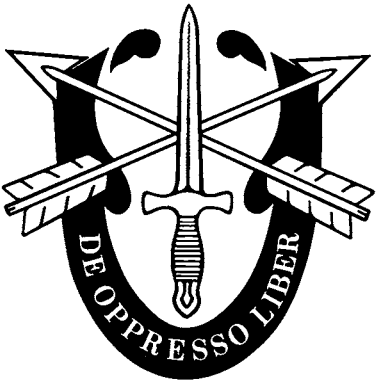
4.3 Soap-Alcohol Systems

4.4 Egg White Systems

4.5 Latex Systems

4.6 Wax Systems

4.7 Animal Blood Systems


DE OPPRESSO LIBER

GELLED FLAME FUELS

LYE SYSTEMS

Lye (also known as caustic soda or Sodium Hydroxide) can be used in combination with powdered rosin or castor oil to gel gasoline for use as a flame fuel which will adhere to target surfaces.

NOTE: This fuel is not suitable for use in the chemical (Sulphuric Acid) type of fire bottle (Section V, No.1). The acid will react with the lye and break down the gel.

MATERIALS REQUIRED:

Parts by Volume	Ingredient	How Used	Common Source
60	Gasoline	Motor fuel	Gas station or motor vehicle
2 (flake) or 1 (powder)	Lye	Drain cleaner, making of soap	Food store Drug store
15	Rosin	Manufacturing Paint & Varnish	Naval stores Industry
	or		
	Castor Oil	Medicine	Food and Drug Stores

PROCEDURE:

CAUTION: Make sure that there are no open flames in the area when mixing the flame fuel. NO SMOKING!

1. Pour gasoline into jar, bottle or other container. (DO NOT USE AN ALUMINUM CONTAINER.)

2. If rosin is in cake form, crush into small pieces.

3. Add rosin or castor oil to the gasoline and stir for about five (5) minutes to mix thoroughly.

4. In a second container (NOT ALUMINUM) add lye to an equal volume of water slowly with stirring.

CAUTION: Lye solution can burn skin and destroy clothing. If any is spilled, wash away immediately with large quantities of water.

5. Add lye solution to the gasoline mix and stir until mixture thickens (about one minute).

NOTE: The sample will eventually thicken to a very firm paste. This can be thinned, if desired, by stirring in additional gasoline.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GELLED FLAME FUELS

LYE-ALCOHOL SYSTEMS

Lye (also known as caustic soda or Sodium Hydroxide) can be used in combination with alcohol and any of several fats to gel gasoline for use as a flame fuel.

NOTE: This fuel is not suitable for use in the chemical (Sulphuric Acid) type of fire bottle (Section V, No. 1). The acid will react with the lye and break down the gel.

MATERIALS REQUIRED:

Parts by Volume	Ingredient	How Used	Common Source
60	Gasoline	Motor fuel	Gas station or motor vehicles
2 (flake) or 1 (powder)	Lye	Drain cleaner Making of soap	Food store Drug store
3	Ethyl Alcohol	Whiskey Medicine	Liquor store Drug store

NOTE: Methyl (wood) alcohol or isopropyl (rubbing) alcohol can be substituted for ethyl alcohol, but their use produces softer gels.

14	Tallow	Food Making of soap	Fat rendered by cooking the meat or suet of animals.

NOTE: The following can be substituted for the tallow:

(a) Wool grease (Lanolin) (very good) -- Fat extracted from sheep wool.
(b) Castor oil (good).
(c) Any vegetable oil (corn, cottonseed, peanut, linseed, etc.)
(d) Any fish oil
(e) Butter or oleomargarine

It is necessary when using substitutes (c) to (e) to double the given amount of fat and of lye for satisfactory bodying.

PROCEDURE:

CAUTION: Make sure that there are no open flames in the area when mixing flame fuels. NO SMOKING!

1. Pour gasoline into bottle, jar or other container. (DO NOT USE AN ALUMINUM CONTAINER).

2. Add Tallow (or substitute) to the gasoline and stir for about 1/2 minute to dissolve fat.

3. Add alcohol to the gasoline mixture.

4. In a separate container (NOT ALUMINUM) slowly add lye to an equal amount of water. Mixture should be stirred constantly while adding lye.

CAUTION: Lye solution can burn skin and destroy clothing. If any is spilled, wash away immediately with large quantities of water.

5. Add lye solution to the gasoline mixture and stir occasionally until thickened (about 1/2 hour).

NOTE: The mixture will eventually (1 to 2 days) thicken to a very firm paste. This can be thinned, if desired, by stirring in additional gasoline.

GELLED FLAME FUELS

SOAP-ALCOHOL SYSTEM

Common household soap can be used in combination with alcohol to gel gasoline for use as a flame fuel which will adhere to target surfaces.

MATERIAL REQUIRED:

Parts by Volume	Ingredient	How Used	Common Source
36	Gasoline	Motor fuel	Gas station, Motor vehicles
1	Ethyl Alcohol	Whiskey Medicine	Liquor store Drug store
	NOTE: Methyl (wood) or isopropyl (rubbing) alcohols can be substituted for the whiskey.		
20 (powdered) or 28 (flake)	Laundry soap	Washing clothes	Stores

NOTE: Unless the word "soap" actually appears somewhere on the container or wrapper, a washing compound is probably a detergent. These Can Not Be Used.

PROCEDURE:

CAUTION: Make sure that there are no open flames in the area when mixing flame fuels. NO SMOKING!

1. If bar soap is used, carve into thin flakes using a knife.

2. Pour alcohol and gasoline into a jar, bottle or other container and mix thoroughly.

3. Add soap powder or flakes to gasoline-alcohol mix and stir occasionally until thickened (about 15 minutes).


DE OPPRESSO LIBER

GELLED FLAME FUELS

EGG SYSTEMS

The white of any bird egg can be used to gel gasoline for use as a flame fuel which will adhere to target surfaces.

MATERIALS REQUIRED:

Parts by Volume	Ingredient	How Used	Common Source
85	Gasoline	Motor fuel Stove fuel Solvent	Gas station Motor vehicles
14	Egg Whites	Food Industrial processes	Food store Farms
Any One Of The Following:			
1	Table Salt	Food Industrial processes	Sea water Natural brine Food store
3	Ground Coffee	Food	Coffee plant Food store
3	Dried Tea Leaves	Food	Tea plant Food store
3	Cocoa	Food	Cacao tree Food store
2	Sugar	Sweetening foods Industrial processes	Sugar cane Food store
1	Saltpeter (Niter) (Potassium Nitrate)	Pyrotechnics Explosives Matches Medicine	Natural Deposits Drug store
1	Epsom salts	Medicine Mineral water Industrial processes	Natural deposits Kieserite Drug store Food store
2	Washing soda (Sal soda)	Washing cleaner Medicine Photography	Food store Drug store Photo supply store

Parts by Volume	Ingredient	How Used	Common Source
1 1/2	Baking Soda	Baking Manufacture of: Beverages, Mineral waters and Medicines	Food store Drug store
1 1/2	Aspirin	Medicine	Drug store Food store

PROCEDURE:

CAUTION: Make sure that there are no open flames in the area when mixing flame fuels. NO SMOKING!

1. Separate egg white from yolk. This can be done by breaking the egg into a dish and carefully removing the yolk with a spoon.

NOTE: DO NOT GET THE YELLOW EGG YOLK MIXED INTO THE EGG WHITE. If egg yolk gets into the egg white, discard the egg.

2. Pour egg white into a jar, bottle, or other container and add gasoline.

3. Add the salt (or other additive) to the mixture and stir occasionally until gel forms (about 5 to 10 minutes).

NOTE: A thicker gelled flame fuel can be obtained by putting the capped jar in hot (65°C) water for about 1/2 hour and then letting them cool to room temperature. (DO NOT HEAT THE GELLED FUEL CONTAINING COFFEE).

GELLED FLAME FUELS

LATEX SYSTEMS

Any milky white plant fluid is a potential source of latex which can be used to gel gasoline

MATERIALS REQUIRED:

Ingredient	How Used	Common Source
Gasoline	Motor fuel Solvent	Gas station Motor vehicle
Latex, commerical or natural	Paints Adhesives	Natural from tree or plant Rubber cement
One of the Following Acids:		
Acetic Acid (Vinegar)	Salad dressing Developing film	Food stores Fermented apple cider Photographic supply
Sulfuric Acid (Oil of Vitriol)	Storage batteries Material processing	Motor vehicles Industrial plants
Hydrochloric Acid (Muriatic Acid)	Petroleum wells Pickling and metal cleaning Industrial processes	Hardware store Industrial plants

NOTE: If acids are not available, use acid salt (alum, sulfates and chlorides other than sodium or potassium). The formic acid from crushed red ants can also be used.

PROCEDURE:

CAUTION: Make sure that there are no open flames in the area when mixing flame fuels. NO SMOKING!

1. With Commercial Rubber Latex:

a. Place 7 parts by volume of latex and 92 parts by volume of gasoline in bottle. Cap bottle and shake to mix well.

b. Add 1 part by volume vinegar (or other acid) and shake until gel forms.

CAUTION: Concentrated acids will burn skin and destroy clothing. If any is spilled, wash away immediately with large quantities of water.

2. With Natural Latex:

a. Natural latex should form lumps as it comes from the plant. If lumps do not form, add a small amount of acid to the latex.

b. Strain off the latex lumps and allow to dry in air.

c. Place 20 parts by volume of latex in bottle and add 80 parts by volume of gasoline. Cover bottle and allow to stand until a swollen gel mass is obtained (2 to 3 days).

GELLED FLAME FUELS

WAX SYSTEMS

Any of several common waxes can be used to gel gasoline for use as a flame fuel which will adhere to target surfaces.

MATERIALS REQUIRED:

Parts by Volume	Ingredient	How Used	Common Source
80	Gasoline	Motor fuel Solvent	Gas station Motor vehicles
Any one of the following:			
20	Ozocerite Mineral wax Fossil wax Ceresin wax	Leather polish Sealing wax Candles Crayons Waxed paper Textile sizing	Natural deposits General stores Department store
	Beeswax	Furniture and floor waxes Artificial fruit and flowers Lithographing Wax paper Textile finish Candles	Honeycomb of bee General store Department store
	Bayberry wax Myrtle wax	Candles Soaps Leather polish Medicine	Natural form Myrica berries General store Department store Drug store

PROCEDURE:

1. Obtaining wax from Natural Sources: Plants and berries are potential sources of natural waxes. Place the plants and/or berries in boiling water. The natural waxes will melt. Let the water cool. The natural waxes will form a solid layer on the water surface. Skim off the solid wax and let it dry. With natural waxes which have suspended matter when melted, screen the wax through a cloth.

2. Melt the wax and pour into jar or bottle which has been placed in a hot water bath.

3. Add gasoline to the bottle.

4. When wax has completely dissolved in the gasoline, allow the water bath to cool slowly to room temperature.

NOTE: If a gel does not form, add additional wax (up to 40% by volume) and repeat the above steps. If no gel forms with 40% wax, make a Lye solution by dissolving a small amount of Lye (Sodium Hydroxide) in an equal amount of water. Add this solution (1/2% by volume) to the gasoline wax mix and shake bottle until a gel forms

GELLED FLAME FUELS

ANIMAL BLOOD SYSTEMS

Animal blood can be used to gel gasoline for use as a flame fuel which will adhere to target surfaces.

MATERIAL REQUIRED:

Parts by Volume	Ingredient	How Used	Common Source
68	Gasoline	Motor fuel Solvent	Gas station Motor vehicles
30	Animal blood Serum	Food Medicine	Slaughter House Natural habitat
Any one of the following:			
2	Salt	Food Industrial processes	Sea Water Natural brine Food store
	Ground Coffee	Food Caffeine source Beverage	Coffee plant Food store
	Dried Tea Leaves	Food Beverage	Tea plant Food store
	Sugar	Sweetening foods Industrial processes	Sugar cane Food store
	Lime	Mortar Plaster Medicine Ceramics Steel making Industrial processes	From calcium carbonate Hardware store Drug store Garden supply store
	Baking soda	Baking Beverages Medicine Industrial processes	 Food store Drug store
	Epsom salts	Medicine Mineral water Industrial processes	Drug store Natural deposits Food store

PROCEDURE:

1. **Preparation of animal blood serum:**

   a. **Slit animal's throat by jugular vein. Hang up-side down to drain.**

   b. **Place coagulated (lumpy) blood in a cloth or on a screen and catch the red fluid (serum) which drains through.**

   c. **Store in cool place if possible.**

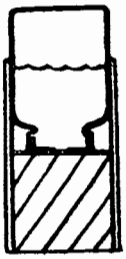
CAUTION: Do not get aged animal blood or the serum into an open cut. This can cause infections.

2. **Pour blood serum into jar, bottle, or other container and add gasoline.**

3. **Add the salt (or other additive) to the mixture and stir until a gel forms.**

ACID DELAY INCENDIARY

This device will ignite automatically after a given time delay.



MATERIAL REQUIRED:

Small jar with cap
Cardboard
Adhesive tape
Potassium Chlorate
Sugar
Sulphuric Acid (Battery Acid)
Rubber sheeting (automotive inner tube)

PROCEDURE:

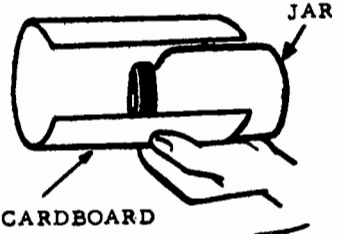
1. Sulphuric acid must be concentrated. If battery acid or other dilute acid is used, concentrate it by boiling. Container used should be of enamelware or oven glass. When dense white fumes begin to appear, immediately remove the acid from heat and allow to cool to room temperature.

CAUTION: Sulphuric acid will burn skin and destroy clothing. If any is spilled, wash it away with a large quantity of water. Fumes are also dangerous and should not be inhaled.

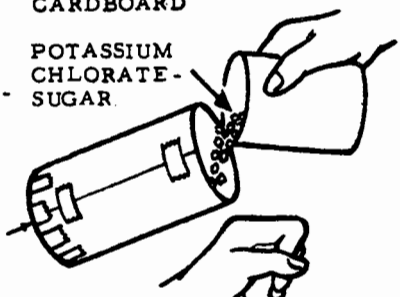
2. Dissolve one part by volume of Potassium Chlorate and one part by volume of sugar in two parts by volume of boiling water.

3. Allow the solution to cool. When crystals settle, pour off and discard the liquid.

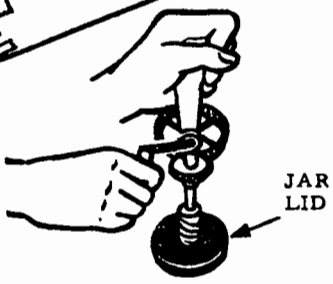
4. Form a tube from cardboard just large enough to fit around the outside of the jar and 2 to 3 times the height of the jar. Tape one end of the tube closed.



5. Pour wet Potassium Chlorate-sugar crystals into the tube until it is about 2/3 full. Stand the tube aside to dry.



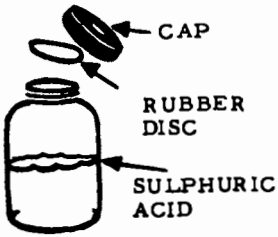
6. Drill a hole through the cap of the jar about 1/2 inch (1 1/4 cm) in diameter.



7. Cut a disc from rubber sheet so that it just fits snugly inside the lid of the jar.

8. Partly fill jar with water, cover with rubber disc and cap tightly with the drilled lid. Invert bottle and allow to stand for a few minutes to make sure that there are no leaks. THIS IS EXTREMELY IMPORTANT.

9. Pour water from jar and fill about 1/3 full with concentrated sulphuric acid. Replace the rubber disc and cap tightly.

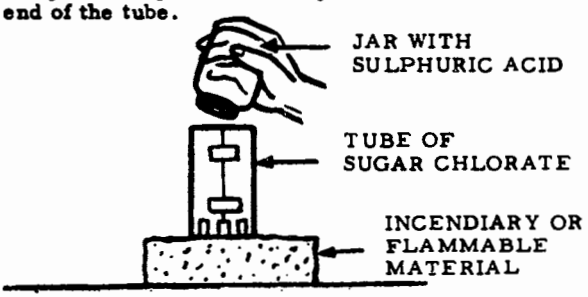


IMPORTANT: Wash outside of jar thoroughly with clear water. If this is not done, the jar may be dangerous to handle during use.

