Welcome to NBK2000

Home of the Natural Born Killers of the 21st century

"The knowledge that they fear is a weapon to be used against them"

The mission of NBK2000 is to spread the knowledge needed to fight the war against the "War on Crime". Americas politicians have used the excuse of an (allegedly) rising crime rate as justification for destroying our constitutional rights, and for militarizing the police in preparation for dictatorship. So with the future of Big Brother hanging over our heads, it's time everyone wakes up to the truth and gets ready to fight.

You can't fight the Goverment openly and hope to win. They'll burn you up like Waco or wait you out until you surrender and stick you in an underground prison like Marion, IL. You have to fight them covertly as an underground resistance fighter like the french against the Nazi occupation. You may be asking yourself "what does committing crimes like rape and murder have to do with fighting an oppressive goverment?" Simple, every resistance group uses assassination (murder) and torture (rape) as weapons against the agents of the State. And, of course, every fighter uses weapons to kill and destroy the agents and property of the State. You need money for bribes (robbery), supplies (burglary and fraud), transportation (GTA), etc. etc..

Below is a list of links for pages on almost every "crime", weapons you'll need to fight the police (or do the crime you want), skills you'll need to excel in crime, and links to penal codes so you'll know how much time you could get. Some pages overlap in content, this is inevitable when you have many related subjects. What you do with the info is up to you. Remember, "If you can't do the time, don't do the crime."

PS If your offended by this web site, Fuck You!

NEW!

Download the entire NBK2000 website in PDF format!

NEW!

also includes several "bookz"! (temporarily down, xoom deleted it. FUCKERS!)

The links below lead to the articles listed in the link directory. Articles with an * beside them do not have any content yet. I'll be adding content as I scan it in. In the meantime, if you have any articles or files that you think would fit in with what you see here, please e-mail it to NBK2000

CRIMES

1. The Philosophy of Crime *
2. Rules to Profit By *
3. Murder *
4. Rape (AKA Snatch Snatching) *
5. Kidnap*
6. Arson
7. Bombing *
8. Extortion *
9. Robbery *
10. Burglary *
11. GTA (Grand Theft Auto) *
12. Stalking *
13. Counterfeiting & Fraud *
14. Drugs (Selling & Making)
15. School Massacres *
16. Random Terror & Killing UPDATED 01/01/2000

WEAPONS & TACTICS

1. Survival in the era of "COPS" & "Americas Most Wanted" *
2. "The Art of War" by Sun Tzu

3. Firearms (pistol, shotgun, and rifle. Store bought & homemade.) UPDATED 01/19/2000
4. Explosives
5. Incendiaries
6. Poisons and Toxins UPDATED 01/29/2000
7. Booby traps & Land mines
8. Hand & Rifle Grenades *
9. Chemical Weapons (Poison gas & Tear gas) UPDATED 01/28/2000
10. Shock & Stun Weapons *
11. Non-Lethal Weapons (Smoke, Foam, Slime, etc.)
12. Anti-Vehicle Traps & Weapons *
13. Anti-Tank Traps & Weapons *
14. Anti-Helicopter Weapons
15. Heavy Weapons (Mortars, Flamethrowers, etc)
16. List of chemical sources and safety info *

SKILLS

1. Surveillance & Counter-Surveillance *
2. Secure Communications (Phone, Mail, Pager, Computer)
3. Lock-picking, Safe-breaking, and Forced Entry
4. Gun fighting & Sniping (Handgun, Shotgun, and Rifle)
5. Armor (Body, Vehicle, House, and Improvised) *
6. Field Fortifications (Foxholes, Bunkers, etc.) *
7. Defensive Driving *
8. Destroying Evidence (DNA, Drugs, etc.) *
9. Body Disposal *
10. Camouflage *
11. Escape & Evasion *
12. Caching (Hiding things by burying them)
13. Stashes (Hiding things)

LEGAL LINKS

1. Your rights when confronted by the Police NEW! 01/08/2000

Strawberry Pop-Tart Blow-Torches

I found this information from some other website and couldn't help but think that this would be great for burning down someones house (maybe even your own) for either murder or insurance fraud. Most people have toasters and they're often underneath cabinets full of flammable materials.

For murder, it's necessary that the person your looking to kill inhales the smoke from the fire. If a person doesn't have any smoke soot in their lungs, that means they weren't breathing when the fire was burning, meaning they were already dead. It's little details like that that could get you caught.

A good scenario would be to use a stungun to immobilize your victim, carry them into the kitchen, put 2 SPTs in their unplugged toaster, push the lever down and jam a fork inside it to keep it from popping up, then plug it in. Make sure there's plenty of fuel for the fire above the toaster and leave the cabinet door open.

When the arson investigator examines the scene this is what he'll probably think: Victim got up in the middle of the night to make a snack, toaster got stuck, victim tried to remove pop-tarts with fork, got shocked, toaster shorted out from fork stuck in it and caught on fire. Victim was unconcious from the shock, died of smoke inhalation and was burned up in the fire that consumed the house. The fire will conveniently destroy any burn marks from the stungun.

If your going to do this for insurance fruad, it's important that the circumstances are consistent with making pop-tarts. That means in the morning. You could pop it in the toaster (leaving the cabinet door above open and stocked with paper towels, flammable household solvents, etc), go outside for a few minutes and when the flames are fully developed, go running to the neighbors screaming "911, call 911!". By the time the firemen show up your house should be totally destroyed.

Have fun.

Abstract

Strawberry Pop Tarts may be a cheap and inexpensive source of incendiary devices. Toasters which fail to eject Pop Tarts cause the Pop Tarts to emit flames 10-18 inches in height.

Introduction

Last year, an article by well-known newspaper columnist *Dave Barry* noted that *Kellogg's Strawberry Pop Tarts* (SPTs) could be made to emit flames "like a blow torch" if left in a toaster too long. The present work describes our independent verification and experience with SPT-based combustion.

Materials Used

Only two basic materials are needed to cause SPT-combustion: a (hopefully inexpensive) toaster and some Strawberry Pop Tarts (Figure 1). In this work, the authors used *Kellogg's Strawberry Pop Tarts with Real Smucker's Fruit*. SPTs can be obtained either with or without frosting; the non-frosted variety were used for this experiment.

Figure 1. Toaster and Strawberry Pop Tarts

In addition to the basic materials, a number of safety-related items were needed to conduct this experiment. First, a suitable location for the experiment was required, it being expected that the kitchen was not the appropriate place for blow-torching SPTs. The author's driveway was chosen as a suitable site. Second, an appropriate means for extinguishing the SPTs would be needed; a research assistant brought along some baking soda for the purpose.

Experiment Preparation

The toaster and SPT both had to be properly prepared for this experiment. In order to guarantee that the SPT would receive sufficient heat to begin combustion, the toaster was set to its highest setting and the lever was jammed in the "down" position using adhesive cellophane. A SPT was removed from the box and its protective packaging and carefully placed into the toaster slot (Figure 2).

Figure 2. Preparation of Toaster and SPT

Next, the toaster and SPT were taken to the driveway, and an extension cord was arranged to provide power to the toaster. At this point, we were ready to begin the experiment.

Figure 3. Toaster Prepared for SPT combustion

The Experiment and Observations

The toaster was plugged in. First the toaster went through a normal "toasting" cycle (approximately 60 seconds), which more than thoroughly cooked the SPT (since the toaster was set to its darkest setting). By this point we could definitely detect a burnt SPT aroma. The toaster then attempted to eject the SPT, but was prevented from doing so by the adhesive cellophane. The toaster then began emitting loud rattling and buzzing noises due to its inability to eject the SPT.

(At this point the researchers became somewhat concerned that the noise from the toaster would wake the neighbors and attract undue attention. However, we decided that we were already committed to the experiment and that the neighbors would be able to sacrifice some sleep in the name of science.)

Soon thereafter, large amounts of smoke began pouring out of the toaster. The researchers noticed that some of the neighbors down the street were beginning to get a little curious, but the experiment proceeded nonetheless. Approximately 40 seconds later, small flames began licking their way out of the toaster. The flames steadily grew larger and larger until reaching a maximum height of about 18 inches above the top of the toaster. Figure 4 presents a time-series collage of the flames emitted from the SPT.

Figure 4. Time Series Photograph of Flaming SPT

As the flames were reaching their maximum height, the toaster abruptly stopped making buzzing noises. We speculate that the flames had by this point shorted the electronics within the toaster. The toaster was quickly disconnected from the primary electrical source to avoid any potential damage to the author's house. At this point, the researchers also realized that the heat could inadvertently melt the adhesive cellophane and cause the flaming SPTs to suddenly eject from the toaster. Unfortunately, this did not occur. The flames continued for several minutes.

At this point there was some slight concern that the flames might take considerable time to diminish. We then enlisted the help of a reluctant research assistant to sprinkle baking soda on the flames. (The reluctance was understandable given the potential for premature SPT ejection described in the above paragraph.) The baking soda quickly extinguished the flames and produced still further smoke (Figure 5a).

Figure 5. Extinguising the SPT

Once the flames were extinguished, the researchers noted an unanticipated problem: what to do with the (now defunct) toaster and the spent SPT. It became obvious that the toaster could not be returned to the author's house due to both a continued potential fire hazard and the smell of burnt strawberries. In addition, it was noted that the toaster was still "too hot to handle," necessitating the use of a nearby garden hose to cool the toaster off. This is illustrated in Figure 5b. Finally it was decided to just leave the toaster by the curb for the sanitation experts to pick up the next morning (Figure 6.)

Figure 6. Toaster Disposal

Summary and Recommendations

In summary, overcooking the SPT did produce a good size flame. The effect was not as pronounced as the researchers had hoped, but was satisfying nonetheless. The research assistant noted that the flames produced did appear to have some color variation. We believe that frosted SPTs may successfully produce even larger torches. Further research in this area is warranted.

Drugs
(Making & Selling)

Drugs are one of the most profitable, and risky, crimes. So you'll need both the knowledge to make them safely, store and transport them without detection, and sell them without getting busted.

For now though, I just have these files on making anesthetics suitable for knocking someone out so you can rob, kidnap, or rape them. I'll be posting more relevant files at a later time.

Chloroform

Chloral Hydrate

Chlorobutanol

You should also check out the Stashes (Hiding things) section for more information.

Chloroform

I found this on the net so if it doesn't work don't blame me. If it does, let me know.

When using chloroform for knocking someone out, you should know that it doesn't work like in the movies. In real life a person who's been struggling and agitated will regain consciousness in about 5 minutes, not an hour like the movies would have you think.

Method 1

Go get a five gallon bucket. The ones used for painting work well and are available new, with a cover, in the paint department of most big homeowner stores. The cover can be used to keep bird droppings and bugs out of the reaction. Put the bucket outside in a reasonably ventilated area with good drainage away from any shrubbery that can be killed by spills. Pour two gallons of 10% sodium hypochlorite solution into the bucket. This material is available in two one-gallon containers for around $4.00 from the local homeowner store in the swimming pool section labeled, “Liquid Pool Chlorine.” Make sure you get the Sodium Hypochlorite, not the Hydrochloric Acid that’s in the same section, HCl is useful, but not for this reaction.

Add 5 pounds of ice to the Hypochlorite. Be careful pouring this stuff, it’s bleach, but twice as strong as the stuff Mom uses to do your laundry. Each splash on your clothing will eat a nice white hole. Stir with a plastic or wooden spoon, avoid metal. Metal spoons won’t spoil the reaction, but it may spoil the spoon.

While the solution cools, measure out 340 grams of acetone into a container. Add about half of the measured acetone into the ice solution and stir it up. Wait about 10 minutes and feel the side of the bucket. It should feel warmer near the bottom and colder as you raise your hand to the ice. Stir the ice mix around and equalize the temperature. Add the rest of the acetone and stir again. Let it set for about 10 minutes.

If you didn’t listen and used less than five pounds of ice in the solution, it will get hot enough to boil off the Chloroform and leave you with nothing but a bad smell, splatters where it boiled over and probably holes in your shoes and clothes. As a matter of fact it would be good to have an extra five pounds of ice around in case you're doing this in the middle of the day in Panama where the temperature is hovering around 104F. At this temperature, or if you're doing this in the Peruvian Mountains at 6500 feet it may take more ice to keep it cool enough not to boil off the Chloroform as it forms. This is a very exothermic reaction, but it can be controlled easily by the addition of ice as needed.

You should have a cool mixture of ice and something that is starting to look cloudy. It will be colder on the top than the bottom and most of the ice has melted. Let this mixture set until the ice completely melts. Grab the bucket and carefully pour off the water and fine white powder leaving behind the Chloroform that has settled to the bottom of the bucket. When you're pouring off the water, it may be hard to see the Chloroform, but trust me, it’s in there. The Chloroform is

heavier than water and falls to the bottom in a bubble looking blob. The blob will have a white powder clinging to it. Just pour off the water until you can clearly see the blob and then pour blob, water and powder into a smaller, easier to handle container. There may be some bubbles forming and rising to the top of the solution. Don't worry, this is normal and will not cause a problem…unless you try to seal the reactants up.

Pour the Chloroform, powder and water through a coffee filter into a separatory funnel and separate the crude Chloroform, which will sink to the bottom. You will get around 200ml of crude Chloroform. Disappointed? This reaction uses very cheap materials and is one of the simplest, cheapest methods known, so just quit bitching and deal with it. Since the procedure is so simple up to this point, make a few more batches before moving to the next step.

The Chloroform has water and the white powder still in it and this needs to be removed. The Chloroform can be vacuum filtered through a six inch sand filter to remove the powder and then passed through about 4 inches of anhydrous magnesium sulfate to remove most of the water, but the mechanical loss would kill half of the product. The best way to clean this up is to distill it. Use an appropriately sized flask, a one liter two-necked flask will work well, even for larger volumes. If html doing more than half a liter, pour it in as the distillation progresses. Use a fractionating column, I use a 400mm, set up for normal distillation with an oil bath and magnetic stirring. If this last paragraph doesn’t mean a thing to you, go to the library and get an organic lab survivor’s guide. These books have pictures and complete descriptions of all the pieces I’ll talk about.

Remember, distilling Chloroform is not an incredibly safe procedure. Chloroform fumes are toxic and narcotic, and may knock you out if aren't being careful. On contact with flames and hot surfaces it can decompose into the dangerous war gas phosgene. So ventilate the area with fans to remove the vapors and attach a vent tube to the vacuum adapter that leads away from the area where I'll working.

It is interesting watching Chloroform distill through a fractionating column. As the solution comes to a boil a gray cloud rises up the column until it reaches the distilling head and spills into the condenser where it disappears into fluid. Below the rising cloud the Chloroform condenses on the sides of the column and drips back into the solution to be converted into the rising cloud again. Keep the boil fairly slow, you I'll want to boil it dry while yI'lloff visiting the bathroom or kitchen. The first Chloroform that comes over is tainted with water, donI'llrry about it, keep collecting. When the Chloroform is almost gone from the source flask, add about 200 ml of water and bring to a gentle boil to force the remaining Chloroform from the column (there’s a bunch of stuff in there). You can tell when the Chloroform is done because the temperature starts to rise pretty quickly from 60C to 80C. Stop the distillation at this point.

As the Chloroform distilled it azeotropically carried over some water that can now be seen as clear bubbles clinging to the sides of the receiving flask or floating around on the top of the clear Chloroform. It can also cloud up the Chloroform some. Pour the Chloroform into a separatory funnel. Put a flask fitted with a filtering funnel loaded with a couple of inches of anhydrous Magnesium Sulfate under the separatory funnel, and let the Chloroform slowly drain through while separating the water. This will leave you with clear anhydrous Chloroform in the flask.

To make anhydrous Magnesium Sulfate, get some Epsom Salts at the drug store and pour about a pound into a casserole dish. Heat the casserole dish in the oven at 450F for about 4 hours. After cooling and chipping and crushing the fused material you have anhydrous Magnesium Sulfate. Putting it in a thick plastic bag and tapping gently with a hammer can crush this stuff. Use a butter knife to get it out of the pan, not an ice pick! You can also line the pan with aluminum foil to make removal easier, but sometimes it's hard to get the aluminum loose from the Magnesium Sulfate. Don't grease the pan stupid!

Now look back at what's left in the distilling flask. It's got water and some nasty green stuff clinging to the sides and a white powder setting on the bottom. See why you distilled it? This crud would have been left in the chloroform and screwed up everything you used it for.

Put your crystal clear, anhydrous Chloroform in a brown bottle, cap tightly and store away from light. If your going to store it for a long time put a couple of drops of 95% alcohol in to stabilize it. Warning, Chloroform will eat rubber, so don't use a rubber stopper. Glass or teflon seals are the best.

Method 2

Required: Calcium Hypochlorite 100g (bleaching powder), acetone 44ml

Place 100g of calcium hypochlorite in a mortar and add 250 ml of water in small quantities at a time: between each addition grind the mixture of bleaching powder and water well together and decant the cream-like suspension through a funnel into a 1-litre flat-bottomed flask. Finally, when all the water has thus been used, only a gritty residue remains in the mortar. Fit the flask with an efficient reflux water-condenser, pour 44ml (35g) of acetone in small quantities, at a time, down the condenser and mix by thorough shaking after each addition. The reaction usually starts spontaneously after a few minutes, and a bath of cold water should be available into which the flask may be dipped if necessary to moderate the reaction. Should the reaction show no signs of starting within 5 minutes of the addition of the acetone, warm the flask cautiously on a boiling water-bath until the reaction starts, and then remove it immediately. When the vigorous boiling has subsided, heat the flask on a boiling water-bath for a further 5-10 minutes (not more) to complete the reaction. Cool the flask in cold water (to prevent loss of chloroform vapor whilst the apparatus is being rearranged) and then fit the flask with a fairly wide delivery-tube and reverse the water-condenser for distillation. Heat the flask on a water-bath until distillation of the chloroform is complete.

The chloroform thus obtained is usually acidic. Therefore shake it thoroughly with dilute sodium hydroxide solution in a separating-funnel. (If the chloroform tends to float on the alkaline solution, it still contains appreciable quantities of acetone: in this case the soda should be run out of the funnel and the chloroform shaken with water to extract the acetone. The extraction with the soda can then be performed after the water has been removed.) Carefully run off the heavy lower layer of chloroform into a small conical flask, dry it over calcium chloride for 15-20 minutes, and then filter it directly into a 75 ml. distilling-flask fitted with a clean dry water-condenser. Distill the chloroform, collecting the fraction of bp. 60-63C. Yield, 30g. (20ml).

Chloroform is a colorless liquid, of bp 61C and D. 1.50. It has a characteristic sweetish smell,

and is frequently used as a solvent in organic chemistry.

Chloral Hydrate

This is the original knock out drug. Nowadays, though, GHB and Chlorobutanol would be preferable because of the ease of manufacturing and the greater effectiveness. The manufacturing recipe here is from the net and is identical to a reference I have so it's verified as authentic.

This a very easy synthesis with all chemicals needed being very easily obtainable from your local pool store (HTH and pool acid), liquor store (grain alcohol "gem clear") and hardware store (Sulfuric acid drain cleaner). As far as the calcium oxide used in the last steps I'm not sure this is really a necessary step other than producing a more pure product. I think that if someone were to stop at step 18 the Chloral Hydrate would have a high enough purity for consumption.

The Process:

1. Put 350ml of anhydrous alcohol (Dry or distill pure grain alcohol.) into a 600ml flask and put a 2-hole stopper into the top.

2. Prepare your chlorine by mixing pool acid (HCL) diluted with an equal weight of water and pouring it onto half its weight of HTH chlorinating powder in a clean 500ml flask and put a 2-hole stopper into the top. Don't add the acid until your ready for generating the chlorine because the reaction begins immediately upon adding the acid

3. Attach a fish tank aerator to the flask in step 2 by a length of plastic tubing and inserting this tubing into the top of the stopper.

4. Connect the remaining opening of the flask in step 2 to one of the openings on the flask in step 1 using another piece of plastic tubing.

5. Place a piece of glass tubing long enough to reach the bottom of the flask in step 1 and insert it into the tubing in step 4 so that it reaches into the bottom of the alcohol flask. (This should start the bubbling of chlorine gas through the alcohol.)

6. Place another piece of plastic tubing into the remaining opening of the alcohol flask and put the open end into the bottom of a 500ml flask.

7. Place the 500ml flask in step 6 in a cold water bath.

8. Continue to bubble the chlorine gas through the alcohol until it will absorb no more gas.

9. Gently heat the alcohol flask using a water bath until the alcohol begins to boil. (Some of the alcohol will distill off into the flask in step 6, several times during the chlorinating process pour the alcohol that distills back into the alcohol flask into the alcohol flask.)

10. When the flask is totally chlorinated it is poured into a Pyrex dish and allowed to cool. (If the above steps were done properly you should have a large mass of crystals upon cooling.)

11. Pour concentrated sulfuric acid equal to 3 times the volume of the impure Chloral Hydrate (the crystal mass) into the dish.

12. Heat this dish on a water bath until the Chloral Hydrate crystals are melted, this solution should then be stirred for approximately 3 min.

13. Pour the solution from step 12 back into a clean dry 1000ml flask and heat (Do not heat above 200F.)

14. As the solution in step 13 heats up the still impure Chloral Hydrate will begin to float to the surface, when it stops rising use a basting syringe (Or whatever you prefer.) to draw off the floating layer of Chloral and place this into a clean, dry beaker.

15. Repeat step 14 until no more Chloral rises to the surface.

16. Heat the beaker in the above step 14 to around 190F for 20 min. to get rid of any alcohol or acid remaining in this solution.

17. Pour the solution from step 16 back into the flask in step 13 (1000ml flask) and add an equal amount (by volume) of sulfuric acid to this flask and stir for approx. 5 min.

18. Distill off the Chloral Hydrate (which distills at 210F) into a clean dry beaker that is placed in an ice bath. (This should not be hard as the sulfuric acid distills at 722F.)

19. Place the distilled Chloral from the above step back into a cleaned, dry 500ml flask and add an equal amount (by volume) of calcium oxide to this flask.

20. Once again distill off the Chloral until the surface of the calcium oxide is dry.

That s it!!!

To use the Chloral Hydrate you have just made add one part water to two parts (by volume) of finished product. The dose range is 250mg-1000mg. Add the desired amount of Chloral solution to a drink of your choice and drink up. Choose a drink to add this to that will mask the taste of the Chloral as it has a bitter taste (orange juice is good). Onset is in about 15 min-30 min. (And you or whoever has taken this will be out for the night.)

Synthesis of 1,1,1-Trichloro-2-methyl-2-propanol (Chlorobutanol)

Chlorobutanol - an alternative to chloral hydrate

According to an older edition of a standard medical pharmacology textbook, chlorobutanol "is qualitatively similar to, but more potent than, chloral hydrate in its action upon the CNS..." and "unlike chloral hydrate, chlorobutanol produces no gastric irritation, and toxic reactions following the administration of therapeutic doses are extremely rare." (Drill, Pharmacology in Medicine, 2nd ed., 1958, p.156).

The recommended dosage range is about the same as for chloral hydrate, 0.25 to 1.25 gm. (Drill, op cit.; Merck Index). It does work, and in the higher dosage range results in a groggy, stuporous state. (AB)USE AT YOUR OWN RISK.

Since I've never actually experienced chloral hydrate, I can best describe the effects of chlorobutanol as effecting motor function before cognitive function. In other words, you know you can't walk a straight line very well, but you can still comprehend a textbook.

The synthesis of chlorobutanol is quite simple, provided you can get one of the key ingredients, chloroform.

Chlorobutanol is prepared by the addition of chloroform to acetone under the catalytic influence of powdered sodium hydroxide, It has a local anaesthetic potency to a mild degree and is used as an anaesthetic dusting powder. Chlorobutanol also has antibacterial and germicidal properties.

Using a molar ratio of 10:1, 45.0 ml acetone was reacted with 5.0 ml chloroform, varying other reaction conditions produced the following results:

Experiment	NaOH	Time	Temp	Yield
1	2.0 g	2 h	-5°C	69.3%
2	1.0 g	2 h	-5°C	71.0%
3	0.5 g	2 h	-5°C	51.9%
4	1.0 g	1 h	-5°C	68.4%
5	1.0 g	2 h	0°C	63.2%

PROCEDURE # 1

45 ml Acetone, 5 ml chloroform and 1 gram powdered sodium hydroxide was mixed in a 250ml flask, and the reaction mixture was stirred at -5°C for two hours. The resulting suspension was filtered, and the filtrate was freed from excess acetone by distillation. Once one has distilled off the acetone, pour the remaining yellowish oily residue (liquid chlorobutanol) into ~200ml of iced

water, preferably with ice pieces still floating about. Chlorobutanol hemihydrate precipitated as a slightly yellowish to white crystalline material, which was filtered off and dried (preferably in a vacuum desiccator).

You will probably want to re-crystallize the crystals isolated from the ice water, as they are usually overly hydrated, and never seem to fully dry. I recommend using ethanol. Ethanol gives beautiful white crystals.You CAN use denatured alcohol (ethanol), as it is only used as a carrier solvent, and the TOXIC methanol is evaporated off with the ethanol during the synthesis. DON'T DRINK DENATURED ALCOHOL. The added methanol is TOXIC. Be sure to use as little solvent as possible to dissolve the chlorobutanol before allowing to evaporate dry as a thin layer on a large glass plate. Scrape off the re-crystallized chlorobutanol with a razor blade or other sharp straight edge. Store the chlorobutanol in a closed dark container, as it sublimes easily. Melting point is 78.4°C.

PROCEDURE # 2

The preferred synthesis is that described by Fishburn & Watson (J. Amer. Pharmaceut. Assoc., 28, 491-3, 1939). "We recommend the following procedure for the preparation of chlorobutanol.

One hundred grams acetone (5 mols, ~125 ml) and 40 Gm. Chloroform (1 mol, ~26.7 ml) are mixed, and 7 Gm. potassium (or sodium) hydroxide dissolved in the minimum quantity of alcohol, are added. The addition occupies fifteen minutes; cooling is usually unnecessary.

The precipitated potassium chloride is filtered off and washed with a little acetone.

The filtrate is distilled on the [boiling] water-bath and when no further liquid distills, about 200 ml. of distilled water are added.

The chlorobutanol is filtered off as a white solid.

Yield (calc. on CHCl3), 25% theoretical.

The acetone distilled off can be used in a subsequent preparation. (Don't re-use the acetone distillate too many times, as yields appear to decrease)."

GENERAL PROPERTIES

Chlorobutanol is slightly soluble in cold water, more soluble in hot water, and readily soluble in ethanol, acetone, chloroform, and numerous other organic solvents.

Chlorobutanol has a very strong camphor-like odor. Some people may find it rather pleasant. In any case, because chlorobutanol sublimes so easily, it is highly detectable in closed areas, so keep in a closed glass container after it has been recrystallized. For this reason, you may want to work with batch quantities of materials in open areas. I have found that people can detect its odor at least an hour after working with batch quantities of chlorobutanol.

Chlorobutanol, along with its camphor-like odor, also has a somewhat astringent camphor-like taste. It also has a astringent aftertaste that can persist for a time. I've found that foods with a higher fat content, such as peanut butter or ice cream, can mask and/or dispel this astringent

aftertaste. Chlorobutanol can also have a mild numbing, local anesthetic effect on the tongue & mouth. Chlorobutanol was at one time medically employed for this local anesthetic effect.

Chlorobutanol is a chloral hydrate derivative, both being metabolized to the same active principal, trichloroethanol.

NOTES

Potassium hydroxide is preferred over sodium hydroxide, as the former is more soluble in ethanol. However, the original authors found that "sodium hydroxide is almost as effective as potassium hydroxide" and is a lot easier to obtain.

I assume you could use the same amount of NaOH as KOH, as the base acts only as a catalyst for the reaction. Both reagent grade KOH and NaOH contain small amounts of their respective carbonates, which are insoluble in ethanol. Therefore either base will never appear to totally dissolve in ethanol. Dissolve as much as you can, and add everything to the acetone-chloroform mixture. The carbonates will not interfere with the reaction, and will be filtered off with the chloride salts.

Acetone density = 0.79 gm/ml

Chloroform density = 1.48 gm/ml

The filtrate from filtering off the water from the chlorobutanol contains significant quantities of chlorobutanol. Further crystals can sometimes be found in this 'mother liquor' if it is re-cooled. Chlorobutanol is slightly soluble in room temp water (1g/125 ml, Drill, Pharmacology in Medicine, 2nd ed., 1958, p.156).

RANDOM TERROR & KILLING

This section is dedicated to the "Tylenol Killer"

and "The Unabomber".

Here is where all the ideas about how to kill random people and cause mass terror are located. These ideas are used when you don't have any particular person or group in mind, when anybody will do, as long as they die. Life treating you unfairly? Imagine how much better you'll feel knowing that someone else's life is going to be a hell of a lot worse than yours. All thanks to you.

This section isn't arranged like the others on this site. There aren't any links going to other pages. All ideas will be added to only this page until such time as there are enough of them to justify seperate sections.

The techniques and ideas listed here range from the maiming of one person up to nation wide deaths and product recalls.

Toilet Terror

1. Using a syringe, inject mustard gas or other vesicant agent into rolls of toilet paper at public toilets at malls and events. And don't forget the paper seat covers too. Anyone wiping their ass with the tainted paper is going to have huge blisters on their assholes and butt cheeks.
2. Take a sponge (real, not synthetic) and soak it in a saturated starch solution. Squeeze it down into a small ball and tie it with string so it will keep its shape till it's totally dry. Remove the string. Have 2 bags of chemicals (sodium cyanide and citric acid). Drop the sponge ball down the toilet and push it down just out of sight, using a coat hanger. Then pour the citric acid in the bowl and the cyanide in the water tank. You want to use enough chemicals to ensure a saturated solution for maximum effectiveness. Don't use other acids instead of citric because they will have odor or color that may give it away. The cyanide goes in the tank because it reacts with water to give of trace amounts of hydrogen cyanide that may be detected if it was in the bowl and not sealed inside the tank.

   What happens then is that the sponge absorbs water and expands to clog the toilet and keep the chemicals in the bowl. When a victim flushes the toilet, the cyanide solution in the tank flows down into the bowl where it reacts with the citric acid to form a lethal cloud of Hydrogen Cyanide gas. The concentration will be so great that the victim will die instantly and anyone else in the same bathroom will die too. And people who hear the noise (or don't) and enter the bathroom will probably also be killed too.

   You can test this out at home using vinegar and baking soda instead of the lethal chemicals. And a plunger instead of a sponge.

Supermarket of Death

1. Most large supermarkets now have a coffee section with a grinder that is used to grind the beans for sale. This is your target. Go to the grinder and pour a small amount of poison into the grinder. When the next person uses the grinder, the poison will be mixed in with the ground up beans into the bottom of the bag. Thus, the poisoned coffee will be the last to be made, ensuring a suitable time delay to prevent tracing it back to you.

   Be sure to use a poison that isn't heat, water, or acid sensitive.

Johny Applemine

1. Using the mines described here, you find paths and shortcuts through parks, hedges, apartment complexes, etc. and just drop a couple on the path. Do this at random as you walk or bike through the city. Look for the obscure paths because if they can be mined, anywhere (as far as the public is concerned) could be mined.

   Also, you could drop 1 or 2 mines in the park, playgrounds, schools, sandlot, anywhere really. Kids make great targets because of the emotional impact of seeing little kids getting their limbs blown off. Parents will keep them inside, no one will use the parks, and the public will be screaming for something to be done. The government will have to spend shitloads of money searching every square inch of parks, etc. for mines. Of course, the task is impossible since you can easily re-mine them at any time. And they can't search every inch of the city.

   And before you get all offended by this, think about the literally MILLIONS of mines we dropped during the vietnam war that are to this day killing children who weren't even alive during the war. Have we done anything to remove them? NO! So maybe america needs to learn what it's like to fear walking anywhere that isn't paved.

Hersey Kiss of Death

1. This one is perfect for everyone out there who thinks children are the spawn of Satan (like I do). Buy a bag of assorted soft candy like milky ways, snickers, that sort of thing. You want the small bite sized candy bars that are soft enough for a syringe to penetrate. Getting the idea yet?

   You inject a slow poison like ricin, or if your feeling dramatic, cyanide. Then proceed to drop a few of these tasty death nuggets where children will be sure to find them; Playgrounds, Schools, Bus Stops, Parks, Toy Stores, etc. The best way to drop these is through a hole in your pants pocket so no one will see you leaving them. Be sure that you're wearing gloves, don't want to leave any incriminating fingerprints, do you?

The Art of War

By Sun Tzu

"The Art of War" was written more than 2,000 years ago by a Chinese General. It is one of the most studied texts on warfare and strategy, and is required reading in many military academies around the world. While it was written before Christ was born, the strategy is timeless, and can be applied with great effect in modern times.

Remember that the best way to avoid arrest or investigation is to avoid suspicion in the first place.

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I. Laying Plans

1. Sun Tzu said: The art of war is of vital importance to the State.

2. It is a matter of life and death, a road either to safety or to ruin. Hence it is a subject of inquiry which can on no account be neglected.

3. The art of war, then, is governed by five constant factors, to be taken into account in one's deliberations, when seeking to determine the conditions obtaining in the field.

4. These are: (1) The Moral Law; (2) Heaven; (3) Earth; (4) The Commander; (5) Method and discipline.

5,6. The Moral Law causes the people to be in complete accord with their ruler, so that they will follow him regardless of their lives,

undismayed by any danger.

7. Heaven signifies night and day, cold and heat, times and seasons.

8. Earth comprises distances, great and small; danger and security; open ground and narrow passes; the chances of life and death.

9. The Commander stands for the virtues of wisdom, sincerely, benevolence, courage and strictness.

10. By method and discipline are to be understood the marshaling of the army in its proper subdivisions, the graduations of rank among the officers, the maintenance of roads by which supplies may reach the army, and the control of military expenditure.

11. These five heads should be familiar to every general: he who knows them will be victorious; he who knows them not will fail.