HOW TO USE:

1. Place the tube containing the Sugar Chlorate crystals on an incendiary or flammable material taped end down.

2. Turn the jar of sulphuric acid cap end down and slide it into the open end of the tube.



After a time delay, the acid will eat through the rubber disc and ignite the sugar chlorate mix. The delay time depends upon the thickness and type of rubber used for the disc. Before using this device, tests should be conducted to determine the delay time that can be expected.

NOTE: A piece of standard automobile inner tube (about 1/32" thick) will provide a delay time of approximately 45 minutes.

Section V
No. 6

IMPROVISED WHITE FLARE

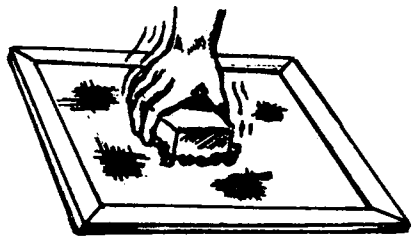
An improvised white flare can be made from potassium nitrate, aluminum powder and shellac. It has a time duration of approximately 2 minutes.

MATERIALS REQUIRED:	SOURCE:
Potassium nitrate	Field grade (Section I, No. 2) Drug Store
Aluminum powder (bronzing)	Hardware or paint store
Shellac	Hardware or paint store
Quart jar with lid	
Fuse, 15 in. long	
Wooden rod, 1/4 in. diameter	
Tin can, 2-1/2 in. diameter x 5 in. long	
Flat window screen	
Wooden block	

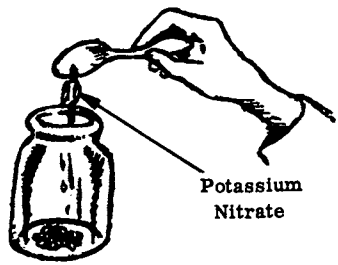
NOTE: All of the above dimensions are approximate.

PROCEDURE:

1. Place the potassium nitrate crystals on the screen. Rub the material back and forth against the screen mesh with the wooden block until the nitrate is granulated into a powder.



2. Measure 21 tablespoons of the powdered nitrate into a quart jar. Add 21 tablespoons of the aluminum powder to the nitrate.

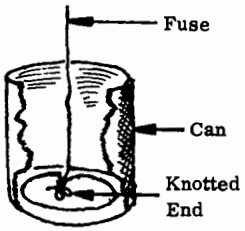


3. Place lid on the jar and shake ingredients vigorously until well mixed.

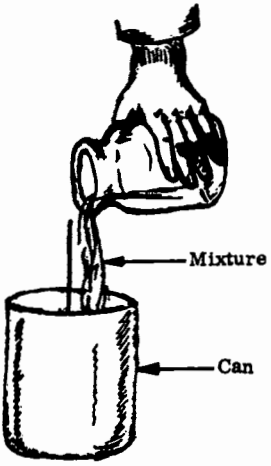
4. Add 12 tablespoons of shellac to the mixture and stir with the wooden rod. Store mixture until ready for Step 7.

5. Knot one end of the fuse.

6. Wrap the knotted end of the fuse once around the inside bottom of the can with the knot at the center. Then, run the rest of the fuse out the center top of the can.



7. Pour the mixture in the can and around the fuse.



8. Store flare mixture away from heat and flame until ready for use, but no longer than 3 weeks.


DE OPPRESSO LIBER

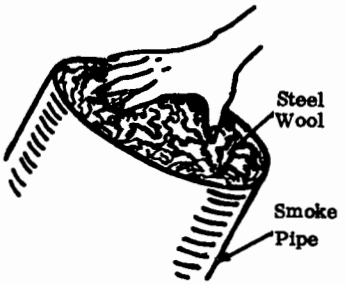
IMPROVISED IRON OXIDE

Iron Oxide can be made from steel wool. It is used in the preparation of Improvised Yellow Flare (Section V, No. 8), Improvised White Smoke Munition (Section V, No. 9) and Improvised Black Smoke Munition (Section V, No. 10).

MATERIAL REQUIRED:	SOURCE:
Steel wool (without soap), approx. 16 large pads	Hardware or general store
Smoke pipe, approximately 4 feet long x 12 inches in diameter, 1/16 inches thick	Hardware store
Vacuum cleaner	Hardware store
Electrical source (110 v., A. C.)	Modern commercial and domestic buildings
Window screen	
Newspaper	
2 containers	
Wooden blocks, if necessary	
Flame source (matches, lighter, etc.)	

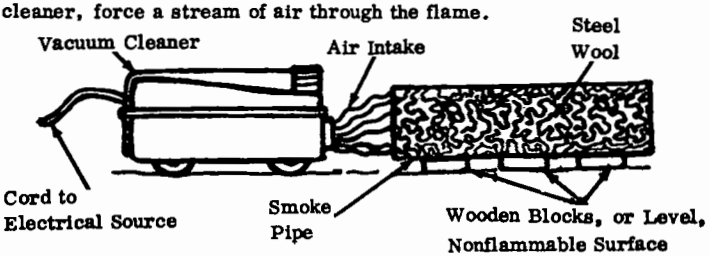
PROCEDURE:

1. Separate a handful of steel wool into a fluffy ball approximately 12 inches in diameter and place into one end of the smoke pipe.



2. Place the pipe on a level, nonflammable surface. Steady the pipe, using wooden blocks if necessary.

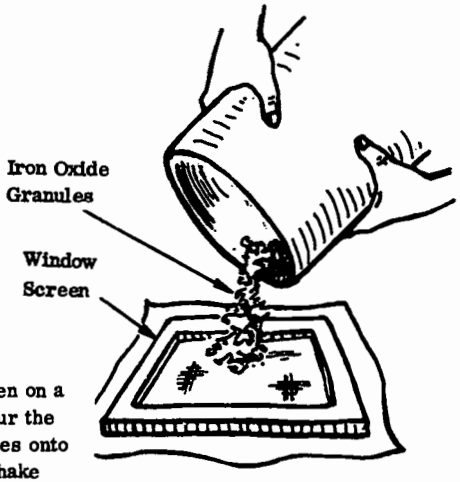
3. Ignite the steel wool with the flame source and, with the vacuum cleaner, force a stream of air through the flame.



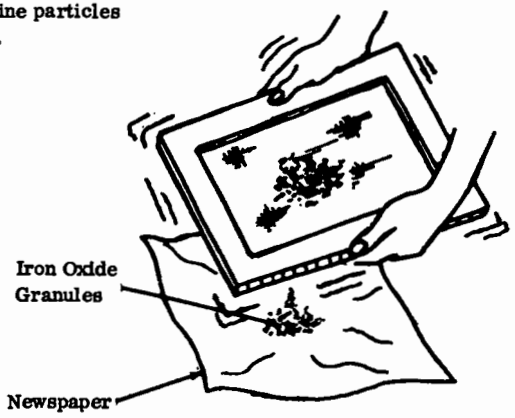
NOTE: The forced air provided by the vacuum cleaner aids in the burning of the steel wool. If the steel wool does not completely burn, more separation of the wool is needed.

4. When the steel wool has almost completely burned, add another handful of the fluffed steel wool (Step No. 1).

5. Continue adding to the flame a single handful of fluffed wool at a time until a sufficient amount of iron oxide granules have accumulated in the stove pipe.



6. Place a window screen on a sheet of newspaper. Pour the burned steel wool granules onto the window screen and shake screen until all the fine particles have passed through.



7. Discard those particles on the newspaper which are fibrous and unburned.

8. Save the particles which were too large to pass through the screen in one of the containers for future burning.

9. Store particles of iron oxide (left on newspaper) in another container until ready for use.


DE OPPRESSO LIBER

Section V
No. 8

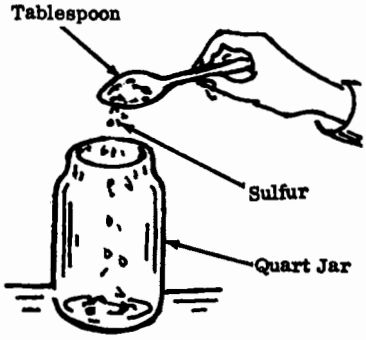
IMPROVISED YELLOW FLARE

A yellow flare can be made from shellac, sulfur, aluminum powder, iron oxide and baking soda. It can be used either for signaling or lighting up a dark area.

MATERIALS REQUIRED:	SOURCES:
Shellac	Hardware or paint store
Sulfur	Drug or agricultural supply store
Aluminum powder (bronzing)	Hardware or paint store
Black iron oxide	Section V, No. 7
Sodium bicarbonate (baking soda)	Food store
Improvised white flare mix	Section V, No. 6
Window Screen	
Wooden rod or stick	
Tablespoon	
Quart jar with lid	
Newspaper	
Wooden block	
Fuse, 15 inches long	
Tin can, 2-1/2 inches diameter x 5 inches long	
Aluminum foil	
Flame source (matches, lighter, etc.)	

PROCEDURE:

1. Measure 6 firm level tablespoons of sulfur into a quart jar.

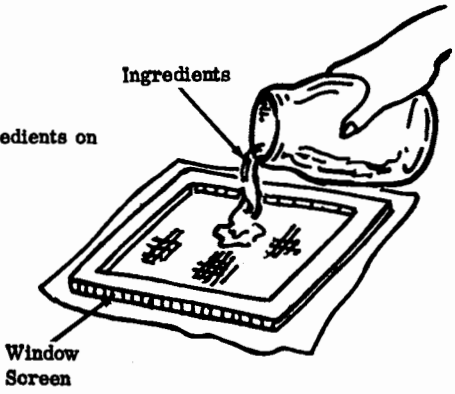


2. Add 7 firm level tablespoons of sodium bicarbonate to the sulfur.

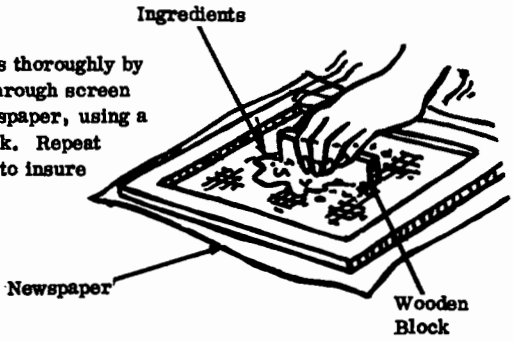
3. Add 2 heaping tablespoons of black iron oxide.

4. Place the lid on the quart jar and shake ingredients 10 times.

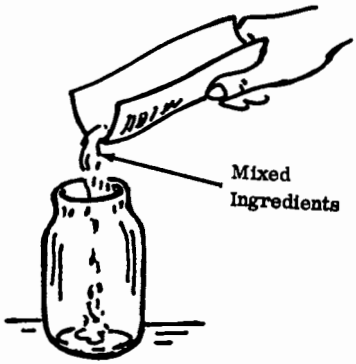
5. Place the mixed ingredients on the window screen.



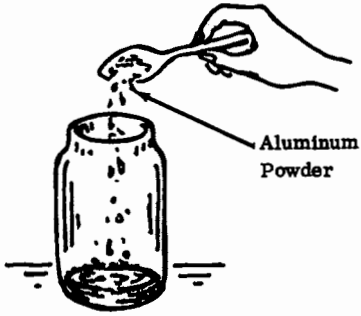
6. Mix ingredients thoroughly by forcing material through screen mesh onto the newspaper, using a wooden rod or stick. Repeat screening 2 times to insure thorough mixing.



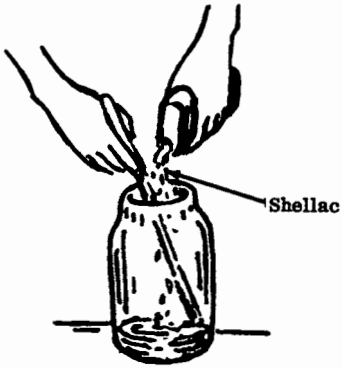
7. Pour mixed ingredients back into the jar.



8. Add 20 heaping tablespoons of aluminum powder to the ingredients.



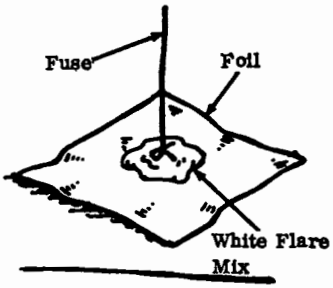
9. Add while stirring the least amount of shellac needed to moisten mixture.



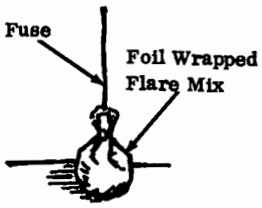
10. Force moistened mix through screen mesh onto the newspaper as in Step 6. Store mixture until ready for Step 14.

11. Measure one heaping teaspoon of white flare mix onto a 4 inch square piece of aluminum foil.

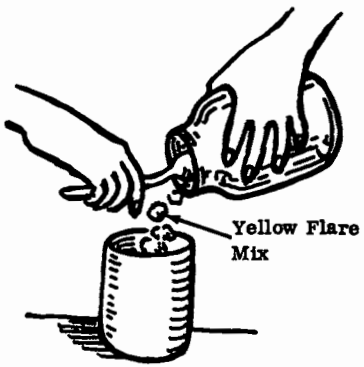
12. Knot one end of the fuse and place the knot onto the mix.



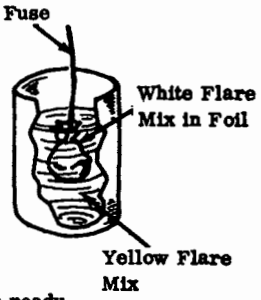
13. Fold the corners of the foil tightly around the fuse.



14. Now place the yellow flare mix into the can.



15. Place the fused white flare mix in the foil below the surface of the yellow flare mix in the can.



16. Light the fuse with the flame source when ready.


DE OPPRESSO LIBER

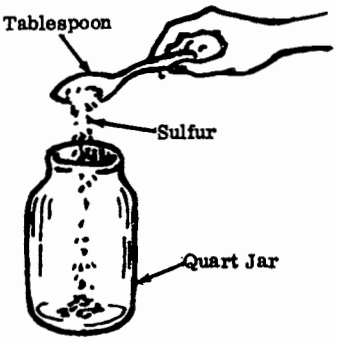
Section V
No. 9

IMPROVISED WHITE SMOKE MUNITION

A white smoke munition can be made from sulfur, potassium nitrate, black powder, aluminum powder, iron oxide and carbon tetrachloride. It can be used either for signaling or screening.

MATERIAL REQUIRED:	SOURCE:
Sulfur	Drug or agricultural supply store
Potassium nitrate (Saltpeter)	Drug store or Section I, No. 2
Improvised black powder	Section I, No. 3
Aluminum powder (bronzing)	Hardware or paint store
Black iron oxide	Section V, No. 7
Carbon tetrachloride	Hardware or paint store
Improvised white flare mix	Section V, No. 6
Tablespoon	
Wooden rod or stick	
Newspaper	
Quart jar with lid	
Window screen	
Fuse, 15 inches long	
Tin can, 2-1/2 inches diameter x 5 inches long	
Flame source (matches, lighter, etc.)	

PROCEDURE:



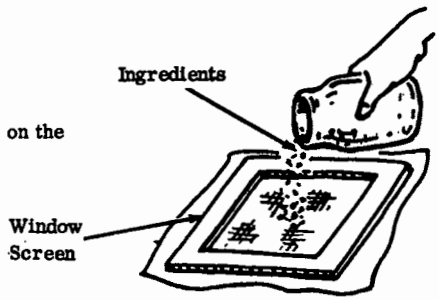
1. Measure 3 level tablespoons of powdered dry sulfur into the quart jar.

2. Add 4 level tablespoons of powdered dry potassium nitrate to th sulfur.

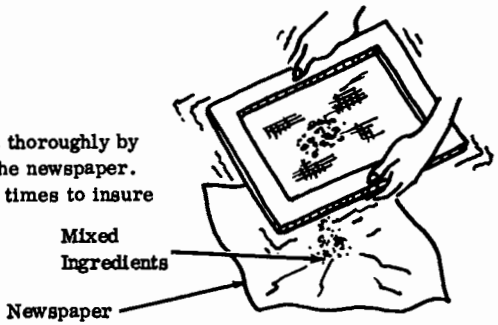
NOTE: It may be necessary to crush the potassium nitrate crystals and sulfur to obtain an accurate measure in tablespoon.

3. Add 2 heaping tablespoons of black iron oxide.

4. Place all ingredients on the window screen.



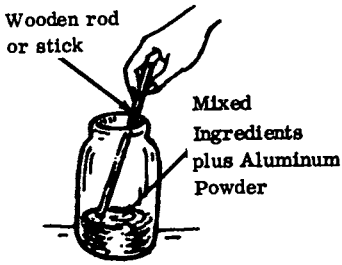
5. Mix ingredients thoroughly by sieving them onto the newspaper. Repeat screening 3 times to insure thorough mixing.



6. Pour mixed ingredients back into the jar.

7. Screw lid onto the quart jar and shake vigorously until the ingredients are evenly mixed.

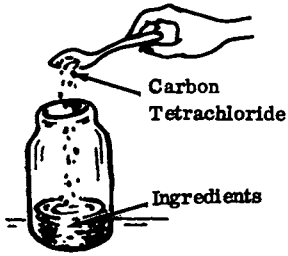
8. Remove lid from quart jar and add 15 heaping tablespoons of aluminum powder (bronzing) to the ingredients. Mix thoroughly with wooden rod or stick.



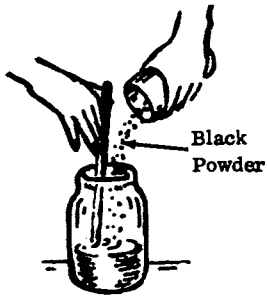
NOTE: If the white smoke mixture is not for immediate use, screw the lid back onto the jar tightly and store until ready for use. If mixture is for immediate use, continue with the following steps.

9. Wet mix the ingredients to a paste consistency with carbon tetrachloride.

CAUTION: Fumes of Carbon Tetrachloride are hazardous. Perform Step 10 in a well ventilated area.



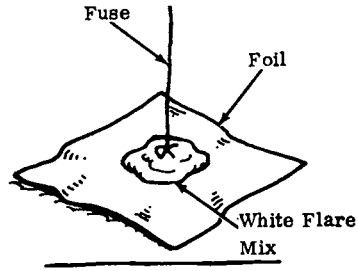
10. Add 1/2 cup of black powder to the ingredients and carefully mix with wooden rod or stick.



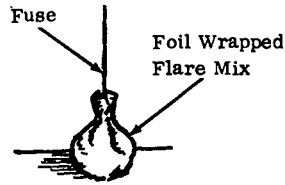
HOW TO USE:

1. Measure one heaping teaspoon of white flare mix onto a 4 inch square piece of aluminum foil.

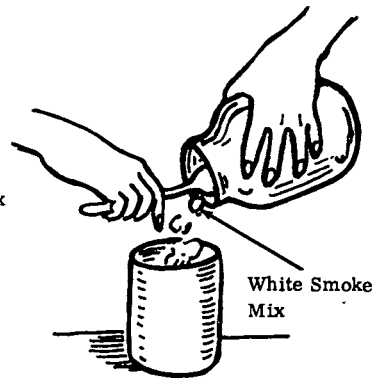
2. Knot one end of the fuse and place the knot into the mix.



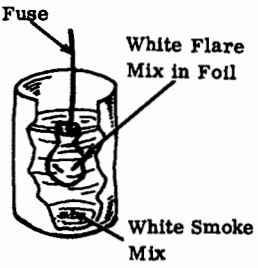
3. Fold the corners of the foil tightly around the fuse.



4. Now place the white smoke mix into the can.



5. Place the fused white flare mix in the foil below the surface of the white smoke mix in the can.



6. Light the fuse with the flame source when ready.

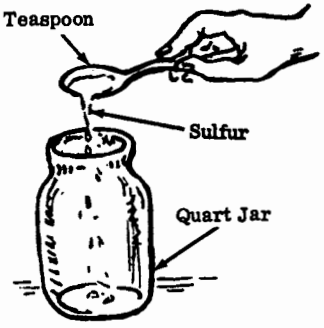

DE OPPRESSO LIBER

IMPROVISED BLACK SMOKE MUNITION

A black smoke munition can be made from sulfur, aluminum powder, iron oxide, moth crystals and carbon tetrachloride. It can be used either for signaling or screening.

MATERIAL REQUIRED:	SOURCES:
Sulfur	Drug store
Aluminum powder (bronzing)	Paint or hardware store
Improvised black iron oxide	Section V, No. 7
Moth crystals (paradichlorobenzene)	Hardware store
Carbon tetrachloride	Paint or hardware store
Improvised white flare mix	Section V, No. 6
Table salt	Food store
Teaspoon	
Tablespoon	
Quart jar or container	
Wooden rod or stick	
Wooden block	
Window screen	
Newspaper	
Fuse, 15 in. long	
Tin can, 2-1/2 in. diameter x 5 in. long	
Aluminum foil	
Flame source (matches, lighter, etc.)	

PROCEDURE:

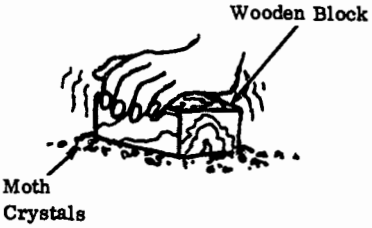


1. Measure 3 level teaspoons of sulfur into a quart jar.

2. Add 1 heaping tablespoon of improvised iron oxide to the sulfur.

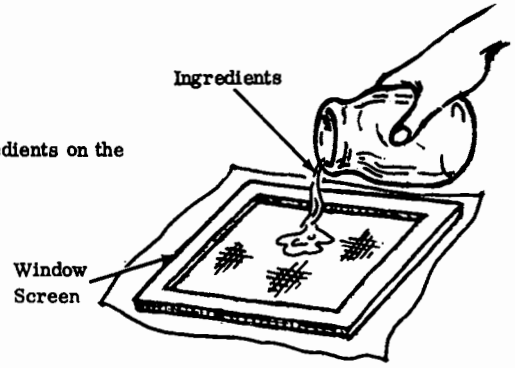
3. Add 2 level teaspoons of table salt.

4. Crush 5 heaping tablespoons of moth crystal into a fine powder using a wooden block.

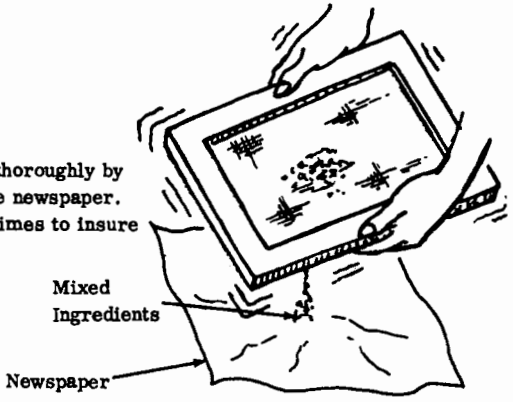


5. Add 4 heaping tablespoons of powdered moth crystals to the other ingredients in jar.

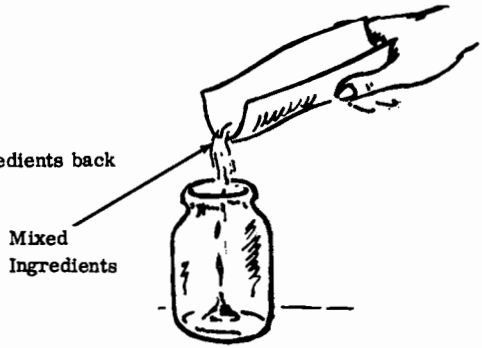
6. Place all ingredients on the window screen.



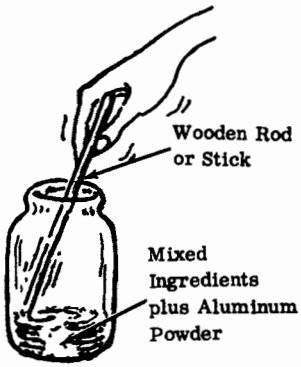
7. Mix ingredients thoroughly by sieving them onto the newspaper. Repeat screening 3 times to insure thorough mixing.



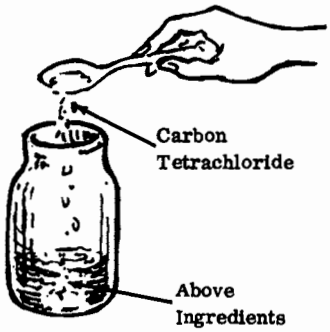
8. Pour mixed ingredients back into the jar.



9. Add 12 heaping tablespoons of aluminum powder to the ingredients and mix by stirring with wooden rod or stick.



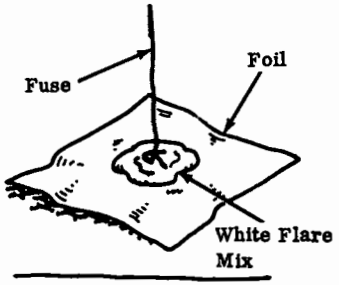
10. Just before use as a black smoke, wet mix the above ingredients to a paste consistency with carbon tetrachloride.



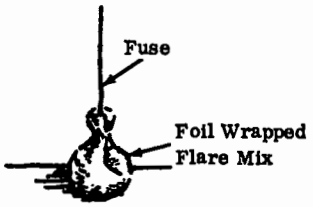
CAUTION: Fumes of Carbon Tetrachloride are hazardous. Perform Step 10 in a well ventilated area.

HOW TO USE:

1. Measure one heaping teaspoon of white flare mix onto a 4 inch square piece of aluminum foil.



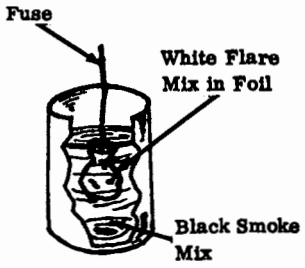
2. Knot one end of the fuse and place the knot into the mix.



3. Fold the corners of the foil tightly around the fuse.

4. Now place the black smoke mix into the can.

5. Place the fused white flare mix in the foil below the surface of the black smoke mix in the can.



6. Light the fuse with the flame source when ready.

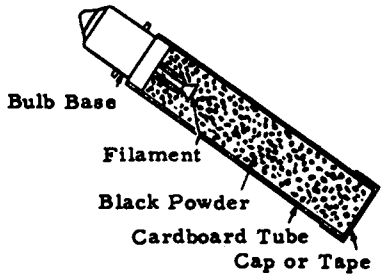

DE OPPRESSO LIBER

ELECTRIC BULB INITIATOR

Mortars, mines and similar weapons often make use of electric initiators. An electric initiator can be made using a flashlight or automobile electric light bulb.

MATERIAL REQUIRED

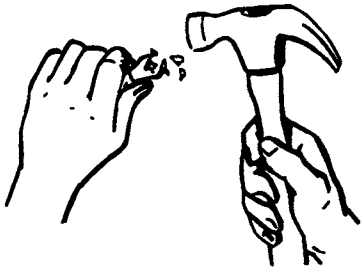
Electric light bulb and
mating socket
Cardboard or heavy paper
Black Powder
Adhesive tape



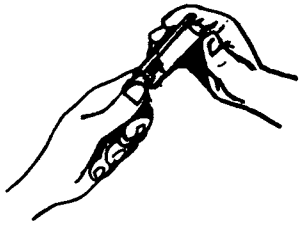
PROCEDURE

Method I

1. Break the glass of the electric light bulb. Take care not to damage the filament. The initiator will NOT work if the filament is broken. Remove all glass above the base of the bulb.

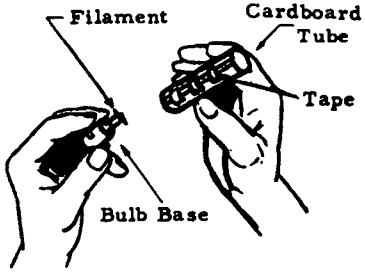


2. Form a tube 3 to 4 inches long from cardboard or heavy paper to fit around the base of the bulb. Join the tube with adhesive tape.



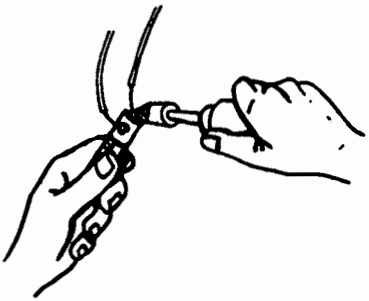
3. Fit the tube to the bulb base and tape in place.

Make sure that the tube does not cover that portion of the bulb base that fits into the socket.

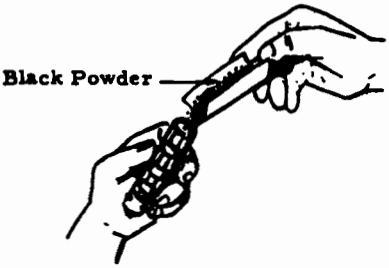


4. If no socket is available for connecting the initiator to the firing circuit, solder the connecting wires to the bulb base.

CAUTION: Do NOT use a hot soldering iron on the completed igniter since it may ignite the Black Powder.



5. Fill the tube with Black Powder and tape the open end of the tube closed.

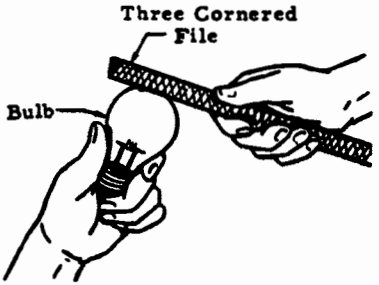


Method II

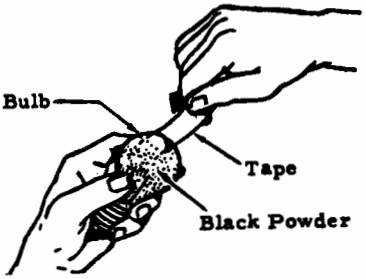
If the glass bulb (electric light) is large enough to hold the Black Powder, it can be used as the container.

PROCEDURE

1. File a small hole in the top of the bulb.



2. Fill the bulb with Black Powder and tape the hole closed.

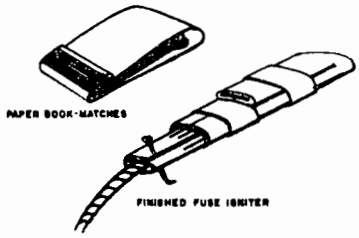


FUSE IGNITER FROM BOOK MATCHES

A simple, reliable fuse igniter can be made from paper book matches.

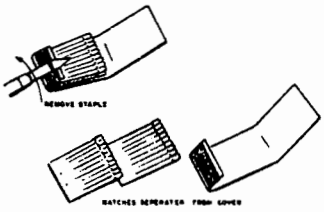
Material Required

Paper book matches.
Adhesive or friction tape.
Fuse cord (improvised or commercial).
Pin or small nail.

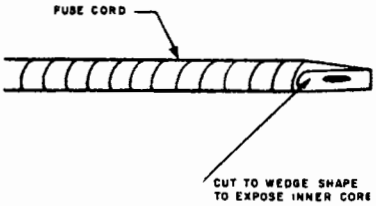


Procedure

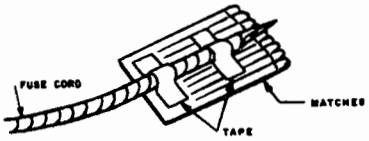
1. Remove the staple(s) from match book and separate matches from cover.



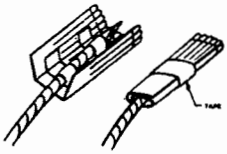
2. Cut fuse cord so that inner core is exposed.



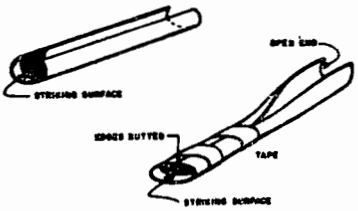
3. Tape exposed end of fuse cord in center of one row of matches.



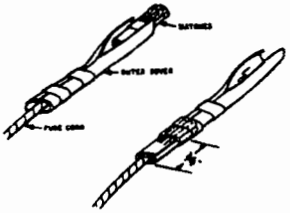
4. Fold matches over fuse and tape.



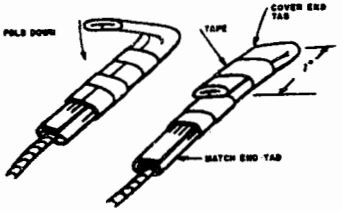
5. Shape the cover into a tube with the striking surface on the inside and tape. Make sure the edges of the cover at the striking end are butted. Leave cover open at opposite end for insertion of the matches.