12. Therefore, in your deliberations, when seeking to determine the military conditions, let them be made the basis of a comparison, in this wise:--

13. (1) Which of the two sovereigns is imbued with the Moral law? (2) Which of the two generals has most ability? (3) With whom lie the advantages derived from Heaven and Earth? (4) On which side is discipline most rigorously enforced? (5) Which army is stronger? (6) On which side are officers and men more highly trained? (7) In which army is there the greater constancy both in reward and punishment?

14. By means of these seven considerations I can forecast victory or defeat.

15. The general that hearkens to my counsel and acts upon it, will conquer: let such a one be retained in command! The general that hearkens not to my counsel nor acts upon it, will suffer defeat:--let such a one be dismissed!

16. While heading the profit of my counsel, avail yourself also of any helpful circumstances over and beyond the ordinary rules.

17. According as circumstances are favorable, one should modify one's plans.

18. All warfare is based on deception.

19. Hence, when able to attack, we must seem unable; when using our forces, we must seem inactive; when we are near, we must make the enemy believe we are far away; when far away, we must make him believe we are near.

20. Hold out baits to entice the enemy. Feign disorder, and crush

him.

21. If he is secure at all points, be prepared for him. If he is in superior strength, evade him.

22. If your opponent is of choleric temper, seek to irritate him. Pretend to be weak, that he may grow arrogant.

23. If he is taking his ease, give him no rest. If his forces are united, separate them.

24. Attack him where he is unprepared, appear where you are not expected.

25. These military devices, leading to victory, must not be divulged beforehand.

26. Now the general who wins a battle makes many calculations in his temple ere the battle is fought. The general who loses a battle makes but few calculations beforehand. Thus do many calculations lead to victory, and few calculations to defeat: how much more no calculation at all! It is by attention to this point that I can foresee who is likely to win or lose.

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II. Waging War

1. Sun Tzu said: In the operations of war, where there are in the field a thousand swift chariots, as many heavy chariots, and a hundred thousand mail-clad soldiers, with provisions enough to carry them a thousand li, the expenditure at home and at the front, including entertainment of guests, small items such as glue and paint, and sums spent on chariots and armor, will reach the total of a thousand ounces of silver per day. Such is the cost of raising an army of 100,000 men.

2. When you engage in actual fighting, if victory is long in coming, then men's weapons will grow dull and their ardor will be damped. If you lay siege to a town, you will exhaust your strength.

3. Again, if the campaign is protracted, the resources of the State will not be equal to the strain.

4. Now, when your weapons are dulled, your ardor damped, your strength exhausted and your treasure spent, other chieftains will spring up to take advantage of your extremity. Then no man, however wise, will be able to avert the consequences that must ensue.

5. Thus, though we have heard of stupid haste in war, cleverness has never been seen associated with long delays.

6. There is no instance of a country having benefited from prolonged warfare.

7. It is only one who is thoroughly acquainted with the evils of war that can thoroughly understand the profitable way of carrying it on.

8. The skillful soldier does not raise a second levy, neither are his supply-wagons loaded more than twice.

9. Bring war material with you from home, but forage on the enemy. Thus the army will have food enough for its needs.

10. Poverty of the State exchequer causes an army to be maintained by contributions from a distance. Contributing to maintain an army at a distance causes the people to be impoverished.

11. On the other hand, the proximity of an army causes prices to go up; and high prices cause the people's substance to be drained away.

12. When their substance is drained away, the peasantry will be afflicted by heavy exactions.

13,14. With this loss of substance and exhaustion of strength, the homes of the people will be stripped bare, and three-tenths of their income will be dissipated; while government expenses for broken chariots, worn-out horses, breast-plates and helmets, bows and arrows, spears and shields, protective mantles, draught-oxen and heavy wagons, will amount to four-tenths of its total revenue.

15. Hence a wise general makes a point of foraging on the enemy. One cart load of the enemy's provisions is equivalent to twenty of one's own, and likewise a single picul of his provender is equivalent to twenty from one's own store.

16. Now in order to kill the enemy, our men must be roused to anger; that there may be advantage from defeating the enemy, they must have their rewards.

17. Therefore in chariot fighting, when ten or more chariots have been taken, those should be rewarded who took the first. Our own flags should be substituted for those of the enemy, and the chariots mingled and used in conjunction with ours. The captured soldiers should be kindly treated and kept.

18. This is called, using the conquered foe to augment one's own strength.

19. In war, then, let your great object be victory, not lengthy campaigns.

20. Thus it may be known that the leader of armies is the arbiter of the people's fate, the man on whom it depends whether the nation

shall be in peace or in peril.
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III. Attack by Stratagem

1. Sun Tzu said: In the practical art of war, the best thing of all is to take the enemy's country whole and intact; to shatter and destroy it is not so good. So, too, it is better to recapture an army entire than to destroy it, to capture a regiment, a detachment or a company entire than to destroy them.

2. Hence to fight and conquer in all your battles is not supreme excellence; supreme excellence consists in breaking the enemy's resistance without fighting.

3. Thus the highest form of generalship is to balk the enemy's plans; the next best is to prevent the junction of the enemy's forces; the next in order is to attack the enemy's army in the field; and the worst policy of all is to besiege walled cities.

4. The rule is, not to besiege walled cities if it can possibly be avoided. The preparation of mantlets, movable shelters, and various implements of war, will take up three whole months; and the piling up of mounds over against the walls will take three months more.

5. The general, unable to control his irritation, will launch his men to the assault like swarming ants, with the result that one-third of his men are slain, while the town still remains untaken. Such are the disastrous effects of a siege.

6. Therefore the skillful leader subdues the enemy's troops without any fighting; he captures their cities without laying siege to them; he overthrows their kingdom without lengthy operations in the field.

7. With his forces intact he will dispute the mastery of the Empire, and thus, without losing a man, his triumph will be complete. This is the method of attacking by stratagem.

8. It is the rule in war, if our forces are ten to the enemy's one, to surround him; if five to one, to attack him; if twice as numerous, to divide our army into two.

9. If equally matched, we can offer battle; if slightly inferior in numbers, we can avoid the enemy; if quite unequal in every way, we can flee from him.

10. Hence, though an obstinate fight may be made by a small force, in the end it must be captured by the larger force.

11. Now the general is the bulwark of the State; if the bulwark is

complete at all points; the State will be strong; if the bulwark is defective, the State will be weak.

12. There are three ways in which a ruler can bring misfortune upon his army:--

13. (1) By commanding the army to advance or to retreat, being ignorant of the fact that it cannot obey. This is called hobbling the army.

14. (2) By attempting to govern an army in the same way as he administers a kingdom, being ignorant of the conditions which obtain in an army. This causes restlessness in the soldier's minds.

15. (3) By employing the officers of his army without discrimination, through ignorance of the military principle of adaptation to circumstances. This shakes the confidence of the soldiers.

16. But when the army is restless and distrustful, trouble is sure to come from the other feudal princes. This is simply bringing anarchy into the army, and flinging victory away.

17. Thus we may know that there are five essentials for victory: (1) He will win who knows when to fight and when not to fight. (2) He will win who knows how to handle both superior and inferior forces. (3) He will win whose army is animated by the same spirit throughout all its ranks. (4) He will win who, prepared himself, waits to take the enemy unprepared. (5) He will win who has military capacity and is not interfered with by the sovereign.

18. Hence the saying: If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle.

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IV. Tactical Dispositions

1. Sun Tzu said: The good fighters of old first put themselves beyond the possibility of defeat, and then waited for an opportunity of defeating the enemy.

2. To secure ourselves against defeat lies in our own hands, but the opportunity of defeating the enemy is provided by the enemy himself.

3. Thus the good fighter is able to secure himself against defeat, but cannot make certain of defeating the enemy.

4. Hence the saying: One may know how to conquer without being able to do it.

5. Security against defeat implies defensive tactics; ability to defeat the enemy means taking the offensive.

6. Standing on the defensive indicates insufficient strength; attacking, a superabundance of strength.

7. The general who is skilled in defense hides in the most secret recesses of the earth; he who is skilled in attack flashes forth from the topmost heights of heaven. Thus on the one hand we have ability to protect ourselves; on the other, a victory that is complete.

8. To see victory only when it is within the ken of the common herd is not the acme of excellence.

9. Neither is it the acme of excellence if you fight and conquer and the whole Empire says, "Well done!"

10. To lift an autumn hair is no sign of great strength; to see the sun and moon is no sign of sharp sight; to hear the noise of thunder is no sign of a quick ear.

11. What the ancients called a clever fighter is one who not only wins, but excels in winning with ease.

12. Hence his victories bring him neither reputation for wisdom nor credit for courage.

13. He wins his battles by making no mistakes. Making no mistakes is what establishes the certainty of victory, for it means conquering an enemy that is already defeated.

14. Hence the skillful fighter puts himself into a position which makes defeat impossible, and does not miss the moment for defeating the enemy.

15. Thus it is that in war the victorious strategist only seeks battle after the victory has been won, whereas he who is destined to defeat first fights and afterwards looks for victory.

16. The consummate leader cultivates the moral law, and strictly adheres to method and discipline; thus it is in his power to control success.

17. In respect of military method, we have, firstly, Measurement; secondly, Estimation of quantity; thirdly, Calculation; fourthly, Balancing of chances; fifthly, Victory.

18. Measurement owes its existence to Earth; Estimation of quantity to Measurement; Calculation to Estimation of quantity; Balancing of chances to Calculation; and Victory to Balancing of chances.

19. A victorious army opposed to a routed one, is as a pound's weight placed in the scale against a single grain.

20. The onrush of a conquering force is like the bursting of pent-up waters into a chasm a thousand fathoms deep.
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V. Energy

1. Sun Tzu said: The control of a large force is the same principle as the control of a few men: it is merely a question of dividing up their numbers.

2. Fighting with a large army under your command is nowise different from fighting with a small one: it is merely a question of instituting signs and signals.

3. To ensure that your whole host may withstand the brunt of the enemy's attack and remain unshaken-- this is effected by maneuvers direct and indirect.

4. That the impact of your army may be like a grindstone dashed against an egg--this is effected by the science of weak points and strong.

5. In all fighting, the direct method may be used for joining battle, but indirect methods will be needed in order to secure victory.

6. Indirect tactics, efficiently applied, are inexhaustible as Heaven and Earth, unending as the flow of rivers and streams; like the sun and moon, they end but to begin anew; like the four seasons, they pass away to return once more.

7. There are not more than five musical notes, yet the combinations of these five give rise to more melodies than can ever be heard.

8. There are not more than five primary colors (blue, yellow, red, white, and black), yet in combination they produce more hues than can ever been seen.

9. There are not more than five cardinal tastes (sour, acrid, salt, sweet, bitter), yet combinations of them yield more flavors than can ever be tasted.

10. In battle, there are not more than two methods of attack--the direct and the indirect; yet these two in combination give rise to an endless series of maneuvers.

11. The direct and the indirect lead on to each other in turn. It is like moving in a circle--you never come to an end. Who can exhaust the possibilities of their combination?

12. The onset of troops is like the rush of a torrent which will even roll stones along in its course.

13. The quality of decision is like the well-timed swoop of a falcon which enables it to strike and destroy its victim.

14. Therefore the good fighter will be terrible in his onset, and prompt in his decision.

15. Energy may be likened to the bending of a crossbow; decision, to the releasing of a trigger.

16. Amid the turmoil and tumult of battle, there may be seeming disorder and yet no real disorder at all; amid confusion and chaos, your array may be without head or tail, yet it will be proof against defeat.

17. Simulated disorder postulates perfect discipline, simulated fear postulates courage; simulated weakness postulates strength.

18. Hiding order beneath the cloak of disorder is simply a question of subdivision; concealing courage under a show of timidity presupposes a fund of latent energy; masking strength with weakness is to be effected by tactical dispositions.

19. Thus one who is skillful at keeping the enemy on the move maintains deceitful appearances, according to which the enemy will act. He sacrifices something, that the enemy may snatch at it.

20. By holding out baits, he keeps him on the march; then with a body of picked men he lies in wait for him.

21. The clever combatant looks to the effect of combined energy, and does not require too much from individuals. Hence his ability to pick out the right men and utilize combined energy.

22. When he utilizes combined energy, his fighting men become as it were like unto rolling logs or stones. For it is the nature of a log or stone to remain motionless on level ground, and to move when on a slope; if four-cornered, to come to a standstill, but if round-shaped, to go rolling down.

23. Thus the energy developed by good fighting men is as the momentum of a round stone rolled down a mountain thousands of feet in height. So much on the subject of energy.
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VI. Weak Points and Strong

1. Sun Tzu said: Whoever is first in the field and awaits the coming of the enemy, will be fresh for the fight; whoever is second in the

field and has to hasten to battle will arrive exhausted.

2. Therefore the clever combatant imposes his will on the enemy, but does not allow the enemy's will to be imposed on him.

3. By holding out advantages to him, he can cause the enemy to approach of his own accord; or, by inflicting damage, he can make it impossible for the enemy to draw near.

4. If the enemy is taking his ease, he can harass him; if well supplied with food, he can starve him out; if quietly encamped, he can force him to move.

5. Appear at points which the enemy must hasten to defend; march swiftly to places where you are not expected.

6. An army may march great distances without distress, if it marches through country where the enemy is not.

7. You can be sure of succeeding in your attacks if you only attack places which are undefended.You can ensure the safety of your defense if you only hold positions that cannot be attacked.

8. Hence that general is skillful in attack whose opponent does not know what to defend; and he is skillful in defense whose opponent does not know what to attack.

9. O divine art of subtlety and secrecy! Through you we learn to be invisible, through you inaudible; and hence we can hold the enemy's fate in our hands.

10. You may advance and be absolutely irresistible, if you make for the enemy's weak points; you may retire and be safe from pursuit if your movements are more rapid than those of the enemy.

11. If we wish to fight, the enemy can be forced to an engagement even though he be sheltered behind a high rampart and a deep ditch. All we need do is attack some other place that he will be obliged to relieve.

12. If we do not wish to fight, we can prevent the enemy from engaging us even though the lines of our encampment be merely traced out on the ground. All we need do is to throw something odd and unaccountable in his way.

13. By discovering the enemy's dispositions and remaining invisible ourselves, we can keep our forces concentrated, while the enemy's must be divided.

14. We can form a single united body, while the enemy must split up

into fractions. Hence there will be a whole pitted against separate parts of a whole, which means that we shall be many to the enemy's few.

15. And if we are able thus to attack an inferior force with a superior one, our opponents will be in dire straits.

16. The spot where we intend to fight must not be made known; for then the enemy will have to prepare against a possible attack at several different points; and his forces being thus distributed in many directions, the numbers we shall have to face at any given point will be proportionately few.

17. For should the enemy strengthen his van, he will weaken his rear; should he strengthen his rear, he will weaken his van; should he strengthen his left, he will weaken his right; should he strengthen his right, he will weaken his left. If he sends reinforcements everywhere, he will everywhere be weak.

18. Numerical weakness comes from having to prepare against possible attacks; numerical strength, from compelling our adversary to make these preparations against us.

19. Knowing the place and the time of the coming battle, we may concentrate from the greatest distances in order to fight.

20. But if neither time nor place be known, then the left wing will be impotent to succor the right, the right equally impotent to succor the left, the van unable to relieve the rear, or the rear to support the van. How much more so if the furthest portions of the army are anything under a hundred LI apart, and even the nearest are separated by several LI!

21. Though according to my estimate the soldiers of Yueh exceed our own in number, that shall advantage them nothing in the matter of victory. I say then that victory can be achieved.

22. Though the enemy be stronger in numbers, we may prevent him from fighting. Scheme so as to discover his plans and the likelihood of their success.

23. Rouse him, and learn the principle of his activity or inactivity. Force him to reveal himself, so as to find out his vulnerable spots.

24. Carefully compare the opposing army with your own, so that you may know where strength is superabundant and where it is deficient.

25. In making tactical dispositions, the highest pitch you can attain is to conceal them; conceal your dispositions, and you will be safe from the prying of the subtlest spies, from the machinations of the

wisest brains.

26. How victory may be produced for them out of the enemy's own tactics--that is what the multitude cannot comprehend.

27. All men can see the tactics whereby I conquer, but what none can see is the strategy out of which victory is evolved.

28. Do not repeat the tactics which have gained you one victory, but let your methods be regulated by the infinite variety of circumstances.

29. Military tactics are like unto water; for water in its natural course runs away from high places and hastens downwards.

30. So in war, the way is to avoid what is strong and to strike at what is weak.

31. Water shapes its course according to the nature of the ground over which it flows; the soldier works out his victory in relation to the foe whom he is facing.

32. Therefore, just as water retains no constant shape, so in warfare there are no constant conditions.

33. He who can modify his tactics in relation to his opponent and thereby succeed in winning, may be called a heaven-born captain.

34. The five elements (water, fire, wood, metal, earth) are not always equally predominant; the four seasons make way for each other in turn. There are short days and long; the moon has its periods of waning and waxing.

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VII. Maneuvering

1. Sun Tzu said: In war, the general receives his commands from the sovereign.

2. Having collected an army and concentrated his forces, he must blend and harmonize the different elements thereof before pitching his camp.

3. After that, comes tactical maneuvering, than which there is nothing more difficult. The difficulty of tactical maneuvering consists in turning the devious into the direct, and misfortune into gain.

4. Thus, to take a long and circuitous route, after enticing the enemy out of the way, and though starting after him, to contrive to reach the goal before him, shows knowledge of the artifice of deviation.

5. Maneuvering with an army is advantageous; with an undisciplined multitude, most dangerous.

6. If you set a fully equipped army in march in order to snatch an advantage, the chances are that you will be too late. On the other hand, to detach a flying column for the purpose involves the sacrifice of its baggage and stores.

7. Thus, if you order your men to roll up their buff-coats, and make forced marches without halting day or night, covering double the usual distance at a stretch, doing a hundred LI in order to wrest an advantage, the leaders of all your three divisions will fall into the hands of the enemy.

8. The stronger men will be in front, the jaded ones will fall behind, and on this plan only one-tenth of your army will reach its destination.

9. If you march fifty LI in order to outmaneuver the enemy, you will lose the leader of your first division, and only half your force will reach the goal.

10. If you march thirty LI with the same object, two-thirds of your army will arrive.

11. We may take it then that an army without its baggage-train is lost; without provisions it is lost; without bases of supply it is lost.

12. We cannot enter into alliances until we are acquainted with the designs of our neighbors.

13. We are not fit to lead an army on the march unless we are familiar with the face of the country--its mountains and forests, its pitfalls and precipices, its marshes and swamps.

14. We shall be unable to turn natural advantage to account unless we make use of local guides.

15. In war, practice dissimulation, and you will succeed.

16. Whether to concentrate or to divide your troops, must be decided by circumstances.

17. Let your rapidity be that of the wind, your compactness that of the forest.

18. In raiding and plundering be like fire, is immovability like a mountain.

19. Let your plans be dark and impenetrable as night, and when you move, fall like a thunderbolt.

20. When you plunder a countryside, let the spoil be divided amongst your men; when you capture new territory, cut it up into allotments

for the benefit of the soldiery.

21. Ponder and deliberate before you make a move.

22. He will conquer who has learnt the artifice of deviation. Such is the art of maneuvering.

23. The Book of Army Management says: On the field of battle, the spoken word does not carry far enough: hence the institution of gongs and drums. Nor can ordinary objects be seen clearly enough: hence the institution of banners and flags.

24. Gongs and drums, banners and flags, are means whereby the ears and eyes of the host may be focused on one particular point.

25. The host thus forming a single united body, is it impossible either for the brave to advance alone, or for the cowardly to retreat alone. This is the art of handling large masses of men.

26. In night-fighting, then, make much use of signal-fires and drums, and in fighting by day, of flags and banners, as a means of influencing the ears and eyes of your army.

27. A whole army may be robbed of its spirit; a commander-in-chief may be robbed of his presence of mind.

28. Now a soldier's spirit is keenest in the morning; by noonday it has begun to flag; and in the evening, his mind is bent only on returning to camp.

29. A clever general, therefore, avoids an army when its spirit is keen, but attacks it when it is sluggish and inclined to return. This is the art of studying moods.

30. Disciplined and calm, to await the appearance of disorder and hubbub amongst the enemy:--this is the art of retaining self-possession.

31. To be near the goal while the enemy is still far from it, to wait at ease while the enemy is toiling and struggling, to be well-fed while the enemy is famished:--this is the art of husbanding one's strength.

32. To refrain from intercepting an enemy whose banners are in perfect order, to refrain from attacking an army drawn up in calm and confident array:--this is the art of studying circumstances.

33. It is a military axiom not to advance uphill against the enemy, nor to oppose him when he comes downhill.

34. Do not pursue an enemy who simulates flight; do not attack soldiers whose temper is keen.

35. Do not swallow bait offered by the enemy. Do not interfere with an army that is returning home.

36. When you surround an army, leave an outlet free. Do not press a desperate foe too hard.

37. Such is the art of warfare.
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VIII. Variation in Tactics

1. Sun Tzu said: In war, the general receives his commands from the sovereign, collects his army and concentrates his forces

2. When in difficult country, do not encamp. In country where high roads intersect, join hands with your allies. Do not linger in dangerously isolated positions. In hemmed-in situations, you must resort to stratagem. In desperate position, you must fight.

3. There are roads which must not be followed, armies which must be not attacked, towns which must be besieged, positions which must not be contested, commands of the sovereign which must not be obeyed.

4. The general who thoroughly understands the advantages that accompany variation of tactics knows how to handle his troops.

5. The general who does not understand these, may be well acquainted with the configuration of the country, yet he will not be able to turn his knowledge to practical account.

6. So, the student of war who is unversed in the art of war of varying his plans, even though he be acquainted with the Five Advantages, will fail to make the best use of his men.

7. Hence in the wise leader's plans, considerations of advantage and of disadvantage will be blended together.

8. If our expectation of advantage be tempered in this way, we may succeed in accomplishing the essential part of our schemes.

9. If, on the other hand, in the midst of difficulties we are always ready to seize an advantage, we may extricate ourselves from misfortune.

10. Reduce the hostile chiefs by inflicting damage on them; and make trouble for them, and keep them constantly engaged; hold out specious allurements, and make them rush to any given point.

11. The art of war teaches us to rely not on the likelihood of the enemy's not coming, but on our own readiness to receive him; not on the chance of his not attacking, but rather on the fact that we have

made our position unassailable.

12. There are five dangerous faults which may affect a general: (1) Recklessness, which leads to destruction; (2) cowardice, which leads to capture; (3) a hasty temper, which can be provoked by insults; (4) a delicacy of honor which is sensitive to shame; (5) over-solicitude for his men, which exposes him to worry and trouble.

13. These are the five besetting sins of a general, ruinous to the conduct of war.

14. When an army is overthrown and its leader slain, the cause will surely be found among these five dangerous faults. Let them be a subject of meditation.
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IX. The Army on the March

1. Sun Tzu said: We come now to the question of encamping the army, and observing signs of the enemy. Pass quickly over mountains, and keep in the neighborhood of valleys.

2. Camp in high places, facing the sun. Do not climb heights in order to fight. So much for mountain warfare.

3. After crossing a river, you should get far away from it.

4. When an invading force crosses a river in its onward march, do not advance to meet it in mid-stream. It will be best to let half the army get across, and then deliver your attack.

5. If you are anxious to fight, you should not go to meet the invader near a river which he has to cross.

6. Moor your craft higher up than the enemy, and facing the sun. Do not move up-stream to meet the enemy. So much for river warfare.

7. In crossing salt-marshes, your sole concern should be to get over them quickly, without any delay.

8. If forced to fight in a salt-marsh, you should have water and grass near you, and get your back to a clump of trees. So much for operations in salt-marches.

9. In dry, level country, take up an easily accessible position with rising ground to your right and on your rear, so that the danger may be in front, and safety lie behind. So much for campaigning in flat country.

10. These are the four useful branches of military knowledge which enabled the Yellow Emperor to vanquish four several sovereigns.

11. All armies prefer high ground to low and sunny places to dark.

12. If you are careful of your men, and camp on hard ground, the army will be free from disease of every kind, and this will spell victory.

13. When you come to a hill or a bank, occupy the sunny side, with the slope on your right rear. Thus you will at once act for the benefit of your soldiers and utilize the natural advantages of the ground.

14. When, in consequence of heavy rains up-country, a river which you wish to ford is swollen and flecked with foam, you must wait until it subsides.

15. Country in which there are precipitous cliffs with torrents running between, deep natural hollows, confined places, tangled thickets, quagmires and crevasses, should be left with all possible speed and not approached.

16. While we keep away from such places, we should get the enemy to approach them; while we face them, we should let the enemy have them on his rear.

17. If in the neighborhood of your camp there should be any hilly country, ponds surrounded by aquatic grass, hollow basins filled with reeds, or woods with thick undergrowth, they must be carefully routed out and searched; for these are places where men in ambush or insidious spies are likely to be lurking.

18. When the enemy is close at hand and remains quiet, he is relying on the natural strength of his position.

19. When he keeps aloof and tries to provoke a battle, he is anxious for the other side to advance.

20. If his place of encampment is easy of access, he is tendering a bait.

21. Movement amongst the trees of a forest shows that the enemy is advancing. The appearance of a number of screens in the midst of thick grass means that the enemy wants to make us suspicious.

22. The rising of birds in their flight is the sign of an ambuscade. Startled beasts indicate that a sudden attack is coming.

23. When there is dust rising in a high column, it is the sign of chariots advancing; when the dust is low, but spread over a wide area, it betokens the approach of infantry. When it branches out in different directions, it shows that parties have been sent to collect firewood. A few clouds of dust moving to and fro signify that the army is encamping.

24. Humble words and increased preparations are signs that the enemy is about to advance. Violent language and driving forward as if to the attack are signs that he will retreat.

25. When the light chariots come out first and take up a position on the wings, it is a sign that the enemy is forming for battle.

26. Peace proposals unaccompanied by a sworn covenant indicate a plot.

27. When there is much running about and the soldiers fall into rank, it means that the critical moment has come.

28. When some are seen advancing and some retreating, it is a lure.

29. When the soldiers stand leaning on their spears, they are faint from want of food.

30. If those who are sent to draw water begin by drinking themselves, the army is suffering from thirst.

31. If the enemy sees an advantage to be gained and makes no effort to secure it, the soldiers are exhausted.

32. If birds gather on any spot, it is unoccupied. Clamor by night betokens nervousness.

33. If there is disturbance in the camp, the general's authority is weak. If the banners and flags are shifted about, sedition is afoot. If the officers are angry, it means that the men are weary.

34. When an army feeds its horses with grain and kills its cattle for food, and when the men do not hang their cooking-pots over the camp-fires, showing that they will not return to their tents, you may know that they are determined to fight to the death.

35. The sight of men whispering together in small knots or speaking in subdued tones points to disaffection amongst the rank and file.

36. Too frequent rewards signify that the enemy is at the end of his resources; too many punishments betray a condition of dire distress.

37. To begin by bluster, but afterwards to take fright at the enemy's numbers, shows a supreme lack of intelligence.

38. When envoys are sent with compliments in their mouths, it is a sign that the enemy wishes for a truce.

39. If the enemy's troops march up angrily and remain facing ours for a long time without either joining battle or taking themselves off again, the situation is one that demands great vigilance and circumspection.

40. If our troops are no more in number than the enemy, that is amply

sufficient; it only means that no direct attack can be made. What we can do is simply to concentrate all our available strength, keep a close watch on the enemy, and obtain reinforcements.

41. He who exercises no forethought but makes light of his opponents is sure to be captured by them.

42. If soldiers are punished before they have grown attached to you, they will not prove submissive; and, unless submissive, then will be practically useless. If, when the soldiers have become attached to you, punishments are not enforced, they will still be unless.

43. Therefore soldiers must be treated in the first instance with humanity, but kept under control by means of iron discipline. This is a certain road to victory.

44. If in training soldiers commands are habitually enforced, the army will be well-disciplined; if not, its discipline will be bad.

45. If a general shows confidence in his men but always insists on his orders being obeyed, the gain will be mutual.
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X. Terrain

1. Sun Tzu said: We may distinguish six kinds of terrain, to wit: (1) Accessible ground; (2) entangling ground; (3) temporizing ground; (4) narrow passes; (5) precipitous heights; (6) positions at a great distance from the enemy.

2. Ground which can be freely traversed by both sides is called accessible.

3. With regard to ground of this nature, be before the enemy in occupying the raised and sunny spots, and carefully guard your line of supplies. Then you will be able to fight with advantage.

4. Ground which can be abandoned but is hard to re-occupy is called entangling.

5. From a position of this sort, if the enemy is unprepared, you may sally forth and defeat him. But if the enemy is prepared for your coming, and you fail to defeat him, then, return being impossible, disaster will ensue.

6. When the position is such that neither side will gain by making the first move, it is called temporizing ground.

7. In a position of this sort, even though the enemy should offer us an attractive bait, it will be advisable not to stir forth, but rather to retreat, thus enticing the enemy in his turn; then, when

part of his army has come out, we may deliver our attack with advantage.

8. With regard to narrow passes, if you can occupy them first, let them be strongly garrisoned and await the advent of the enemy.

9. Should the army forestall you in occupying a pass, do not go after him if the pass is fully garrisoned, but only if it is weakly garrisoned.

10. With regard to precipitous heights, if you are beforehand with your adversary, you should occupy the raised and sunny spots, and there wait for him to come up.

11. If the enemy has occupied them before you, do not follow him, but retreat and try to entice him away.

12. If you are situated at a great distance from the enemy, and the strength of the two armies is equal, it is not easy to provoke a battle, and fighting will be to your disadvantage.

13. These six are the principles connected with Earth. The general who has attained a responsible post must be careful to study them.

14. Now an army is exposed to six several calamities, not arising from natural causes, but from faults for which the general is responsible. These are: (1) Flight; (2) insubordination; (3) collapse; (4) ruin; (5) disorganization; (6) rout.

15. Other conditions being equal, if one force is hurled against another ten times its size, the result will be the flight of the former.

16. When the common soldiers are too strong and their officers too weak, the result is insubordination. When the officers are too strong and the common soldiers too weak, the result is collapse.

17. When the higher officers are angry and insubordinate, and on meeting the enemy give battle on their own account from a feeling of resentment, before the commander-in-chief can tell whether or no he is in a position to fight, the result is ruin.

18. When the general is weak and without authority; when his orders are not clear and distinct; when there are no fixes duties assigned to officers and men, and the ranks are formed in a slovenly haphazard manner, the result is utter disorganization.

19. When a general, unable to estimate the enemy's strength, allows an inferior force to engage a larger one, or hurls a weak detachment against a powerful one, and neglects to place picked soldiers in the front rank, the result must be rout.

20. These are six ways of courting defeat, which must be carefully

noted by the general who has attained a responsible post.

21. The natural formation of the country is the soldier's best ally; but a power of estimating the adversary, of controlling the forces of victory, and of shrewdly calculating difficulties, dangers and distances, constitutes the test of a great general.

22. He who knows these things, and in fighting puts his knowledge into practice, will win his battles. He who knows them not, nor practices them, will surely be defeated.

23. If fighting is sure to result in victory, then you must fight, even though the ruler forbid it; if fighting will not result in victory, then you must not fight even at the ruler's bidding.

24. The general who advances without coveting fame and retreats without fearing disgrace, whose only thought is to protect his country and do good service for his sovereign, is the jewel of the kingdom.

25. Regard your soldiers as your children, and they will follow you into the deepest valleys; look upon them as your own beloved sons, and they will stand by you even unto death.

26. If, however, you are indulgent, but unable to make your authority felt; kind-hearted, but unable to enforce your commands; and incapable, moreover, of quelling disorder: then your soldiers must be likened to spoilt children; they are useless for any practical purpose.

27. If we know that our own men are in a condition to attack, but are unaware that the enemy is not open to attack, we have gone only halfway towards victory.

28. If we know that the enemy is open to attack, but are unaware that our own men are not in a condition to attack, we have gone only halfway towards victory.

29. If we know that the enemy is open to attack, and also know that our men are in a condition to attack, but are unaware that the nature of the ground makes fighting impracticable, we have still gone only halfway towards victory.

30. Hence the experienced soldier, once in motion, is never bewildered; once he has broken camp, he is never at a loss.

31. Hence the saying: If you know the enemy and know yourself, your victory will not stand in doubt; if you know Heaven and know Earth, you may make your victory complete.

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XI. The Nine Situations

1. Sun Tzu said: The art of war recognizes nine varieties of ground: (1) Dispersive ground; (2) facile ground; (3) contentious ground; (4) open ground; (5) ground of intersecting highways; (6) serious ground; (7) difficult ground; (8) hemmed-in ground; (9) desperate ground.

2. When a chieftain is fighting in his own territory, it is dispersive ground.

3. When he has penetrated into hostile territory, but to no great distance, it is facile ground.

4. Ground the possession of which imports great advantage to either side, is contentious ground.

5. Ground on which each side has liberty of movement is open ground.

6. Ground which forms the key to three contiguous states, so that he who occupies it first has most of the Empire at his command, is a ground of intersecting highways.

7. When an army has penetrated into the heart of a hostile country, leaving a number of fortified cities in its rear, it is serious ground.

8. Mountain forests, rugged steeps, marshes and fens--all country that is hard to traverse: this is difficult ground.

9. Ground which is reached through narrow gorges, and from which we can only retire by tortuous paths, so that a small number of the enemy would suffice to crush a large body of our men: this is hemmed in ground.

10. Ground on which we can only be saved from destruction by fighting without delay, is desperate ground.

11. On dispersive ground, therefore, fight not. On facile ground, halt not. On contentious ground, attack not.

12. On open ground, do not try to block the enemy's way. On the ground of intersecting highways, join hands with your allies.

13. On serious ground, gather in plunder. In difficult ground, keep steadily on the march.

14. On hemmed-in ground, resort to stratagem. On desperate ground, fight.

15. Those who were called skillful leaders of old knew how to drive a wedge between the enemy's front and rear; to prevent co-operation between his large and small divisions; to hinder the good troops from

rescuing the bad, the officers from rallying their men.

16. When the enemy's men were united, they managed to keep them in disorder.

17. When it was to their advantage, they made a forward move; when otherwise, they stopped still.

18. If asked how to cope with a great host of the enemy in orderly array and on the point of marching to the attack, I should say: "Begin by seizing something which your opponent holds dear; then he will be amenable to your will."