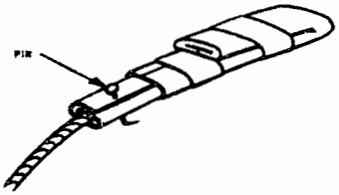
6. Push the taped matches with fuse cord into the tube until the bottom ends of the matches are exposed about 3/4 inch (2 cm).



7. Flatten and fold the open end of the tube so that it laps over about 1 inch (2-1/2 cm); tape in place.



8. Push pin or small nail through matches and fuse cord. Bend end of pin or nail.



Method of Use

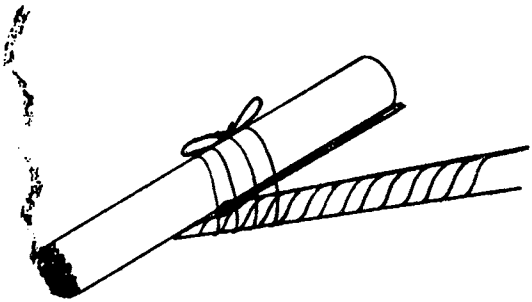
To light the fuse cord, the igniter is held by both hands and pulled sharply or quickly.

CAUTION

Store matches and completed fuse igniters in moistureproof containers such as plastic or rubber type bags until ready for use. Damp or wet paper book matches will not ignite. Fuse lengths should not exceed 12 in. (30 cm) for easy storage. These can be spliced to main fuses when needed.

DELAY IGNITER FROM CIGARETTE

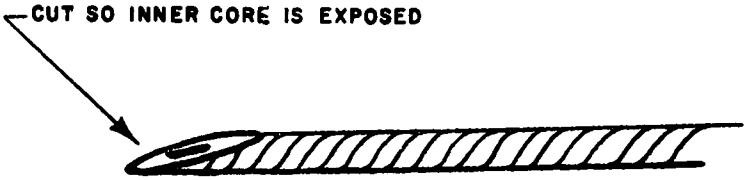
A simple and economical time delay can be made with a common cigarette.



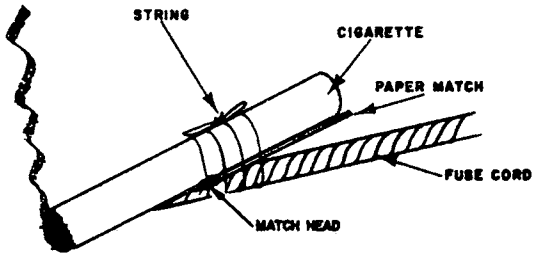
Materials Required

Cigarette.
Paper match.
String (shoelace or similar cord).
Fuse cord (improvised or commercial).

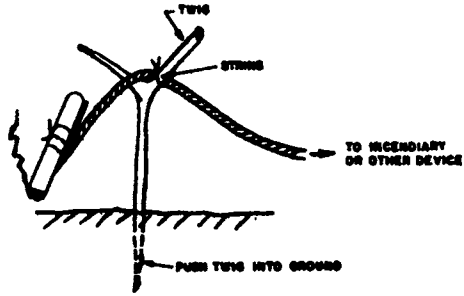
Procedure



1. Cut end of fuse cord to expose inner core.



2. Light cigarette in normal fashion. Place a paper match so that the head is over exposed end of fuse cord and tie both to the side of the burning cigarette with string.



3. Position the burning cigarette with fuse so that it burns freely. A suggested method is to hang the delay on a twig.

NOTE

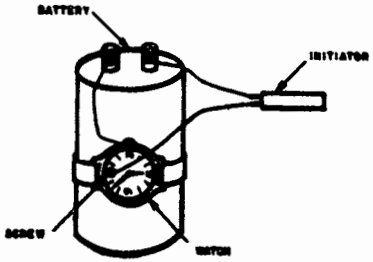
Common dry cigarettes burn about 1 inch every 7 or 8 minutes in still air. If the fuse cord is placed 1 inch from the burning end of a cigarette a time delay of 7 or 8 minutes will result.

Delay time will vary depending upon type of cigarette, wind, moisture, and other atmospheric conditions.

To obtain accurate delay time, a test run should be made under "use" conditions.

WATCH DELAY TIMER

A time delay device for use with electrical firing circuits can be made by using a watch with a plastic crystal.



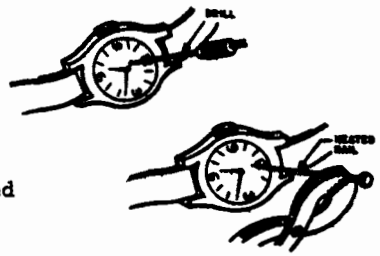
Material and Equipment Required

Watch with plastic crystal.
Small clean metal screw.
Battery.
Connecting wires.
Drill or nail.

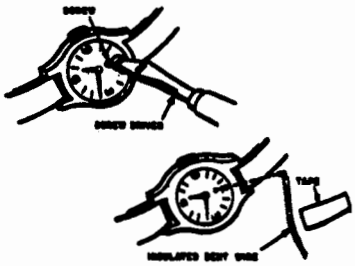
Procedure

1. If watch has a sweep or large second hand, remove it. If delay time of more than one hour is required, also remove the minute hand. If hands are painted, carefully scrape paint from contact edge with knife.

2. Drill a hole through the crystal of the watch or pierce the crystal with a heated nail. The hole must be small enough that the screw can be tightly threaded into it.



3. Place the screw in the hole and turn down as far as possible without making contact with the face of the watch. If screw has a pointed tip, it may be necessary to grind the tip flat.



If no screw is available, pass a bent stiff wire through the hole and tape to the crystal.

IMPORTANT:	Check to make sure hand of watch cannot pass screw or wire without contacting it.

How to Use

1. Set the watch so that a hand will reach the screw or wire at the time you want the firing circuit completed.

2. Wind the watch.

3. Attach a wire from the case of the watch to one terminal of the battery.

4. Attach one wire from an electric initiator (blasting cap, squib, or alarm device) to the screw or wire on the face of the watch.

5. After thorough inspection is made to assure that the screw or the wire connected to it is not touching the face or case of the watch, attach the other wire from the initiator to the second terminal of the battery.

CAUTION
Follow step 5 carefully to prevent premature initiation.

NO-FLASH FUSE IGNITER

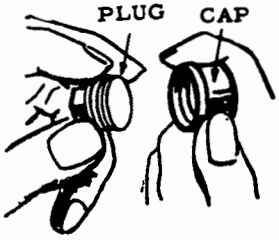
A simple no-flash fuse igniter can be made from common pipe fittings.

MATERIAL REQUIRED:

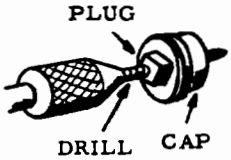
1/4 in. (6mm) Pipe Cap
Solid 1/4 in. (6mm) Pipe Plug
Flat head nail about 1/16 in. (1 1/2 mm) in diameter
Hand Drill
Common "Strike Anywhere" Matches
Adhesive Tape

PROCEDURE:

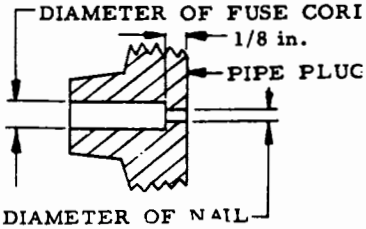
1. Screw the pipe plug tightly into the pipe cap.



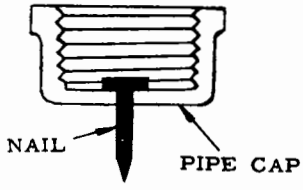
2. Drill hole completely through the center of the plug and cap large enough that the nail fits loosely.



3. Enlarge the hole in the plug except for the last 1/8 in. (3 mm) so that the fuse cord will just fit.

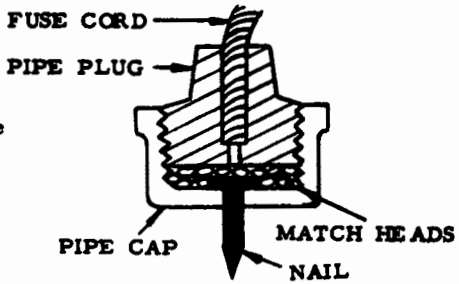


4. Remove the plug from the cap and push the flat head nail through the hole in the cap from the inside.

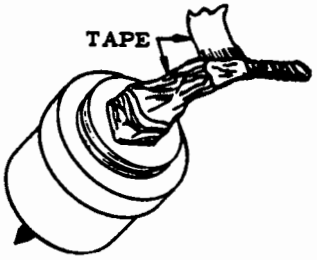


5. Cut the striking tips from approximately 10 strike-anywhere matches. Place match tips inside pipe cap and screw plug in finger tight.

HOW TO USE:



1. Slide the fuse cord into the hole in the pipe plug.



2. Tape igniter to fuse cord.

3. Tap point of nail on a hard surface to ignite the fuse.

DRIED SEED TIMER

A time delay device for electrical firing circuits can be made using the principle of expansion of dried seeds.

MATERIEL REQUIRED:

Dried peas, beans or other dehydrated seeds
Wide mouth glass jar with non-metal cap
Two screws or bolts
Thin metal plate
Hand drill
Screwdriver

PROCEDURE:

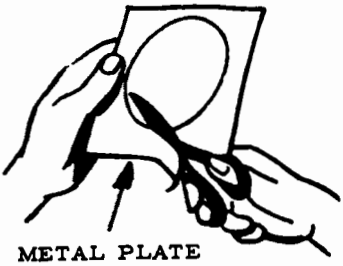
1. Determine the rate of rise of the dried seeds selected. This is necessary to determine delay time of the timer.

   a. Place a sample of the dried seeds in the jar and cover with water.

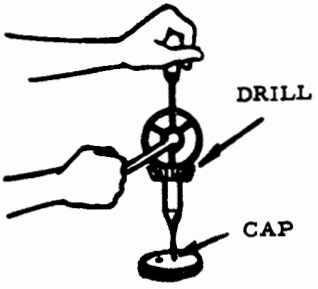
   b. Measure the time it takes for the seeds to rise a given height. Most dried seeds increase 50% in one to two hours.

2. Cut a disc from thin metal plate. Disc should fit loosely inside the jar.

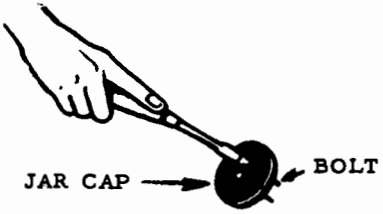
NOTE: If metal is painted, rusty or otherwise coated, it must be scraped or sanded to obtain a clean metal surface.



3. Drill two holes in the cap of the jar about 2 inches apart. Diameter of holes should be such that screws or bolts will thread tightly into them. If the jar has a metal cap or no cap, a piece of wood or plastic (NOT METAL) can be used as a cover.



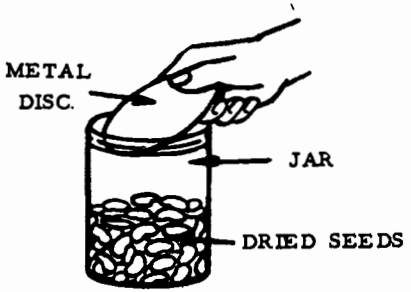
4. Turn the two screws or bolts through the holes in the cap. Bolts should extend about one in. (2 1/2 cm) into the jar.



IMPORTANT: Both bolts must extend the same distance below the container cover.

5. Pour dried seeds into the container. The level will depend upon the previously measured rise time and the desired delay.

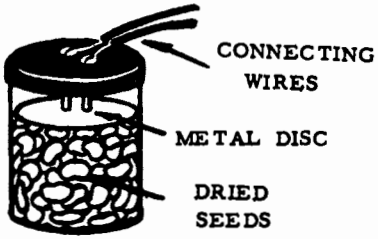
6. Place the metal disc in the jar on top of the seeds.



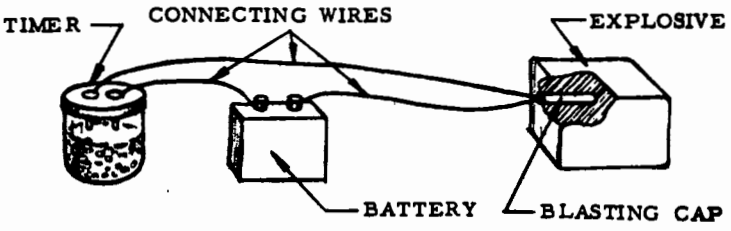
HOW TO USE:

1. Add just enough water to completely cover the seeds and place the cap on the jar.

2. Attach connecting wires from the firing circuit to the two screws on the cap.



Expansion of the seeds will raise the metal disc until it contacts the screws and closes the circuit.



FUSE CORDS

These fuse cords are used for igniting propellants and incendiaries or, with a non-electric blasting cap, to detonate explosives.

FAST BURNING FUSE

The burning rate of this fuse is approximately 40 in. (100 cm) per minute.

MATERIAL REQUIRED:

Soft Cotton String
Fine Black Powder ---- or
Piece of round stick
Two pans or dishes

Potassium Nitrate (Saltpeter)	25 parts
Charcoal	3 parts
Sulphur	2 parts

PROCEDURE:

1. Moisten fine Black Powder to form a paste or prepare a substitute as follows:

a. Dissolve Potassium Nitrate in an equal amount of water.

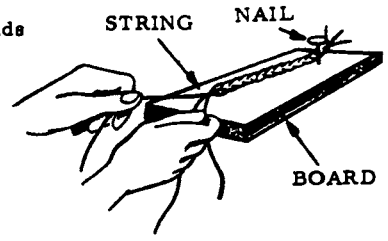
b. Pulverize charcoal by spreading thinly on a hard surface and rolling the round stick over it to crush to a fine powder.

c. Pulverize sulphur in the same manner.

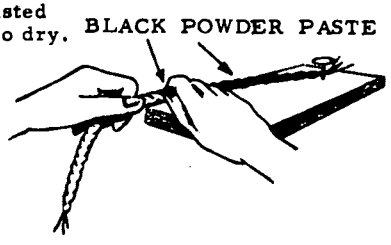
d. Dry mix sulphur and charcoal.

e. Add Potassium Nitrate solution to the dry mix to obtain a thoroughly wet paste.

2. Twist or braid three strands of cotton string together.



3. Rub paste mixture into twisted string with fingers and allow to dry.



4. Check actual burning rate of fuse by measuring the time it takes for a known length to burn. This is used to determine the length needed for a desired delay time. If 5 in. (12 1/2 cm) burns for 6 seconds, 50 in. (125 cm) of fuse cord will be needed to obtain a one minute (60 second) delay time.

SLOW BURNING FUSE

The burning rate of this fuse is approximately 2 in. (5 cm) per minute.

MATERIAL REQUIRED:

Cotton String or 3 Shoelaces
Potassium Nitrate or Potassium Chlorate
Granulated Sugar

PROCEDURE:

1. Wash cotton string or shoelaces in hot soapy water; rinse in fresh water.

2. Dissolve 1 part Potassium Nitrate or Potassium Chlorate and 1 part granulated sugar in 2 parts hot water.

3. Soak string or shoelaces in solution.

4. Twist or braid three strands of string together and allow to dry.

5. Check actual burning rate of the fuse by measuring the time it takes for a known length to burn. This is used to determine the length needed for the desired delay time. If 2 in. (5 cm) burns for 1 minute, 10 in. (25 cm) will be needed to obtain a 5 minute delay.

NOTE: The last few inches of this cord (the end inserted in the material to be ignited) should be coated with the fast burning Black Powder paste if possible. This must be done when the fuse is used to ignite a blasting cap.

REMEMBER: The burning rate of either of these fuses can vary greatly. Do Not Use for ignition until you have checked their burning rate.

CLOTHESPIN TIME DELAY SWITCH

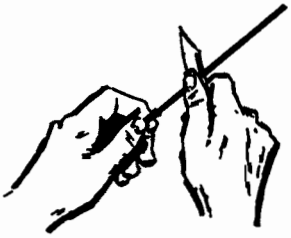
A 3 to 5 minute time delay switch can be made from the clothespin switch (Section VII, No. 1) and a cigarette. The system can be used for initiation of explosive charges, mines, and booby traps.

MATERIAL REQUIRED:

Spring type clothespin
Solid or stranded copper wire about 1/16 in. (2 mm) in diameter (field or bell wire is suitable)
Fine string, about 6 inches in length
Cigarette
Knife

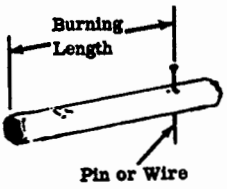
PROCEDURE:

1. Strip about 4 inches (10 cm) of insulation from the ends of 2 copper wires. Scrape copper wires with pocket knife until metal is shiny.



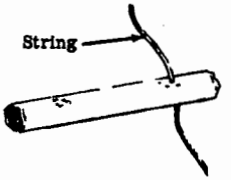
2. Wind one scraped wire tightly on one jaw of the clothespin, and the other wire on the other jaw so that the wires will be in contact with each other when the jaws are closed.

3. Measuring from tip of cigarette, measure a length of cigarette that will correspond to the desired delay time. Make a hole in cigarette at this point, using wire or pin.

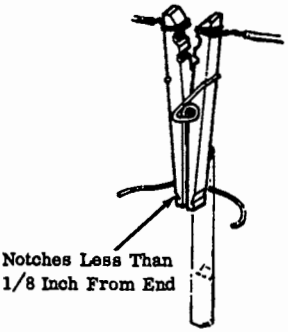


NOTE: Delay time may be adjusted by varying the burning length of the cigarette. Burning rate in still air is approximately 7 minutes per inch (2.5 cm). Since this rate varies with environment and brand of cigarette, it should be tested in each case if accurate delay time is desired.

4. Thread string through hole in cigarette.



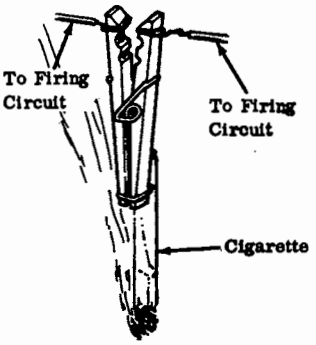
5. Tie string around rear of clothespin, 1/8 inch or less from end. The clothespin may be notched to hold the string in place.



NOTE: The string must keep the rear end of the clothespin closed so that the jaws stay open and no contact is made between the wires.

HOW TO USE:

Suspend the entire system vertically with the cigarette tip down. Light tip of cigarette. Switch will close and initiation will occur when the cigarette burns up to and through the string.



NOTE: Wires to the firing circuit must not be pulled taut when the switch is mounted. This could prevent the jaws from closing.

TIME DELAY GRENADE

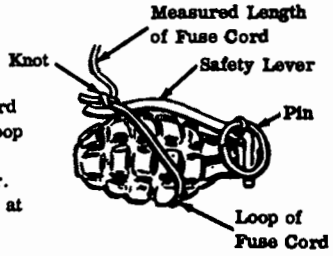
This delay mechanism makes it possible to use an ordinary grenade as a time bomb.

MATERIAL REQUIRED:

Grenade
Fuse Cord

IMPORTANT: Fuse cord must be the type that burns completely. Slow burning improvised fuse cord (Section VI, No. 7) is suitable. Safety fuse is not satisfactory, since its outer covering does not burn.

PROCEDURE:

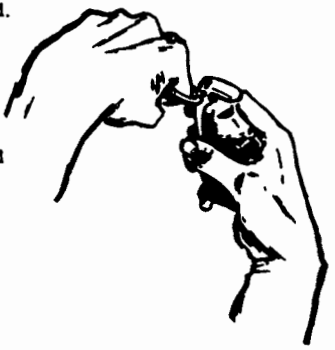


1. Bend end of safety lever upward to form a hook. Make a single loop of fuse cord around the center of the grenade body and safety lever. Tie a knot of the non-slip variety at the safety lever.

NOTE: The loop must be tight enough to hold the safety lever in position when the pin is removed.

2. Measuring from the knot along the free length of the fuse cord, measure off a length of fuse cord that will give the desired delay time. Cut off the excess fuse cord.

HOW TO USE:



1. Place hand around grenade and safety lever so safety lever is held in place. Carefully remove pin.

2. Emplace grenade in desired location while holding grenade and safety lever.

3. Very carefully remove hand from grenade and safety lever, making sure that the fuse cord holds the safety lever in place.

CAUTION: If loop and knot of fuse cord do not hold for any reason and the safety lever is released, the grenade will explode after the regular delay time.

4. Light free end of fuse cord.

CAN-LIQUID TIME DELAY

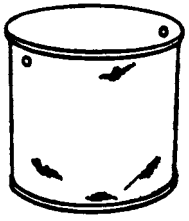
A time delay device for electrical firing circuits can be made using a can and liquid.

MATERIAL REQUIRED:

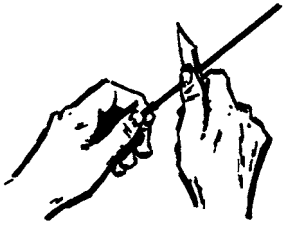
Can
Liquid (water, gasoline, etc.)
Small block of wood or any material that will float on the liquid used
Knife
2 pieces of solid wire, each piece 1 foot (30 cm) or longer

PROCEDURE:

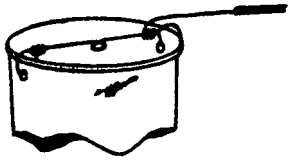
1. Make 2 small holes at opposite sides of the can very close to the top.



2. Remove insulation from a long piece of wire for a distance a little greater than the diameter of the can.

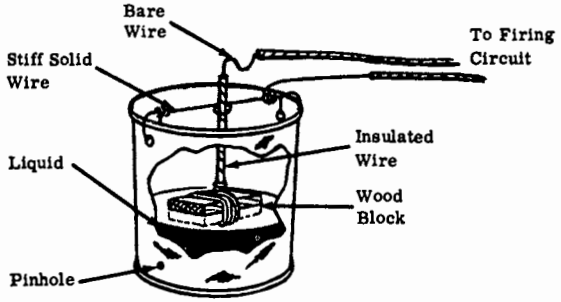


3. Secure the wire in place across the top of the can by threading it through the holes and twisting in place, leaving some slack. Make loop in center or wire. Be sure a long piece of wire extends from one end of the can.



4. Wrap a piece of insulated wire around the block of wood. Scrape insulation from a small section of this wire and bend as shown so that wire contacts loop before wood touches bottom of container. Thread this wire through the loop of bare wire.

5. Make a very small hole (pinhole) in the side of the container. Fill container with a quantity of liquid corresponding to the desired delay time. Since the rate at which liquid leaves the can depends upon weather conditions, liquid used, size of hole, amount of liquid in the container, etc., determine the delay time for each individual case. Delays from a few minutes to many hours are possible. Vary time by adjusting liquid level, type of liquid (water, oil) and hole size.



HOW TO USE:

1. Fill can with liquid to the same level as during experimental run (step 5 above). Be sure that wooden block floats on liquid and that wire is free to move down as liquid leaves container.

2. Connect wires to firing circuit.

NOTE: A long term delay can be obtained by placing a volatile liquid (gasoline, ether, etc.) in the can instead of water and relying on evaporation to lower the level. Be sure that the wood will float on the liquid used. DO NOT MAKE PINHOLE IN SIDE OF CAN!

SHORT TERM TIME DELAY FOR GRENADE

A simple modification can produce delays of approximately 12 seconds for grenades when fired from Grenade Launchers (Section IV, No. 5).

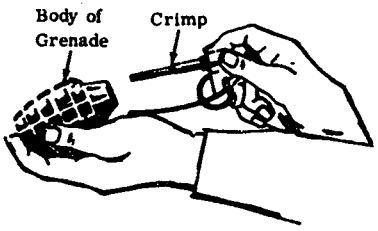
MATERIAL REQUIRED:

Grenade
Nail
Knife } may not be needed
Pliers }
Safety fuse

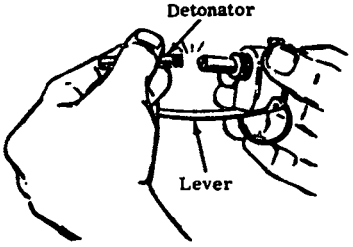
NOTE: Any safety or improvised fuse may be used. However, since different time delays will result, determine the burning rate of the fuse first.

PROCEDURE:

1. Unscrew fuse mechanism from body of grenade and remove. Pliers may have to be used.

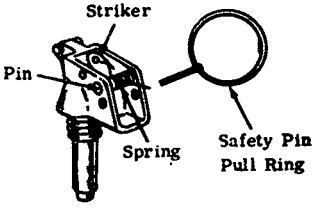


2. Carefully cut with knife or break off detonator at crimp and save for later use.

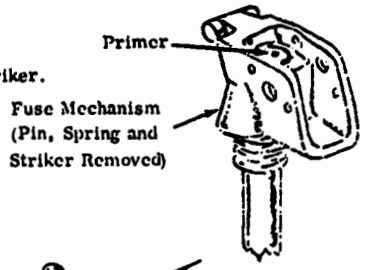


CAUTION: If detonator is cut or broken below the crimp, detonation may occur and severe injuries could result.

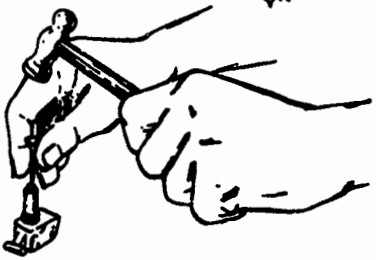
3. Remove safety pin pull ring and lever, letting striker hit the primer. Place fuse mechanism aside until delay fuse powder mix in mechanism is completely burned.



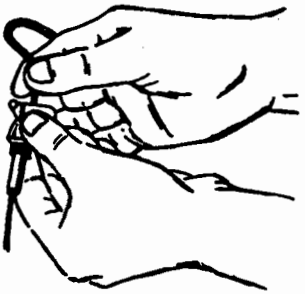
4. Remove pin, spring, and striker.



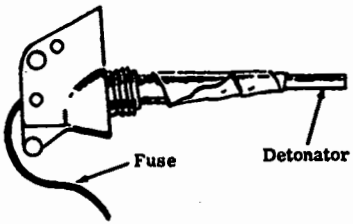
5. Remove primer from fuse mechanism by pushing nail through bottom end of primer hole and tapping with hammer.



6. Insert safety fuse through top of primer hole. Enlarge hole if necessary. The fuse should go completely through the hole.



7. Insert fuse into detonator and tape it securely to modified fuse mechanism.

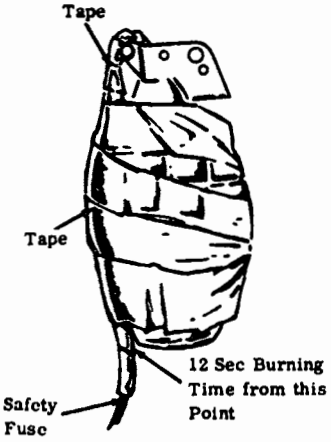


NOTE: Be sure that fuse rests firmly against detonator at all times.

8. Screw modified fuse mecnanism back into grenade. Grenade is now ready for use.

NOTE: If time delay is used for Improvised Grenade Launchers (Section IV, No. 5) -

1. Wrap tape around safety fuse.
2. Securely tape fuse to grenade.
3. Load grenade in launcher. Grenade will explode in approximately 12 seconds after safety fuse burns up to bottom of grenade.




DE OPPRESSO LIBER

Section VI
No. 12

LONG TERM TIME DELAY FOR GRENADE

A simple modification can produce delays of approximately 20 seconds for grenades when fired from Grenade Launchers (Section IV, No. 5).

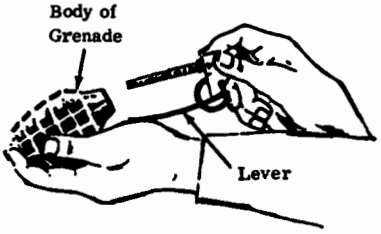
MATERIAL REQUIRED:

Grenade
Nail
"Strike-anywhere" matches, 6 to 8
Pliers (may not be needed)
Knife or sharp cutting edge
Piece of wood
Safety fuse

NOTE: Any safety or improvised fuse may be used. However, since different time delays will result, determine the burning rate of the fuse first.

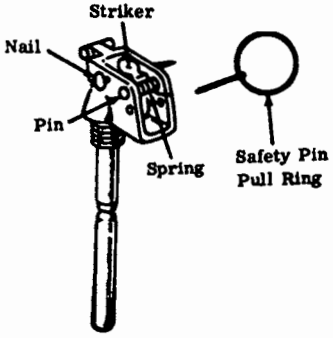
PROCEDURE:

1. Unscrew fuse mechanism from body of grenade and remove. Pliers may have to be used.

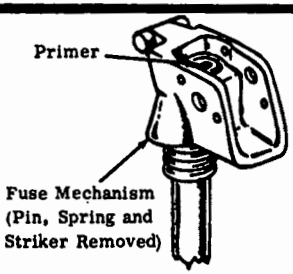


2. Insert nail completely through safety hole (hole over primer).

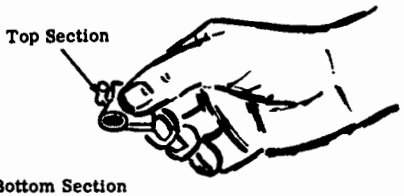
3. Carefully remove safety pin pull ring and lever, and allow striker to hit nail.



CAUTION: If for any reason, striker should hit primer instead of nail, detonator will explode after (4-5 sec.) delay time.

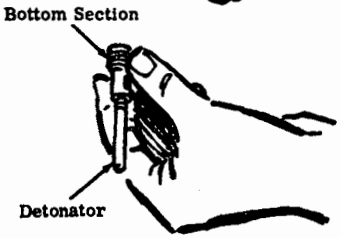


4. Push pin out and remove spring and striker. Remove nail.

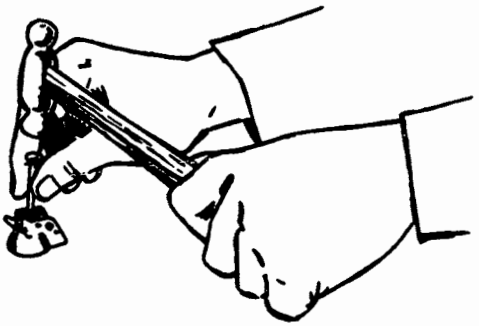


5. Carefully remove top section of fuse mechanism from bottom section by unscrewing. Pliers may have to be used.

CAUTION: Use extreme care - sudden shock may set off detonator.

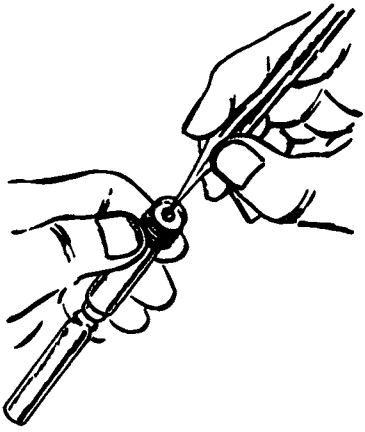


6. Fire primer by hitting nail placed against top of it. Remove fired primer (same as procedure 5 of Section VI, No. 11).

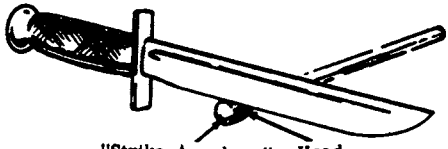


CAUTION: Do not hold assembly in your hand during above operation, as serious burns may result.

7. Scrape delay fuse powder with a sharpened stick. Loosen about 1/4 in. (6 mm) of powder in cavity.



8. Cut off tips (not whole head) of 6 "strike-anywhere" matches with sharp cutting edge. Drop them into delay fuse hole.

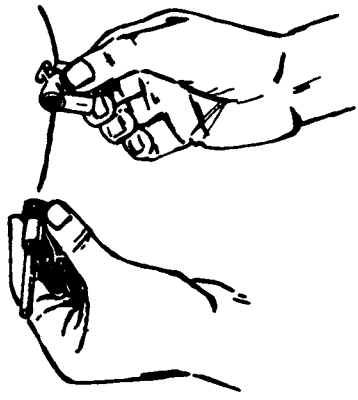


"Strike-Anywhere" Head
Match Tip

9. Place safety fuse in delay fuse hole so that it is flush against the match tips.

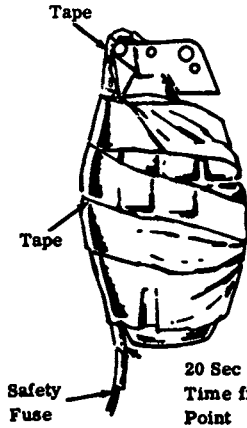
IMPORTANT: Be sure fuse remains flush against the match tips at all times.