19. Rapidity is the essence of war: take advantage of the enemy's unreadiness, make your way by unexpected routes, and attack unguarded spots.

20. The following are the principles to be observed by an invading force: The further you penetrate into a country, the greater will be the solidarity of your troops, and thus the defenders will not prevail against you.

21. Make forays in fertile country in order to supply your army with food.

22. Carefully study the well-being of your men, and do not overtax them. Concentrate your energy and hoard your strength. Keep your army continually on the move, and devise unfathomable plans.

23. Throw your soldiers into positions whence there is no escape, and they will prefer death to flight. If they will face death, there is nothing they may not achieve. Officers and men alike will put forth their uttermost strength.

24. Soldiers when in desperate straits lose the sense of fear. If there is no place of refuge, they will stand firm. If they are in hostile country, they will show a stubborn front. If there is no help for it, they will fight hard.

25. Thus, without waiting to be marshaled, the soldiers will be constantly on the qui vive; without waiting to be asked, they will do your will; without restrictions, they will be faithful; without giving orders, they can be trusted.

26. Prohibit the taking of omens, and do away with superstitious doubts. Then, until death itself comes, no calamity need be feared.

27. If our soldiers are not overburdened with money, it is not because they have a distaste for riches; if their lives are not unduly long, it is not because they are disinclined to longevity.

28. On the day they are ordered out to battle, your soldiers may weep, those sitting up bedewing their garments, and those lying down letting the tears run down their cheeks. But let them once be brought to bay, and they will display the courage of a Chu or a Kuei.

29. The skillful tactician may be likened to the shuai-jan. Now the shuai-jan is a snake that is found in the ChUng mountains. Strike at its head, and you will be attacked by its tail; strike at its tail, and you will be attacked by its head; strike at its middle, and you will be attacked by head and tail both.

30. Asked if an army can be made to imitate the shuai-jan, I should answer, Yes. For the men of Wu and the men of Yueh are enemies; yet if they are crossing a river in the same boat and are caught by a storm, they will come to each other's assistance just as the left hand helps the right.

31. Hence it is not enough to put one's trust in the tethering of horses, and the burying of chariot wheels in the ground

32. The principle on which to manage an army is to set up one standard of courage which all must reach.

33. How to make the best of both strong and weak--that is a question involving the proper use of ground.

34. Thus the skillful general conducts his army just as though he were leading a single man, willy-nilly, by the hand.

35. It is the business of a general to be quiet and thus ensure secrecy; upright and just, and thus maintain order.

36. He must be able to mystify his officers and men by false reports and appearances, and thus keep them in total ignorance.

37. By altering his arrangements and changing his plans, he keeps the enemy without definite knowledge. By shifting his camp and taking circuitous routes, he prevents the enemy from anticipating his purpose.

38. At the critical moment, the leader of an army acts like one who has climbed up a height and then kicks away the ladder behind him. He carries his men deep into hostile territory before he shows his hand.

39. He burns his boats and breaks his cooking-pots; like a shepherd driving a flock of sheep, he drives his men this way and that, and nothing knows whither he is going.

40. To muster his host and bring it into danger:--this may be termed the business of the general.

41. The different measures suited to the nine varieties of ground; the expediency of aggressive or defensive tactics; and the fundamental laws of human nature: these are things that must most certainly be studied.

42. When invading hostile territory, the general principle is, that penetrating deeply brings cohesion; penetrating but a short way means dispersion.

43. When you leave your own country behind, and take your army across neighborhood territory, you find yourself on critical ground. When there are means of communication on all four sides, the ground is one of intersecting highways.

44. When you penetrate deeply into a country, it is serious ground. When you penetrate but a little way, it is facile ground.

45. When you have the enemy's strongholds on your rear, and narrow passes in front, it is hemmed-in ground. When there is no place of refuge at all, it is desperate ground.

46. Therefore, on dispersive ground, I would inspire my men with unity of purpose. On facile ground, I would see that there is close connection between all parts of my army.

47. On contentious ground, I would hurry up my rear.

48. On open ground, I would keep a vigilant eye on my defenses. On ground of intersecting highways, I would consolidate my alliances.

49. On serious ground, I would try to ensure a continuous stream of supplies. On difficult ground, I would keep pushing on along the road.

50. On hemmed-in ground, I would block any way of retreat. On desperate ground, I would proclaim to my soldiers the hopelessness of saving their lives.

51. For it is the soldier's disposition to offer an obstinate resistance when surrounded, to fight hard when he cannot help himself, and to obey promptly when he has fallen into danger.

52. We cannot enter into alliance with neighboring princes until we are acquainted with their designs. We are not fit to lead an army on the march unless we are familiar with the face of the country--its mountains and forests, its pitfalls and precipices, its marshes and swamps. We shall be unable to turn natural advantages to account unless we make use of local guides.

53. To be ignored of any one of the following four or five principles does not befit a warlike prince.

54. When a warlike prince attacks a powerful state, his generalship shows itself in preventing the concentration of the enemy's forces. He overawes his opponents, and their allies are prevented from joining against him.

55. Hence he does not strive to ally himself with all and sundry, nor does he foster the power of other states. He carries out his own secret designs, keeping his antagonists in awe. Thus he is able to capture their cities and overthrow their kingdoms.

56. Bestow rewards without regard to rule, issue orders without regard to previous arrangements; and you will be able to handle a whole army as though you had to do with but a single man.

57. Confront your soldiers with the deed itself; never let them know your design. When the outlook is bright, bring it before their eyes; but tell them nothing when the situation is gloomy.

58. Place your army in deadly peril, and it will survive; plunge it into desperate straits, and it will come off in safety.

59. For it is precisely when a force has fallen into harm's way that is capable of striking a blow for victory.

60. Success in warfare is gained by carefully accommodating ourselves to the enemy's purpose.

61. By persistently hanging on the enemy's flank, we shall succeed in the long run in killing the commander-in-chief.

62. This is called ability to accomplish a thing by sheer cunning.

63. On the day that you take up your command, block the frontier passes, destroy the official tallies, and stop the passage of all emissaries.

64. Be stern in the council-chamber, so that you may control the situation.

65. If the enemy leaves a door open, you must rush in.

66. Forestall your opponent by seizing what he holds dear, and subtly contrive to time his arrival on the ground.

67. Walk in the path defined by rule, and accommodate yourself to the enemy until you can fight a decisive battle.

68. At first, then, exhibit the coyness of a maiden, until the enemy gives you an opening; afterwards emulate the rapidity of a running hare, and it will be too late for the enemy to oppose you.

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XII. The Attack by Fire

1. Sun Tzu said: There are five ways of attacking with fire. The first is to burn soldiers in their camp; the second is to burn stores; the third is to burn baggage trains; the fourth is to burn arsenals and magazines; the fifth is to hurl dropping fire amongst the enemy.

2. In order to carry out an attack, we must have means available. The material for raising fire should always be kept in readiness.

3. There is a proper season for making attacks with fire, and special days for starting a conflagration.

4. The proper season is when the weather is very dry; the special days are those when the moon is in the constellations of the Sieve, the Wall, the Wing or the Cross-bar; for these four are all days of rising wind.

5. In attacking with fire, one should be prepared to meet five possible developments:

6. (1) When fire breaks out inside to enemy's camp, respond at once with an attack from without.

7. (2) If there is an outbreak of fire, but the enemy's soldiers remain quiet, bide your time and do not attack.

8. (3) When the force of the flames has reached its height, follow it up with an attack, if that is practicable; if not, stay where you are.

9. (4) If it is possible to make an assault with fire from without, do not wait for it to break out within, but deliver your attack at a favorable moment.

10. (5) When you start a fire, be to windward of it. Do not attack from the leeward.

11. A wind that rises in the daytime lasts long, but a night breeze soon falls.

12. In every army, the five developments connected with fire must be known, the movements of the stars calculated, and a watch kept for the proper days.

13. Hence those who use fire as an aid to the attack show intelligence; those who use water as an aid to the attack gain an accession of strength.

14. By means of water, an enemy may be intercepted, but not robbed of all his belongings.

15. Unhappy is the fate of one who tries to win his battles and succeed in his attacks without cultivating the spirit of enterprise; for the

result is waste of time and general stagnation.

16. Hence the saying: The enlightened ruler lays his plans well ahead; the good general cultivates his resources.

17. Move not unless you see an advantage; use not your troops unless there is something to be gained; fight not unless the position is critical.

18. No ruler should put troops into the field merely to gratify his own spleen; no general should fight a battle simply out of pique.

19. If it is to your advantage, make a forward move; if not, stay where you are.

20. Anger may in time change to gladness; vexation may be succeeded by content.

21. But a kingdom that has once been destroyed can never come again into being; nor can the dead ever be brought back to life.

22. Hence the enlightened ruler is heedful, and the good general full of caution. This is the way to keep a country at peace and an army intact.

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XIII. The Use of Spies

1. Sun Tzu said: Raising a host of a hundred thousand men and marching them great distances entails heavy loss on the people and a drain on the resources of the State. The daily expenditure will amount to a thousand ounces of silver. There will be commotion at home and abroad, and men will drop down exhausted on the highways. As many as seven hundred thousand families will be impeded in their labor.

2. Hostile armies may face each other for years, striving for the victory which is decided in a single day. This being so, to remain in ignorance of the enemy's condition simply because one grudges the outlay of a hundred ounces of silver in honors and emoluments, is the height of inhumanity.

3. One who acts thus is no leader of men, no present help to his sovereign, no master of victory.

4. Thus, what enables the wise sovereign and the good general to strike and conquer, and achieve things beyond the reach of ordinary men, is foreknowledge.

5. Now this foreknowledge cannot be elicited from spirits; it cannot be obtained inductively from experience, nor by any deductive calculation.

6. Knowledge of the enemy's dispositions can only be obtained from other men.

7. Hence the use of spies, of whom there are five classes: (1) Local spies; (2) inward spies; (3) converted spies; (4) doomed spies; (5) surviving spies.

8. When these five kinds of spy are all at work, none can discover the secret system. This is called "divine manipulation of the threads." It is the sovereign's most precious faculty.

9. Having local spies means employing the services of the inhabitants of a district.

10. Having inward spies, making use of officials of the enemy.

11. Having converted spies, getting hold of the enemy's spies and using them for our own purposes.

12. Having doomed spies, doing certain things openly for purposes of deception, and allowing our spies to know of them and report them to the enemy.

13. Surviving spies, finally, are those who bring back news from the enemy's camp.

14. Hence it is that which none in the whole army are more intimate relations to be maintained than with spies. None should be more liberally rewarded. In no other business should greater secrecy be preserved.

15. Spies cannot be usefully employed without a certain intuitive sagacity.

16. They cannot be properly managed without benevolence and straightforwardness.

17. Without subtle ingenuity of mind, one cannot make certain of the truth of their reports.

18. Be subtle! be subtle! and use your spies for every kind of business.

19. If a secret piece of news is divulged by a spy before the time is ripe, he must be put to death together with the man to whom the secret was told.

20. Whether the object be to crush an army, to storm a city, or to assassinate an individual, it is always necessary to begin by finding out the names of the attendants, the aides-de-camp, and door-keepers and sentries of the general in command. Our spies must be commissioned to ascertain these.

21. The enemy's spies who have come to spy on us must be sought out,

tempted with bribes, led away and comfortably housed. Thus they will become converted spies and available for our service.

22. It is through the information brought by the converted spy that we are able to acquire and employ local and inward spies.

23. It is owing to his information, again, that we can cause the doomed spy to carry false tidings to the enemy.

24. Lastly, it is by his information that the surviving spy can be used on appointed occasions.

25. The end and aim of spying in all its five varieties is knowledge of the enemy; and this knowledge can only be derived, in the first instance, from the converted spy. Hence it is essential that the converted spy be treated with the utmost liberality.

26. Of old, the rise of the Yin dynasty was due to I Chih who had served under the Hsia. Likewise, the rise of the Chou dynasty was due to Lu Ya who had served under the Yin.

27. Hence it is only the enlightened ruler and the wise general who will use the highest intelligence of the army for purposes of spying and thereby they achieve great results. Spies are a most important element in water, because on them depends an army's ability to move.

THE END

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FIREARMS

Firearms are the most feared, versatile, and recognizable weapon in a criminals armory. Knives and bombs are useful weapons, but they don't inspire the same immediate fear in someone as a gun pointed at their head. Getting the right kind of gun for the job and at an affordable price can sometimes be a challenge though.

With that in mind, I've set out to to list sources for cheap guns that you can throw away, ways to modify guns to make them more powerful and quiet, and the skills to use them to greatest lethal effect. This page is concerned only with the hardware side of firearms. For the tactics to use, go to the Gunfighting page.

1. Cheap Guns and Gun Kits (including full-auto kits)
2. Infrared TV Gunsight
3. MAC11 Construction Manual (.ZIP File)
4. MAC10-11 Receiver Plans (.ZIP File). Use with above .ZIP file.
5. Full Auto Conversions
6. Silencers
7. Ammunition
    - Armor Piercing Bullet Patent
    - Shot Slug UPDATE 01/01/2000
    - IR Tracers NEW! 01/19/2000

Cheap, Untraceable Guns

First some basic facts about guns and crime. To be a credible threat to a person beyond arms reach, armed with a weapon other than a gun, is basically impossible. They might out run you, fight you, or use a weapon to attack you. A knife is a useful tool, but it's not something you want to use against someone armed with a taser or mace. Plus, a person is more likely to play hero if they think they have a good chance of beating you without getting hurt. A gun makes that very unlikely.

Of course, you need to get a gun first and with all the shit you have to go through to get one either legally in a store (paper trail), or illegally on the streets (possible arrest), your going to have a tough time getting one and avoiding trouble. But thankfully we live in America and all your gun needs can be met through the mail. Below are sources for guns that you can order as plans, components, or kits. Everything from $30 one shot derringers up to DIY .50 Browning machine guns. As long as your careful ordering these guns, they are untracable and can be thrown away or left behind without them leading back to you.

P.S. For plans for homemade pistols, shotguns, and rifles, go to our weaponspage.

The 4 guns below are available from "Et Cetera L.L.C., PO BOX 929, Copperhill, TN, 37317" Order by phone: 1-800-642-1600. Customer service: 1-423-496-9050. 24hr FAX: 1-423-496-2111. Prices current as of 06/25/99.

Please note that these 4 guns come as kits, require assembly, and that you make the side plates and breech face, which you can easily do with sheet metal and a file.

.410 shotgun with stock holding 3 spare shells.
$42.45

This company sells kits for making Sten Gun receivers. These are 9mm machine guns used by the British Army during WW2, and are capable of firing 600+ rounds per minute. All the other parts needed can be bought as kits from several other companies for about $125-150. Order from: CATCo., 316 California Avenue, #341, Reno, NV, 89509. 1-707-253-8338. Please note that they will not ship or sell these to you if you live in California. So you'll have to use a mail drop out of state if you live there. They also sell many other machine gun kits for converting AR-15s, AK, SKS,and even belt-fed Browning .30 Machine Guns!

Sten receiver kits, 9mm.
$39

Infrared TV Gunsight

This article was OCR'd from "Soldier of Fortune", October 1998, pages 48-51, and 76.
Written by N.E. Macdougald. Photos by Stephen Whalen

In keeping with the NBK motto that what's good for the Jack-Booted goose is good for the Cop-Killing gander, we've brought you this article in the hopes that you , our clever readers, will put together your own "Robosight" using readily available microcameras and Virtual Reality headsets.

After all, the ability to shoot around corners and accurately hit your targets goes a long way to having a long and productive criminal career.

In June 1995, a SWAT team attempted a hostage rescue on the 13th floor of an office high-rise in downtown Houston. The perpetrator had his terrified and unlucky female hostage holed up in an executive suite while the team stealthily penetrated from above, hardly the dynamic-entry assault they'd envisioned (but permission for which had been denied). They lifted a ceiling tile and inserted a camera. Then, the sharp cracks of gunfire! The hostage was dead.

As Matthew Hagerty, owner of LandTec Inc. (Sonora, Calif.), takes an exotic-looking weapon sighting system out of its case he states simply, "Sight Unseen's SU-4 is the future of tactical equipment." As he explains the system's functions and benefits, I'm becoming increasingly eager to test-shoot this new way of viewing criminals. As the only U.S. source for Sight Unseen, Inc., Hagerty explains how the remote infrared video weapon sighting system could have saved the hostage's life.

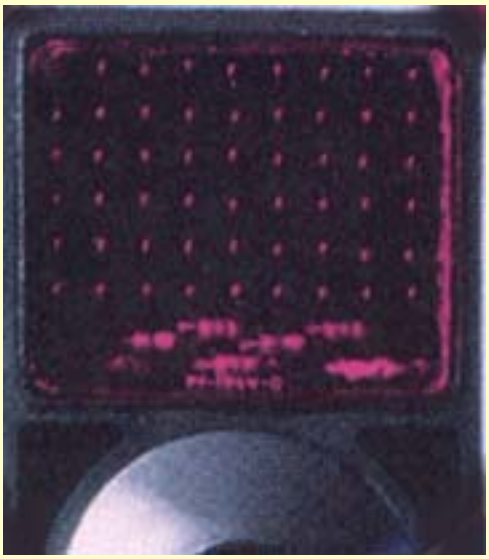
"When I showed these officers Sight Unseen, they said the hostage situation might have ended differently if they'd had this. Instead of using the fiberoptic camera, they could have used our video sighting system on their duty weapon and inserted it through the ceiling tile."

Hagerty knows what he's talking about. A shooter for more than 30 years, he's been through seven courses with Scott Reitz, L.A.P.D. Metro SWAT and SIS firearms instructor; and is a veteran of additional training from Brett McQueen, California Pistolcraft, an accomplished firearms authority/ instructor in her own right.

Hagerty, an experienced sales representative of hardware and software for law enforcement and the U.S. military, has sent some 230,000 rounds down range during the past four years, shooting professionally for Hughes Aircraft for their El Segundo, Calif., facility. He also currently tests and markets their $45,000 thermal weapon sight, a second-generation passive infrared device for military and law-enforcement deployment. (Be on alert for a forthcoming article on the Thermal Sight).

Sight Unseen's Versatile SU-4

Sight Unseen boasts active infrared capability that enables it to function day or night. And the infrared light isn't visible to the naked eye. The nonmoving, light-weight system mounts a miniaturized black-and-white video camera on a handgun or rifle (the camera, is the size of a 3x9 scope and fits in standard 1-inch scope ring. A lightweight headset blocks one eye with a video screen; the other sees normally. The user sees a I X image with superimposed crosshairs. These crosshairs are reverse video, which means they maintain contrast as the background changes. Because it's a standard (NTSC) video format, it can be recorded.



This is a close up view of the IR illuminator. It consists of 54 IR LEDs. You could make the equivalent using perf board and IR LEDs soldered in parallel, and encased in a waterproof plastic case.

As with conventional sights, the user points the weapon toward a target. Unlike conventional sights, the user can remain fully behind cover, only the user's gun hand can be seen by a hostile. A belt pack, roughly the size of an M-16 magazine pouch, contains the battery and electronics module. Although straightforward, the system takes some getting used to.

This is what a cop would normally see of you when your shooting around a corner. As you can see there is still quite a bit of you exposed to return fire. Not as much as would be exposed if you didn't use the corner for cover, but still too much for your continued good health.

This is all a target would see of you when using a "robosight". As you can see, compared to the above picture, there's hardly anything for a cop to hit with his return fire.

Good for you, bad for him.

On Colorado's rugged western slope, Hagerty propped a center-of-mass pistol target against a tree. As I fired the Sight Unseen system mounted on a Glock pistol, at a right angle to the target to simulate using the sight from behind a building, I noticed that wherever I turned my head, the onscreen image stayed with me. I popped off three rounds and all hit 6 inches left of center. Hargerty moved the crosshairs a few "clicks" by adjusting the windage control in my belt pack. Seconds later I hit dead-center from 8 yards away. Although viewing a different image with each eye was unusual, I was surprised at how quickly I adapted to this new mode of target acquisition.

Cost, Availability, and History

Hagerty informed me that the SU-4 is "under $10,000 and for sale only to police or military."

Sight Unseen's inventor, Larry Elliott, was born in New York City, after WWII. After working in the recording industry for about eight years, Elliott relocated to Southern California where he discovered the need for a target acquisition system that could save family members' and officers' lives by enabling them to remain behind cover while firing. A shooter for 25 years, and experienced in electronics for 30, Elliott developed the system with the help of mentor John Davies, who financially supported the system's refinement. Elliott produced the first working model in 1995 and has a patent pending.

Because the system must withstand significant recoil, it's built robustly, which makes manufacturing difficult. After astutely hiring several consultants in various fields to solve technical and general problems, Elliott's understandably careful with his product: "My worst nightmare is that it gets into the wrong hands."

Hagerty provided me with the names of law-enforcement personnel who have test fired the system. Most had their tickets punched in the military, and had gone on to SpecOps units or law enforcement.

Retired SEAL Rick Wood said, "It's very impressive." Born and raised in Mesquite, Texas, he spent 25 years in the U.S. Navy, serving on SEAL Teams 1, 3, and 5. Wood did a stint as instructor at the SEAL training facility in Coronado, Calif., and was a rated EOD technician. He first saw Sight Unseen in the fall of 1996.

"The unit has unlimited potential in CQB (close-quarters battle) because of the IR source and video. It'll be great for training in shoot-no-shoot situations. It'll also work great in hostage rescue or any close-in environment in darkness. I put 60 to 100 rounds through it in unlikely shooting positions and was amazed and surprised at what power it gave me."

When asked if Sight Unseen has potential, Gulf War veteran Dr. Kelly Jones said, "Hell, yes." Jones earned a Ph.D. from Texas A & M and served in the U.S. Air Force from 1988 to 1993. Currently a consultant and SWAT instructor, he first encountered Sight Unseen in 1994, in Washington, D.C., where he spotted a mock up mounted on a futuristic weapons system.

In November 1997, Jones finally shot the system. "I don't think Sight Unseen's a panacea that should be fitted , to all weapons, but I think one person in each team should have one. I thought it might be a gee-whiz gizmo at first. It takes some getting used to. If you're going to be good with it, you have to use it all the time. I'd recommend it to any SpecOps unit with a need to conduct close-range stealth reconnaissance, especially, units that need to clear or defend areas that provide no natural cover. I'd probably deploy one SU-4 per team. Using it while wearing a gas mask might be a problem. In the future, I'd like to see a built-in digital compass; and get rid of the (video) wires, and make the next generation digital."

A former MP and a shooter for 35 years, Steve Abbott has participated in SOF's 3-gun shoots. His first impression of the sight was, "total amazement."

Born and raised in Mt. Ida, Ark., Abbott served in the U.S. Army from 1960-1963. He joined the Visalia, Calif., Police Department in 1965, where he was an eight-year SWAT veteran. Presently, he's sergeant-in-charge of the narcotics and property crimes unit, as well as rangemaster.

"We put about 250 rounds through the system at the department's tactical house. There were three other officers there, all SWAT or ex-SWAT.

Matt had to fight to get the sight system back. I see it playing a major role in law enforcement, You can see in the dark without being seen and without clumsy goggles or other gear. It could be built into a helmet and used on the street as part of duty equipment.

Shooter and SWAT team member Dave Sundy was asked if he'd recommend Sight Unseen:

"Absolutely." Sundy joined a 260-member police force in 1986 and is now SWAT-team armorer. He spent four years as a sniper and is a grad of the FBI sniper school at Camp Pendleton. In addition, he served as an instructor for five years at California's Regional Criminal Justice Training Center.

"I saw the system in December of '96 at Chocolate Mountain (a U.S. Navy facility in Niland). I showed it to 25 guys at the range - it was mounted on a Beretta 92F. We shot about 400 rounds through it. I was immediately impressed by its versatility - and its compactness and accuracy.

"It's a valuable tool for entry-team members, better than a pole camera. Unlike a pole camera, it lets the guy using it shoot if he needs to."

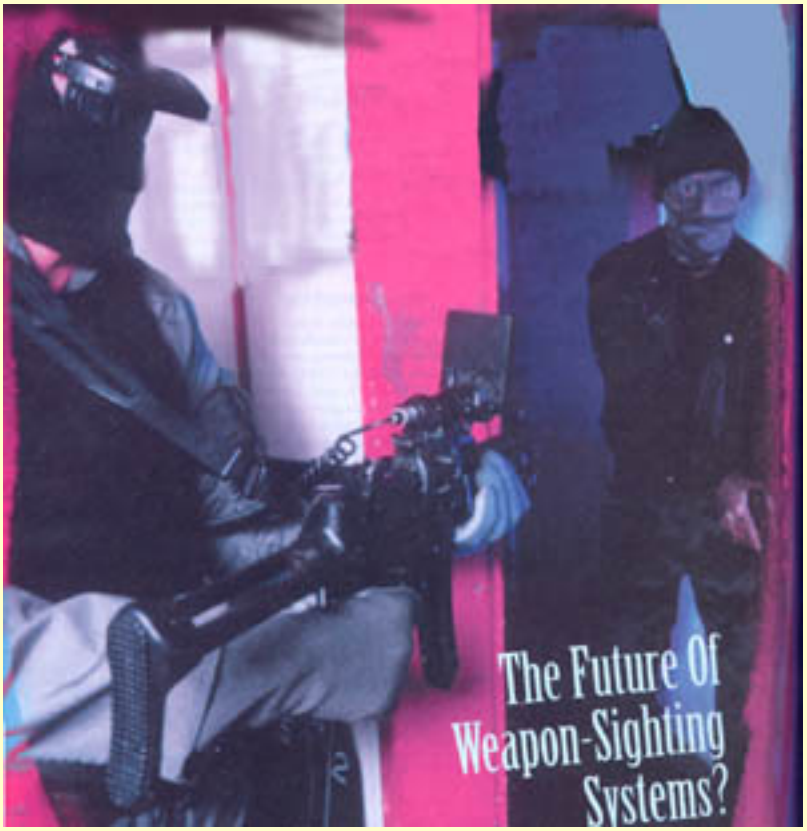
Even Hollywood likes the robosight. Founded in 1916, Stembridge Gun Rentals, Inc., caters to the film and video industries. Harry Lu has been a weapon specialist at Stembridge for eight years, where his firearms resume includes "Waterworld", "Eraser", "Air Force One", "True Lies", and "Terminator 2".

Changing the Face of Dynamic Entry

Growing up in gang-troubled East L.A., Lu knows about guns. A gunsmith and shooter for 19 years, he first saw Sight Unseen in March 1997 at the L.A. sheriff's office range out in Wayside. Lu put 50 rounds through the sight, which was mounted on an AR-15. "There were a few bowling pins about 25 yards down range. I shot perpendicular (to them) from a crouch, with the gun across my knees. I hit a pin every time in near-darkness.

"After shooting at the range, we went to the tear gas room and closed the doors. (Looking through the sight) I saw some cardboard boxes and could read the writing on them in total darkness." Lu paused, then concluded, "It'll change the face of dynamic entry."

Shooting around a corner with a handgun.



Shooting around a corner with a SMG.

If Sight Unseen's SU-4 proves as durable as claimed, it may, indeed, change the face of dynamic entry. No longer will cops have to stick their necks out. "Using cover, they can methodically clear areas while minimizing personal risk. Sight Unseen also may become a deterrent as word of its effectiveness spreads through the criminal community - savvy crooks will surrender if they think they'll be shot without a chance to return fire (savvy cops will run if they know what's good for them.). Law enforcement's use of laser target designators proves crooks quickly lose their juice when they realize they're in a sharpshooter's sights.

The Department of Energy recently purchased an SU-4 for in-house use by tactical units. Following suit, the Naval Special Warfare Command's research and engineering facility, in Crane, Ind., is ordering two SU-4s for test and evaluation for a Special Operations Forces (SOFMOD) M4A1 5.56mm carbine.

These prestigious initial orders will ultimately sound the wake-up call for numerous purchases by other agencies and units.

The future is now.

For more information on Sight Unseen, use official letterhead to contact: Matthew Hagerty: LandTec, Inc., P.O. Box 5456, Sonora, CA 95370; Tel.: (209)533-4001; pager: (800)308-0856.

SU-4 Specifications

- Battery: 32 oz.
- Belt and Pouch: 7.5 oz.
- Camera (with scope rings) weight: 7 oz.

- Lens: 30-degree aperture, 1x magnification
- Housing:7075 T6 aircraft alloy
- Electronics module: 8.75 oz.
- Headset monitor, weight: 8.75 oz.
- Infrared unit: 4.75 oz.
- Total weight: 3.75 lb.
- Cost: under $10,000 (as if!)

United States Patent **5,763,819**
Huffman **June 9, 1998**

ARMOR PIERCING FRAGMENTING BULLET

This patent is a very simple, very easy design for a bullet that has the ability to penetrate common barriers and cover, and still have the ability to fragment inside of the target to maximize the killing potential. The need for a bullet of this type was demonstrated by the L.A. Bank Robbers.

They were firing full-auto with armor-piercing bullets and wounded 15 people, including 8 cops. But no one was killed because the bullets punched a hole clean through their victims. To increase the likelihood of killing your victims you need to use bullets that will cause massive damage. Of course, you have to hit the target to kill it. This often means having to shoot through something (car door, desk, etc.) and, if your shooting hollowpoints, wasting ammo punching a hole through. And if you use AP ammo, you get through with one shot, but it goes clean through the victim with minimal damage.

This bullet design takes care of that problem. It's hard and heavy enough to punch through, yet brittle enough to blow apart while penetrating. And, of course, you also poison the bullet to insure that even a minor flesh wound in the foot would be fatal.

Abstract

Other Common Bullets

1. Silver Tip
2. Hydra-Shok
3. Nyclad
4. Glaser
5. MagSafe
6. XTP
7. Black Talon
8. Starfire
9. TMJ
10. Gold Dot

11. Golden Saber
12. Black Rhino

Summary of the Invention

Alloy Composition

Bullet Manufacture

Bullet Operation

The Nature of Penetration of 10% Ballistic Gelatin

Military Uses

ABSTRACT

The present invention relates generally to small arms bullets and relates in particular to frangible bullets and ordinance which fragments following penetration of a variety of obstacles prior to encountering the intended target zone. The disclosure relates specifically to small arms bullets which have a high likelihood of fragmentation after target zone penetration causing a significant crush cavity following passage through obstacles including clothing, glass, building materials and other structures. The disclosed bullet design is produced in a simple and inexpensive process, provides high accuracy and fragmentation and penetration in a 5 to 15 inch target zone, at either sonic or subsonic velocities, following penetration of shielding obstacles. The bullet disclosed is of a weight and design which will permit operation at sonic or subsonic velocities, without jamming, in civilian and military small arms including automatic weapons. The disclosure also applies to military ordinance and armor piercing munitions where fragmentation following obstacle penetration is intended.

OTHER BULLET TYPES

The evolution of bullets designed to incapacitate with an initial shot would include progressively the hollowpoint, prefragmented and frangible designs. The 1994 Annual Edition 11 of Guns & Ammo, Petersen Publishing Company, pages 19-25, summarizes, in part, the evolution. More recent developments are reviewed in Handguns August 1995, Volume 9, Number 8, Petersen Publishing Company, pages 42-46, 88 and 89. Background pertinent to evolution and development of predecessors to the disclosure herein is now noted:

SILVERTIP

The aluminum jacketed Winchester Silvertip. was introduced in 1980 as an improvement over then existing hollowpoint bullets. The serrated aluminum jacket was understood to enable bullets to expand more reliably and to larger diameters than copper-jacketed bullets. The design intent was to achieve rapid expansion and avoid overpenetration thereby reducing risk to bystanders. The United States Secret Service reportedly used a 9 mm 115 grain version of this bullet until the early 1990's when it commenced use of a +P+ version. This bullet is

understood to have performed to design expectations when employed by the FBI in a Miami, Fla. confrontation where the assailant continued a deadly offense after being shot by police authorities. This bullet was considered a standard for hollowpoint handgun ammunition from 1980 through 1988.

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HYDRA-SHOK

The Hydra-Shok., designed in the 1970's, is a pointed or rounded tip hollowpoint with a lead post swaged in the center of the hollowpoint cavity. The center post is understood to amplify and focus fluid pressure and act as an accuracy enhancing forward and centerline balance shaft. Accuracy is reported as a problem related to large-cavity hollowpoints. Federal Cartridge is reported to have assumed production rights of this bullet in 1987 and to have modified the design retaining the hollowpoint with swaged center post concept. These design changes are understood to have led law enforcement agencies to consider this bullet as a standard for comparison of bullet performance, thereby replacing the Winchester Silvertip.. The FBI is understood to have conducted testing of these bullets with and without the swaged center post. Reported test results for external and terminal ballistics, believed to have been conducted with 10% ballistic gelatin, indicated that the unmodified bullet demonstrated superior performance, after penetration of glass, in size of crush cavities, accuracy, expansion and penetration in the 12-to-18-inch range.

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NYCLAD

(3) The Nyclad. bullet was considered a solution to stopping-power problems of poor expansion reliability in lower-velocity calibers. This bullet is now produced by Federal Cartridge. The design was changed making the nylon coating thinner (for improved accuracy), reduced the tin and antimony content (to improve the reliability of expansion), and changed the feed profiles and hollowpoint openings on all calibers. These changes were reported to produce reliable expansion, high weight retention and adequate penetration. The Nyclad. is understood to expand more reliably at the lowest velocities than copper jacketed hollowpoint bullets and to expand more readily than other lead hollowpoints which must use higher percentages of antimony (used to harden lead and prevent bore fouling). The bullet was rated highly in .38 Special (non-+P, 125-grain) and 9 mm (non-+P, 124 grain calibers in testing in calibrated ordinance gelatin and in actual police shooting results.