10. Thread fuse through primer hole. Enlarge hole if necessary. Screw modified fuse mechanism back together. Screw combination back into grenade. Grenade modification is now ready for use. Light fuse when ready to use.



NOTE: If time delay is used for Improvised Grenade Launchers (Section IV, No. 5) -

1. Wrap tape around safety fuse.
2. Securely tape fuse to grenade
3. Load grenade in launcher. Grenade will explode in approximately 20 seconds after safety fuse burns up to bottom of grenade.



Section VI
No. 13

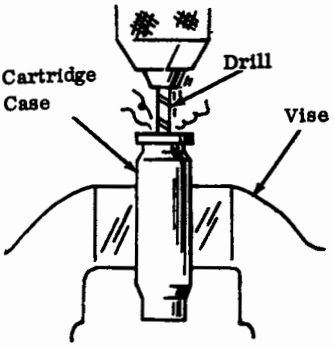
DETONATOR

Detonators (blasting caps) can be made from a used small arms cartridge case and field manufactured explosives. Detonators are used to initiate secondary high explosives (C-4, TNT, etc.).

MATERIAL REQUIRED:	SOURCE:
Primary explosive	See table
Booster explosive	RDX (Section I, No. 15) or Picric Acid (Section I, No. 21)
Improvised scale	Section VII, No. 8
Used cartridge case	.22 caliber or larger
Fuse, 12 in. long	
Round wooden stick (small enough just to fit in the neck of the cartridge case)	
Drill or knife	
Long nail with sharpened end	
Vise	
Improvised loading fixture	

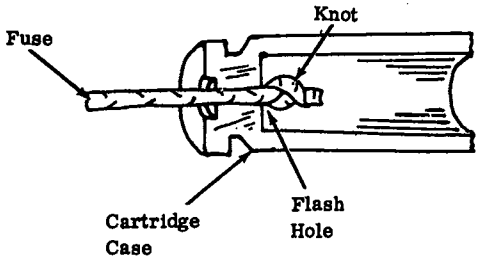
PROCEDURE:

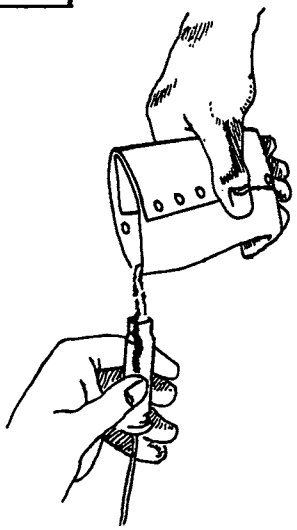
1. Remove fired primer from a used cartridge case using a sharpened nail. (See Section III, No. 5.)



2. If necessary, open out flash hole in the primer pocket using a drill or knife. Make it large enough to receive fuse.

3. Place one end of fuse in the flash hole and extend it through the case until it becomes exposed at the open end. Knot this end and then pull fuse in cartridge case thus preventing fuse from falling out.

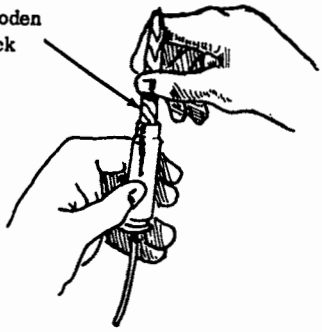




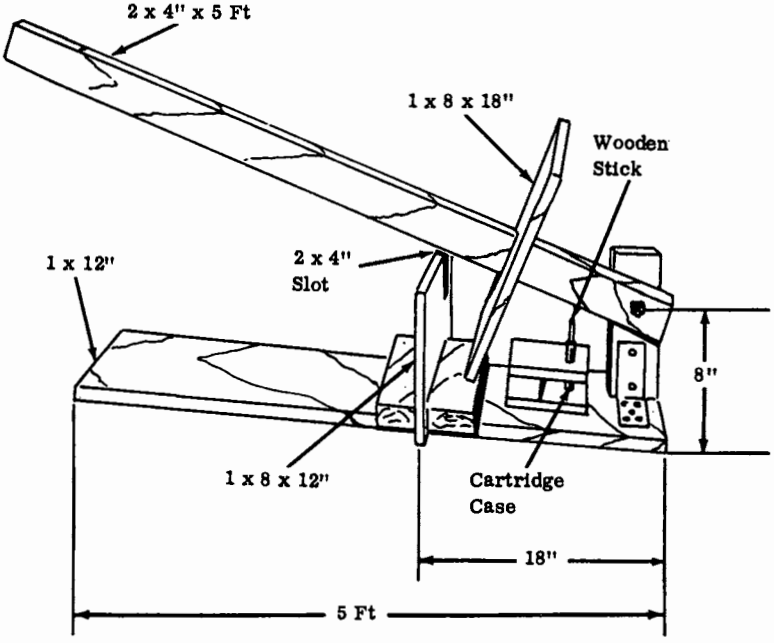
4. Load the primary explosive in the cartridge case, using the following table for the proper amount.

Primary Explosive	Primary Explosive Source	Minimum Weight*
Lead Picrate**	Section I, No. 20	3 grams (3 Handbook Pages)
TACC (Tetramminecopper Chlorate)	Section I, No. 16	1 gram (1 Handbook Page)
DDNP (Diazodinitrophenol)	Section I, No. 19	0.5 gram (1/2 Handbook Page)
Mercury Fulminate	Section I, No. 24	0.75 gram (3/4 Handbook Page)
HMTD	Section I, No. 17	
Double Salts	Section I, No. 22	

* See Section VII, No. 8 for details on improvised scale.
** .22 Cal. cartridge case cannot be used with lead picrate as there is not enough volume to contain the explosive train.



5. Compress the primary explosive into the cartridge case with the wooden stick and the following improvised loading fixture.



CAUTION: The primary explosive is shock and flame sensitive.

NOTE: Tamping is not needed when TACC is used.

6. Add one gram of booster explosive. The booster can be RDX (Section I, No. 15), or Picric Acid (Section I, No. 21).

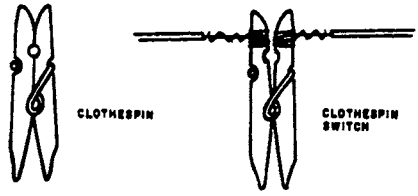
7. Compress the booster explosive into the cartridge case with wooden stick and the loading fixture.

8. If the case is not full, fill the remainder with the secondary explosive to be detonated.

CAUTION: Detonator has considerably more power than a military blasting cap and should be handled carefully.

CLOTHESPIN SWITCH

A spring type clothespin is used to make a circuit closing switch to actuate explosive charges, mines, booby traps and alarm systems.

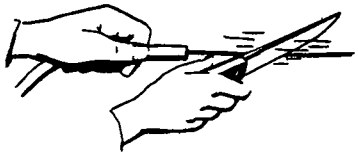


Material Required

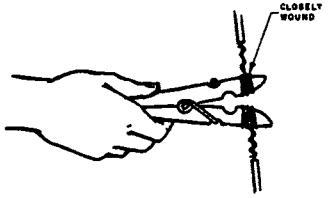
Spring type clothespin.
Solid copper wire -- 1/16 in. (2 mm) in diameter.
Strong string on wire.
Flat piece of wood (roughly 1/8 x 1" x 2").
Knife.

Procedure

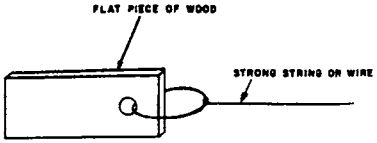
1. Strip four in. (10 cm) of insulation from the ends of 2 solid copper wires. Scrape copper wires with pocket knife until metal is shiny.



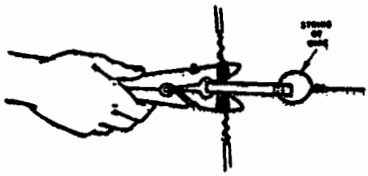
2. Wind one scraped wire tightly on one jaw of the clothespin, and the other wire on the other jaw.



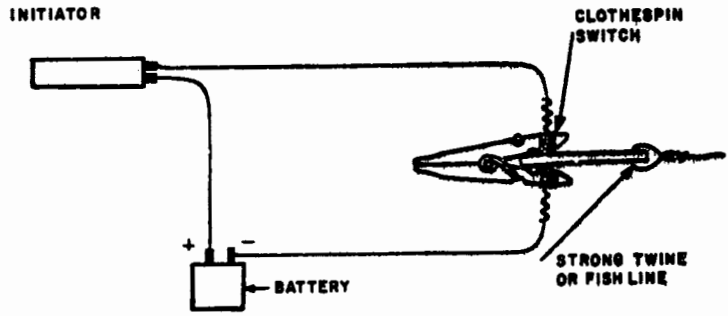
3. Make a hole in one end of the flat piece of wood using a knife, heated nail or drill Tie strong string or wire through the hole.



5. Place flat piece of wood between jaws of the clothespin switch.



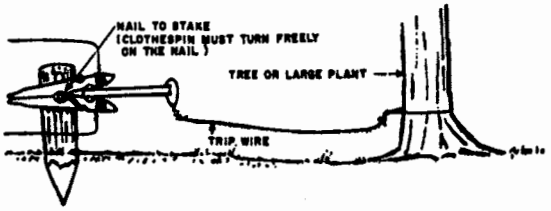
Basic Firing Circuit



When the flat piece of wood is removed by pulling the string, the jaws of the clothespin will close completing the circuit.

> CAUTION
>
> Do not attach the battery until the switch and trip wire have been emplaced and examined. Be sure the flat piece of wood is separating the jaws of the switch.

A Method of Use

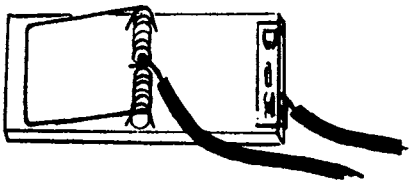


MOUSETRAP SWITCH

A common mousetrap can be used to make a circuit closing switch for electrically initiated explosives, mines and booby traps.

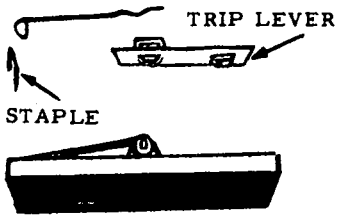
MATERIEL REQUIRED:

Mousetrap
Hacksaw or File
Connecting wires



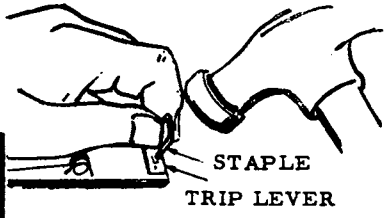
PROCEDURE:

1. Remove the trip lever from the mousetrap using a hacksaw or file. Also remove the staple and holding wire.



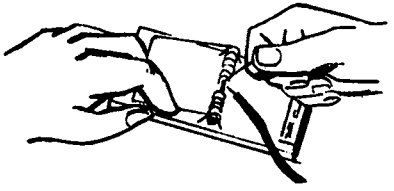
2. Retract the striker of the mousetrap and attach the trip lever across the end of the wood base using the staple with which the holding wire was attached.

NOTE: If the trip lever is not made of metal, a piece of metal of approximately the same size should be used.

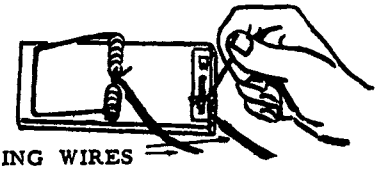


3. Strip one in. (2 1/2 cm) of insulation from the ends of 2 connecting wires.

4. Wrap one wire tightly around the spring loaded striker of the mousetrap.



5. Wrap the second wire around some part of the trip lever or piece of metal.



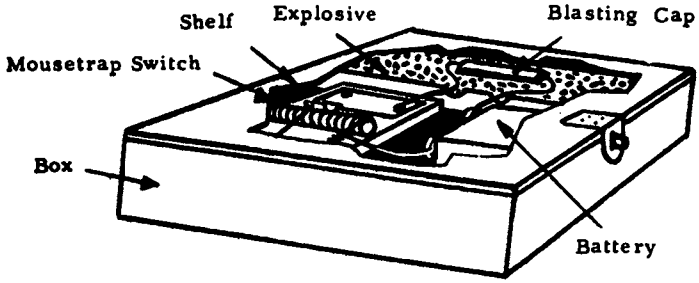
CONNECTING WIRES

NOTE: If a soldering iron is available, solder both of the above wires in place.

HOW TO USE:

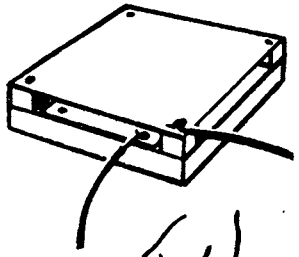
This switch can be used in a number of ways -- one typical method is presented here.

The switch is placed inside a box which also contains the explosive and batteries. The spring loaded striker is held back by the lid of the box and when the box is opened the circuit is closed.



FLEXIBLE PLATE SWITCH

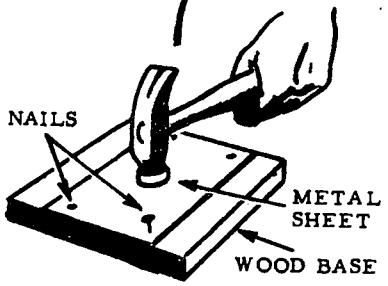
This pressure sensitive switch is used for initiating emplaced mines and explosives.



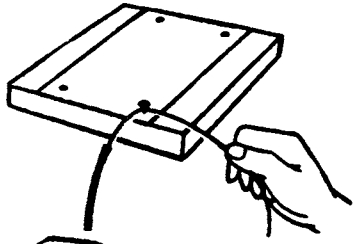
MATERIAL REQUIRED:

Two flexible metal sheets
  one approximately 10 in. (25 cm) square
  one approximately 10 in. x 8 in.(20 cm)
Piece of wood 10 in. square by 1 in. thick
Four soft wood blocks 1 in.x 1 in.x 1/4 in.
Eight flat head nails, 1 in. long
Connecting wires
Adhesive tape

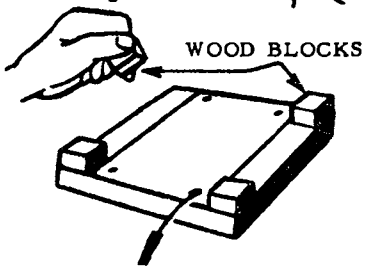
PROCEDURE:



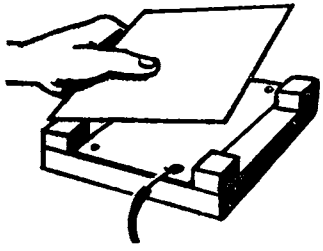
1. Nail 10 in. x 8 in. metal sheet to 10 in. square piece of wood so that 1 in. of wood shows on each side of metal. Leave one of the nails sticking up about 1/4 in.



2. Strip insulation from the end of one connecting wire. Wrap this end around the nail and drive the nail all the way in.

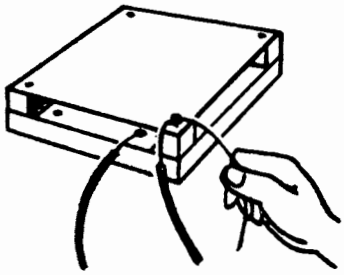


3. Place the four wood blocks on the corners of the wood base.

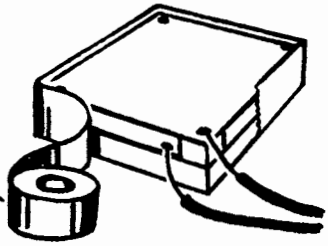


4. Place the 10 in. square flexible metal sheet so that it rests on the blocks in line with the wood base.

5. Drive four nails through the metal sheet and the blocks to fasten to the wood base. A second connecting wire is attached to one of the nails as in Step 2.

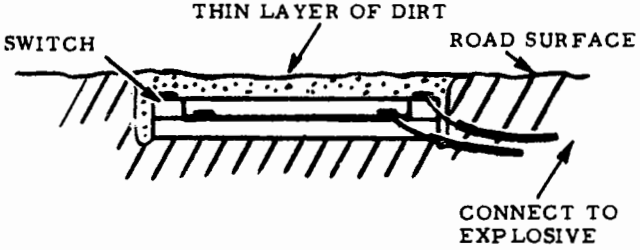


6. Wrap adhesive tape around the edges of the plate and wood base. This will assure that no dirt or other foreign matter will get between the plates and prevent the switch from operating.

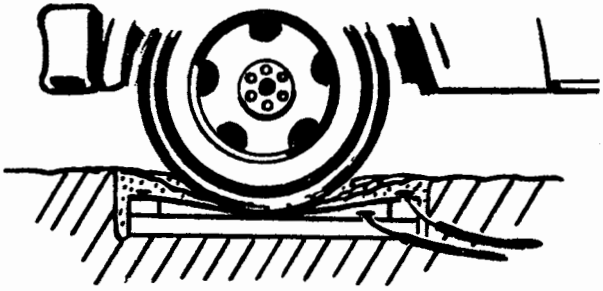


HOW TO USE:

The switch is placed in a hole in the path of expected traffic and covered with a thin layer of dirt or other camouflaging material. The mine or other explosive device connected to the switch can be buried with the switch or emplaced elsewhere as desired.

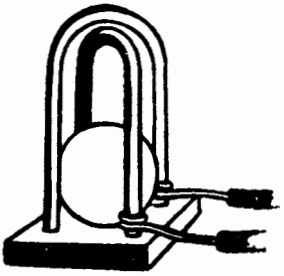


When a vehicle passes over the switch, the two metal plates make contact closing the firing circuit.



METAL BALL SWITCH

This switch will close an electric circuit when it is tipped in any direction. It can be used alone for booby traps or in combination with another switch or timer as an anti-disturbance switch.



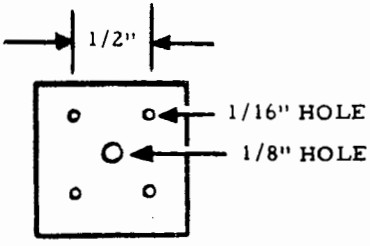
MATERIAL REQUIRED:

Metal Ball 1/2" (1 1/4 cm) diameter (see Note)
Solid copper wire 1/16" (1/4 cm) diameter
Wood block 1" (2 1/2 cm) square by 1/4" thick
Hand drill
Connecting wires
Soldering iron & solder

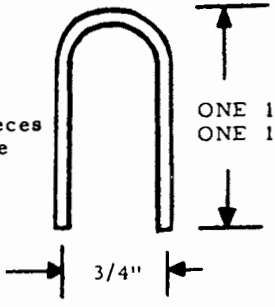
NOTE: If other than a 1/2" diameter ball is used, other dimensic must be changed so that the ball will rest in the center hole of the block without touching either of the wires.

PROCEDURE:

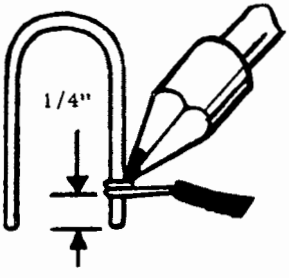
1. Drill four 1/16" holes and one 1/8" hole through the wood block as shown.



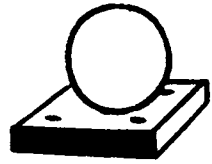
2. Form two "U" shaped pieces from 1/16" copper wire to the dimensions shown.



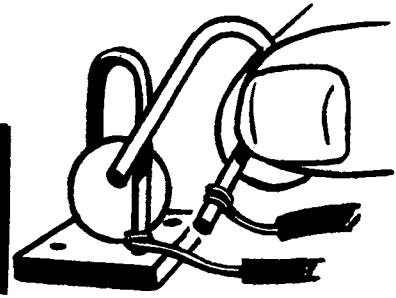
3. Wrap a connecting wire around one leg of each "U" at least 1/4" from the end and solder in place.



4. Place metal ball on block so that it rests in the center hole.



5. Insert the ends of the small "U" into two holes in the block. Insert large "U" into the remaining two holes.



CAUTION: Make sure that the metal ball does not touch either "U" shaped wire when the switch is standing on its base. If the ball does touch, bend wires outward slightly.

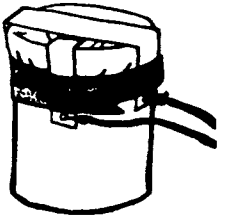
HOW TO USE:

Mount switch vertically and connect in electrical firing circuit as with any other switch. When tipped in any direction it will close the circuit.

CAUTION: Switch must be mounted vertically and not disturbed while completing connections.

ALTIMETER SWITCH

This switch is designed for use with explosives placed on aircraft. It will close an electrical firing circuit when an altitude of approximately 5000 ft (1-1/2 KM) is reached.



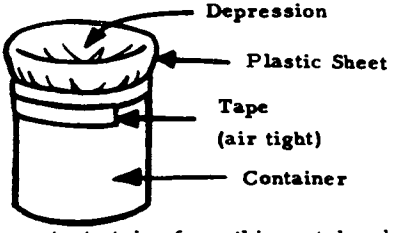
MATERIAL REQUIRED:

Jar or tin can
Thin sheet of flexible plastic or waxed paper
Thin metal sheet (cut from tin can)
Adhesive Tape
Connecting Wires

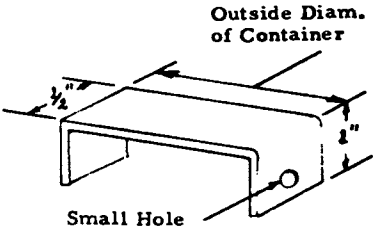
PROCEDURE:

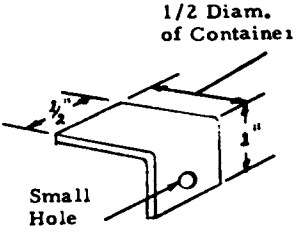
1. Place sheet of plastic or waxed paper over the top of the can or jar and tape tightly to sides of container.

NOTE: Plastic sheet should not be stretched tight. A small depression should be left in the top.



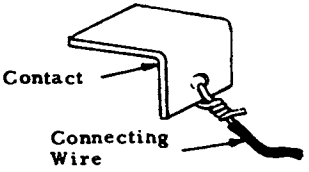
2. Cut two contact strips from thin metal and bend to the shapes shown.



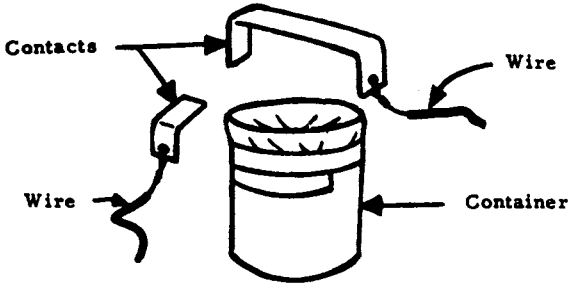


3. Strip insulation from the ends of two connecting wires. Attach one wire to each contact strip.

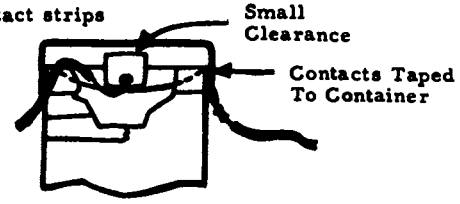
NOTE: If a soldering iron is available solder wires in place.



4. Place contact strips over container so that the larger contact is above the smaller with a very small clearance between the two.



5. Securely tape contact strips to sides of container.



HOW TO USE:

1. Connect the altimeter switch in an explosive circuit the same as any switch.

2. Place the explosive package on airplane. As the plane rises the air inside the container will expand. This forces the plastic sheet against the contacts closing the firing circuit.

NOTE: The switch will not function in a pressurized cabin. It must be placed in some part of the plane which will not be pressurized.

PULL-LOOP SWITCH

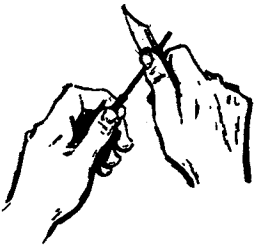
This switch will initiate explosive charges, mines, and booby traps when the trip wire is pulled.

MATERIAL REQUIRED:

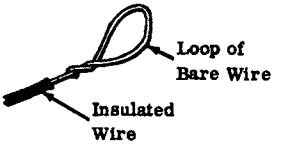
2 lengths of insulated wire
Knife
Strong string or cord
Fine thread that will break easily

PROCEDURE:

1. Remove about 2 inches of insulation from one end of each length of wire. Scrape bare wire with knife until metal is shiny.



2. Make a loop out of each piece of bare wire.

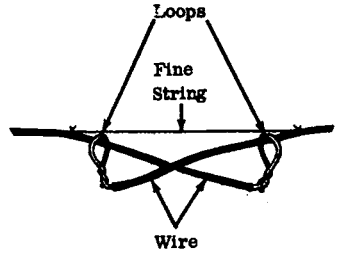


3. Thread each wire through the loop of the other wire so the wires can slide along each other.

NOTE: The loops should contact each other when the two wires are pulled taut.

HOW TO USE:

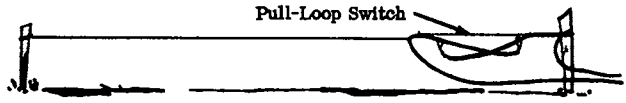
1. Separate loops by about 2 inches. Tie piece of fine thread around wires near each loop Thread should be taut enough to support loops and wire, yet fine enough that it will break under a very slight pull.



2. Fasten one wire to tree or stake and connect end to firing circuit.

3. Tie a piece of cord or string around the other piece of wire a few inches from the loop. Tie free end of cord around tree, bush, or stake. Connect the free end of the wire to the firing circuit. Initiation will occur when the tripcord is pulled.

CAUTION: Be sure that the loops do not contact each other when the wires are connected to the firing circuit.



OTHER USES: The switch minus the fine thread may be used to activate a booby trap by such means as attaching it between the lid and a rigid portion of a box, between a door and a door jamb, and in similar manners.

KNIFE SWITCH

This device will close the firing circuit charges, mines, and booby traps when the trip wire is pulled or cut.

MATERIAL REQUIRED:

Knife or hack saw blade
6 nails
Strong string or light rope
Sturdy wooden board
Wire

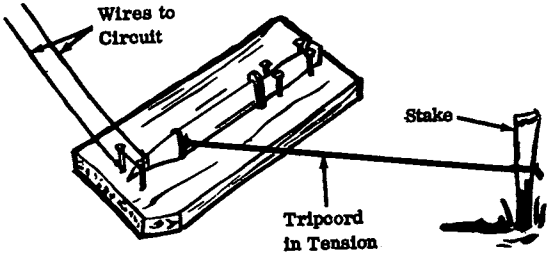
PROCEDURE:

1. Place knife on board. Drive 2 nails into board on each side of knife handle so knife is held in place.

2. Drive one nail into board so that it touches blade of knife near the point.

3. Attach rope to knife. Place rope across path. Apply tension to rope, pulling knife blade away from nail slightly. Tie rope to tree, bush, or stake.

4. Drive another nail into board near the tip of the knife blade as shown below. Connect the two nails with a piece of conducting wire. Nail shoulc be positioned so that it will contact the second nail when blade is pulled about 1 inch (2-1/2 cm) to the side.



NOTE: Check position of nails to knife blade. The nails should be placed so that the knife blade will contact either one when the rope is pulled or released.

HOW TO USE:

Attach one wire from firing circuit to one of the nails and the other to the knife blade. The circuit will be completed when the tripcord is pulled or released.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IMPROVISED SCALE

This scale provides a means of weighing propellant and other items when conventional scales or balances are not available.

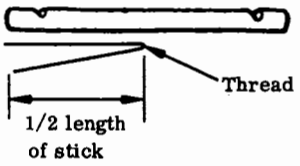
MATERIAL REQUIRED:

Pages from Improvised Munitions Handbook
Straight sticks about 1 foot (30 cm) long and 1/4 in. (5 mm) in diameter
Thread or fine string

PROCEDURE:

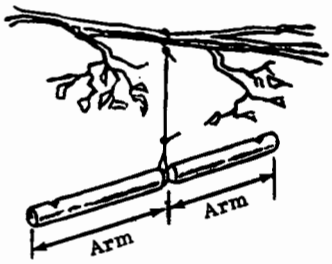
1. Make a notch about 1/2 in. (1 cm) from each end of stick. Be sure that the two notches are the same distance from the end of the stick.

2. Find the exact center of the stick by folding in half a piece of thread the same length as the stick and placing it alongside the stick as a ruler. Make a small notch at the center of the stick.



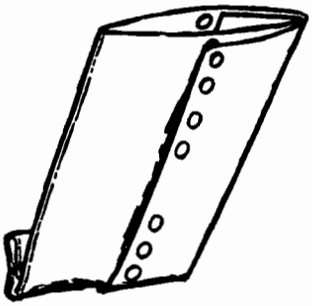
3. Tie a piece of thread around the notch. Suspend stick from branch, another stick wedged between rocks, or by any other means. Be sure stick is balanced and free to move.

NOTE: If stick is not balanced, shave or scrape a little off the heavy end until it does balance. Be sure the lengths of the arms are the same.

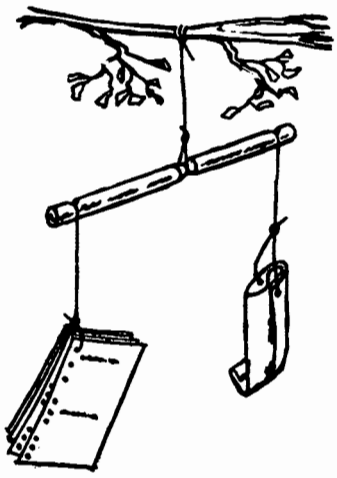


4. Make a container out of one piece of paper. This can be done by rolling the paper into a cylinder and folding up the bottom a few times.

5. Punch 2 holes at opposite sides of paper container. Suspend container from one side of stick.



6. Count out the number of handbook pages equal in weight to that of the quantity of material to be weighed. Each sheet of paper weighs about 1.3 grams (20 grains or .04 ounce). Suspend these sheets, plus one, to balance container on the other side of the scale.



7. Slowly add the material to be weighed to the container. When the stick is balanced, the desired amount of material is in the container.

8. If it is desired to weigh a quantity of material larger than that which would fit in the above container, make a container out of a larger paper or paper bag, and suspend from one side of the stick. Suspend handbook pages from the other side until the stick is balanced. Now place a number of sheets of handbook pages equal in weight to that of the desired amount of material to be weighed on one side, and fill the container with the material until the stick is balanced.

9. A similar method may be used to measure parts or percentage by weight. The weight units are unimportant. Suspend equal weight containers from each side of the stick. Bags, tin cans, etc. can be used. Place one material in one of the containers. Fill the other container with the other material until they balance. Empty and refill the number of times necessary to get the required parts by weight (e.g., 5 to 1 parts by weight would require 5 fillings of one can for one filling of the other).

ROPE GRENADE LAUNCHING TECHNIQUE

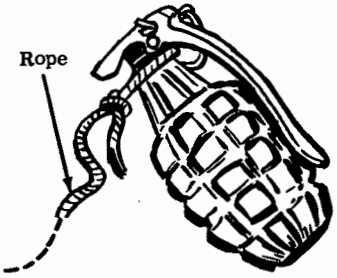
A method of increasing the distance a grenade may be thrown. Safety fuse is used to increase the delay time.

MATERIAL REQUIRED:

Hand grenade (Improvised pipe hand grenade, Section II, No. 1 may be used)
Safety fuse or fast burning Improvised Fuse, (Section VI, No. 7)
Light rope, cord, or string

PROCEDURE:

1. Tie a 4 to 6 foot (1 meter) length of cord to the grenade. Be sure that the rope will not prevent the grenade handle from coming off.

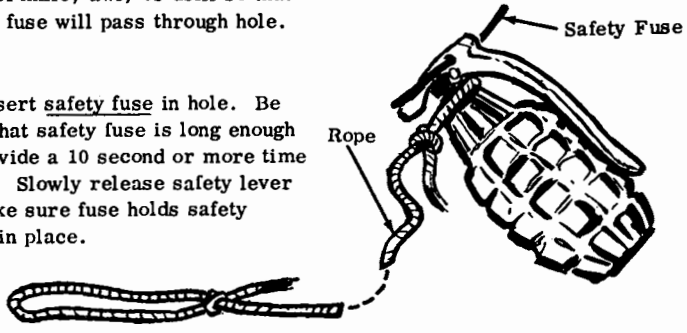


Note: If improvised grenade is used, tie cord around grenade near the end cap. Tape in place if necessary.