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GLASER

(4) The Glaser Safety Slug. was developed by Jack Y. Canon, in approximately 1969 and was believed to be the first frangible prefragmented personal defense bullet. This bullet has a thin serrated copper jacket filled with number 12 or number 6 birdshot and sealed with a polymer

nose cap. The bullet is reported to rupture on impact releasing birdshot and creating a wound resembling that from a .410 bore contact shotgun blast. The bullet is understood to have been used by the U.S. Customs Service "Sky Marshals" as the bullet least likely to overpenetrate and cause a bystander hazard; it was also considered the least likely to ricochet or puncture an aircraft fuselage. The bullet has been considered most likely to expand and transfer energy. The bullet was once filed with liquid Teflon. which was shown to both slow pellet dispersion in a target and reduce velocity (due to added weight). The bullet has changed from a flatnose profile to a roundnose profile in 1987. This profile change increased the feed reliability of the bullet in automatic pistols. An additional change was the use of compressed birdshot in 1991. The compressed load was reported to produce deeper pellet penetration, greater internal dispersion and improved accuracy. The use of number 12 birdshot was deemed to reduce ricochet hazard while number 6 birdshot developed deeper penetration. A characteristic of this bullet is the maximum penetration of 5 to 7 inches in calibrated ordinance gelatin. The bullet was tested in the Strasbourg animal tests and was rated first in .38 Special +P; second overall in .380 ACP, .40 S&W and .45 ACP; and third in 9 mm, 10 mm and .357 Magnum.

Frangible bullets of this type design are disclosed in U.S. Pat. Nos. 3,911,820 and 3,972,286 to Jack Y. Canon.

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MAGSAFE

(5) The MagSafe. frangible and prefragmented defensive bullet uses a serrated copper alloy jacket. Compressed or fused number 4 or number 2 birdshot, embedded in marine epoxy, constitutes the prefragmented core of this bullet. The bullet fragments on impact, produces a fewer number of larger-diameter crush cavities than the Glaser Safety Slug., and penetrates between 11 and 13 inches. The bullet is reported to remain intact when penetrating objects (including building materials and auto panels) intermediate to the target with release of the prefragmented load upon impact with ordnance gelatin.

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XTP

(6) The Hornady Manufacturing. XTP and XTP-HP are understood to have been designed in response to FBI needs following the hollowpoint experience wherein the perpetrator was able to continue a damaging offense after having been shot. It is understood that the FBI had set up a series of eight performance tests involving bare gelatin and also gelatin behind heavy clothes, auto glass, sheet metal and building materials. The tests were intended for ordinance for use by special agents and not necessarily for police use in general. The test methodology developed is reported to have been the controlling aspect of bullet design since 1987. The Hornady XTP. and XTP-HP. are understood to have been designed to suppress bullet expansion and totally avoid fragmentation. If is believed that the rounds perform as designed producing extremely deep penetration with little expansion. The XTP-HP. is understood to perform well when operated at very high velocities. The 9 mm 124-grain XTP. loaded to +P+

velocities was the best overall 9 mm load in tests conducted by the Indianapolis Police. Tests involving .40 S&W high-speed 155-grain XTP. operated satisfactorily at velocities which would be expected to fragment other bullet designs. The XTP., for a hollowpoint design, is also understood to perform well in match-grade accuracy. It is also reported that the conical feed profile of the XTP. assists consistent feed reliability,

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BLACK TALON

(7) The Winchester. Black Talon. (named the Supreme Expansion Talon SXT.) is understood to utilize a copper-zinc jacket designed to encourage the jacket to peel back into segments or petals and to eliminate separation of the jacket petals after expansion. The jacket petal formation increases tissue damage along the bullet path. The design is intended to increase stopping power by causing tissue damage outside the normal crush zone including crushing, stretching and cutting mechanisms. The "talon" or petal formation is produced by a combination of alloy (using a higher than normal copper content in the copper-zinc jacket) and a reverse-taper jacket design formed with a special selective heat-treat process. The bullet appears to be a copper-base FMJ bullet just prior to the last pierce-and-form operation. The jacket is thicker near the hollowpoint. The hollowpoint opening is punched into the bullet. The reverse taper jacket increases production control of "heel bulge" in the final forming operation. It is understood that square-based constant-diameter bullets have enhanced accuracy.

The Black Talon. heat-treat is intended to soften the jacket near the hollowpoint cavity to permit the jacket to fold back easily. The middle of the jacket is partially annealed and the bullet shank and base are left full work-hardened. The jacket serration operation includes a 90-degree bend that forms the base of the talon for reinforcement. When the jacket petals peel back, they remain exposed even after impact with bone. The bullet is reported to penetrate deeper than ordinary JHP bullets before expansion commences.

It is reported that the Black Talon. expands more rapidly, once expansion begins, than a conventional JHP. This permits a higher penetrating velocity as with a subsonic hollowpoint and a large recovered diameter and temporary cavity as with a rapidly expanding Silvertip..

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STARFIRE

(8) The Eldorado Starfire. is understood to utilize a fluted hollowpoint cavity, in lieu of center post, in addressing bullet expansion. The Starfire. design includes sharp edges and a flat bullet profile. The sharp edges are provided by the ribs inside the hollowpoint cavity. The ribs and flutes roll outward during expansion to engage tissue and assist in penetration. The ribs and flutes act as wedges to force the cavity walls open. Fluid pressure enters the hollowpoint cavity and is split by the wedge-shaped ribs. The pressure is redirected into the flutes that line the cavity wall. Expansion pressure is focused on the cavity wall which opens along five lines. The hollowpoint cavity is approximately as deep as the bullet is long and has the ability to expand to the bullet base. The bullet does not fragment after expansion nor does it fragment after

high-velocity impacts. The bullet continues to expand to larger recovered diameters. Large bullet diameters typically limit the depth of penetration. It is believed that the sharp edges of the ribs and the high retained weight tend to increase the depth of penetration. In the Strasbourg tests the Starfire. outperformed conventional JHP bullets of the same weight and velocity. Ordnance gelatin tests indicate the 9 mm 124-grain Starfire. to be an effective police and defensive load.

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TMJ

(9) The CCI-Clount Totally Metal Jacketed. (TMJ) bullet was introduced in 1988 and was followed by the CCI Plated Hollow Point. (PHP) which used the TMJ blank. The copper jackets of these bullets, solid and hollowpoint respectively, were applied through electroplating onto a lead core. Advantages of copper-plated bullets over conventional swaged jackets include a core which is precluded from rotation or separation from the jacket thus increasing accuracy. The plated jacket also increases weight retention, especially for high-velocity impacts with tissue or impact with a hard object. The fully encased bullet also reduces airborne lead contamination.

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GOLD DOT

CCI changed design parameters for the PHP line in 1993, introducing the Gold Dot., to include eight serrations. The bullets are reswaged after plating for uniform diameters and square bases to increase accuracy. The bullets terminate expansion prior to shearing off the mushroom formation. The Gold Dot. design is intended to avoid fragmentation, from shearing of the mushroom, in the high-velocity loads and where light bullet weights and rapid expansion may limit penetration.

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GOLDEN SABER

(10) The Remington. Golden Saber HPJ. demonstrates divergence from past jacket cladding technology, where gilding metal consisted of 95% copper and 5% zinc, using a jacket made from cartridge brass of 70% copper and 30% zinc forming a stiffer jacket. This slows the rate of expansion and reduces fragmentation. The stiffer jacket is complemented by a larger hollowpoint cavity opening which is the same diameter as the jacket opening. The cavity is relatively shallow. Early expansion forces are directed against the stiff jacket and not the lead core. The jacket peels back but, because of the stiffness, does not fold back against the bullet shank holding, instead, a large diameter. Expansion forces focus on the bullet core with a shallow hollowpoint cavity. Shallow cavities are believed to produce minimum core expansion and maximum weight retention. The Golden Sabre. design is thought to increase tissue damage from the jacket structure rather than relying on damage from the core. The core

maintains its weight for deeper penetration. The jacket expands to a large recovered diameter for the crushing action of the bullet. The jacket remains away from the bullet core even after impact with bone. Initial gelatin and animal tests indicate the HPJ. to have improved hollowpoint performance in comparison with prior Remington. auto pistol bullet hollowpoint technology.

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BLACK RHINO

(11) The Signature Products Corp. Rhino-Ammo., Black Rhino. or Razor-Ammo. was introduced in late 1994. It is understood that the Rhino-Ammo. is formed from a CCI-Speer hollowpoint bullet. The .45 ACP caliber is based on the Speer 225-grain JHP. The bullet is fixed in a lathe and the hollowpoint cavity drilled down to approximately the bullet base and to a diameter approximately as large as the jacket opening. Thereafter the hollowed-out bullet is put in a fluid energy mill, tumbled in media that removes more lead, smooths out the cavity walls and polishes the bullet jacket. In original loads a polymer was poured into the drilled-out cavity. It was determined that this process significantly reduced projectile accuracy being too rear heavy to be stable in flight. Weight was added forward of the center of gravity leading to a second-generation load which managed accuracy of groups into five inches at 50 feet. The polymer in the second-generation bullets was poured into the cavity in two phases: the first phase filled the cavity leaving space for seven number 4 birdshot pellets and room for final sealing polymer; following the curing of the initial polymer, birdshot was added and sealed. This second generation of bullet, in the .45 ACP caliber, it is understood, weighed 125 grains while the 9 mm version weighed 98 grains. Blended canister-grade powder was used to achieve a desired time-pressure curve. The impact, with this design, results in the jacket peeling back, the release of plastic core fragments and then release of the birdshot pellets. It is understood that 1,500 to 1,600 fps velocity loads have been independently tested, in both .45 ACP and 9 mm, in calibrated, 10% gelatin revealing 5.3-inch cavity diameter and penetration depth of 7.5 inches.

The Rhino-Ammo. was compared, in .45 ACP and 9 mm loads, with the Glaser Safety Slug. and the MagSafe.. The comparison indicated that the bullet construction was markedly different from the Glaser Safety Slug. and markedly similar to the MagSafe.. The Rhino-Ammo. or Razor-Ammo. was found to instantly fragment in 10% gelatin even after penetration of heavy clothes. The bullet construction has no hollowpoint cavity. The birdshot pellets at the nose of the bullet penetrated independently of the main stretch cavity as did lead fragments from the lead lining from the lead core. There was no finding of independent penetration from the polymer fragments after the polymer core fragmented. The polymer fragments were found to line the inside of the temporary cavity caused by the bullet breakup. The polymer fragments were hard and sharp but lacked sufficient weight to cause independent penetration.

Rhino-Ammo. or Razor-Ammo. is understood to have been compared with similar fragmenting loads and with conventional hollowpoint loads. In 9 mm and .45 ACP calibers the bullet was deemed to be as effective as the best frangible load in the caliber and more effective than the best hollowpoint producing more stopping power than subsonic and non-hollowpoint loads.

Tests have been conducted regarding the probability of particular bullets or loads in delivering

an impact of a nature of likely terminating activity of a perpetrator with a single shot. Marshall and others have written about the Strasbourg tests where the subjects were goats. Glaser. and Magsafe. prefragmented rounds, consisting of bird shot placed in a jacket covered with epoxy, were judged to have the impact with the highest likelihood of terminating activity with a single shot. The impact of the prefragmented bullet had the highest likelihood of causing almost instantaneous disabling impact. The existing prefragmented bullets, consisting of bird shot in epoxy, have weights lower than a standard police or military small arms bullet. The lower weight contributes to weapon malfunction. The bird shot, being smooth and round, causes a less significant crush cavity than a design with fragmentation.

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SUMMARY OF THE INVENTION

In accordance with the present invention, a bullet design is disclosed which relates specifically to small arms bullets which have a high likelihood of inflicting a significant crush cavity within the target zone with a single shot following passage through obstacles including clothing, glass, building materials and other structures. The disclosed bullet design is produced in a simple and inexpensive process, provides high accuracy and produces a significant crush cavity through bullet core fragmentation with penetration of 5 to 15 inches in 10% ballistic gelatin, at either sonic or subsonic velocities, following penetration of shielding obstacles. The bullet disclosed is of a weight and design which will permit operation at sonic or subsonic velocities, without jamming, in civilian and military small arms including automatic weapons. The disclosure also applies to military ordinance and armor piercing munitions where fragmentation following obstacle penetration is intended.

The present invention comprises an improvement to known solid, hollowpoint, prefragmented and frangible bullets and other munitions intended to inflict significant crush cavities with a minimum of shots. The disclosure demonstrates a bullet design which is produced in a simple and inexpensive process; which provides high accuracy; which will penetrate shielding materials prior to fragmentation and which will create a significant crush cavity when used in small arms caliber weapons. The disclosure also applies to military cannon and other large artillery rounds including armor piercing rounds.

The invention herein disclosed addresses particular bullet design, production and utilization issues alluded to in the foregoing Background of the Invention and in literature and practices which are familiar to individuals and organizations professionally associated with firearms. The issues addressed and resolved by this disclosure relate to the utilization of small arms ammunition in circumstances requiring rapid immobilization and include: 1. delayed or limited expansion and fragmentation leading to overpenetration and risk to bystanders; 2. problems of poor fragmentation reliability in lower-velocity calibers; 3. unsatisfactory operation at velocities which would be expected to fragment most bullet designs; 4. bullet and or jacket formation permitting overpenetration or reduced crush cavity along the bullet path; 5. decreased stopping power caused by decreased damage within the normal crush zone including inadequate crushing, stretching and cutting mechanisms; 6. light bullet weights and rapid expansion and or fragmentation limiting penetration; 7. complex and expensive bullet manufacturing processes or steps including filling thin serrated copper jackets with birdshot and polymer or other

compounds, compressing or fusing birdshot embedded in epoxy, producing reverse-taper jackets requiring special selective heat-treat processes, electroplating copper jackets onto lead core bullets, forming hollowpoint cavity using a lathe and drilling process followed by tumbling of the hollowed-out bullet in a fluid energy mill prior to filling the cavity with polymer and birdshot; 8. bullet shapes or feed profiles which interfere or impede automatic feed mechanisms; and 9. reduced accuracy related to large-cavity hollowpoints or unpredictable centers of gravity caused by bullets composed in part of birdshot. Those familiar with the art will recognize additional issues of concern which are eliminated or lessened by the present invention.

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ALLOY COMPOSITION

The preferred embodiment of the obstacle piercing frangible bullet is composed of a bullet core of metals and/or alloys which are brittle or frangible and which fragment, under conditions described herein, following impact with a target. A principal characteristic of importance is the frangibility of the metal or alloy which in turn leads to the fragmentation property which is the focus of this disclosure. The alloys of foremost consideration herein are derived from and related to dental alloys and amalgams. The particular alloy or amalgam initially considered is a standard dental alloy made of mercury, silver, tin, copper and zinc (hereafter identified as Alloy A). Dental amalgams are also found which contain the following in addition to mercury, silver, tin and copper: palladium, gold, platinum, indium as in U.S. Pat. No. 5,242,305 to O'Brien; zinc, indium, palladium, platinum, gold, cobalt, nickel, germanium and selenium as in U.S. Pat. No. 4,758,274 to Kumei Yasuhiro and others; combinations of alloys as in U.S. Pat. No. 3,997,328 to Greener; combinations of alloys including an alloying constituent individually selected from the group consisting of 5% cadmium, 5%-50% zinc, 5%-50% aluminum, copper in an amount to provide a silver-to-copper ration of about 2.6:1 as in U.S. Pat. No. 3,980,472 to Asgar and Reichman.

It is apparent that many dental alloys or amalgams exist. A dental amalgam composed, by percentage by weight, of 50% mercury, 26% silver, 23% tin and 1% copper demonstrates the brittleness and frangibility resulting in fragmentation characteristics of particular importance to this disclosure. It is believed that dental amalgams or alloys universally demonstrate this fragmentation characteristic. Dental amalgams prepared from the ranges of elements set out in the following table as Alloys A, B, C, D and E demonstrates fragmentation characteristics which likewise support this disclosure.

The silver component of these amalgams poses a particular expense which would be of prominent interest in manufacturing. The replacement of silver with cadmium or cadmium and bismuth reduces the expense and yields, as well, the fragmentation characteristic which is sought by this disclosure. The following table suggests ranges of elements in amalgams of Alloy B, C and D which provide the intended fragmentation characteristic. Other amalgams and alloys from the group of cadmium, bismuth, and antimony, will also produce the intended fragmentation characteristic. However, it is important to note that other amalgams and alloys will provide the requisite brittleness and will suffice in performance to deliver fragmentation of a nature which will accomplish the result intended by this disclosure.

Alloy A, an amalgam, disclosed for use in the present invention, has been commonly utilized for decades for dental restorations, without adverse results, with direct human body contact. There has been no evidence developed of clinical hazard to humans from Alloy A.

The composition of Alloys A, B, C, D and E, element percentages by weight, are as follows:

	Alloy A	Alloy B	Alloy C	Alloy D	Alloy E
Mercury	40%-60%	55%-70%	55%-65%	55%-65%	60%-70%
Silver	25%-40%	0	0	0	0
Cadmium	0	15%-45%	10%-30%	15%-30	25%-30%
Bismuth	0	0	10%-30%	15%-30%	0
Tin	15%-25%	0-25%	0	0	0
Copper	0-5%	0-2%	5%-15%	5%-15%	5%-10%
Zinc	0-2%	0-1%	0-1%	0-1%	0-1%

An ideal amalgam for Alloy A consists of the mixture by percentages by weight of Mercury 50%, Silver 26%, Tin 23% and Copper 1%. An ideal amalgam for Alloy B consists of the mixture by percentages by weight of Mercury 66%, Cadmium 20%, Tin 12.9% and Copper 0.1%.

The Alloys noted above exhibit requisite brittleness and are ranked in decreasing brittleness as follows: Alloy A, D, E, C and B with Alloy A demonstrating the greatest brittleness. A ranking of the alloys for hardness follows the same pattern as found in ranking for brittleness.

The metals used in tests associated with this disclosure and in dental amalgams are in powder form of 100 mesh or finer and are 99% pure. The mercury was triple distilled at 99.9% pure. The elements used for bullet production are not expected to require purity to this extent while producing the required fragmentation characteristic.

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BULLET MANUFACTURING PROCESS

Alloy A has been in use for approximately one hundred years for dental purposes. The amalgamation alloy formation process utilized in dentists' offices is well known. The mixing process does not require furnaces or the need for any heating. The bullet formation, from the alloys plastic state, does not require presses or other devices to exert extraordinary forces to deform the jacket or bullets. Precision production is easily attained by bullet formation with these alloys in their plastic state. There is no need to attend to hardening and softening processes as done with lead, by use of minute quantities of antimony and zinc.

The silver content of Alloy A poses an expense factor which can be addressed through use of Alloy B or other alloys suggested. Other alloy combinations of elements can significantly reduce the expense of manufacturing the alloy.

These alloys, when used as dental amalgams, are formed by mixing mercury, in its liquid state, with the remaining elements in powder form. Mixing may be accomplished in a twin screw or

auger device or any of a variety of mixing devices or by a variety of mixing means. Dental amalgams are commonly contained, prior to mixing, in a cylinder divided into two compartments by a diaphragm. One cylinder compartment contains mercury while the second contains a powdered mixture of silver, copper, tin, zinc and others as previously discussed. The mixing means commonly found in the dentist's office is a shaker. The vibration or shaking of the cylinder breaks the diaphragm allowing the amalgamation of mercury and the components contained in the second compartment. The alloys set out herein may similarly be mixed.

Formation of the amalgam of Alloy A, B, C, D and E, may be accomplished, without the addition of heat, between a temperature range of from approximately 12.degree. F. to approximately 130.degree. F. The alloy assumes a plastic state immediately upon completion of mixing and can be forced into a mold, for solid designs, or a mold or jacket allowing a hollowpoint configuration to be stamped, with very little pressure, into the nose of the bullet. The forming or stamping of the hollowpoint, in virtually any configuration or design, is easily accomplished with a simply shaped die which could be easily inserted into the bullet nose or hollowpoint opening of a jacket by a hydraulic ram or other device, including die insertion by hand, to push down into or displace the alloy, in its plastic state, in a mould or jacket. The plastic state alloy is easily molded, manipulated, and formed. Hence any press or die insertion mechanism would not require significant mechanical advantage. A die would not need to be made of tool steel or carbide and wouldn't require cutting properties inasmuch as the hollowpoint operation is merely one of displacing or compressing the alloy in its plastic state. Following removal of the die the alloy will proceed to set up or cure to its full strength. A bullet formed absent a preformed jacket can have a jacket applied via electroplating.

The alloy setting time can be varied by the selection of the amount of the elements present in the alloy, by control of the temperature of the process and by the length of time of mixing. The time for cure or set up of the alloy in its plastic or mixed stage decreases with increased alloy mix temperature. The cure or set up time can be manipulated to permit the alloys to remain in a plastic state for time sufficient to permit hollowpoint formation and other molding operations with little pressure or mechanical advantage. Extended plastic state times can be achieved. The cure or set up time can also be reduced to as little as 2 minutes. Choice of alloy by element weights can be made which will allow the alloy to achieve any shape necessary to pass through injection nozzles. The alloy mixing is routinely accomplished in dentist's offices and applied, in their plastic states, in the filling of cavities.

Alloys A, B and C can be expected to remain in their plastic state for up to 15 minutes following alloy mixing, under appropriate temperature and mixing conditions. Alloys D and E remain in the plastic state for a much shorter time than expected for Alloys A, B and C resulting in a short setup time.

Following mixing, the alloy would be injected, while in the plastic stage, into a jacket with a hollowpoint design stamped depending on the type of fragmentation desired. The management of production of type of bullet, whether solid or hollowpoint, is readily accomplished while the alloys are in their plastic state.

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BULLET OPERATION

The formation of a hollowpoint in a bullet of this alloy will produce a bullet with hollowpoint operational characteristics with fragmentation following impact and upon penetration. Bullets of these alloys without a hollowpoint will perform like a solid round. Solid round nose bullets and hollowpoints of these alloys, of 9 mm and .40 caliber, have penetrated one-sixteenth inch sheet steel in tests (hollowpoints used in these tests penetrated the sheet steel and then fragmented in water contained behind the steel barrier). In most hollowpoint tests, Sierra Jacket Hollowpoint bullets were used as the source of the jacket with bullet core contents melted and removed and with jackets then filled with the herein disclosed alloys. The Sierra Jackets were filled to form 115 grain 9 mm, 165 grain .40 S&W, and 100 grain .380 ACP JHP bullets. The bullet weight includes the weight of the jacket and alloy core.

The alloys proposed for this use offer the following characteristics: 1. they have approximately the same density as lead; 2. they are homogenous; 3. the components with the exception of mercury are available in powders of 100 mesh or finer and are easily stored and combined; 4. the combination of the alloy components is simply accomplished by mixing; 5. the alloys readily adapt to irregular shapes at room temperatures for approximately one to fifteen minutes following mixing thus lending to ease in formation of bullets without jackets or in filling standard hollowpoint bullet jackets; 6. the alloy, with or without jacket, readily receives a variety of dies for the forming of hollowpoint cavities of any shape and depth; 7. they are relatively hard; and 8. they are frangible at low and high velocities producing sharp fragment particles of 0.01" up to the bullet diameter.

In bullets formed with the disclosed alloys, fragmentation can be controlled by a combination of the velocity of the bullet, hollowpoint diameter, depth and shape and choice of alloy. Alloy C fragments into smaller pieces than Alloys A or B. Alloy D is harder and produces larger fragments than Alloys A or B. The larger diameter deeper hollowpoint cavities will increase the number of fragments while producing smaller fragments and providing less penetration in all alloys. Inversely, smaller diameter, shallower hollowpoint cavities will produce fewer fragments of larger size resulting in deeper penetration. In tests, the fragmentation of the bullet core was noted to frequently terminate at the bottom of the hollowpoint cavity leaving intact the portion of the bullet core essentially between the bottom of the hollowpoint cavity and the bullet base. Fragmentation is noted to be increased when a lead post is swaged in the center of the hollowpoint cavity.

Fragmentation occurs at velocities from 400 feet per second or lower to 1,400 feet per second and higher. Small arms bullets utilizing these alloys will operate at low safe pressures and will not require a change in gun powder loads to achieve desirable performance characteristics. Bullets of these alloys will fragment in water or 10% or 20% ballistic gelatin after piercing various barriers including building materials such as sheetrock, wood, glass, and sheetmetal and clothing or combinations of these and other materials.

bullet penetration in 10% ballistic gelatin can be moderate to very deep, depending on the alloy used and the hollowpoint design, with standard bullet weights, powder loads and pressures (Speer, Reloading Rifle & Pistol Manual (Number 12), copyright Blount, Inc. Sporting Equipment Division, P. O. Box 856, Lewiston, Id., 83501, 1994.) Alloys A, B and E produce

penetration of 4" to 15". Tests of Alloy C produced penetration of 7"=8" while Alloy D penetration is expected to be up to 12". However, penetration and fragmentation can be manipulated by selection of the hollowpoint cavity profile.

Bullets manufactured from the alloys disclosed will function below the sonic level resulting in fragmentation and production of significant crush cavity and penetration at a velocity of 1000 feet per second. Testing also demonstrates satisfactory operation at muzzle velocities up to 1300 feet per second.

In tests an 87 grain bullet composed of these alloys was fired at a velocity of at least 1300 feet per second. Penetration was not as deep as with heavier bullets however a large hollowpoint was employed resulting in significant fragmentation. The large hollowpoint was used mainly to remove some of the material to lower the bullet weight. The same Sierra jacket was used throughout all experiments. The jacket was commercial and was unmodified with existing serrations left intact and unmodified with the exception of certain tests. In testing penetration through 2" wood and fabric barriers, serrations were added to jackets using a file. Deeper serrations insured fragmentation after penetration.

Bullets produced from these alloys will fragment at standard handguns velocities. All experimentation was done with 115 grain 9 mm, 165 grain .40 S&W and 100 grain 380 ACP with Sierra Hollowpoint Jackets. Fragmentation was demonstrated to occur below the sonic speed (below approximately 1180 feet per second). Fragmentation also occurs above 1250 feet per second.

These alloys produce a homogenous mass causing the bullet to have the same density throughout. This characteristic increases accuracy and reduces likelihood of tumbling. The Magsafe. rounds and the Glaser Safety Slug. rounds utilize a jacket filled with bird shot. In some of the Magsafe. rounds the bird shot is compressed resulting in distorted shot. The shot is then sealed with epoxies. The birdshot composition precludes the forming of a uniform density and hence a center of gravity along the longitudinal centerline of the bullet. The birdshot bullets tend to be less accurate than conventional bullets.

The birdshot design frangible bullets weighing less than standard bullets require extremely high velocities to function well. The low density of the birdshot designs result in bullets which weigh approximately one-half as much as a lead filled jacket. The density of these alloys approximates that of lead. The comparison of densities of these alloys and lead is demonstrated as follows: using identical jackets and hollowpoint designs, a lead bullet will weigh 115 grains while a bullet consisting of these alloys will weigh 110 grains.

The Magsafe and Glaser Safety rounds are composed of bird shot sealed in a jacket with epoxy. The bird shot in certain Magsafe rounds is compressed into the jacket. The compressed shot structure is inherently limited in producing a uniform center of gravity. Compression causes the shot to be distorted thus eliminating uniformity of density and precluding a center of gravity along the bullet's centerline. This limitation contributes to tumbling and inaccuracy. The construction results in low bullet weight thus requiring extremely high muzzle velocities to effect reasonable functioning in most small arms. The weight of bullets composed of bird shot is generally half of that which would be experienced if the jacket was filled with lead. Such construction does not function as well as commercial ammunition existing today in particular in

automatic weapons. Recent design changes are reported to have increased accuracy and reliability in automatic weapon use. These bullets remain unreliable, in automatic weapon use, at low velocities.

The round nose solid and the small diameter hollowpoint designs will operate in revolvers and semi-automatics and full automatic weapons. The bullet should function at least as well as the commercial ammunition that exists today in any automatic, revolver or any automatic weapon.

The very high velocities of the Magsafe. and Glaser. bullets creates additional obstacles. Super sonic velocities cause a sonic crack when bullets with such velocities are fired with this occurring even in a suppressed weapon. Marked muzzle blast results. The high velocity design of the Glaser and Magsafe bullets compensates for the low bullet weight. This low weight/high velocity design problem is compounded when a bullet designed for a 4 inch barrel pistol is used in a pistol with a 2 inch barrel. The bullet when used in the 4 inch barrel will reach 1200 ft/sec but will not achieve a similar velocity if used in a 2 inch barrel. A normal hollowpoint bullet, when shot under such circumstance, will fail to expand. However, many current hollowpoint designs do not function well or at all below the speed of sound of approximately 1180 feet per second. Recent design changes are reported to have improved regular hollowpoint performance at velocities of 950 feet per second. The Magsafe and Glaser bullets do not penetrate or fragment satisfactorily at low velocities continuing to require velocities of approximately 1400-1600 feet per second.

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THE NATURE OF PENETRATION OF 10% BALLISTIC GELATIN

Extensive tests in water and 10% ballistic gelatin demonstrated that an extremely small hollowpoint allows deeper penetration while producing fewer fragments of larger size. Conversely, the larger the diameter and the deeper the hollowpoint the greater the number of fragments with more fragments of a smaller size.

The crush cavity in the ballistic gelatin was on average 4 inches in diameter at its maximum dimension. The fragments that are formed are jagged, and caused extensive damage within the penetration and crush cavity. Damage to tissue would be extensive. Damage within the crush cavity is opened up more rapidly, by the extensive fragment lacerations, than with rounds of other designs. It was noted that bullet fragmentation commenced earlier in the penetration in ballistic gelatin and water than occurred with rounds of other design.

These alloys should be more efficient due to the brittleness and abrupt fracturing, following penetration, without metal flowing. Lead alloys, in conventional hollowpoints, lose energy in the form of heat inasmuch as lead flows as deformation occurs thereby producing heat. The alloys disclosed herein will flow less, with deformation, as a result of the fragmentation. Energy otherwise lost through generation of heat in conventional bullets is expended, in the bullets disclosed here, through the fragmentation and penetration.

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MILITARY AND MUNITIONS USES

These alloys could be used as an armor piercing round and for other military applications with the addition of the appropriate penetrator. Armor piercing penetrators, including tungsten penetrators, could be inserted in rounds while alloys are still in their plastic state. Any semi-solid or solid substance may be so inserted during the plastic state. In tests with a 30 caliber rifle at approximately 3,000 feet per second, rounds pierced one-sixteenth inch steel plate with fragments cutting a 4" diameter hole in steel mesh located 6" behind the steel plate.

Manufacturing processes for military applications will be simplified using these alloys. The typical incendiary armor piercing round requires the drilling of a hole in carbide steel like material. The armor piercing portion must be machined to exact tolerances. This requires one entirely separate step. Cutting armor piercing material is difficult. The incendiary device or tracer has to be placed in the base. The machining and drilling processes are time consuming, expensive, and labor intensive procedure requiring many steps and many machines. These processes and steps would not be required with the use of the alloys disclosed herein. The use of alloys in their plastic state would be formed in a press or mold or would be stamped. The hollowpoint could be formed by pressing a die into the mold, as in the formation of the hollowpoint in a small arms caliber bullet, or the mold could include a hollowpoint forming element. An incendiary device could be placed in such a cavity without requiring a machining process. An alternative process for the insertion of an incendiary device would be to form fill a jacket with the alloy in its plastic state with the incendiary device in place. It could be placed inside the jacket even easier and would take on the form of the jacket and then be pressed or condensed. The manufacturing of such munitions using a bullet alloy with a plastic state eliminates many of the usual process steps.

These alloys could replace steel in high explosive rounds up to and including 16 inch high explosive projectiles. Such munitions require substantial precision machining which is eliminated in processes permitted with these alloys. In such munitions a steel casing must be formed to accommodate a high explosive packed within the cavity. These alloys would permit such cases to simply be stamped. The material strength of these alloys will accommodate many military applications. The frangible nature of the alloy, when detonated, would meet design requirements for military purposes.

Military applications also include above and below ground explosives, such as a grenades and mines. The frangible nature of these alloys would eliminate the manufacturing of scored cast iron hand grenade cases.

The hollowpoint design is primarily used in ammunition for pistols. The 9 mm NATO design is favored by many nations for military use including the United States, Germany, France, Spain and Italy. Hundreds of millions of rounds are produced every year for military purposes. The majority of military weapons are designed to function with "ball" ammunition. Ball ammunition has a full metal jacket. Hollowpoint ammunition does not function consistently in the military firearm. The reason hollowpoint ammunition does not function consistently in military firearms is a design function of automatic weapons requiring round nose bullets such as that provided by FMJ ball ammunition. Many military firearms are designed to function with a round nose bullet while many weapons destined primarily for civilian use have been manufactured to function

with hollowpoint bullets. The Berretta 92 and the Glock will function with round nose or hollowpoint bullets. Weapons utilized by foreign armed forces may function only with FMJ rounds. Conventional hollowpoint designs have relatively large cavity openings and consequently tend to jam on the feed ramp.

The bullet design disclosed herein functions well, producing the intended fragmentation characteristic, with very small hollowpoints and should function the same as a FMJ round in automatic weapon use.

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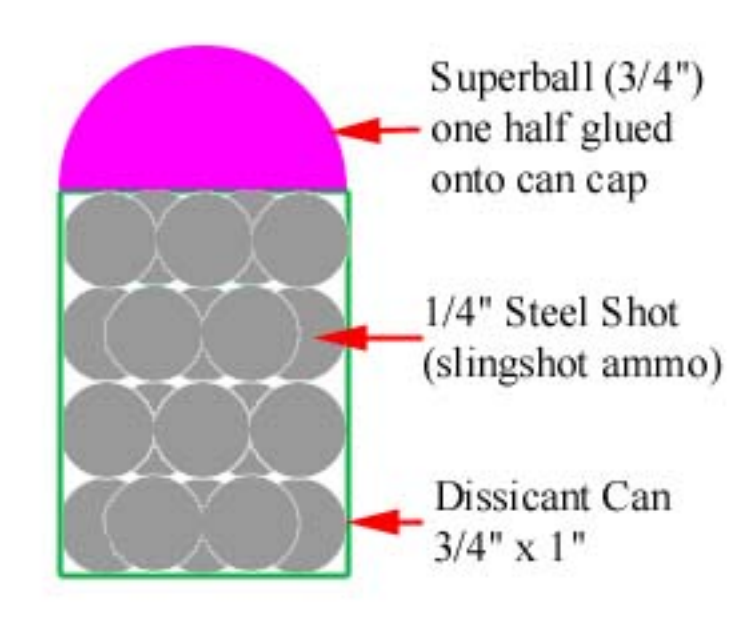
Shotgun Shot-Slug

This section will explain how to make a shot-slug. This combines the range and accuracy of a slug with the devastating killing power of a shot shell. These shells are especially effective when used against barriers like walls and cars. When the shell hits, it breaks up and scatters the shot through to the other side. So if someone is hiding behind a wall 70 yards away, you use this slug. When it hits the wall, it punches through, and shreds the person on the other side.

This is the canister as it looks straight from the pharmacy. The pharmacy is where you get these things. Just ask the pharmacist to save all the desiccant capsules they get in the pill bottles. If they ask what you use them for, tell them you use them to keep parts dry. Watch parts or model parts.

This shows how the pellets are arranged in the canister. Using 1/4" steel slingshot ammo you can fit 20 pellets in 4 layers inside a canister. The spaces are filled in with the silica gel that filled the canister as you put in each 5 pellet layer.

If you have a drill and the patience, you can make poisoned shot. This will insure a kill. Drill a hole as big as the flat face of the shot. Drill it a deep as possible without penetrating through to the other side. Fill the hole with a potent poison (you don't have much room) like ricin or succinylcholine chloride. Pack it in as tightly as possible then seal the hole with a drop or two of a water soluble glue like mucilage. With the right poison even 1 pellet in the foot will be fatal.



This is how the canister is constructed. After the canister is filled with pellets and silica gel, the edge of the canister is lightly coated with superglue and the cap is put on. After the glue dries, glue on the half superball and let dry. The reason for the superball is aerodynamics. It won't affect the fragmentation.

You could fire the shot-slug without the superball but it won't be as accurate or go as far because of tumbling.

Here's some commercially manufactured ammunition that does the same thing as my version. Only difference is you have to be police or military to order it from these guys. You can see their site here. If you wanted to, you could duplicate this version by taking slices of rod stock and using a saw to cut it into quarter sections.

Another thing that this ammo can do is penetrate soft body armor. It was tested in "SWAT" magazine (don't remember the exact issue, but it was during the last half of '99). It completely shredded a level IIA vest. Which just so happens to be the most common vest worn by cops.

The Quadrangle Slug (12 gauge shotgun only) is a slug designed as a nonexplosive fragmenting munition intended as an anti-vehicle or anti-material (also a dandy anti-personnel) slug. It is capable of disabling automobiles, light aircraft, and marine vessels.

This is due to eight pie-shaped hardened steel pellets wrapped in a cylindrical plastic boot (to protect the bore of the shotgun).

It is fired and travels intact to the target as a slug and then it penetrates the exterior surface of the vehicle - automotive sheet metal, airplane skin, marine hull material - like a slug (i.e. punches a 12 gauge hole through it).

The Quadrangle pellets are then released upon the interior of the engine compartment where they cut through valve covers, slash electrical components, perforate lubrication /cooling hoses, destroy batteries, etc... (They'll also cut, slash, perforate, and destroy the vehicles occupants if they happen to be in the way!).

One to two shots will disable the average pickup or automobile. Nine sharp edges, six pointed corners, and five surfaces that allow the quadrangle pellet to dig and cut through sheet metal with minimal loss of energy. It's an ideal round for any situation where one desires to stop a vehicle or prevent its leaving a crime in progress.

Pellets are fired at 1,560 fps. They pattern similar to 00 buckshot, depending on the shotgun used. The Quadrangle Slug will penetrate 3/16 inch steel plate angled at 45 degrees at 25 yards.

INFRARED TRACER COMPOSITIONS

Tracers are very useful for combat in dark areas since you can visually guide your fire to your target. The problem though is that the tracers will give away your position to the enemy as well.

The tracers descibed here are visible only with IR optics like goggles or rifle scopes, allowing you to see where your fire is going without revealing you position like regular tracers will. See the original patent here.

BACKGROUND

1. The Field of the Invention

The present invention is related to infrared tracer compositions which are capable of producing a consistent infrared output when fired from a rifle or other weapon or launch system. More particularly, the present invention relates to infrared tracer compositions which burn reliably and do not require additional igniters for initiation.

2. Technical Background

Tracers bullets and other projectiles are often used in combat and training situations. Tracer bullets provide a visual trace of the path of a projectile. They also provide a relatively reliable means of gauging whether the projectiles fired are impacting upon the desired target or whether adjustments in aim are required.

One of the problems with the use of tracer bullets which emit visible light is that the location of the source of the trace bullet is also discernable. Thus, it is possible for an enemy to visually locate the source of the tracer bullet and to direct a counter-attack toward that location.

For this reason, there has been great interest in the development of tracers that are not visible to the naked human eye. With the development of infrared detection systems, such as night vision goggles, there has been interest in developing tracers which emit infrared light, but which emit little or no visible light. At the same time, it is necessary to tailor the infrared emission such that it is not overly intense at any particular point because very high intensity infrared light could temporarily blind an observer using an infrared detection system.

As early as the 1940's, the United States Army was at work developing "dim" tracer formulations. Dim tracer formulations were generally formulations which gave off only limited visible light, but which emitted significant infrared light. One early formulation designated by the Army as I-136 generally comprised 90.0% strontium peroxide, 10% calcium resonate, and up to about 6.0% magnesium. This formulation, however, had a number of limitations in terms of performance and output.

Eventually the United States Army developed an improved dim tracer formulation designated R-440. This composition is generally comprised of about 40% strontium peroxide, 40% barium peroxide, 10% calcium resinate, and 10% magnesium carbonate.

While R-440 was an improvement over the existing art at the time, the composition presents a

number of limitations. For example, the formulation suffers from unreliable ignition. This requires the use of an igniter or an ignition composition associated with the R-440 composition. The ignition composition adds to the complexity and cost of manufacture, and also tends to produce additional visible light during the firing of the tracer.

An addition problem is that R-440 provides a smaller than ideal infrared light output. The composition has a relatively low level near infrared intensity which limits the visibility of the tracer at extended ranges. That is, as the tracer travels closer to the target, the infrared output tends to diminish.

A further problem with R-440 is that the material is a powder. Several problems arise when processing an energetic material in powdered form. It is sometimes observed, for example, that as much as 40% of the material is lost during processing. This is clearly a huge drawback to the use of R-440 and results in a substantial increase in the cost of the product. Furthermore, the small particle size produced by the use of calcium resonate as a binder presents a safety concern. The small powdery particles of the material provide large amounts of surface area which make the material more prone to accidental ignition.

It is desirable in many contexts to provide a tracer that is not only "dim" but which is also "covert" That is, rather than emitting small amounts of visible light, the tracer is essentially free of visible emissions. Convert tracers operate in the same general manner as conventional red, green, and white visible tracers, except that covert tracers produce no visible signature. The achievement completely covert performance has been difficult with conventional formulations.

Accordingly, it would be a substantial advancement in the art to provide covert tracer compositions which overcame some of the problems encountered in the art. It would be an advancement in the art to provide tracer compositions which did not require igniters or ignition compositions in order to operate. It would be a further advancement in the art to provide tracer compositions which had augmented near infrared intensity when compared with conventional compositions. It would be an additional advancement in the art to provide compositions which were not in powder form and which avoided the use of hazardous compositions, such as ozone depleting solvents. It would also be an advancement in the art to provide covert tracer compositions which were safer to use and less sensitive to accidental ignition than conventional tracer compositions.

Such compositions are disclosed and claimed herein.

BRIEF SUMMARY AND OBJECTS OF THE INVENTION

The present invention relates to tracer compositions designed especially for use in 5.56 mm, 7.62 mm, 50 caliber, 20 mm, and 30 mm small caliber munitions. The compositions may also be adaptable for other tracer applications. These compositions are also designed to reduce the loss of night vision normally associated with firing tracers. Since these materials are covert and produce essentially no detectable visible light upon firing, they avoid revealing the source of the tracer.

The compositions of the present invention are able to augment near infrared emissions when fired. This is accomplished by the addition of infrared producing alkali metal salts as oxidizers and fuels in the composition. Such materials may, for example, include potassium, cesium, and

rubidium nitrates and perchlorates. In addition, the compositions may include potassium, rubidium, and cesium salts of materials such as bitetrazole amines (BTA), cyanates, sebacic acid, azides, oxalic acid, bicarbonates, 3-nitro-1,2,4,-triazol-5-one (NTO), thiocyanate, carboxylic acids, and similar materials.

The present invention also teaches the addition of one or more binders. The binders act to bind the entire composition together. In conventional tracer compositions, the binder has typically been calcium resinate. However, using calcium resinate, a powdery composition is formed. This results in loss of material during processing and increased danger of accidental ignition due to the small particle size/large surface area created. Therefore, it is presently preferred within the scope of the present invention to avoid the use of calcium resinate as a binder.

Using the binders taught by the present invention it is possible to process the compositions using aprotic solvents. One of the further problems in the art has been the use of protic solvents which can cause the composition to degrade over time. Aprotic solvents, conversely, are generally less likely to cause product degradation and may also be safer and more environmentally friendly. Examples of solvents which fall within the scope of the present invention include methyl and ethyl acetate, acetone, and methyethyl ketone.

A further novel feature of the present invention is the addition of a burn rate catalyst to the covert tracer composition. The burn rate catalyst is selected such that it improves ignition reliability and enhances combustion under rigorous ballistic conditions. Such burn rate catalysts include boron, iron oxide, cupric oxide, manganese dioxide, carbon, silicon, graphite fibrils, amorphous silica, copper oxide, potassium dodecaborate, the dipotassium salt of bitetrazole amine (K.sub.2 BTA), the potassium salt of dilituric acid, or mixtures thereof. Use of a burn rate catalyst helps provide a composition which burns rapidly to completion and which does not require a separate ignition composition, as is conventional in this art.

The compositions of the present invention also include one or more peroxides. Presently preferred peroxides include strontium peroxide and barium peroxide; however, other peroxides may also be used. Peroxides also aid in assuring that the composition burns rapidly to completion under ballistic conditions.

Using the present invention, compositions are provided which overcome some of the problems encountered in the art. The tracer compositions of the present invention do not require igniters or ignition compositions in order to operate. The compositions also have augmented near infrared intensity when compared to conventional compositions.

Importantly, it is also possible to make the compositions in granular form rather than powder form. This allows manufacture and use of the tracer compositions with a minimum of material loss and an increase in safety. At the same time, the compositions of the present invention allow for the use of non-hazardous and non-degrading solvents.

These and other objects and advantages of the invention will become apparent upon reading the following detailed description and appended claims.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is related to significant improvements in covert infrared tracer

formulations. The formulations of the present invention overcome a number of the persistent problems encountered in the art.

One of the advantages of the present invention is an increase in the infrared output of the compositions. As was mentioned above, it is desirable to have a consistent infrared trace from firing to impact. This improvement is accomplished in part by the addition of from about 0.5% to about 55% by weight alkali metal compounds in the formulation.

Alkali metals may be added to the compositions in any form which is compatible with the other components of the compositions. For example, the composition may include potassium, rubidium, and cesium nitrates, perchlorates, or mixtures thereof. Furthermore, alkali metal carbonates, bicarbonates, citrates, sorbates, oxalates, dicarboxylic acids, cyanates, thionates, azides, ferrocyanates and acetates, tetrazoles, and bitrazole amines are also preferred forms of the alkali metal. For example, potassium bitetrazole amine has been found to provide acceptable results.

It is observed that the addition of alkali metal salts significantly increases the plume size of the tracer and dramatically improves the near infrared emission over conventional compositions. The increased plum size and high near infrared intensity greatly improves the tracer performance. These additives significantly improve the visibility, when viewed through night vision devices. The compositions of the present invention can be detected at greater distances than existing compositions such as R-440. This greater near infrared performance is achieved while eliminating substantially all visible light. Thus, the compositions of the present invention can be characterized as "covert", as that term is used herein.

The present invention also includes the addition of from about 0.5% to about 10% burn rate catalyst. The burn rate catalyst improves ignition and sustains the combustion of the covert tracer formulation during firing. This avoids the need for additional igniters and ignition compositions, and also avoids the problem of flame loss during use. These problems have been common when using existing compositions.

Presently preferred burn rate catalysts include boron, iron oxide, cupric oxide, manganese dioxide, carbon, silicon, graphite fibrils, amorphous silica, copper oxide, potassium dodecaborate, the dipotassium salt of bitetrazole amine, the potassium salt of dilituric acid, or mixtures thereof. The addition of burn rate catalysts increases the infrared plume during use. As mentioned above, the use of the burn rate catalyst helps eliminate the need for visible light producing ignition compositions such as I-136.

The present invention also employs improved fuels/binders, and associated solvent systems which are distinct from those typically used in conventional tracers. One fuel that is sometimes preferred is lactose. Lactose has a low melting point which is important during processing. It also has a good fuel value. The use of organic fuels, such as lactose also contributes to the large plume size due to after burning.

Binders are used which are capable of producing a granular product. This is to be distinguished from the powdery R-440 product. Binders which produce a granular product are well known in the art. Generally, such binders produce a hard product and may be thermoplastic in nature or may be cured during processing. The exact size of the product can be selected during

processing. However, a hard plastic material that is impervious to moisture is presently preferred. Examples of such binders include nylon.sup.1, VAAR (vinylacetate alcohol resin) commercially available from Union Carbide, Viton A commercially available from DuPont, HyCAR available from Zeon Chemicals, and polypropylene carbonate.

.sup.1 Nylon was formerly a trademark of DuPont and refers to a group of polymers which are generally combinations of diamines and dicarboxylic acids. The most common type of nylon is synthesized from adipic acid and hexamethylene diamine. Nylons are well known and commercially available.

Generally from about 1% to about 20% by weight binder is preferred in the composition. For most applications, from about 2% to about 10% by weight binder is preferred, with from about 2% to about 6% by weight being the most preferred range. As mentioned above, it is preferred that the binder produce a hard granular material, instead of the powder of conventional compositions. The size of the granular particles may be selected during processing by well known techniques. Generally, the granules will have particle sizes in the range of from about 500.mu. to about 800.mu.. For purposes of this discussion, particles having sizes in this range will be consider "granular" in nature and will fall within the scope of the present invention.

One of the other advantages of the binders of the present invention is that more desirable solvent systems can be used in association with these binders. Conventional binder systems for tracer compositions use carbon tetrachloride, which is acidic, a suspected carcinogen, and an environmental hazard. In the present invention, it is generally preferred that any solvent be generally aprotic and less acidic than conventional solvents. This lessens degradation of the composition over time. It also helps in avoiding environmental problems associated with the processing and use of the tracer compositions.

The compositions of the present invention rely on peroxides as a primary component. Generally, the compositions of the present invention will include from about 30% to about 98% by weight of at least one peroxide. Exemplary peroxides include strontium peroxide, barium peroxide, mixtures of strontium peroxide and barium peroxide, and other peroxides which are compatible with the other components of the composition.

It is found that the use of substantial quantities of peroxides, together with the other components of the compositions, result in complete burning and good performance of the compositions.

EXAMPLES

The following examples are given to illustrate various embodiments which have been made or may be made in accordance with the present invention. These examples are given by way of example only, and it is to be understood that the following examples are not comprehensive or exhaustive of the many types of embodiments of the present invention which can be prepared in accordance with the present invention.

Example 1

In this example a composition within the scope of the present invention was formulated from the following ingredients, expressed in weight percent:

Material	Weight %
Strontium peroxide	40.0
Barium peroxide	40.0
Boron	0.5
Potassium oxalate	10.0
Lactose	5.5
VAAR	4.0

This composition produced a covert tracer composition that was placed within a tracer round and fired. The tracer round was observed to produce an infrared trace throughout the test firing.

Example 2

In this example a composition within the scope of the present invention was formulated from the following ingredients, expressed in weight percent:

Material	Weight %
Strontium peroxide	40.0
Barium peroxide	40.0
Silica	5.0
Lactose	6.0
Potassium oxalate	7.0
VAAR	2.0

This composition produced a covert tracer composition that was placed within a tracer round and fired. The tracer round was observed to produce an infrared trace throughout the test firing.

Example 3

In this example a composition within the scope of the present invention was formulated from the following ingredients, expressed in weight percent:

Material	Weight %
Barium peroxide	41.5

Cesium nitrate	41.5
Silicon	5.0
Boron	3.0
Potassium oxalate	5.0
VAAR	4.0

This composition produced a covert tracer composition that was placed within a tracer round and fired. The tracer round was observed to produce an infrared trace throughout the test firing.

Example 4

In this example a composition within the scope of the present invention was formulated from the following ingredients, expressed in weight percent:

Material	Weight %
Strontium peroxide	40.0
Barium peroxide	40.0
K.sub.2 BTA	5.0
Lactose	10.0
Magnesium carbonate	1.0
VAAR	4.0

This composition produced a covert tracer composition that was placed within a tracer round and fired. The tracer round was observed to produce an infrared trace throughout the test firing.

All of the above examples using VAAR were mixed in an acetone or ethylacetate slurry. Ethanol may be used, but aprotic solvents, such as ethylacetate and acetone, are the preferred solvents. As was discussed above, protic solvents, such as methanol and ethanol, may aid in the decomposition of the barium and strontium peroxides.

SUMMARY

In summary, the present invention provides covert infrared tracer compositions which overcome some of the problems encountered in the art. In particular, the compositions of the present invention do not require igniters or ignition compositions in order to operate. The compositions of the present invention provide tracer compositions which have augmented near infrared intensity when compared with conventional compositions. The compositions may also be processed while avoiding the use of hazardous compositions, such as ozone depleting solvents. Because of the fact that the compositions are granular rather than in powdered form, they are safer to use and less sensitive to accidental ignition than conventional tracer compositions.

The invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope. is:

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(1 of 1)

United States Patent ***5,639,984***
Nielson **June 17, 1997**

Infrared tracer compositions

Abstract

Convert infrared tracer compositions are provided. The compositions are formed using peroxide such as strontium peroxide and barium peroxide. Added to these materials is a burn rate catalyst such as boron, iron oxide, cupric oxide, manganese dioxide, carbon, silicon, graphite fibrils, amorphous silica, copper oxide, potassium dodecaborate, the dipotassium salt of bitetrazole amine, and the potassium salt of dilituric acid. The composition also includes alkali metal compounds in order to enhance the infrared emissions. The compositions are bound together using a binder such that the composition results in a granular material having a mean particle size in the range of from about 500.mu. to about 800.mu..

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Parent Case Text

This application is a continuation of U.S. application Ser. No. 08/405,260, filed Mar. 14, 1995, for Infrared Tracer Compositions, now abandoned.

Claims

1. An infrared tracer composition comprising:

from about 30% to about 98% by weight of at least one peroxide;

from about 1% to about 20% by weight binder;

from about 0.5% to about 15% by weight burn rate catalyst; and

from about 0.5% to about 55% by weight alkali metal compound, said alkali metal compound being selected from the group consisting of alkali metal perchlorates, bitetrazole amines, cyanates, sebacic acids, azides, oxalic acids, bicarbonates, 3-nitro-1,2,4,-triazol-5-ones, thiocyanates, carboxylic acids, and mixtures thereof.

2. An infrared tracer composition as defined in claim 1 wherein said binder is selected such that the composition is granular in consistency having a mean particle size in the range of from about 500.mu. to about 800.mu..

3. An infrared tracer composition as defined in claim 1 wherein said binder is a vinylacetate alcohol resin binder.

4. An infrared tracer composition as defined in claim 1 wherein said binder is nylon.

5. An infrared tracer composition as defined in claim 1 further comprising an alkali metal nitrate.

6. An infrared tracer composition as defined in claim 1 wherein said burn rate catalyst is boron.

7. An infrared tracer composition as defined in claim 1 wherein said burn rate catalyst is silicon.

8. An infrared tracer composition as defined in claim 1 wherein said burn rate catalyst is selected from the group consisting of boron, iron oxide, cupric oxide, manganese dioxide, carbon, silicon, graphite fibrils, amorphous silica, copper oxide, potassium dodecaborate, the dipotassium salt of bitetrazole amine, the potassium salt of dilituric acid, or mixtures thereof.

9. An infrared tracer composition as defined in claim 1 wherein said peroxide is selected from the group consisting of strontium peroxide, barium peroxide, or mixtures thereof.

10. An infrared tracer composition comprising:

from about 30% to about 98% by weight of at least one peroxide;

from about 1% to about 20% by weight binder, wherein said binder is selected such that the composition is granular in consistency having a mean particle size in the range of from about 500.mu. to about 800.mu.;

from about 0.5% to about 15% burn rate catalyst selected from the group consisting of boron, iron oxide, cupric oxide, manganese dioxide, carbon, silicon, graphite fibrils, amorphous silica, copper oxide, potassium dodecaborate, the dipotassium salt of bitetrazole amine, the potassium salt of dilituric acid, or mixtures thereof; and

from about 0.5% to about 55% alkali metal compound, wherein said alkali metal compound is selected from the group consisting of alkali metal perchlorates, bitetrazole amines, cyanates, sebacic acids, azides, oxalic acids, bicarbonates, 3-nitro-1,2,4,-triazol-5-ones (BTA), thiocyanates, carboxylic acids, and mixtures thereof.

11. An infrared tracer composition as defined in claim 10 wherein said binder is a vinylacetate alcohol resin binder.

12. An infrared tracer composition as defined in claim 10 wherein said binder is nylon.

13. An infrared tracer composition as defined in claim 10 wherein said peroxide is selected from the group consisting of strontium peroxide, barium peroxide, or mixtures thereof.

14. An infrared tracer composition comprising:

from about 30% to about 98 % by weight peroxide selected from the group consisting of strontium peroxide, barium peroxide, or mixtures thereof;

from about 1% to about 20% by weight binder, wherein said binder is selected such that the composition is granular in consistency having a mean particle size in the range of from about 500.mu. to about 800.mu.;

from about 0.5% to about 15% burn rate catalyst; and

from about 0.5% to about 55% alkali metal compound, wherein said alkali metal compound is selected from the group consisting of alkali metal perchlorates, bitetrazole amines, cyanates, sebacic acids, azides, oxalic acids, bicarbonates, 3-nitro-1,2,4,-triazol-5-ones (BTA), thiocyanates, carboxylic acids, and mixtures thereof.

15. An infrared tracer composition as defined in claim 14 wherein said burn rate catalyst is selected from the group consisting of boron, iron oxide, cupric oxide, manganese dioxide, carbon, silicon, graphite fibrils, amorphous silica, copper oxide, potassium dodecaborate, the dipotassium salt of bitetrazole amine, and the potassium salt of dilituric acid, or mixtures thereof.

Description

BACKGROUND

1. The Field of the Invention

The present invention is related to infrared tracer compositions which are capable of producing a consistent infrared output when fired from a rifle or other weapon or launch system. More particularly, the present invention relates to infrared tracer compositions which burn reliably and do not require additional igniters for initiation.

2. Technical Background

Tracers bullets and other projectiles are often used in combat and training situations. Tracer bullets provide a visual trace of the path of a projectile. They also provide a relatively reliable means of gauging whether the projectiles fired are impacting upon the desired target or whether adjustments in aim are required.

One of the problems with the use of tracer bullets which emit visible light is that the location of the source of the trace bullet is also discernable. Thus, it is possible for an enemy to visually locate the source of the tracer bullet and to direct a counter-attack toward that location.

For this reason, there has been great interest in the development of tracers that are not visible to the naked human eye. With the development of infrared detection systems, such as night vision goggles, there has been interest in developing tracers which emit infrared light, but which emit little or no visible light. At the same time, it is necessary to tailor the infrared emission such that it is not overly intense at any particular point because very high intensity infrared light could temporarily blind an observer using an infrared detection system.

As early as the 1940's, the United States Army was at work developing "dim" tracer formulations. Dim tracer formulations were generally formulations which gave off only limited visible light, but which emitted significant infrared light. One early formulation designated by the Army as I-136 generally comprised 90.0% strontium peroxide, 10% calcium resonate, and up to about 6.0% magnesium. This formulation, however, had a number of limitations in terms of performance and output.

Eventually the United States Army developed an improved dim tracer formulation designated R-440. This composition is generally comprised of about 40% strontium peroxide, 40% barium peroxide, 10% calcium resinate, and 10% magnesium carbonate.

While R-440 was an improvement over the existing art at the time, the composition presents a number of limitations. For example, the formulation suffers from unreliable ignition. This requires the use of an igniter or an ignition composition associated with the R-440 composition. The ignition composition adds to the complexity and cost of manufacture, and also tends to produce additional visible light during the firing of the tracer.

An addition problem is that R-440 provides a smaller than ideal infrared light output. The composition has a relatively low level near infrared intensity which limits the visibility of the tracer at extended ranges. That is, as the tracer travels closer to the target, the infrared output tends to diminish.

A further problem with R-440 is that the material is a powder. Several problems arise when processing an energetic material in powdered form. It is sometimes observed, for example, that as much as 40% of the material is lost during processing. This is clearly a huge drawback to the use of R-440 and results in a substantial increase in the cost of the product. Furthermore, the small particle size produced by the use of calcium resonate as a binder presents a safety concern. The small powdery particles of the

material provide large amounts of surface area which make the material more prone to accidental ignition.

It is desirable in many contexts to provide a tracer that is not only "dim" but which is also "covert." That is, rather than emitting small amounts of visible light, the tracer is essentially free of visible emissions. Convert tracers operate in the same general manner as conventional red, green, and white visible tracers, except that covert tracers produce no visible signature. The achievement completely covert performance has been difficult with conventional formulations.

Accordingly, it would be a substantial advancement in the art to provide covert tracer compositions which overcame some of the problems encountered in the art. It would be an advancement in the art to provide tracer compositions which did not require igniters or ignition compositions in order to operate. It would be a further advancement in the art to provide tracer compositions which had augmented near infrared intensity when compared with conventional compositions. It would be an additional advancement in the art to provide compositions which were not in powder form and which avoided the use of hazardous compositions, such as ozone depleting solvents. It would also be an advancement in the art to provide covert tracer compositions which were safer to use and less sensitive to accidental ignition than conventional tracer compositions.

Such compositions are disclosed and claimed herein.

BRIEF SUMMARY AND OBJECTS OF THE INVENTION

The present invention relates to tracer compositions designed especially for use in 5.56 mm, 7.62 mm, 50 caliber, 20 mm, and 30 mm small caliber munitions. The compositions may also be adaptable for other tracer applications. These compositions are also designed to reduce the loss of night vision normally associated with firing tracers. Since these materials are covert and produce essentially no detectable visible light upon firing, they avoid revealing the source of the tracer.

The compositions of the present invention are able to augment near infrared emissions when fired. This is accomplished by the addition of infrared producing alkali metal salts as oxidizers and fuels in the composition. Such materials may, for example, include potassium, cesium, and rubidium nitrates and perchlorates. In addition, the compositions may include potassium, rubidium, and cesium salts of materials such as bitetrazole amines (BTA), cyanates, sebacic acid, azides, oxalic acid, bicarbonates, 3-nitro-1,2,4,-triazol-5-one (NTO), thiocyanate, carboxylic acids, and similar materials.

The present invention also teaches the addition of one or more binders. The binders act to bind the entire composition together. In conventional tracer compositions, the binder has typically been calcium resinate. However, using calcium resinate, a powdery composition is formed. This results in loss of material during processing and increased danger of accidental ignition due to the small particle size/large surface area created. Therefore, it is presently preferred within the scope of the present invention to avoid the use of calcium resinate as a binder.

Using the binders taught by the present invention it is possible to process the compositions using aprotic solvents. One of the further problems in the art has been the use of protic solvents which can cause the composition to degrade over time. Aprotic solvents, conversely, are generally less likely to cause product degradation and may also be safer and more environmentally friendly. Examples of solvents which fall within the scope of the present invention include methyl and ethyl acetate, acetone, and methyethyl ketone.

A further novel feature of the present invention is the addition of a burn rate catalyst to the covert tracer composition. The burn rate catalyst is selected such that it improves ignition reliability and enhances combustion under rigorous ballistic conditions. Such burn rate catalysts include boron, iron oxide, cupric oxide, manganese dioxide, carbon, silicon, graphite fibrils, amorphous silica, copper oxide, potassium dodecaborate, the dipotassium salt of bitetrazole amine (K.sub.2 BTA), the potassium salt of dilituric acid, or mixtures thereof. Use of a burn rate catalyst helps provide a composition which burns rapidly to completion and which does not require a separate ignition composition, as is conventional in this art.

The compositions of the present invention also include one or more peroxides. Presently preferred peroxides include strontium peroxide and barium peroxide; however, other peroxides may also be used. Peroxides also aid in assuring that the composition burns rapidly to completion under ballistic conditions.

Using the present invention, compositions are provided which overcome some of the problems encountered in the art. The tracer compositions of the present invention do not require igniters or ignition compositions in order to operate. The compositions also have augmented near infrared intensity when compared to conventional compositions.

Importantly, it is also possible to make the compositions in granular form rather than powder form. This allows manufacture and use of the tracer compositions with a minimum of material loss and an increase in safety. At the same time, the compositions of the present invention allow for the use of non-hazardous and non-degrading solvents.

These and other objects and advantages of the invention will become apparent upon reading the following detailed description and appended claims.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is related to significant improvements in covert infrared tracer formulations. The formulations of the present invention overcome a number of the persistent problems encountered in the art.

One of the advantages of the present invention is an increase in the infrared output of the compositions. As was mentioned above, it is desirable to have a consistent infrared trace from firing to impact. This improvement is accomplished in part by the addition of from about 0.5% to about 55% by weight alkali metal compounds in the formulation.

Alkali metals may be added to the compositions in any form which is compatible with the other components of the compositions. For example, the composition may include potassium, rubidium, and cesium nitrates, perchlorates, or mixtures thereof. Furthermore, alkali metal carbonates, bicarbonates, citrates, sorbates, oxalates, dicarboxylic acids, cyanates, thionates, azides, ferrocyanates and acetates, tetrazoles, and bitrazole amines are also preferred forms of the alkali metal. For example, potassium bitetrazole amine has been found to provide acceptable results.

It is observed that the addition of alkali metal salts significantly increases the plume size of the tracer and dramatically improves the near infrared emission over conventional compositions. The increased plum size and high near infrared intensity greatly improves the tracer performance. These additives significantly improve the visibility, when viewed through night vision devices. The compositions of the

present invention can be detected at greater distances than existing compositions such as R-440. This greater near infrared performance is achieved while eliminating substantially all visible light. Thus, the compositions of the present invention can be characterized as "covert," as that term is used herein.

The present invention also includes the addition of from about 0.5% to about 10% burn rate catalyst. The burn rate catalyst improves ignition and sustains the combustion of the covert tracer formulation during firing. This avoids the need for additional igniters and ignition compositions, and also avoids the problem of flame loss during use. These problems have been common when using existing compositions.

Presently preferred burn rate catalysts include boron, iron oxide, cupric oxide, manganese dioxide, carbon, silicon, graphite fibrils, amorphous silica, copper oxide, potassium dodecaborate, the dipotassium salt of bitetrazole amine, the potassium salt of dilituric acid, or mixtures thereof. The addition of burn rate catalysts increases the infrared plume during use. As mentioned above, the use of the burn rate catalyst helps eliminate the need for visible light producing ignition compositions such as I-136.

The present invention also employs improved fuels/binders, and associated solvent systems which are distinct from those typically used in conventional tracers. One fuel that is sometimes preferred is lactose. Lactose has a low melting point which is important during processing. It also has a good fuel value. The use of organic fuels, such as lactose also contributes to the large plume size due to after burning.

Binders are used which are capable of producing a granular product. This is to be distinguished from the powdery R-440 product. Binders which produce a granular product are well known in the art. Generally, such binders produce a hard product and may be thermoplastic in nature or may be cured during processing. The exact size of the product can be selected during processing. However, a hard plastic material that is impervious to moisture is presently preferred. Examples of such binders include nylon.sup.1, VAAR (vinylacetate alcohol resin) commercially available from Union Carbide, Viton A commercially available from DuPont, HyCAR available from Zeon Chemicals, and polypropylene carbonate.

.sup.1 Nylon was formerly a trademark of DuPont and refers to a group of polymers which are generally combinations of diamines and dicarboxylic acids. The most common type of nylon is synthesized from adipic acid and hexamethylene diamine. Nylons are well known and commercially available.

Generally from about 1% to about 20% by weight binder is preferred in the composition. For most applications, from about 2% to about 10% by weight binder is preferred, with from about 2% to about 6% by weight being the most preferred range. As mentioned above, it is preferred that the binder produce a hard granular material, instead of the powder of conventional compositions. The size of the granular particles may be selected during processing by well known techniques. Generally, the granules will have particle sizes in the range of from about 500.mu. to about 800.mu.. For purposes of this discussion, particles having sizes in this range will be consider "granular" in nature and will fall within the scope of the present invention.

One of the other advantages of the binders of the present invention is that more desirable solvent systems can be used in association with these binders. Conventional binder systems for tracer compositions use carbon tetrachloride, which is acidic, a suspected carcinogen, and an environmental hazard. In the present invention, it is generally preferred that any solvent be generally aprotic and less

acidic than conventional solvents. This lessens degradation of the composition over time. It also helps in avoiding environmental problems associated with the processing and use of the tracer compositions.

The compositions of the present invention rely on peroxides as a primary component. Generally, the compositions of the present invention will include from about 30% to about 98% by weight of at least one peroxide. Exemplary peroxides include strontium peroxide, barium peroxide, mixtures of strontium peroxide and barium peroxide, and other peroxides which are compatible with the other components of the composition.

It is found that the use of substantial quantities of peroxides, together with the other components of the compositions, result in complete burning and good performance of the compositions.

EXAMPLES

The following examples are given to illustrate various embodiments which have been made or may be made in accordance with the present invention. These examples are given by way of example only, and it is to be understood that the following examples are not comprehensive or exhaustive of the many types of embodiments of the present invention which can be prepared in accordance with the present invention.