2. Tie a large knot in the other end of the cord for use as a handle.

3. Carefully remove safety pin from grenade, holding safety lever in place. Enlarge safety pin hole with point of knife, awl, or drill so that safety fuse will pass through hole.

4. Insert safety fuse in hole. Be sure that safety fuse is long enough to provide a 10 second or more time delay. Slowly release safety lever to make sure fuse holds safety lever in place.



CAUTION: If safety lever should be released for any reason, grenade will explode after regular delay time (4-5 sec.).

NOTE: If diameter of safety fuse is too large to fit in hole (Step 4), follow procedure and How to Use of Time Delay Grenade, Section VI, No. 9, instead of Steps 3 and 4 above.

HOW TO USE:

1. Light fuse.

2. Whirl grenade overhead, holding knot at end of rope, until grenade picks up speed (3 or 4 turns).

3. Release when sighted on target.

CAUTION: Be sure to release grenade within 10 seconds after fuse is lit.

NOTE: It is helpful to practice first with a dummy grenade or a rock to improve accuracy. With practice, accurate launching up to 100 meters (300 feet) can be obtained.

BICYCLE GENERATOR POWER SOURCE

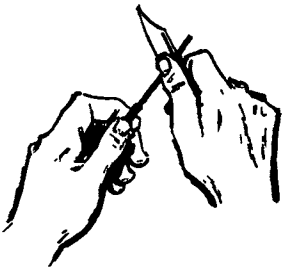
A 6 volt, 3 watt bicycle generator will set off one or two blasting caps (connected in series) or an igniter.

MATERIAL REQUIRED:

Bicycle generator (6 volts, 3 watt)
Copper wire
Knife

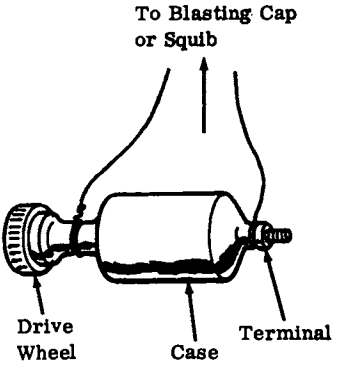
PROCEDURE:

1. Strip about 4 in. (10 cm) of coating from both ends of 2 copper wires. Scrape ends with knife until metal is shiny.



2. Connect the end of one wire to the generator terminal.

3. Attach the end of the second wire to generator case. This wire may be wrapped around a convenient projection, taped, or simply held against the case with the hand.

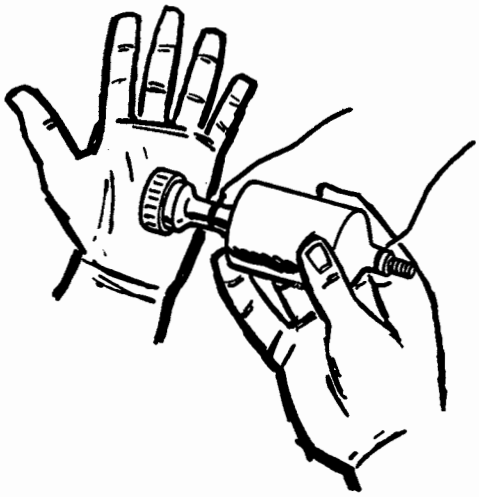


HOW TO USE:

1. Connect free ends of wires to blasting cap or squib leads.

CAUTION: If drive wheel is rotated, explosive may be set off.

2. Run the drive wheel firmly and rapidly across the palm of the hand to activate generator.



AUTOMOBILE GENERATOR POWER SOURCE

An automobile generator can be used as a means of firing one blasting cap or igniter. (Improvised Igniter, Section V, No. 2, may be used.)

MATERIAL REQUIRED:

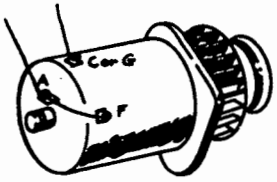
Automobile generator (6, 12, or 28 volts). (An alternator will not work.)
Copper Wire
Strong string or wire, about 5 ft. (150 cm) long and 1/16 in. (1-1/2 mm) in diameter
Knife
Small light bulb requiring same voltage as generator, (for example, bulb from same vehicle as generator).

PROCEDURE:

1. Strip about 1 in. (2-1/2 cm) of coating from both ends of 3 copper wires. Scrape ends with knife until metal is shiny.

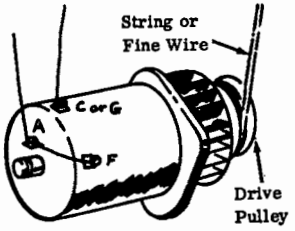
2. Connect the A and F terminals with one piece of wire.

3. Connect a wire to the A terminal. Connect another to the G terminal.



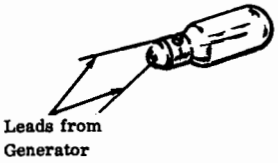
NOTE: The F and G or C terminals may not be labeled; in this case, connect wires as shown. The F terminal is usually smaller in size than the C or G terminal.

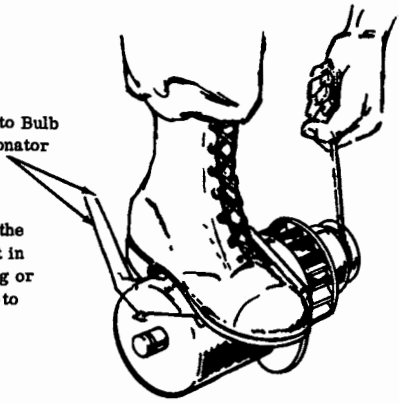
4. Wrap several turns of string or wire clockwise around the drive pulley.



HOW TO USE:

1. Connect the free ends of the wires to the light bulb.



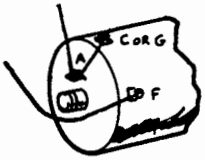


2. Place one foot on the generator to secure it in place. Give the string or wire a very hard pull to light the bulb.

NOTE: If not successful at first, rewind string and try again several times. After repeating this operation and the bulb still does not light, follow Step 4, "How to Use."

3. If light bulb lights, follow Steps 1 and 2 of above, "How to Use," connecting free ends of wires to blasting cap or igniter instead of to light bulb.

4. If light bulb does not light after several pulls, switch leads connected to F and G terminals. Repeat above "How to Use," Steps 1 to 3.



IMPROVISED BATTERY (SHORT LASTING)

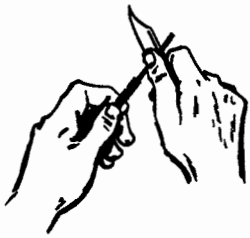
This battery is powerful but must be used within 15 minutes after fabrication. One cell of this battery will detonate one blasting cap or one igniter. Two cells, connected in series, will detonate two of these devices and so on. Larger cells have a longer life as well as greater power.

MATERIALS	COMMON SOURCE
Water	
Sodium hydroxide (lye, solid or concentrated solution)	Soap manufacturing Disinfectants Sewer cleaner
Copper or brass plate about 4 in. (10 cm) square and 1/16 in. (2 mm) thick	
Aluminum plate or sheet, same size as copper plate	
Charcoal powder	
Container for mixing	
Knife	
One of the following:	
Potassium permanganate, solid	Disinfectants Deodorants
Calcium hypochlorite, solid	Disinfectants Water treating chemicals Chlorine bleaches
Manganese dioxide (pyrolucite)	Dead dry-cell batteries

NOTE: Be sure sodium hydroxide solution is at least a 45% solution by weight. If not, boil off some of the water. If solid sodium hydroxide is available, dissolve some sodium hydroxide in about twice as much water (by volume).

PROCEDURE:

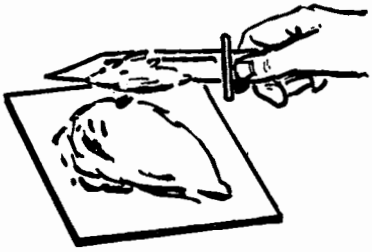
1. Scrape coating off both ends of wires with knife until metal is shiny.



2. Mix thoroughly (do not grind) approximately equal volumes of powdered charcoal and one of the following: potassium permangenate, calcium hypochlorite, or manganese dioxide. Add water until a very thick paste is formed.

CAUTION: Avoid getting any of the ingredient on the skin or in the eyes.

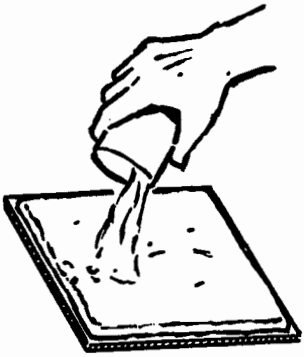
3. Spread a layer of this mixture about 1/8 in. (2 mm) thick on the copper or brass plate. Be sure mixture is thick enough so that when mixture is sandwiched between two metal plates, the plates will not touch each other at any point.



NOTE: If more power is required, prepare several plates as above.

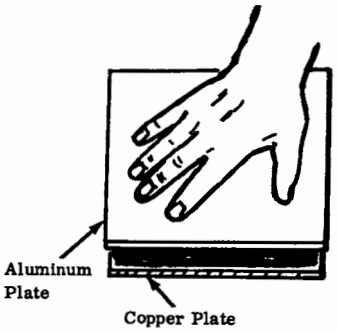
HOW TO USE:

1. Just prior to use (no more than 15 minutes), carefully pour a small quantity of sodium hydroxide solution over the mixture on each plate used.



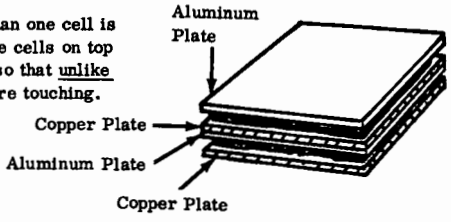
CAUTION: If solution gets on skin, wash off immediately with water.

2. Place an aluminum plate on top of the mixture on each copper plate. Press firmly. Remove any excess that oozes out between the plates.

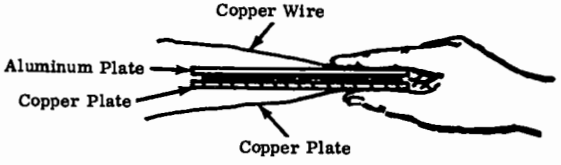


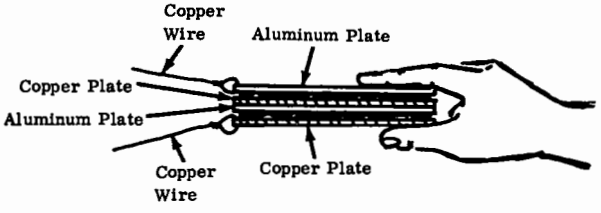
CAUTION: Be sure plates are not touching each other at any point.

3. If more than one cell is used, place the cells on top of each other so that unlike metal plates are touching.



4. When ready to fire, clean plates with knife where connections are to be made. Connect one wire to the outer aluminum plate. This may be done by holding the wires against the plates or by hooking them through holes punched through plates. If wires are hooked through plates, be sure they do not touch mixture between plates.



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IMPROVISED BATTERY (2 HOUR DURATION)

This battery should be used within 2 hours and should be securely wrapped. Three cells will detonate one blasting cap or one igniter. Five cells, connected in series, will detonate two of these devices and so on. Larger cells have a longer life and will yield more power.

If depolarizing materials such as potassium permanganate or manganese dioxide cannot be obtained, ten cells without depolarizer, arranged as described below, (Step 4) will detonate one blasting cap.

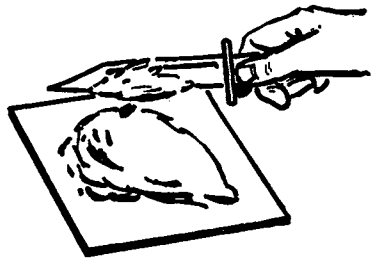
MATERIALS	COMMON SOURCE
Water	
Ammonium chloride (sal ammoniac) (solid or concentrated solution)	Medicines Soldering fluxes Fertilizers Ice melting chemicals for roads
Charcoal powder	
Copper or brass plate about 4 in. (10 cm) square and 1/16 in. (2 mm) thick	
Aluminum plate same size as copper or brass plate	
Wax and paper (or waxed paper)	Candles
Wire, string or tape	
Container for mixing	
Knife	
One of the following:	
Potassium permanganate, solid	Disinfectants Deodorants
Manganese dioxide	Dead dry batteries

NOTE: If ammonium chloride solution is not concentrated (at least 45% by weight) boil off some of the water.

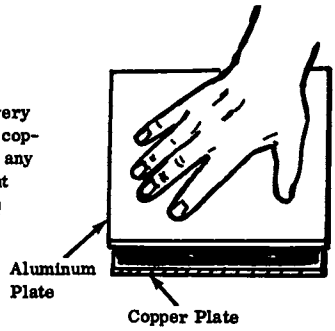
PROCEDURE:

1. Mix thoroughly (do not grind) approximately equal volumes of powdered charcoal, ammonium chloride and one of the following: potassium permanganate or manganese dioxide. Add water until a very thick paste is formed. If ammonium chloride is in solution form, it may not be necessary to add water.

2. Spread a layer of this mixture, about 1/8 in. (3 mm) thick, on a clean copper or brass plate. The layer must be thick enough to prevent a second plate from touching the copper plate when it is pressed on top.

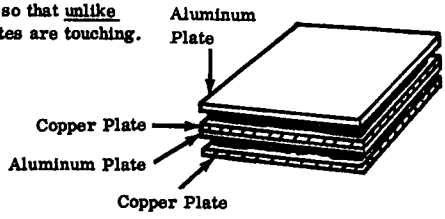


3. Press an aluminum plate very firmly upon the mixture on the copper plate. Remove completely any of the mixture that squeezes out between the plates. The plates must not touch.



4. If more than one cell is desired:

   a. Place one cell on top of the other so that unlike metal plates are touching.



Section VII
No. 14

ARMOR MATERIALS

The following table shows the amount of indigenous materials needed to stop ball type projectiles of the 5.56 mm, .30 caliber, and .50 caliber ammunition fired from their respective weapons at a distance of 10 feet (3 m).

INDIGENOUS MATERIAL	THICKNESS OF MATERIALS					
	Inches			Centimeters		
	5.56 mm	.30 cal 7.62 mm	.50 cal 12.70 mm	5.56 mm	.30 cal 7.62 mm	.50 cal 12.70 mm
Mild steel (structural)	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{1}{4}$	2
Mild aluminum (structural)	1	1	2	$2\frac{1}{2}$	$2\frac{1}{2}$	5
Pine wood (soft)	14	22	32	36	56	82
Broken stones (cobble gravel)	3	4	11	8	11	28
Dry sand	4	5	14	11	13	36
Wet sand or earth	6	13	21	16	33	54

NOTE: After many projectiles are fired into the armor, the armor will break down. More material must be added.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Other Books Available From Desert Publications

001	Firearm Silencers Vol 1	$9.95
003	The Silencer Cookbook	$9.95
004	Select Fire Uzi Modification Manual	$9.95
005	Expedient Hand Grenades	$12.00
007	007 Travel Kit, The	$8.00
008	Law Enforcement Guide to Firearms Silencer	$8.00
009	Springfield Rifle, The	$10.00
010	Full Auto Vol 3 MAC-10 Mod Manual	$7.95
012	Fighting Garand, The	$11.95
013	M1 Carbine Owners Manual	$9.95
014	Ruger Carbine Cookbook	$8.00
015	M-14 Rifle, The	$7.95
016	AR-15, M16 and M16A1 5.56mm Rifles	$9.95
017	Shotguns	$9.95
019	AR15 A2/M16A2 Assault Rifle	$9.95
022	Full Auto Vol 7 Bingham AK-22	$7.95
027	Full Auto Vol 4 Thompson SMG	$7.95
030	STANAG M-Talk	$12.95
031	Thompson Submachine Guns	$11.95
035	How to Build Silencers	$6.95
036	Full Auto Vol 2 Uzi Mod Manual	$7.95
049	Firearm Silencers Vol 3	$13.95
050	Firearm Silencers Vol 2	$16.95
054	Company Offices HB of Ger. Army	$11.95
056	German Infantry Weapons Vol 1	$14.95
060	Survival Gunsmithing	$9.95
061	FullAuto Vol 1 Ar-15 Mod Manual	$7.95
064	HK Assault Rifle Systems	$27.95
065	SKS Type of Carbines, The	$14.95
066	Private Weapoeneer, The	$9.95
067	Rough Riders, The	$24.95
068	Lasers & Night Vision Devices	$29.95
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