Example 1

In this example a composition within the scope of the present invention was formulated from the following ingredients, expressed in weight percent:

Material	Weight %
Strontium peroxide	40.0
Barium peroxide	40.0
Boron	0.5
Potassium oxalate	10.0
Lactose	5.5
VAAR	4.0

This composition produced a covert tracer composition that was placed within a tracer round and fired. The tracer round was observed to produce an infrared trace throughout the test firing.

Example 2

In this example a composition within the scope of the present invention was formulated from the following ingredients, expressed in weight percent:

Material	Weight %
Strontium peroxide	40.0
Barium peroxide	40.0
Silica	5.0
Lactose	6.0
Potassium oxalate	7.0
VAAR	2.0

This composition produced a covert tracer composition that was placed within a tracer round and fired. The tracer round was observed to produce an infrared trace throughout the test firing.

Example 3

In this example a composition within the scope of the present invention was formulated from the following ingredients, expressed in weight percent:

Material	Weight %
Barium peroxide	41.5
Cesium nitrate	41.5
Silicon	5.0
Boron	3.0
Potassium oxalate	5.0
VAAR	4.0

This composition produced a covert tracer composition that was placed within a tracer round and fired. The tracer round was observed to produce an infrared trace throughout the test firing.

Example 4

In this example a composition within the scope of the present invention was formulated from the following ingredients, expressed in weight percent:

Material	Weight %

Strontium peroxide	40.0
Barium peroxide	40.0
K.sub.2 BTA	5.0
Lactose	10.0
Magnesium carbonate	1.0
VAAR	4.0

This composition produced a covert tracer composition that was placed within a tracer round and fired. The tracer round was observed to produce an infrared trace throughout the test firing.

All of the above examples using VAAR were mixed in an acetone or ethylacetate slurry. Ethanol may be used, but aprotic solvents, such as ethylacetate and acetone, are the preferred solvents. As was discussed above, protic solvents, such as methanol and ethanol, may aid in the decomposition of the barium and strontium peroxides.

SUMMARY

In summary, the present invention provides covert infrared tracer compositions which overcome some of the problems encountered in the art. In particular, the compositions of the present invention do not require igniters or ignition compositions in order to operate. The compositions of the present invention provide tracer compositions which have augmented near infrared intensity when compared with conventional compositions. The compositions may also be processed while avoiding the use of hazardous compositions, such as ozone depleting solvents. Because of the fact that the compositions are granular rather than in powdered form, they are safer to use and less sensitive to accidental ignition than conventional tracer compositions.

The invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope. is:

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EXPLOSIVES

This section will show you how to make explosives from common, easily available chemicals. You will learn to use them safely and effectively, with maximum effect. The types of explosives range from simple fertilizer types to military-grade plastique. Also explained is how to make the detonators needed to use high explosives.

1. Homemade Detonators
2. Kitchen Improvised Detonators
3. Kitchen Improvised Plastic Explosives #1
4. Kitchen Improvised Plastic Explosives #2 (coming soon)
5. Gun Cotton
6. Vitamin C Gunpowder

Homemade Detonators

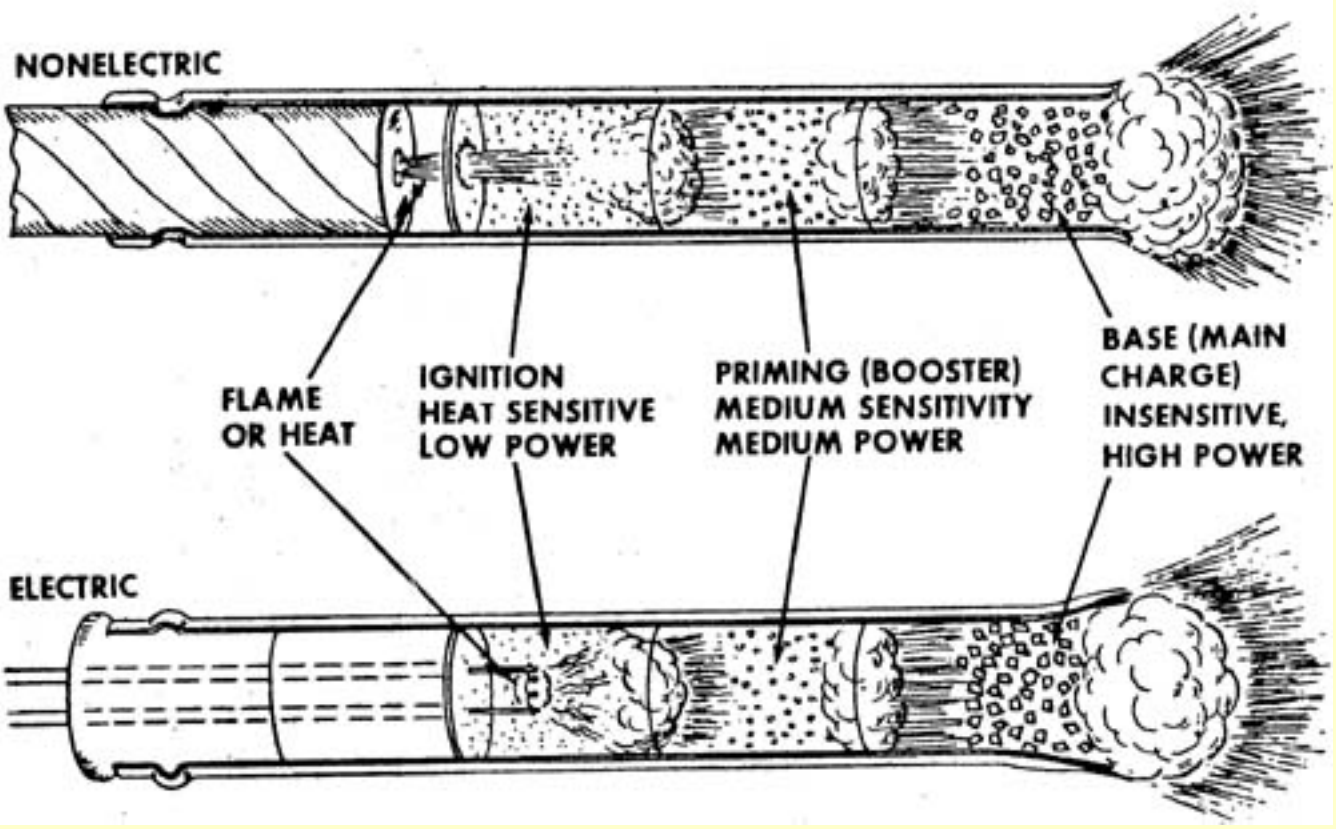
This is from a police book from the 70's and shows several simple types of homemade detonators.

How Blasting Caps Function

Upon application of current, the bridge wire of the electric cap heats to incandescence and ignites the loose ignition mixture. The resulting heat or flame sets off the extremely sensitive intermediate charge which, in turn, detonates the base charge.

In nonelectrical caps the burning safety fuse ignites the ignition charge, which sets off the priming explosive, which in turn detonates the base charge. In both cases the sequence following initiation is essentially identical.

When the primary explosive is stimulated by a sufficient amount of heat or flame, it undergoes a rapid chemical transformation from a solid into a hot gas by a process somewhat similar to the multiplication and amplification of the burning reaction which occurs within a low explosive. However, the speed of the reaction is so rapid that the mass of burning hot gas which it generates transcends ordinary burning and becomes a wave or expanding wall of pressure capable of initiating a larger volume of an adjacent high explosive by its shock velocity alone. This wave or shock front is called the blast propagation or propagation wave, This reaction is illustrated below.

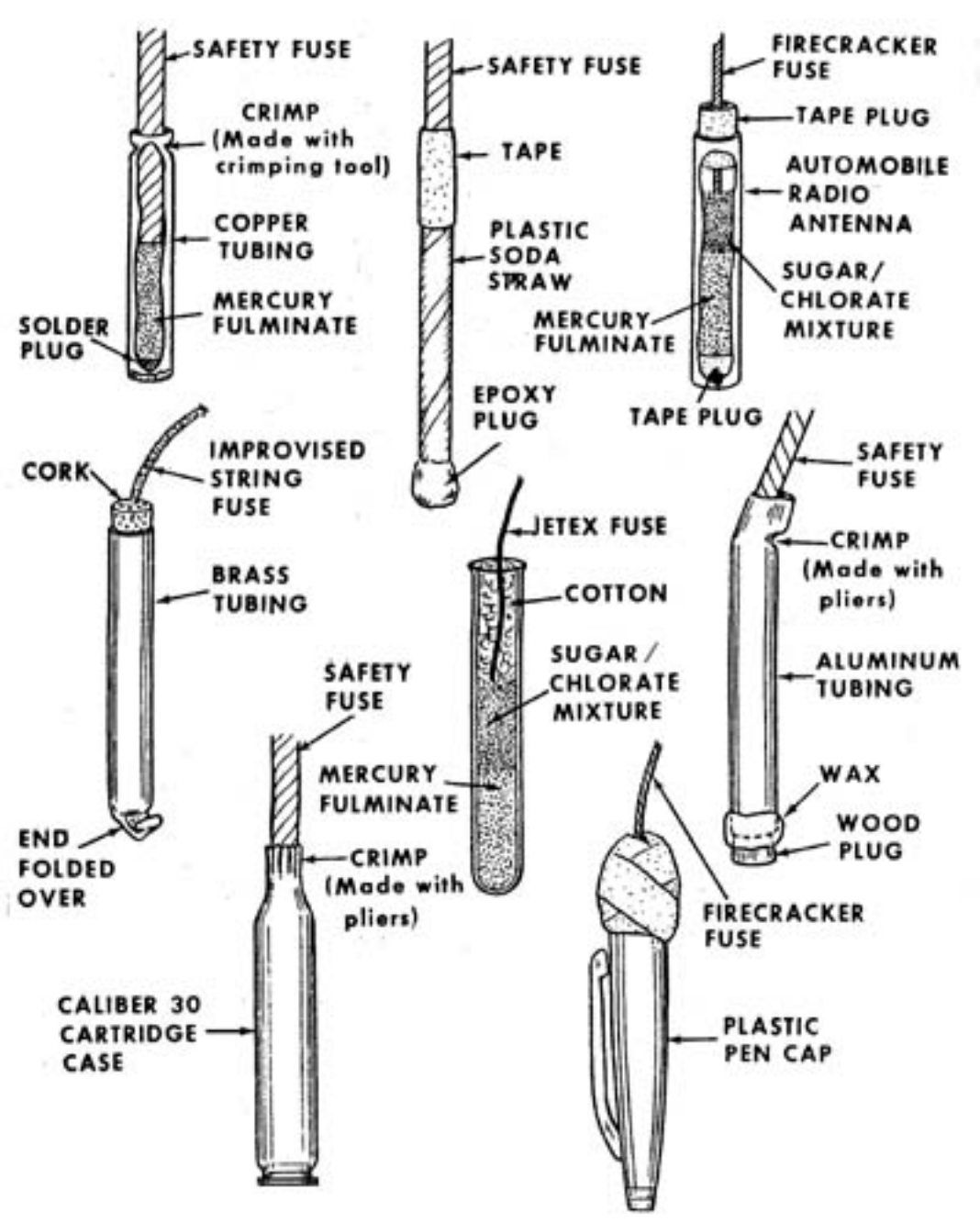


The Blasting Cap Shell

Once a primary high explosive has been manufactured or obtained, it is ready for placement into a suitable container. A wide variety of containers may be employed, although a rigid walled container is usually selected in order to minimize accidental friction, short, or stress to the sensitive primary high explosive compound. In addition to being rigid, if the container is metal a chemically nonreactive or low reactivity metal such as copper or aluminum is usually selected. Lengths of 1/4 inch diameter or larger copper or aluminum tubing, obtained from hardware or automotive supply houses are frequently employed as improvised blasting cap shells. These soft metal tubes are first cut to the desired length, usually about two to three inches, and then sealed at one end by soldering or cementing the materials.

Improvised blasting cap shell construction is certainly not limited to copper and aluminum tubing. Lengths of automobile radio antenna (chrome-plated brass); plastic bodies of ball point, felt tip, and fountain pens; thin-walled brass tubing used by model makers; plastic soda straws; glass test tubes; and many other materials have been successfully employed as improvised blasting cap shells with excellent results.

Various types of improvised nonelectric blasting caps are illustrated below.



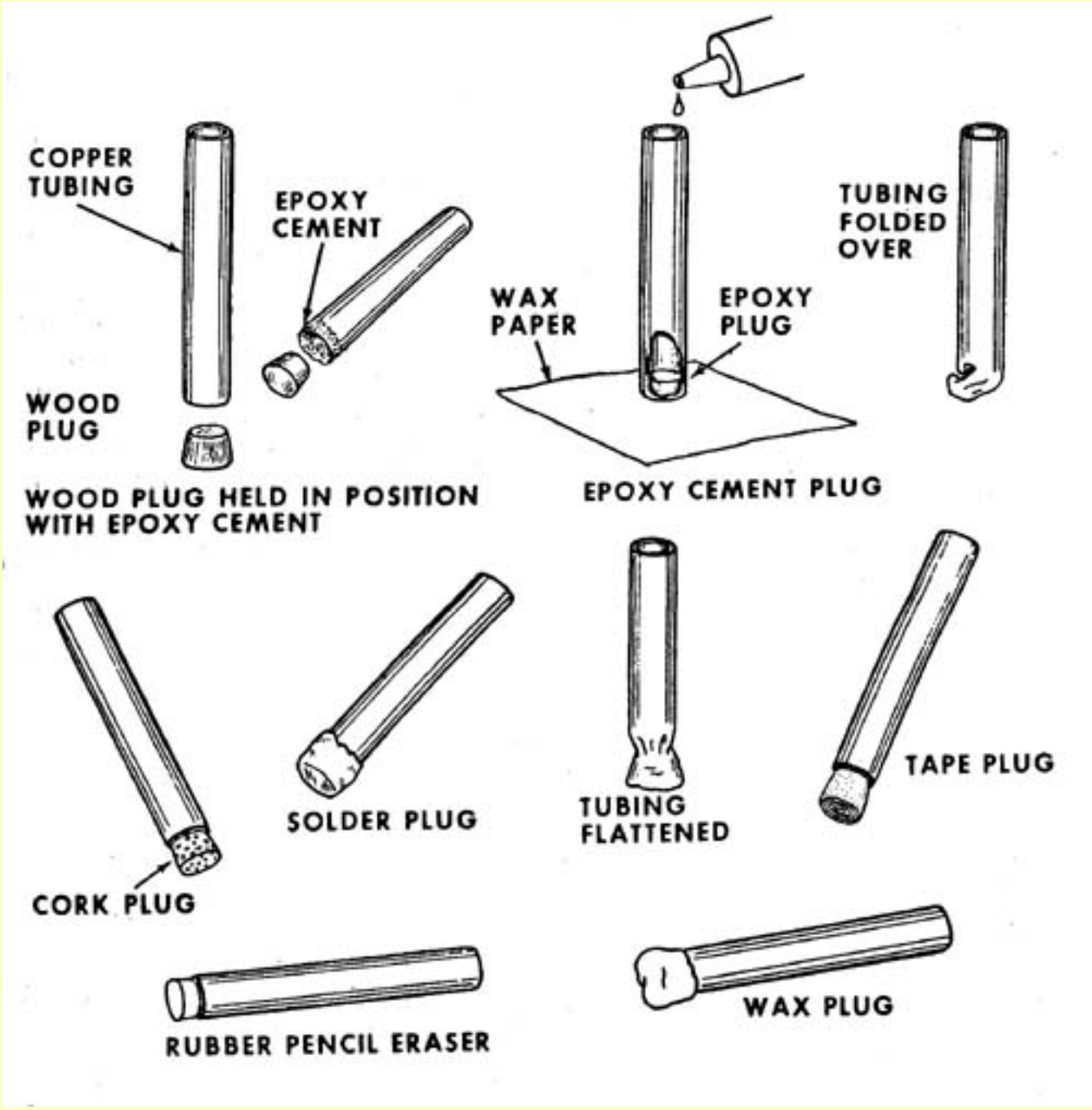
Once the shell has been plugged at one end, the primary high explosive crystals are carefully placed into the shell and lightly packed or tamped with a rod. This procedure is not overly hazardous so long as a wooden rod is employed to press the explosive into the tube. Loose crystals of mercury fulminate have an apparent density (gravimetric density) of about 1.75.

When employed in commercially manufactured blasting caps, mercury fulminate is compressed to densities of approximately 2.5 to 4.0 under a pressure of about 3,000 pounds per square inch. This density will produce a detonation velocity of about 4,000 meters per second. Mercury fulminate is not more sensitive to heat, flame, spark, or shock after compression than in loose crystal condition, but the increased density produces a higher detonation velocity which increases its efficiency.

Generally no real attempt at density increase is attempted by the manufacturer of improvised blasting caps. The crystals are simply tightly packed into the shell container. So long as the

manufacturer contents himself with tamping or compressing the crystals of mercury fulminate with a wooden rod or dowel no real danger exists, and space will be conserved within the shell.

The improvised blasting cap will probably be loaded with one to four grams of mercury fulminate crystals. Normally, loading the shell with one gram would produce an improvised blasting cap approximately Number 6 strength if the manufacturer was able to achieve the proper density of explosive in loading. In most cases the desired density pressure of 3,000 pounds per square inch cannot be achieved and the builder compensates usually by increasing the total amount of explosive loaded.



Once the shell has been loaded with the explosive, it is a simple matter to insert a length of commercial safety fuse into the copper or aluminum tube until it makes contact with the tamped crystals. Once in place, the soft tubing may be crimped lightly around the fuse with a pair of pliers, or the two units may be taped together. In instances where the shell of the improvised

blasting cap is made of plastic or glass, tape or cement will be employed to join the safety fuse to the cap shell.

If commercial safety fuse cannot be obtained for use with the improvised nonelectric blasting cap, either firecracker fuse, model rocket fuse such as "Jetex," or improvised fuse will be used. Because these fuses are normally small in diameter (1/8 to 1/32 inch) and do not produce the desired intense hot spit of flame required for reliable initiation of the improvised nonelectric blasting cap, the builder will usually load a portion of the blasting cap shell with a burning or ignition compound such as potassium chlorate and granular sugar to insure ignition and detonation. These smaller diameter fuses are generally affixed with tape to the improvised blasting cap shell, if the fuse employed is of the external burning type and excessive taping of the fuse occurs, there is an excellent chance that the name will be extinguished by contact with the tape and a misfire will occur.

In some cases, improvised nonelectric blasting caps used in conjunction with commercial safety fuses have been made highly waterproof by the application of silicon rubber cement (sealing compound) to the joint area between the safety fuse and the cap shell. Other improvised nonelectric blasting caps joined to commercial safety fuses have been encased inside long balloons or condoms to provide a degree of water or moisture resistance.

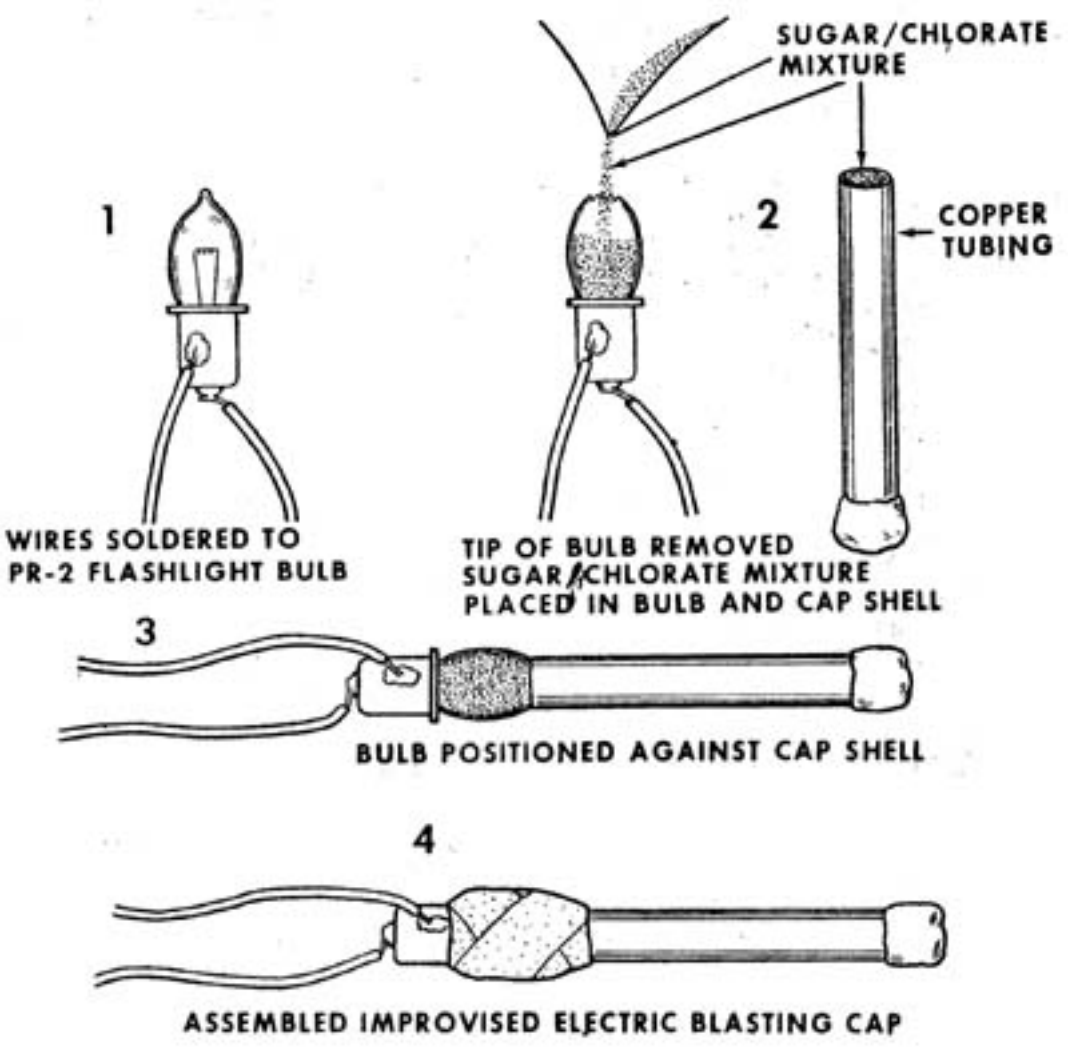
Typical Improvised Electric Caps

The same basic construction, configuration, and explosive loading of the improvised blasting cap shell applies to both nonelectric and electric blasting caps. The essential difference is in the method employed in the ignition of the primary high explosive filler. Improvised electric blasting cap construction can utilize one of three basic systems for obtaining electrical ignition:

- Small Flashlight Bulb Method
- Automobile Light Bulb Method
- Improvised Bridge Wire Methods

Small Flashlight Bulb Method

The most commonly employed system of electrical ignition uses the fine filament wire inside a small flashlight bulb as the electrical ignition or bridge wire element. A bulb having a protruding glass tip, such as the PR #2 type, is normally preferred. Wires are soldered to the bulb contact points and then the tip of the glass bulb is carefully broken off with a pair of pliers. Black powder, smokeless powder, or a mixture of potassium chlorate and granular sugar is carefully placed into the glass bulb around the filament wire and into the open end of the improvised blasting cap shell. After the hole in the bulb is aligned with the open end of the shell, the bulb and cap shell are joined together with tape, as illustrated below. This system has also been employed to convert commercially manufactured nonelectric blasting caps to improvised electric blasting caps. Conversion by this system has received wide usage for a number of years by terrorists in the Middle East, Latin America, and other parts of the world.



The reliability of this conversion or ignition system is high. Failures occur only when the filament wire in the bulb is broken, when the violent burning action prematurely separates the bulb and the cap shell, or when damp ignition materials are employed inside the flashlight bulb and fail to ignite before the bulb filament wire burns in half. When care is taken in assembling the component parts, the rate of failure is extremely low.

This system of ignition or conversion is widely known among bombers in this country. The Department of the Army Technical Manual TM 31-200-1, "Unconventional Warfare Devices and Techniques, References", provides an illustrated example of this construction technique. While this 1966 publication was reclassified to "confidential" by the Army in 1970, no attempt was made to recover copies from public libraries, schools, or private citizens. In effect, therefore, the reclassification applied only to the military. Copies of this now "classified" manual are presently being offered for sale by a number of publishing houses in the United States, apparently without fear of legal action for federal security violations.

Automobile Light Bulb Method.

The second system of conversion or assembly of improvised electric blasting caps is also illustrated and explained in Army Technical Manual TM 31-200-1, and, therefore, must be considered to be available to potential bombers.

This method involves the employment of an automobile light bulb normally used in parking or dome lights. These bulbs have a metal base approximately 1/2 inch in diameter and a large and fairly heavy bulb filament wire. Wires are soldered to the outside of the metal light bulb. The glass bulb is broken away by slowly squeezing it between the jaws of a vice or a pipe wrench, taking care not to break the bulb filament wire. The open end of the improvised blasting cap shell is then filled with smokeless powder or some other highly flammable substance, and the light bulb filament wire is carefully imbedded in the mixture. Once the bulb filament wire has been imbedded, the bulb body is cemented or taped to the improvised blasting cap shell to complete the assembly.

The degree of reliability of this ignition system is directly proportional to the manual skill level of the builder. If the builder is a careful craftsman, he will probably be able to assemble this improvised electric blasting cap without causing the bulb filament to break. In normal employment, the probable failure rate of improvised electric blasting caps assembled by using this technique will probably run from ten to fifty percent. Removing the bulb filament wire from its protective glass envelope and inserting it into an ignition mixture frequently results in breakage of the filament wire and failure of the blasting cap.

If the builder has access to a blasting galvanometer, it is possible to check the continuity of the electrical circuit after the assembly of the improvised blasting cap to determine if the filament wire has been broken. In most cases, however, the builder does not possess a blasting galvanometer, nor can such a device be safely improvised. When it is not possible to determine if the filament wire is intact after assembly, this method is not particularly reliable.

Improvised Bridge Wire Methods.

A third method of improvising electric caps involves the construction of bridge wire assemblies by employing one of three distinct techniques:

- Soldered bridge wire
- Multi-strand or single strand bridge wire
- Model rocket igniter bridge wire

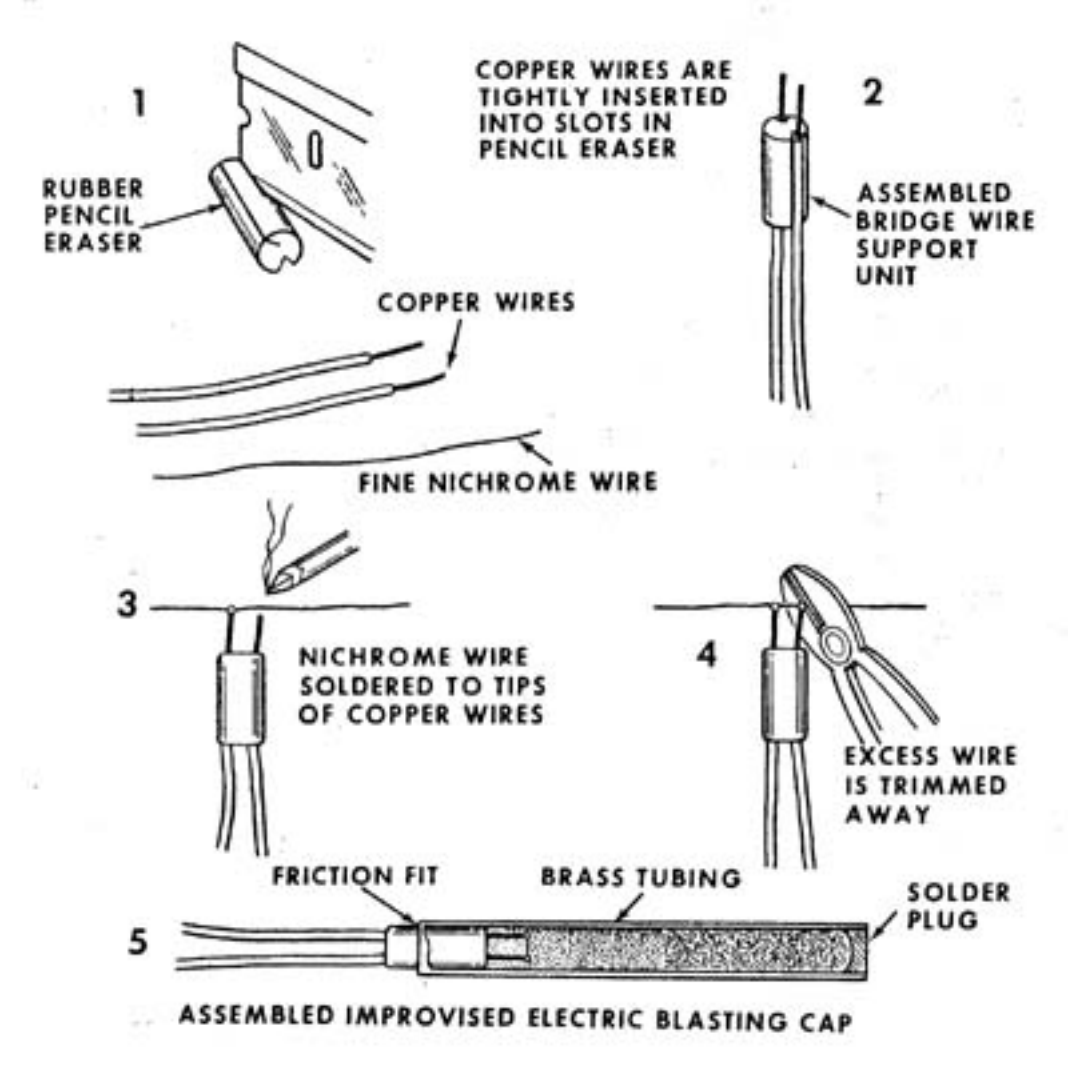
However, regardless of which technique is used, it is necessary to support and protect the bridge wire in some mariner during assembly and use in order to prevent breakage or electrical shorting of the bridge wire unit. When such protection and support can be provided by wooden plugs, electrical tape, epoxy cement, silicon rubber sealant, wax, cardboard or many other materials, probably the most professional support units are constructed from the erasers found on ordinary wooden pencils. Rubber pencil erasers measure approximately 1/4 inch in diameter by 1/2 inch in length and their size and shape make them ideal bridge wire support units that will fit snugly into copper automobile gas line tubing, fired .30 caliber cartridge cases, sections of radio antenna and other shell materials normally employed in the construction of improvised blasting caps.

If the improvised blasting cap shell opening is larger than the pencil eraser, it is a simple matter to wrap the eraser with tape and increase the diameter until a correct fit is obtained. The rubber pencil eraser is prepared for use by employing a razor blade to cut two "V" grooves on opposite

sides of the eraser. The electrical wire used in construction of the improvised bridge wire is then pressed tightly into these grooves until flush with the outside surface of the eraser. The rubber eraser body will grip and hold the wires tightly in position as well as provide electrical insulation if bare or uninsulated wires are used.

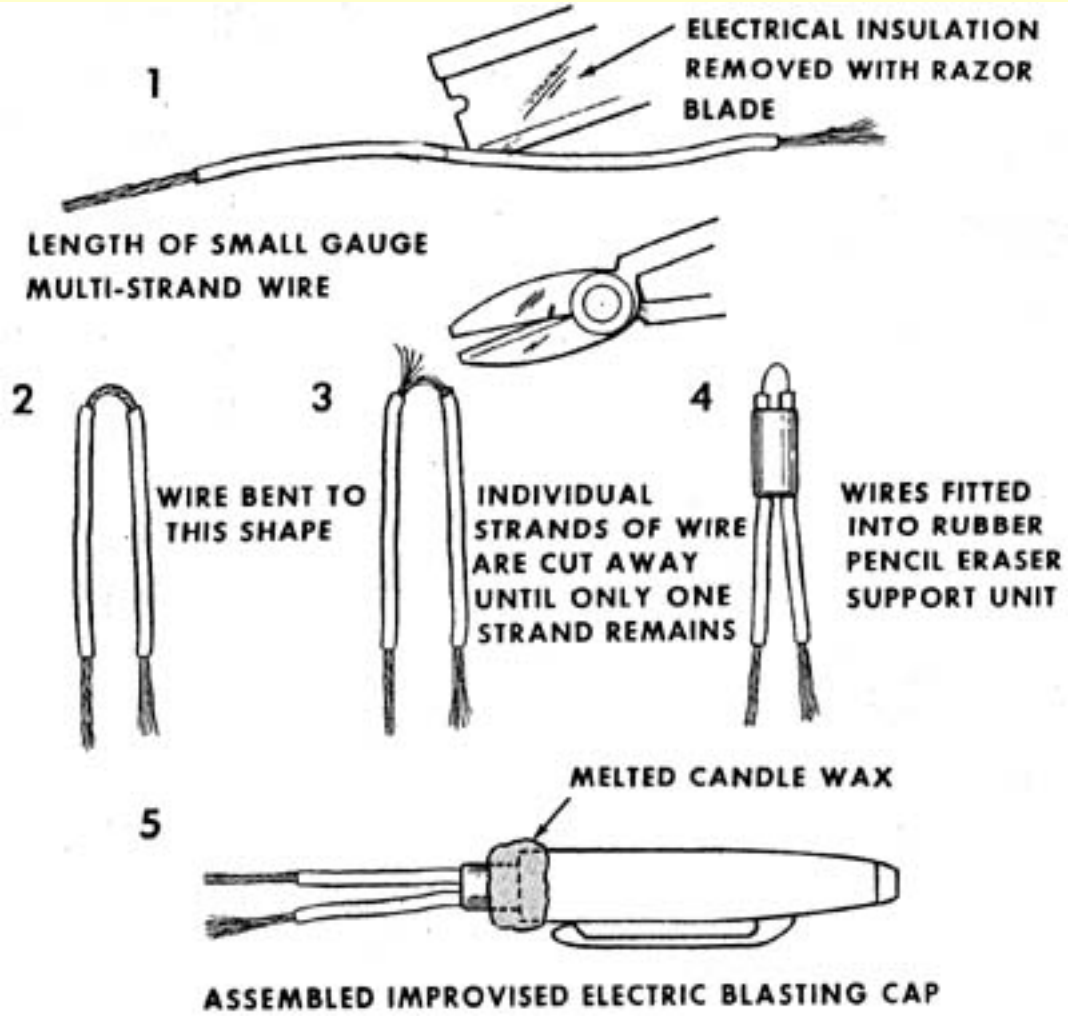
Soldered Bridge Wire Technique.

The electrical wires protruding beyond the end of the eraser bridge wire support unit are allowed to extend 1/8 to 1/4 inch in length and are stripped of electrical insulation. These strands of copper wire are generally 18 to 22 gauge in diameter. After the eraser bridge wire support unit with the two protruding Wires inserted has been placed firmly in a small vise, a length of much finer nichrome or copper wire is carefully soldered to the protruding wire ends to form the bridge wire unit, When the excess wire is trimmed away, the improvised bridge wire unit is complete and ready for insertion into the ignition material previously placed waterproofing into the blasting cap shell. The illustration below illustrates this technique of bridge wire construction. If of the improvised electric blasting cap is required, the end may be wax coated or painted with rubber cement.



Multi-Strand/Single Strand Bridge Wire Technique

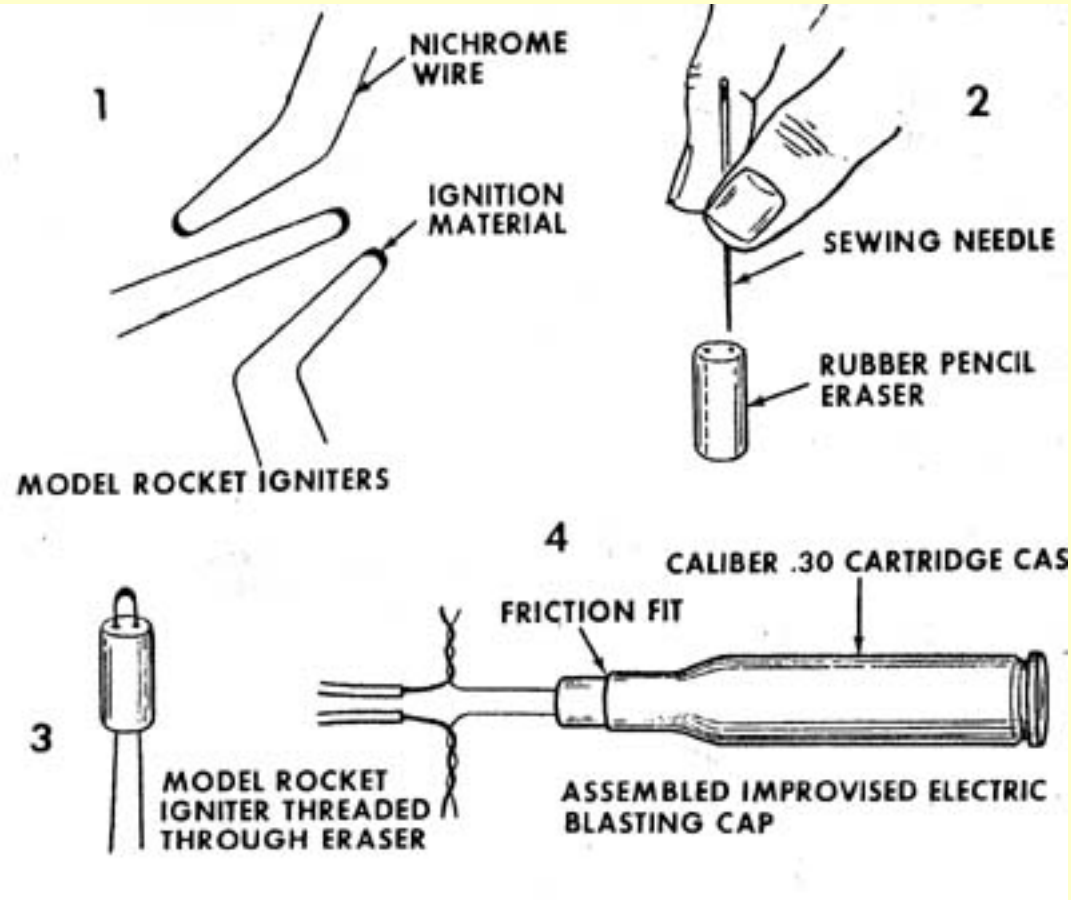
The construction of this bridge wire unit can be very simple if a small gauge multi-strand copper wire is utilized. The desired length of wire is selected and a 1/8 to 1/4 inch section of the electrical insulating material is carefully removed from the center section of the wire. The exposed multi-strand wire is then carefully cut one strand at a time, until only a single strand of wire connects the two insulated sections. The single strand section acts as the bridge wire and is assembled to the rubber pencil eraser support unit as previously described. The bridge wire unit is then inserted into the improvised blasting cap shell to complete the construction of the electrical blasting cap.



There are two primary disadvantages of this technique of construction. One is the fairly low resistance of the copper wire, as high resistance is desirable for heating. The second lies in the careful cutting away of the multi-strand wires to expose the single wire. The builders of these bridge wires frequently and unknowingly bend and break the single remaining strand of wire while assembling the wires to the support unit or inserting the unit into the cap shell. However, this system is still quite reliable and has been utilized by terrorists world-wide during the last twenty years.

Model Rocket Igniter Bridge Wire Technique.

Model rocketry is a growing hobby in the United States. Many hobby stores stock the model bodies, rocket motors, and accessories necessary to launch these rockets. One of the accessories commonly employed is a rocket motor igniter, which consists of a 3-inch length of fine chrome wire with an ignition composition in the center. These igniters, with their preassembled ignition compound, offer still another extremely simple method of manufacturing improvised electric blasting caps.



In constructing this bridge wire unit, the rubber pencil eraser is once again employed as a support unit. In this case, however, a sewing needle is used to push two holes longitudinally, 1/8 inch apart, through the eraser. The nichrome wire legs of the model rocket igniter are threaded through the holes and attached to longer lengths of wire by soldering or twisting. By placing the bare nichrome wires through the eraser, the builder insures that the wires will not be electrically short-circuited against the metal blasting cap shell and that the bridge wire is correctly positioned in the ignition mixture after insertion into the cap shell.

Kitchen Improvised Blasting Caps
by Tim Lewis
Published by Information Publishing 1995.

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HOW BLASTING CAPS WORK

I know you have seen before, on TV, the western where the good guy sticks a fuse in a stick of dynamite and presto he has a fuse detonation device? If you have used explosives in the military or otherwise you know that this is a bunch of hooey! While there are explosive compositions that can be made to detonate this easily, this same trait gives them a dangerous nature that requires very special precautions, if they can be used at all.
Detonation is in essence a chemical reaction brought about by a high velocity shock wave at speeds as low as 1100 M/sec. and going up to 9300 M/sec. for "Median" explosives. This shock wave is initially produced by the blasting cap and is continued throughout the explosive charge as the

detonation progresses. These waves have the appearance, in high speed photos, similar to ripples in a smooth pond of water as a pebble is thrown in. These detonation waves must meet or exceed certain strength and rate requirements to detonate a particular charge or explosive. Each explosive has a different requirement for detonation from the blasting cap standpoint. A good rule of thumb for any explosive is to use more blasting cap than is needed. This is a good idea as most explosives can be overdriven with a larger than needed detonator. By overdriven, I mean that an abnormally high detonation rate can be achieved as the high speed detonation from the cap will carry over in the explosive.

Many people with whom I have conversed, have mentioned pipe bombs that are made by filling a pipe with either black powder or smokeless powder. These pipe bombs are poor for fragmentation due to the actual deflagration nature of this type ordinance. Deflagration is the simple burning of a propellant or explosive. This will generate pressure great enough to rupture the container (pipe) and no more. 2" schedule 40 pipe will rupture at approximately 7144 PSI If black powder or smokeless powder is being used, this is the maximum pressure a pipe bomb would generate. If this same pipe were filled with powdered ammonium nitrate fuel oil explosive and detonated with a blasting cap with an approximate pressure of detonation of 600,000 PSI plus. This same set up (cap initiated) with "Bulls eye" brand smokeless powder from Hercules Inc. Wilmington Delaware as a pipe filler with a blasting cap will generate approximately 2,000,000 In plus detonation pressure. This amounts to an 8300% and 28000% increase over deflagration respectively. As these figures prove, true detonation is awesome and an unbelievable increase over simple propellant deflagration explosive fillers. Most of the high CHNO explosive groups will make the transition from deflagration to detonation. Usually this transition will require the build up of a good deal of pressure. The ammonium nitrate cargos of the High Flyer and Grandcamp are said to possibly have undergone this type of deflagration to detonation transition. This transitions, caused the detonation of their cargos of thousands of tons of fertilizer grade ammonium nitrate. This detonation in Texas City, Texas Harbor, in 1947 generated 50 million dollars damage and jiggled seismograph needles in Denver, Colorado. This was the largest non nuclear explosion in U.S. history.

As mentioned earlier we have explained that detonation is a shock wave induced chemical reaction. This detonation wave, and what happens, is perhaps explained easier in the drawing below. In this drawing the zone in front of the shock wave is the unreacted zone. Behind this zone, the shock wave is seen. This area of the shock wave is called the "Shock zone." This is the mechanical shock wave that originated at the detonator. This shock zone is usually 0.00001 cm long. The "chemical reaction zone" immediately follows the shock zone. The shock zone is the point of the highest pressure of the detonation. The "chemical reaction zone" is the part of the detonation zone that has the highest temperature and velocity.

This chemical reaction zone is where the actual chemical reactions of the detonation, and the subsequent detonation byproducts are produced. This zone does not actually include the detonation byproducts because the reactions are not complete. This chemical reaction zone is usually 0.1 to 1.0 cm long. One of the characteristic differences of deflagration and detonation is the flow of the byproducts. In deflagration the products flow from the combustion zone. In detonation the products flow toward the shock zone.

At times the detonation zone in an explosive can progress through the explosive at a much slower than normal rate. This is called low order detonation. Nitroglycerin, one of the most powerful explosives known, still has this undesirable trait. "Nitro" can detonate with high order detonation rates of over 8000 M/sec. while low order detonation can be as low at 1500 M/sec..

The density of an explosive has a great bearing on the rate of the detonation zone than the explosive mass. Every explosive has a greater detonation velocity with respect to the density. These are fixed and unchangeable under ideal conditions. Usually, the greater the density, the higher the detonation rate. Also, the higher the density, the lower the sensitivity. These statements, of course, are generalizations and will not hold true always. In a classic sense they give somewhat of an idea as to the way explosives perform.

As this is a field of explosives that can become a lifelong study, we won't attempt to give course in these theories. It is good, however, to understand why explosives perform the way they do so that maximum use could be had from them. The theory above is the hydrodynamic theory of detonation. This is the most generally accepted of the explosive detonation theories. For further reading here are two good books:

DETONATION AND TWO PHASE FLOW
Vol. 6 of "Progress in Astronautics and Rocketry"
by S.S. Penner & B.P. Mullins Academic Press (NY NY)

SCIENCE OF HIGH EXPLOSIVES
by M.A. Cook
Available from Information Publishing

For the purpose of this book we will cover two different types of explosives. Primary and base explosives, with respect to blasting cap manufacture and the manufacture of these explosives.

Primary explosives are usually sensitive to shock, friction, and heat. They are used to detonate the base charge in blasting caps. These explosives are used due to the ability of the primary explosive to make an easy and quick transition to detonation. As a general rule, these explosives require very little confinement to make the deflagration to detonation transition.

The detonation wave set up by the primary explosive is the

beginning of the detonation process. This primary shock wave will detonate the base charge in the caps. The base charge of the cap is normally R.D.X. or some other high explosive. The base charge needs to be powerful and stable, but still sensitive to the primary detonation wave.
The 6700 M/sec. plus base charge detonation velocity, will set off the main charge and with lower velocity explosive will overdrive them by sending such a high velocity shock wave through the explosive.

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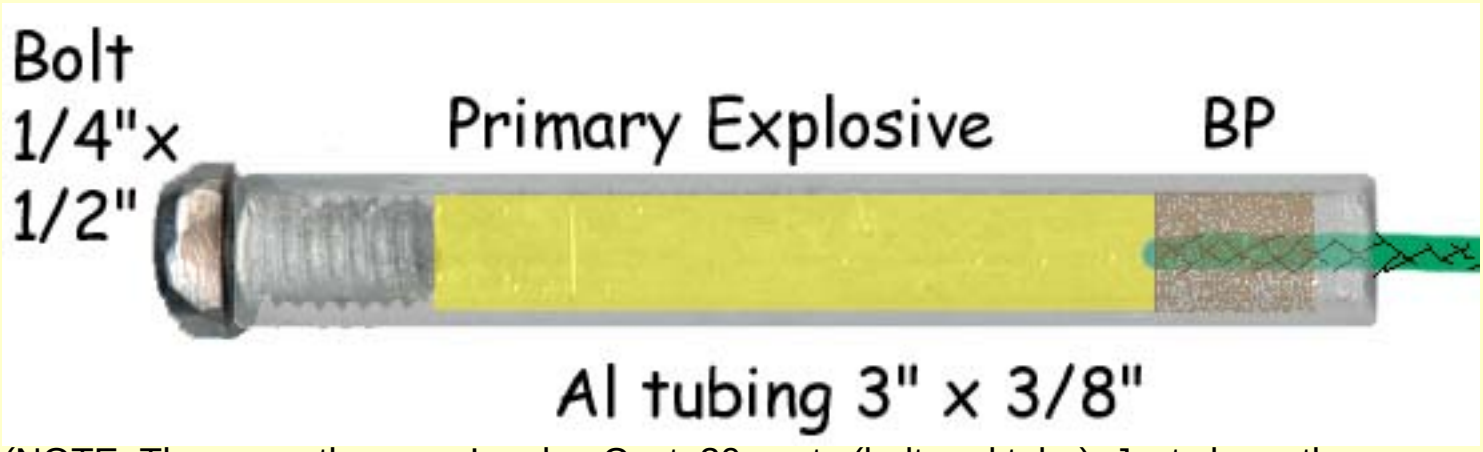
FUSE CAP MANUFACTURE

Being totally realistic one cannot hope to produce a blasting cap comparable to commercial products. The precision of modern manufacturing can produce caps cheaply and safely. The actual loading process is a dangerous one, but can be made relatively safe by taking the precautions outlined in the processes below. The home producer, can however, manufacture a cap that will work 99% of the time. These "homemade" caps will detonate most of the high explosives that their commercial counterparts will.

Fuse caps are blasting caps that are fired by the flame from a safety fuse. This flame ignites the flash charge of loose black powder. This, in turn, ignites the primary explosive. This primary explosive makes the transition from burning (deflagration) to detonation. These caps can be loaded as a simple cap or a compound cap. The simple cap has only the flash charge and the primary explosive. The compound caps have both these ingredients plus a high explosive base charge. The compound caps are usually a good deal stronger due to the high explosive base charge. To manufacture these caps the explosives are simply pressed into the cap container. This container should be 1/4 inch in diameter (or larger) copper or aluminum tubing 1.25" long or a 5.56 mm NATO spent cartridge. The tubing can have one end sealed with a wooden plug or simply be crimped closed with a pair of pliers. The burr should be removed from the open end of the tubing. After removing this burr, these tubes would be ready to load with the explosive charges.



(NOTE: These are the caps I make. Cost: 30 cents (bolt and tube). Just clamp the

tubing (gently) in a vise and screw in the bolt into the tube. Then grind down the bolt to round off the edges.)

When using a 5.56 mm NATO spent case the primer would need to be removed. After this has been done the flash hole would need to be enlarged enough to accept the fuse. This could be accomplished with a hand drill or by using a nail. The cap case would then be ready to insert the fuse and load with the explosive charges. The copper or aluminum tubes would need the base charge to be pressed in first. This pressing should be done with a close fitting wooden dowel. This should also be done with the tube supported rigidly from underneath and surrounded with bags of sand to absorb the explosion, if necessary. Find in this section a drawing of a loading apparatus. This apparatus would be safe as the operator would be remote. This press would be simple to make and would be highly recommended. Next the primary charge should be pressed into the tube.

CAUTION: Primary explosives are very sensitive to friction and impact ! Extreme care should be taken in this step of the procedure. A foul up here could be very dangerous!

After this primary charge is pressed a very small amount of black powder is placed on top of the primary charge. This will ensure the ignition of the primary charge. The fuse is then placed in the mouth of the filled tube so that the end contacts the black powder ignition charge.

NOTE: Use only good quality safety fuse. Good fuse can be made by soaking cotton twine in a saturated solution of potassium chlorate. This, however, will not be as reliable and therefore not as safe.

A small wad of cotton is then pressed on top of the fuse and igniter charge so that the fuse can exit the tube on one side. This is then crimped with pliers. Care should be taken to ensure the primary explosive is not present in the area of the tube to be crimped, as this crimping with this primary in between the tube walls could very well cause the premature detonation of the cap. This cap would then be ready to use.

Simple caps can be loaded similarly with the deletion of the base charge in the loading. They can also be loaded into a .22 magnum spent cartridge case in a manner similar to the method above. These small caps will not be as powerful as the larger caps. Some of the primaries would not be suitable and all of the others would need their primary charge doubled for maximum performance.

The 5.56 mm cartridge case would be load is the exact opposite of the copper or aluminum tube caps. The fuse would be inserted into the case through the flash hole. The black powder ignition charge would then be place in the bottom of the case. The primary would then be placed in the

bottom of the case. The primary would then be pressed into the case carefully and of course on top of that would be the base charge. After these were pressed into the case a small ball of cotton or paper would be pressed into the case to fill the remaining portion. Then the end of the case would be crimped with pliers to close the cap. This cap would then be ready to use.

1/4" aluminum or copper tube.
Igniter: Black Powder .20 G

PRIMARY:
HMTD .75 G
DDNP .50 G
Mercury Fulminate .75 G
Double Salts .75 G
Nitromannite .50 G

BASE:
RDX 1.0 G
PETN 1.0 G
Picric Acid 1.0 G
TeNN 1.0 G
Nitromannite 1.0 G
MMAN (3/8" tubing) 3.0 G
Nitroguanidine 2.0 G
Tetryl 1.5 G

As you can see by the above chart the nitromannite is listed as both a primary and a base charge. The reason for this is, that while it is not actually a primary explosive, it tends to function as one. Nitromannite's use as a base charge makes use of the 8000+ M/sec. detonation velocity. This nitromannite is a very touchy substance with sensitivity approaching that of nitroglycerin. It would be best used as a last resort.

5.56 mm Empty cartridge case:

Igniter:
Black powder .20 G

PRIMARY:
HMTD .75 G
DDNP .50 G
Mercury Fulminate .75 G
TACC 1.0 G
Double Salts .75 G
Lead Picrate 3.0 G
Nitromannite .50 G

TACN 4.5 G

BASE:
PETN 1.0 G
RDX 1.0 G
Picric Acid 1.0 G
TeNN 1.0 G
Nitromannite 1.0 G
Picric Acid 1.0 G
Nitroguanidine 2.0 G
MMAN (7.62case) 3.0 G
Tetryl 1.5 G

TACC is listed here as a primary. This is given due to the ease of manufacture. This primary is stated in literature to detonate TNT. The need for a heavy wall thickness detonator capsule would limit this to 5.56 mm shell detonators or larger empty shells. The use of MMAN would require waterproofing the finished cap by dipping in molten wax or paraffin.

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ELECTRIC BLASTING CAP MANUFACTURE

Electric blasting caps offer a good deal more versatility to the blaster. This allows better and more remote blasting operations and the possibility for timed blasting applications are great but cannot offer the versatility of application. The electric blasting cap (EBC) can.

EBC's are very simple in their function. Current is passed through the two wires leading from the cap. This current, due to resistance, heats a small "bridge wire" which in turn fires an ignition mixture. This, in turn, fires the primary explosive and base charge respectively. The problem with improvisation is finding a performing bridge wire which will give reliable performance. Earlier literature has stated that the "guts" from light bulbs will work. They will work but cannot be expected to resist corrosion produced by some situations and could not be expected to give stable reliable detonation instigation.

Take a spent 7.62 mm NATO case. with a small pin punch, nail or other small slender rigid object, reach into the case and knock out the fired primer. Enlarge the flash hole with a 1/8 inch diameter drill. Deburr this enlarged hole so that the wires passing through will not have their insulation cut by these burrs, and thus causing a dud. Pass two sections of 22 gauge insulated wire, twelve inches long, through the 1/8 inch hole so that they go completely through the case, and their ends are free of the case mouth. Strip 1/8 inch of the insulation off the wires protruding from the case mouth. Cut a 3/8 inch section of .01 inch "nichrome wire", which is available at any hobby store or from nearly any electronics

supplier. Nichrome wire is the wire inside toasters and other appliances that gets hot when current is passed through it. Discarded appliances could be another source of this wire. This piece of nichrome wire is spliced into both of the wires at the case mouth. Splice the 22 gauge wires to both ends of the nichrome wire bridge. This splice can be formed by twisting the nichrome wire around the upper part of the stripped 22 gauge wire and the lower part of the 22 gauge wire bent up to form a loop. A drop of solder is placed on these splices to ensure a good circuit. Outside dimensions of this improvised "bridge wire" should not be greater than .28 inches. A small wooden support should then be placed above the junction of the bridge wire. This will help the improvised bridge resist deformation and breaks from loading the cap. This wooden support could be made of a wooden match stick cut to length. This support should be 1/4 inch or less in length, with the ends notched out for the 22 gauge wire. These wires should be glued on the support stick. This whole bridge wire unit should be narrow enough to allow it to be pulled inside the 7.62 mm case even with the priming mixture on it. The wires should be twisted together on the other side of the wooden support after the glue on the ends of the support stick have dried, securing the wires in place. These bridge wire units are now ready to have their igniter composition placed on them. We will give three different compositions for this.

#1

Match heads (ground damp with acetone) 50%
Smokeless powder 50%

#2

Black powder (improvised will work) 50%
Smokeless powder 50%

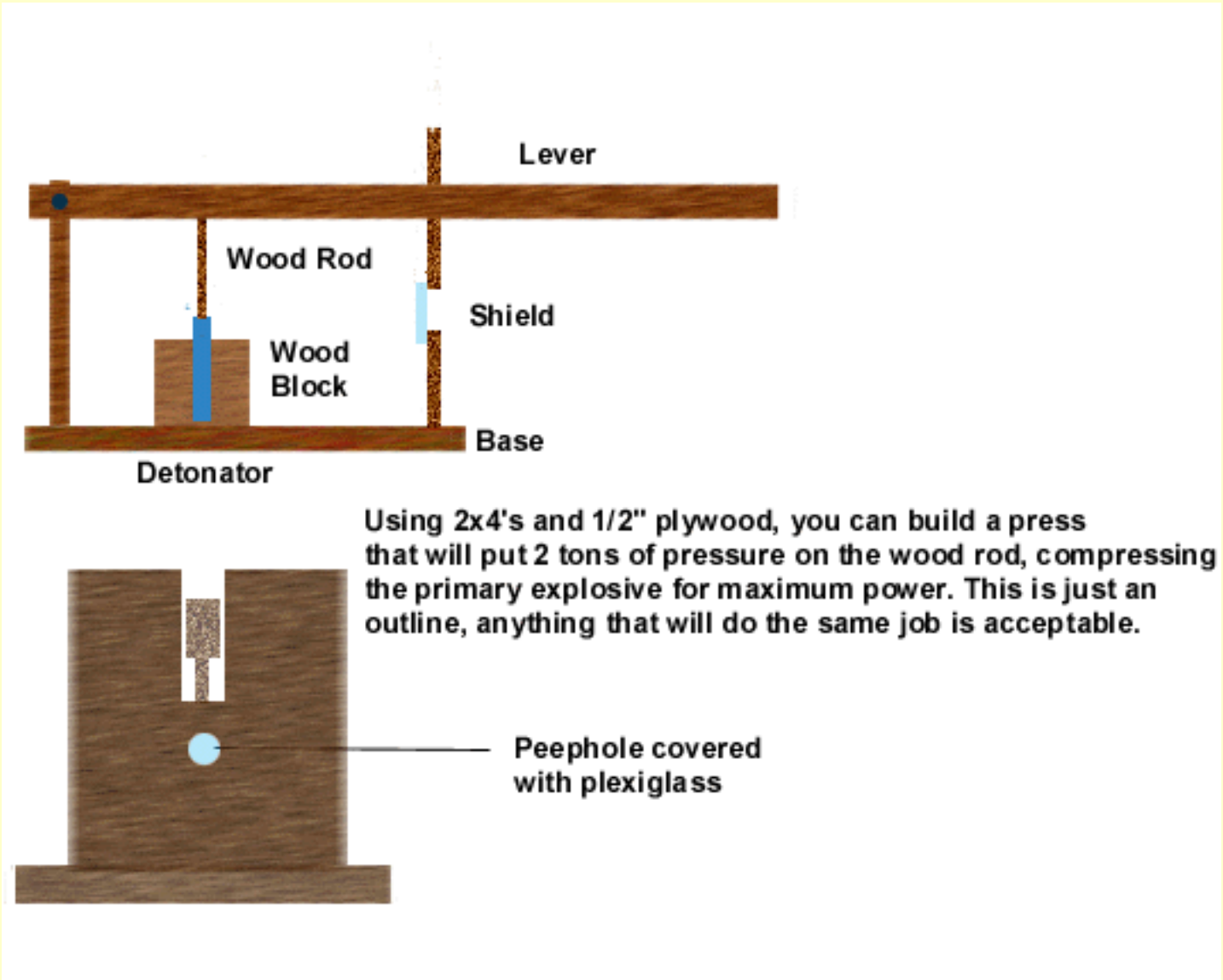
#3

Potassium Perchlorate 60%
Sulfur 40%
White glue (Elmer's) enough to form a pasty mass

The first two of these compositions should be used by mixing and slightly dampened with acetone. This will form a putty type mixture. This is pressed very gently around the bridge wire assembly. Remember, you have to get this back into the case, and when dry this priming mixture will be as hard as rock. It should also be said that great care should be taken to ensure the continuity of the circuit. This can and should be checked by using a OHM meter. Let these dry, and they are almost ready to load with explosives. You may want to test one of these before loading to see how they work. In tests, these bridge wires when used in ignition squibs, where 98% reliable. They are also sensitive to 2 "C" batteries or larger.

Gently pull the bridge assembly into the case with the wires extended from the other side: When firmly in the case as far as possible, put several drops of "model airplane glue" in the recess where the spent primer was. This is allowed to dry. When dry, these are ready to load.

These are loaded with the same amounts of explosives as the fused caps so use the table in that section of this book to find the quantity to load. The only difference is the amount of black powder igniter used. Use 1/8 to 1/4 gram of black powder for the igniter charge. This is done to cushion the bridge wire when the primary and base explosives are pressed in. After the addition of the black powder igniter, tap the case to settle this charge. The primary explosive charge is very carefully pressed on top of the igniter charge with a wooden dowel and remotely if possible. Best results will be obtained with the press apparatus. See the drawing.



The base charge is then pressed on on top of the primary charge. Check the circuits, one at a time, with a OHM meter from behind a barricade. Press cotton in the remaining part of the case, a crimp with cotton, in the part of the case that is being crimped. These can be water proofed by dipping the completed cap in hot wax for just long enough to immerse them

completely. These caps are ready to use and will equal a #8 or #10 blasting cap.

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HMTD (Hexamethylenetriperoxidediamine)

DETONATION VELOCITY 4511 M/sec. @ 0.88 G/cc
5100 M/sec. @ 1.10 G/cc

FRICTION SENSITIVITY Very Sensitive!!!

BEHAVIOR TO FLAME Small quantities flash like guncotton
Large accumulations will detonate.

HMTD is a high performance initiating explosive. It is one of the better initiating explosives but has some definite drawbacks. HMTD is not stable at even slightly elevated temperatures. Room temperature will even cause a decrease in performance with storage time. As one would imagine, due to the extreme excess of oxygen, the corrosion of metals in contact with the peroxide is a problem. The metals that will cause problems are aluminum, zinc, antimony, brass, copper, lead and iron. These metals in contact with the HMTD even when dry, will cause corrosion. With water present, in the HMTD, the corrosion would more quickly disable an improvised blasting cap that could be made with this material. Spraying the inside of your copper tubing with urethane plastic would most likely reduce greatly, if not completely stop, this corrosion problem. To manufacture HMTD, use one of the processes below.

Process #1

Obtain 6% hair bleaching peroxide which is available from any beauty salon or beauty supply store. This is a 20 volume hydrogen peroxide. Place 9 teaspoons of this. 6% peroxide in a one pint canning jar or 500 ml beaker. In three portions dissolve by stirring 2-1/2 teaspoons of powdered hexamine (Crushed U.S. Army ration heating tablets, See "Kitchen Improvised Plastic Explosives" chapter 2, "Urintropine" etc.). This is stirred until all the hexamine dissolves. The solution should then be chilled in a ice water bath for 1/2 hour. To this chilled solution add, in four portions, 4-1/2 teaspoons of powdered citric acid. Citric acid is readily available and should be found with canning supplies or in a pharmacy. With each addition the solution should be stirred until the citric acid dissolves in the liquid before another addition is made. When all the additions have been made continue stirring the liquid. The beaker or jar containing the solution should remain in the ice bath. The solution will become cloudy. With the completiorì of the 1/2 hour stirring the liquid is placed in a refrigerator. This will speed the process. If a refrigerator is not

available let the solution stand for 24 hours. Filter the solution through a paper towel or coffee filter. The white substance is the explosive.

CAUTION: HMTD is sensitive to shock, impact, friction, heat and open flame. Extreme care should be exercised. HMTD will detonate from any of these stimuli even when soaked with water.

These white crystals are washed with 45 ml of distilled water. Tap water can be used if necessary, but will yield a compound of lesser purity. They are then washed with 75 ml methanol alcohol. These crystals are allowed to dry in a cool dry place. If a 30% technical grade ("Superoxol") of hydrogen peroxide is available it should be used instead of the 6%. If 30% is used the proportions are as follows to use in the same process as above are:

HYDROGEN PEROXIDE. "Superoxol" (30% d. 1.11 G/cc)- 185 G
HEXAMINE (Crushed ration heating tablets) 56 G
CITRIC ACID (tech. grade or food grade) 84 G

These are used in the procedure given above. Simply "plug in" the amount immediately above for the spoon wise proportions given in the 6% hydrogen peroxide process and the washing would be done with 150 ml cold water. Of course in the procedure if 35% or 40% is the only type hydrogen peroxide available, then simply calculate the actual weight of hydrogen peroxide. We know that 185 G. of peroxide are used above. This is 30% hydrogen peroxide.185 G. X.30=55.5 G.. We know that we need 55.5 G. hydrogen peroxide. Suppose we have some 40% peroxide. We take our 55.5 and divide by.40 thus 55.5 / 0.40=138.75. Simply use 139.0 G. of this 40% hydrogen peroxide in the procedure above. The yield of this process with 30% hydrogen peroxide is much greater that is the use of 6% hydrogen peroxide. But with the 6% being the easier of the two to obtain it still would hold possibilities

PROCESS #2

This second process is one of very easy acquisition of the main ingredients. Yield is not as high as the procedure above with either strength peroxide. This process makes use of the easy formation of hexamine and the parallel formation of a slightly acid solution. This acid is liberated from the ammonium sulfate salt. It is, of course, sulfuric acid. This acid performs the function of the citric acid in the procedure above. This is after the free ammonia and the formaldehyde form hexamine. Yield will be relatively low with this procedure but the materials are readily available and cheap. Since this procedure takes place at a elevated temperature there will be some lost of product to this subsequent heat and the decomposition that will accompany it. This process will work and could be used if necessary.

Five hundred grams of 3% hydrogen peroxide are placed in a quart jar or 1000 ml beaker. Three percent hydrogen peroxide is available as an antiseptic solution in grocery stores, etc... To this is added fifty grams ammonium sulfate. Ammonium sulfate is available as common fertilizer. This is stirred until dissolved. This liquid should be heated in a water bath to 55 degrees C. (131 degrees F.). Immediately when the temperature reaches this temperature add 5.3 grams of 37% formaldehyde solution. Stir this solution well and take off water bath. Let this liquid cool to room temperature and set for 24 hours. A white product will be seen in the liquid at this time.

CAUTION: This white product is dangerous and sensitive to FRICTION, SHOCK, HEAT OR FLAME. Handle with great care !! Even wet H.M.T.D. is dangerous and will detonate with ease.

This is filtered out and washed with one washing of 50 ml distilled water and then with 75 ml of 100% methanol. The methanol will speed the drying process. This white fluffy powder will be H.M.T.D. This powder will be sensitive to friction and small quantities should be handled.

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DDNP (Diazodinitrophenol)--

DETONATION VELOCITY 4400 M/sec. @ 0.9 G/cc
6600 M/sec. @ 1.5 G/cc
6900 M/sec. @ 1.6 G/cc

FRICTION SENSITIVITY - Less sensitive than mercury fulminate and the same as lead azide.
BEHAVIOR TO FLAME - Small quantities flash like guncotton. Large 6 grams and larger would likely detonate.

DDNP is one of the highest in performance of nearly all the homemade primary explosive. It is stable and compatible with other explosives, but, lead azide. This is a good choice for manufacture as the precursor to this DDNP primary explosive is picric acid. Picric acid is more powerful than T.N.T. with a detonation rate of 7200 M/sec. it becomes the base charge for your homemade caps. It is prepared by a diazotization reaction on picramic acid. This is produced from picric acid, sodium hydroxide (lye) and sulfur. See picric acid for it's manufacture instructions.

MANUFACTURE:

In a pint glass jar place 90 ml warm water and 1.5 grams of lye (sodium hydroxide). Mix these with a "teflon" stirrer until all the lye had dissolved. Dissolve 9 grams of picric acid crystals in the lye water solution by stirring. Label this jar solution #1. In a 500 ml beaker 3 ml

of water is placed. Dissolve 7.5 grams of sulfur and 7.5 grams of lye (sodium hydroxide) by stirring the solution. Boil this solution over a heat source. When the solution turns dark red remove and allow the liquid to cool. Label this solution #2. Add this cooled solution #2 in three portions, to solution #1. Stir with a teflon rod while the liquid is being added. Again allow the solution mixture cool. Filter this mixture through filter papers (coffee filter, paper towels). Small red particles will gather on the paper. Discard the liquid. Dissolve these red particle in 180 ml of boiling water. Remove and filter this hot liquid through a filter paper (coffee filter, paper towels). Discard the particles left on the paper and label the liquid left #3. To Solution t#3 with an eyedropper slowly add sulfuric acid (Janitor supply, boiled battery acid) to the filtered solution until it turns orange brown. Add an additional 7.5 grams of acid to the liquid. In a separate pint jar, dissolve 5.4 grams of potassium or sodium nitrite in 240 ml of water. Label this solution #4. In one portion solution #4 is added with stirring to solution #3. Allow the solution to stand for 10 minutes. The mixture will turn light brown.

CAUTION: At this point the brown color is the DDNP that has formed. Keep away from flame, avoid friction and keep from shock.

Filter the light brown solution through a filter paper (paper towel, coffee filter). Wash the particles left on the paper with 60 ml of water. Allow to completely dry for 24 hours. Drying time can be reduced to 2 hours if crystals are placed in a shallow pyrex dish and this placed in a hot (not boiling) water bath.

CAUTION: DDNP is sensitive to shock, friction and flame. Expose to any of these will very likely detonate the compound prematurely.

This powder should be stored in small quantities in stoppered glass containers. More safety in storage leave 25% water in the powder and dry immediately prior to use.

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ACETONE PEROXIDE (Acetonetriperoxide)

DETONATION VELOCITY 3750 M/sec @ 0.92 Gucci
5300 M/sec @ 1.18 Gucci

FRICTION SENSITIVITY - Very sensitive. One of the more sensitive in this book.

BEHAVIOR TO FLAME - Burns violently and sometimes detonates even in small quantities.

Acetone peroxide is a powerful primary explosive. It, as with other

explosive peroxides, seems to be very volatile. In standing 10 days at room temperature, 50% of the sample will completely volatilize. It is a powerful, brilliant explosive. It's vaporizable nature makes it a explosive that would have to be used immediately after manufacture. However, this explosive is compatible with metals and will not cause their corrosion and the subsequent dangers involved. It is also compatible with picric acid, R.D.X., T.N.T., P.E.T.N., Tetryl, potassium chlorate and antimony sulfide.

It is highly friction sensitive and extreme care should be taken to avoid this. Acetone peroxide is one of the most sensitive explosive known to man. Great care would be needed to handle this explosive carefully. It is a powerful primary base charge in the cap. Also mixtures of R.D.X. and Picric acid with acetone peroxide are reported to be used between primary explosive and the base charge.

CAUTION: Acetone peroxide one of the most sensitive explosive known to man. this composition is dangerous and would need to be handled by someone with a lot of common sense. Mixtures such as picric acid/acetone peroxide (40/60) or similar mixtures with R.D.X. and P.E.T.N. will give explosives greatly increased resistance to impact without losing much initiation performance.

Great care would be needed to ensure the safety of the manufacturer due to the high sensitivity of the acetone peroxide. These dried crystals would be ready to load into detonators for immediate use as the storage stability is not very good.

MANUFACTURE:

Acetone peroxide is formed when hydrogen peroxide 30% acts on acetone. The introduction of dilute sulfuric acid causes the reaction to go into completion. Procedure is as follows. 50 ml acetone is placed in a one pint jar or 500 ml beaker. To this is added 30 ml hydrogen peroxide (30%). This liquid is placed in an ice water bath and cooled to 5 degrees centigrade. To this cooled mixture is added 3 ml of sulfuric acid (20%). This addition is done at 5 degrees centigrade and done in a drop wise fashion. When the temperature begins to rise (10 degrees C.), slow the addition until the temperature falls again. With the completion of the addition stir the mixture. A flocculent precipitate will form. This is filtered out after the mixture stands for one hour. Wash the white product three times with water (distilled preferably). Let the material filtered out of the reaction liquids and washed and dry this solid. By spreading out the acetone peroxide this drying process can be speeded up. These dry crystals are now ready for loading into the caps as a primary explosives.

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DOUBLE SALTS

DETONATION VELOCITY 3600 M/sec. @ 3.96 G/cc

FRICTION SENSITIVITY - This primary explosive is on the same order of sensitivity as is lead azide.

BEHAVIOR TO FLAME - Burns violently and sometimes detonates even in small quantities.

These double salts are a basic acetylide group primary explosive. This explosive has good sensitivity, powder and performance. It is readily made from silver (coin), nitric acid and calcium carbide/ water or acetylene. This is an easy compound to make. What I found interesting is the fact that this primary is not photo active. Most silver salts are light sensitive. This would be a good choice due to the wide availability to the main ingredients. DDNP, HMTD and mercury fulminate, are better primary explosives but this one has many possibilities. With this primary explosive suitable caps could be made and would be very usable and storage stable as some others in this publication could not.

MANUFACTURE

Dilute 10.1 ml of nitric acid (red fuming) with 6.75 ml of water. If reagent or technical grade acid is available (70% strength) this will not need any water mixed with it to reduce the strength. Simply use 17.5 ml of this 70% nitric acid. Place a silver dime or equivalent amount of silver metal in the acid. It will dissolve leaving a green solution.

CAUTION: Avoid the brown gas (nitrogen dioxide) produced when dissolving the silver metal in the acid. This gas is a deadly poison and the immediate exposure to the gas and it s subsequent damage will not show up for hours or even days! This should be done with good ventilation!

It may be necessary to heat the liquid to get the coin or metal to completely dissolve. Pour this green solution into a tall slender glass jar such as an olive jar. Place this jar with the green solution in it in a hot water bath and heat. Crystals will form. The heating is continued until these crystals dissolve again. In another flask or even a "Coke" bottle, place ten teaspoons of calcium carbide into this flask with a cork with a hose passing through a hole in the cork. Place the other end of the hose in the tall jar with the solution in it. Remove the stopper from the flask or bottle and add one teaspoon of water.

CAUTION: Acetylene gas is highly flammable and an explosion hazard. Keep away from heat and flame as much as possible.

The gas should begin generating. Add one more teaspoon and place the stopper back into the container. The acetylene gas generated by the calcium carbide and water should be going through the hose and bubbling through the solution in the tall glass. Bubble this gas through the

solution for 5-8 minutes. Brown vapor will be given off by the liquid as is absorbs acetylene and white flakes will begin to be formed in the silver solution. Remove the solution from the heat source and allow it to cool. Filter the liquid through a filter paper (paper towel, coffee filter) into a glass container. Green crystals will be caught on the filter paper. These green crystals would then be washed with 45 ml alcohol. The crystals will change from green to white in color and the methanol wash will turn green. Place these white crystals on a paper towel and allow to air dry.

CAUTION: Handle this dry explosive with great care. Do not scrape or handle roughly. Keep away from flame or spark source or heat and store in a cool dry place.

These salts will perform well and are easy to make. Their stability is good, which is very important. A good choice of primary explosives.

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TACC (Tetraminecopper (II) Chlorate)

DETONATION VELOCITY - Not given

FRICTION SENSITIVITY - This primary explosive is as sensitive as is lead azide

BEHAVIOR TO FLAME - Deflagrates with a green flame. Requires confinement to detonate.

Tetramine copper chlorate is a very interesting primary explosive. While it has these good properties it is also easily made. It's drawbacks are the tendency to "dead press" or become so packed that it will not detonate the base charge in the cap and water contamination problems. For this primary explosive to detonate it must be loose in the detonator shell. It would be best used in caps where the base charge is pressed in first. Rifle shell improvised blasting caps would not work well with this explosive due to this property. In this reaction the sodium chlorate and the copper sulfate are heated together with methanol. This reaction produced copper chlorate. This copper chlorate dissolved in methanol. It then has ammonia gas bubbled through the solution. The tetramine group is added in this step. So the main actors in this chemical play are copper sulfate other wise known as "blue vitriol". Copper sulfate is available from feed stores or electroplating chemical supplier. Sodium chlorate is also a chemical required and would be available from matches, dyes, textiles manufacture and as a weed killer. "Kitchen Improvised Plastic Explosives" has a section on chlorate manufacture in chapters four five and six. Ammonia is the last building block. This can be generated in one of two ways which will be explained in the manufacture section. The methanol

used is just a reaction liquid and a carrier, as it does not actually enter into the reaction. One problem with this process is the contamination of the methanol with water. This allows the sodium sulfate to become soluble in the first reaction and will remove the ability to separate the products of the reaction. The process is longer than others but is simple and produced a good purity, stable product. This primary explosive should be kept dry, as it could begin to decompose in the presence of moisture.

MANUFACTURE-

Measure 15 grams of sodium chlorate into a large mouth pint bottle. Sodium chlorate is the oxidizer in matches. It is also available as a weed killer. Add 360 ml of methanol or ethanol to the sodium chlorate in the pint jar. To this add 24 grams of copper sulfate. Place this liquid in a hot water bath. Heat at the boiling point for 30 minutes with occasionally stirring the liquid during the reaction.

CAUTION: Remember methanol is very flammable and great care should be taken to ensure the lack of open flame in it s proximity. Avoid breathing the vapors of methanol.

Keep the volume constant by continually adding alcohol to replace what is being boiled away. After 30 minutes remove the jar from the water bath. The color of the solution should change from blue to light green. Filter the solution into a jar through a paper towel or drip coffee filter. The filtrate (liquid) should be caught in a jar similar to the one used in the first step. Label this liquid #1. In a narrow necked gallon jar or flask and a stopper (one hole) place 1500 ml clear ammonia water in the solution. This is available from the grocery store in a clear non soapy form. In the mouth of this is placed a stopper with one hole and a plastic or rubber hose. This is placed into a hot water bath. Ammonia will begin to generate out of the gallon jug. A better ammonia generator could be made by filling a long necked bottle or flask with 250 grams lye (sodium hydroxide). 500 grams of dry ammonium nitrate fertilizer or ammonium sulfate fertilizer is added. Addition of small quantities of water and closing with a stopper hose set up could generate greater quantities of ammonia and it would be drier ammonia due to the nature of its generation. Generation would be maintained by the addition of more water. But with either method the hose should be placed in the liquid in the liquid #1. The ammonia gas should be bubbled through the liquid. It will begin to absorb ammonia turn light blue. Continue bubbling for 10 minutes.

CAUTION: The ammonia gas generated will kill or cause grave damage if exposure is severe. Use with good ventilation.

The solution will turn dark blue. Bubble the ammonia gas through solution #1 for ten more minutes and remove the hose from the solution. Reduce the volume of the liquid by pouring into a shallow pyrex dish. Set this dish

under a fan and allow 1/2 the alcohol to evaporate. Filter (paper towel or drip coffee filters) the crystals that remain in the liquid and wash them with 50 ml very cold methanol. Set these aside to dry for 16-24 hours.

CAUTION: Explosive is shock and flame sensitive and great care should be exercised during handling.

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MERCURY FULMINATE

DETONATION VELOCITY - 3500 M/sec. @2.0 G.cc.
4250 M/sec. @3.0 G/cc.
5000 M/sec. @4.0 G/cc.

FRICTION SENSITIVITY - Sensitive to friction and shocks

BEHAVIOR TO FLAME - Deflagrates when one crystal is ignited. Layers several crystals deep detonate violently.

Mercury fulminate had it's industrial beginnings in 1867. Alfred Nobel took out a British patent on the blasting cap, its use and makeup. His first blasting caps were simple ones very similar in many ways to the one in this book. Mercury fulminate was chosen out of a field of explosive fulminating compositions. This was mainly due to the stability that could be obtained and the ability to lend it's self to commercial manufacture at that time. Of course, the primary explosives used today are much superior to mercury fulminate. Mercury fulminate is not good for storage at elevated temperatures over 6-12 months. Five years in the magazine could disable caps. It is a good choice for clandestine manufacture. It would also be a very good choice for electric cap manufacture. The drawbacks would be the poor elevated temperature storage and the toxic nature of mercury and subsequent problems in loading.

MANUFACTURE

In a pint large mouth fruit jar or 500 ml beaker place either 2 ml water and 10 ml 90%+ nitric acid. Water first of course. If 70% nitric acid is available then place 11.5 ml of it instead of the 90% in the pint jar. Add 1 1/4 gram of mercury. Mercury should be available in thermometers, mercury switches and in old radio tubes.

CAUTION: Mercury fulminate manufacture generates fumes that are poisonous and this whole procedure should be done with very good ventilation.

The metal in the bottom of the jar should begin to bubble. If not add water drop wise to the solution until it does. A vigorous effervescent reaction takes place and red fumes are produces. They should be avoided as they are very poisonous. The mercury will all dissolve in the solution. If not heat gently but from a remote position until it does. After it is

dissolved let it cool somewhat. Warm 90 cc of ethanol (90%+, "Everclear") in a quart jar. Add the metal/acid to this ethyl alcohol. The reaction should start within 5 minutes. The fumes put off by this mixture should be avoided. When the reaction is complete the fumes will have subsided and a grey powder will have settled to the bottom.

CAUTION: The fumes produced are poisonous and flammable and they should be avoided as well as flame should be kept away as fumes are highly flammable too!

Filter the grey powder out of the liquid.

CAUTION: The grey powder is the explosive and shock, friction and flame or heat should be avoided! Contact with the crystals should be avoided as the free mercury still poses a health problem!

These grey mercury fulminate crystals should be washed with 60 ml ethyl alcohol. Allow the crystals to dry by spreading them out gently. These dry mercury fulminate crystals are then ready to use. This explosive can safely be stored under water and these crystals could be mixed with 200 ml distilled water and stored until needed.

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LEAD PICRATE

DETONATION VELOCITY - 4400 M/sec.

SENSITIVITY - This primary is very sensitive to shock friction and heat or flame. This sensitivity is high and care should be used in handling.

BEHAVIOR TO FLAME - Burns violently and sometimes detonates even in small quantities.

This is a good choice. The precursors to lead picrate and picric acid, lead monoxide and methanol. PA can be used as the base charge in the caps therefore reducing problems and simplification of production. It is not nearly as good a primary explosive as H.M.T.D. or D.D.N.P. but will work and is simple to make. Litharge, picric acid and methanol is all that is needed to make this one. This is a very dense heavy primary due to the lead in it's makeup. So from a cap volume use it is in the same class as all the other primaries in this publication.

MANUFACTURE

In a shallow glass dish, dissolve two grams of picric acid (see PA section) in ten ml of methanol. All stirring should be done with a teflon or wooden stirrer. Slowly while stirring add two grams of litharge (lead monoxide, white lead litharge-plumbing supply stores) to the methanol/PA

solution.

CAUTION: At this point this is a primary explosive. Keep away from flame. Continue stirring mixture until all the alcohol has evaporated. When this happens the mixture will suddenly thicken. Stir the mixture occasionally to stop any lumps from forming.

CAUTION: Beware of drying material forming on the inside of the container. This material will be shock, flame and friction sensitive.

Spread this lead picrate in a flat shallow pan to dry. If possible dry the mixture on a hot water bath for two hours. This will ultimately give a better product with more stability.

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NITROGEN SULFIDE

FRICTION SENSITIVITY - Very sensitive to friction great care would be needed to produce this compound.

BEHAVIOR TO FLAME - Small quantities (less than one gram) deflagrate with a puff and larger sizes will detonate.

CHARGE WEIGHT - 2.0 Grams in 3/8 copper tubing only.

Nitrogen sulfide is a dangerous compound to make. It is sensitive to friction and heat. Mercury fulminate is much safer to use from the friction aspect. This compound is more powerful than mercury fulminate but with slightly less brisance. Storage stability is good for "straight" nitrogen sulfide. In the proper mixture with potassium chlorate the primary explosive is not stable @50 degrees C. for long periods of time. Heat can and will cause detonations. It is however despite these problems, easily prepared from common ingredients. This preparation is a simple one, with a variety of raw materials. As good a primary explosive as lead picrate. The recommended filler with this primary explosive is nitrogen sulfide 80% and completely dry potassium chlorate 20%. This is mixed and 2 grams are loaded over the charge and pressed on top the base charge. Better primary explosives can be had but this one is easy and expedient.

MANUFACTURE

Place 100 grams of finely powdered sulfur (brimstone: garden supply store, pharmacy, industrial chemical supply) is placed in a tall narrow flask or narrow necked bottle equipped with a two hole stopper and placed in a frying pan filled with oil and heated until the sulfur melts (215 degrees C., 420 degrees F.). In this place a hose from the chlorine gas generator. This generator is a gallon jar with either liquid laundry bleach (5.25% Sodium hypochlorite aqueous solution) or 31% hydrochloric (Muriatic acid, swimming pool supply). to the bleach (total 1.2 gallons) is added in

small portions sodium bisulfite ("Saniflush": bathroom cleaners, sodium acid sulfite, swimming pool additive). This generation with the bleach/ bisulfite generator should have the bleach split into three equal amounts and reacted with the bisulfite one at a time. The second and third. 4 gallon refill should be done only after the green gas is no longer generated by new sodium bisulfite additions. The spent bleach is poured out of the gallonjug. The second or third fill are poured into the jug the process repeated until all three 2/5 gallon bleach solutions are reacted and the chlorine bubbled through the molten sulfur. To 255 grams hydrochloric acid is added 53 grams manganese dioxide (black manganese oxide: dry cell battery mfg., phosphating solutions, steel mfg.) in small portions. This is done in small additions until all the manganese dioxide is dissolved and the chlorine has stopped it's bubbling.

CAUTION: Chlorine gas is toxic avoid contact and used with very good ventilation. Used as a war gas in WWI.

Immediately after the addition and beginning chlorine generation place a one hole stopper to which some stainless steel or plastic (heat resistant) tubing has been inserted in the hole. The other end of this hose directs the chlorine gas generated through the two hole stopper into the bottom of the now molten sulfur. The other hole of the two hole stopper has a hose inserted just through the stopper. The end of this hose is placed into a flask or narrow necked bottle cooled by a salted ice bath. This sulfur will begin to absorb the chlorine generated. This reaction forming sulfur dichloride. A total of 42 grams of chlorine need to be absorbed by the sulfur. As this chlorine is dissolved sulfur dichloride will begin to form. Sulfur is very soluble in sulfur chlorides and will begin to be dissolved in the chloride already formed. This sulfur chloride will vaporize and collect in the bottle chilled by the salted ice bath. This is done until the temperature drops and begins to boil. Continue to pass the chlorine gas through the liquid. After all the chlorine has gone through the sulfur heat until the sulfur liquid no longer boils. Heat for another ten minutes and allow to cool. The last flask should have caught most of the sulfur dichloride liquid. Take the mixture off the heat and allow to cool. Dissolve 212 gram of this liquid in 1700 grams benzene (common industrial solvent).

CAUTION: Sulfur dichloride (Sulfur chloride) is a pungent oily liquid. All contact should be avoided! All steps of this process should be carried out with good ventilation. Benzene is a very dangerous liquid. Contact with the skin, breathing of the vapors are dangerous and should be avoided. Great care should be used when handling this known carcinogen. It is also highly flammable.

Filter this solution through a paper coffee filter. This filtering should remove nearly all the sulfur. The remaining liquid should have no

solids in it. Then ammonia gas generator is set up and ammonia gas is bubbled through the solution. The ammonia generator (ammonium nitrate/lye) is described in TACC section of the primary explosive section of this book. A dark brown powdery powder will collect in the bottom as the ammonia bubbles through the liquid. Keep bubbling the ammonia gas through the solution. Until this brown powder dissolves in the solution and a orange-yellow color is observed. Flocculent ammonia chloride crystals are seen in the liquid. Warm the benzene until it boils. Filter immediately through a filter with 200 grams fresh benzene. Add this benzene wash to the liquid just filtered (filtrate). Let this liquid evaporate until a mushy crystalline mass remains and filter. Let these crystals dry. These golden yellow to orange red are nitrogen sulfide.

CAUTION: This explosive is friction, flame and shock sensitive. Handle with the greatest care.

This powder must be pressed into the cap using the apparatus shown in the cap manufacture section for proper performance and moisture should be avoided. Contamination with sulfur in mixtures with potassium chlorate could very well cause an explosion!

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SILVER FULMINATE

FRICTION SENSITIVITY - Extremely friction sensitive! Should not be used if other primary explosives can be made.

BEHAVIOR TO FLAME - Single crystals explode violently. Larger amounts than given in the process below should not be made.

CHARGE WEIGHT - 1.0 G. compound cap

Silver fulminate (SF) is an extremely dangerous compound. Friction flame and sometimes contact with the dried product will cause it's detonation. It's performance is fair and the acquisition of the raw ingredients is simple. Never used due to the extremely unstable nature of SF. If other primary explosive options existed they would be better choice than this one. To use this primary explosive it must be mixed with tapioca starch (flour) to reduce this explosive extreme sensitivity. It is easily obtained due to the abundance of silver (coins, powder, ingots). Small batches of SF should be made with protective barricades between the operator and the reaction vessel. Again this explosive is dangerous and should be avoided if at all possible.

MANUFACTURE

Place 6 ml nitric acid (1.42 G/cc common technical grade acid or "watered" down stronger acid) in a 100 ml pyrex beaker containing 1.2 ml

water and heated to 95-100 degrees F.. Place one gram of silver, (coins, bars, powder) in this acid solution.

CAUTION: This addition should be done with excellent ventilation as the nitrogen dioxide fumes generated are very toxic even in small quantities!

This will begin to bubble as the silver is dissolved. This will form silver nitrate in a very acid solution. When the silver dissolves (gentle heating may be necessary to get all the mercury to dissolve). In a 500 ml beaker surrounded by an ice bath place 15 ml 95% + ethyl alcohol ("Everclear" or redistilled concentrate whiskey etc.) and add the silver/acid solution to the liquid not allowing the temperature to rise above 65 degrees C.

CAUTION: This addition will cause the generation of poison gases and should be done with good ventilation.

A vigorous reaction will take place with this addition. Dense white poisonous fumes are given off. As time lapses, the density of these fumes will diminish. The reaction will subside in 20-25 minutes. When the foaming reaction ceases, pour this solution into 200 ml water. The white crystals are then allowed to settle and the clear liquid on top poured off. Add 0.25 gram tapioca starch to the white crystals and filter the solution. The crystals filtered out through a paper towel or drip coffee filter. They are then washed with 30 cc ethanol. These crystals are then used in an area away from sunlight.

CAUTION: This white powder is extremely flame, friction and light sensitive. Friction and impacts should be avoided and the material should be expected to explode at any time. Again this explosive is dangerous even for someone with much laboratory experience. This composition should be avoided and it's manufacture undertaken only as a last resort.

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NITROMANNITE (Mannite hexanitrate)

DETONATION VELOCITY - 7000m/sec. @1.50 G/cc

FRICTION SENSITIVITY - As sensitive as nitroglycerin. The sensitivity is greater when between two hard surfaces.

BEHAVIOR TO FLAME - Will deflagrate under some conditions but local over-heating from a match will cause detonation.

Mannite is a simple sugar. It finds wide use as a baby laxative, in artificial resins and as a pharmaceutical dilutant. It can, through nitration, become a superb base charge for blasting caps. This explosive is attractive because of it's power and performance characteristics. It has a high detonation rate, good brisance and initiation properties. It has

several bad points. It requires concentrated acid (90%+) which is harder to prepare. It has elevated temperature storage problems with greatly increased sensitivity. This instability is brought on by storage at 75 degrees C. for two days. The mixture of tetracene and nitromannite (40/60) will give a powerful brisant primary explosive that detonates from moderate heat. Nitromannite is usually used straight as a base charge for blasting caps with 0.75 gram charge weights giving 100% reliability.

MANUFACTURE

One hundred grams of nitric acid (Specific Gravity 1.51 G/cc) is placed in a quart jar or 800-1000 ml beaker. This is cooled by surrounding with a salted ice bath. 20.2 G. mannite is added in very small portions with gentle stirring. The temperature should be kept below 0 degrees C. This is done by controlling the amount of time between the additions of the mannite. When the temperature approaches 0 degrees C. stop additions until the temperature has fallen some. After all the mannite has be added 200 G. 98% sulfuric acid is added dropwise to the solution. This is done while the mixture is stirred and with the temperature below 0 degrees C, temperature is again maintained by the speed of the addition. When the temperature rises close to 0 degrees stop the addition and allow the liquid reaction mass to cool before addition is resumed. Completing the addition of sulfuric acid the porridge-like mixture is stirred for 5 minutes and then filtered. This filtering can be done through hardened filter paper or 10 drip coffee filters (simultaneously). This product is washed with water and then washed with 5% sodium bicarbonate/water solution. Then the crystals are washed again with water. This crude product is then dissolved in boiling alcohol with as much dissolved as possible. Place this container in a refrigerator and when chilled filter through one drip coffee filter. The liquid remaining is reheated and water is added until a turbidity is seen (churning of the solution). Allow to cool and filter the crystals out of this solution. Completely dry the material and it is ready to use. Could be kept under water for safety until ready to use.

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R.D.X. (Cyclotrimethylenetrinitramine)

DETONATION VELOCITY - 5830 M/sec. @1.00 G/cc
8360 M/sec. @1.67 G/cc

FRICTION SENSITIVITY - Slightly less sensitive than T.N.T. but with 180% the actual power. Particle size reduction should be done while wet.

BEHAVIOR TO FLAME - Burns with a yellow flame. Very seldom if ever transforms into detonation.

R.D.X. is a powerful explosive. It is very stable and has good storage properties. It is widely used commercially as a base explosive charge in detonators and blasting caps. One gram of R.D.X. in a cap with a primary charge will detonate anything a #8 cap will detonate. For the process to make R.D.X. from camp stove fuel - see chapter 2 in "Kitchen Improvised Plastic Explosives" This process while not simple will produce a good product. This is a superb explosive and can find many uses. P.E.T.N. is the only explosive that really is close to being as good a base charge explosive as R.D.X. In "Kitchen Improvised Plastic Explosives II" there is a new process to manufacture R.D.X. Below is a process for extracting this explosive powder from "C-4" plastique explosive. The product will be as good as any for base charge use. C-4 could also be used as a base charge as is!

EXTRACTION - Take a 1/2 pound block of C-4 and place in a container impervious to gasoline. Add one liter of gasoline. Let this gasoline soak the block until the plasticizers are dissolved (just a powder is settled on the bottom of container) and filter the gasoline. Save the powder and discard the gasoline filtrate. Let this powder dry until it is free of gasoline. This should yield 206 grams of R.D.X.. This powder is ready to use as a base charge in a improvised blasting cap.

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PETN (Pentaerythrite Tetranitrate)

DETONATION VELOCITY - 5830 M/sec. @ 1.09 G/cc.
7490 M/sec. @ 1.51 G/cc.
8300 M/sec. @ 1.77 G/cc.

FRICTION SENSITIVITY - Sensitive to friction between two hard surfaces

BEHAVIOR TO FLAME - Burns quietly after melting with a slightly luminous flame.

PETN is a powerful explosive. It's power is slightly greater than R.D.X. and it is slightly more sensitive to initiation. It is powerful, stable, safe and efficient for the manufacture of improvised blasting caps. PETN is found, in it's common form, as the filler in detonating cord (E-cord etc.). If a person had access to this detonating cord he could salvage the PETN out of the cord by splitting it and simply scraping out the filler with a pocket knife or similar tool. The larger primer cord could yield as much as 1.7 lb. (771 grams) of the powder per hundred feet of cord. If access was available this method would be much better and easier than actual manufacture. This manufacture requires the acquisition of fuming nitric acid. This can be bought or made. For manufacture see chapter 2 of "Kitchen Improvised Plastic Explosives" Then the pentaerythrite must be obtained. It is available and is used in the paint

and varnish industries as well as in the manufacture of synthetic resins. It is cheap, but could raise a few questions in it's acquisition. Sulfuric acid is available from cleaning supply houses and as some generic drain openers. This is one of the best choices for cap base charge explosives. It has great power and will, in a properly constructed cap, give super reliable detonation initiation.

MANUFACTURE-

In a quart jar or a 1000 ml beaker place 400 ml 99% strong white nitric acid. This acid can be bought from a laboratory supply or the fuming red acid produced in process in "Kitchen Improvised Plastic Explosives". This fuming red acid will need to have the excess nitrogen dioxide purged until it is clear. This is done by adding 2-3 grams urea (45-0-0 fertilizer will work) to the acid. The mixture should clear up and loose the red tint. If not, warm the acid in the beaker and bubble dry air through the mixture. With the clear, white acid in the beaker place this beaker in a salted ice bath. Let it cool to below 0 degrees C.. Add with stirring 100 grams of pentaerythrite in small portions to the acid. The addition is done as such a speed that the temperature of the solution does not rise to more than 5 degrees C. When the addition is complete stir the acid/pentaerythrite solution for 15 more minutes. The crystals of the product will probably already have formed somewhat in the liquid.

CAUTION: At this point the crystals are a high explosive and should be treated with respect.

This solution is then poured into a previously prepared gallon jar with 2 1/2 quarts of cracked ice and water. PETN will immediately form and should be filtered out of the solution through a paper towel or drip coffee filters. This should yield 220 grams. This product needs purification. Wash these crystals 3 times with water and then wash 1 time with a 5% sodium bicarbonate solution. Wash once more with water and then dissolve the crystals in hot acetone. Let this cool and the crystals will begin to fall out of solution. Add an equal volume of water to the acetone and the crystals will fall out of solution. Filter these crystals out and wash with methanol and let them dry. This PETN can be dried by either simply air drying for 24 hours or by drying in a hot water bath. These dried crystals are ready to use.

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PICRIC ACID (trinitrophenol)

DETONATION VELOCITY - 4965 M/sec. @0.97 G/cc
6510 M/sec. @1.4 G/cc
7480 M/sec. @1.7 G/cc

FRICTION SENSITIVITY - More sensitive than T.N.T. but not substantially. Metals should be coated to ensure the formation of picrate salts. Coating copper tubing or rifle cases with urethane plastic spray could prevent this form happening.

BEHAVIOR TO FLAME - Small quantities burn with a sooty flame after melting. Large quantities can transform the deflagration into detonation in some rare instances.

Picric acid is a good choice of explosive base charges in caps. Relative performance would be 120% (T.N.T.=100%). Nitrophenols have been with us for a while. Their creation from nitric acid and animal horn was the first of these discoveries. Nearly 100 years passed before researchers found out it could be made to explode. It is this relative insensitivity of the material and it's good primary sensitivity yield many used for this explosive. It is very stable in storage with samples from late 1800's showing little signs of deterioration. The only reason that we do not use PA as an explosive in modern ordinance is mostly from a cost standpoint. PA can be reacted with ammonium hydroxide to form "Explosive D". This is a superb shaped charge explosive and does find some demolition and specialized munition loading. Brisance is very high for picric acid and it will detonate easily from the primary explosives in the primary section of the publication. Picric acid is poisonous and all contact should be avoided. This process uses the phenol byproduct used everyday as an analgesic. Aspirin (acetylsalicylic acid) in it's purified form, sulfuric acid (98%) and sodium or potassium nitrate are the ingredients. Aspirin is available in any drug store or supermarket. Sulfuric acid is available at janitorial supply houses and plumbing suppliers. Battery acid that has been boiled until white fumes appear will also work. Sodium or potassium nitrate should be available from hobby stores and as stump remover in garden stores. The methanol carrier can be found at hardware stores and from janitorial supplies. Caution should be used in handling the product of the process below. Contact should be avoided. Contact includes breathing dust and exposure of the skin or any other part of the body. Liver and kidney failure could result. Use gloves and retire any utensil that will be used in the process.

MANUFACTURE

Crush 100 aspirin tablets. Powder these crushed aspirin tablets. To them add 500 ml alcohol (95%) This alcohol will dissolve the acetylsalicylic acid in the aspirin and leave all the pill fillers in solid form in the bottom. Stir this aspirin/alcohol liquid for five minutes while warming it gently. Filter the warm liquid and keep the filtrate (liquid) and discard the remainder. Evaporate this liquid in a shallow pan in a hot water or oil bath. Collect the dried acetylsalicylic acid

crystals. Place 700 ml sulfuric acid in the bottom of a gallon jar. To this acid is added the acetylsalicylic acid crystals from above. This gallon jar is placed in an oil bath (electric frying pan would be easiest but flame heat will work). This is heated with stirring until all the crystals are dissolved in the hot acid. The crystals having dissolved will allow you to begin the addition of sodium or potassium nitrate. This addition is done in three portions, allowing the acid mixture to cool some between additions.

CAUTION: The addition of the nitrate to the hot acid will generate nitrogen dioxide which is a deadly poison. This step should be carried out with excellent ventilation!

This liquid will react vigorously, as the 75 grams of either of the nitrates are added to the solution in this three part addition. The solution should turn red and then back to the yellow orange color. After the additions let the solution cool to room temperature while stirring occasionally. Pour this room temperature solution into 1500 ml of cracked ice and water (1/4 ice). The product will precipitate out immediately as a brilliant yellow compound. Filter through a paper towel or 5 drip coffee filters in a funnel. Wash these crystals with 450 ml cold water. Discard the filtrate (liquid remaining after filtering). The yellow crystals are trinitrophenol. These crystals need to be dried for 3 hours on a boiling water bath or on a 1O5 degree C. oil bath. They are then ready to load into a detonator as a base explosive. Avoid contact with the yellow composition as it is highly poisonous. Wear gloves (viton) when working with this explosive.

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M.M.A.N. (Monomethylamine nitrate)

DETONATION VELOCITY - 6100 M/sec. @ 1.2 G/cc
6600 M/sec. @ 1.4 G / cc

FRICTION SENSITIVITY - Very insensitive. Similar to T.N.T..

BEHAVIOR TO FLAME - Burns if heated to 370-390 degrees C. and will burn completely in 6-8 seconds.

M.M.A.N. is a powerful explosive with 112-120% the power of T.N.T. with a greater detonation rate. This explosive is not as sensitive as others in this publication to primary explosive requiring 2 G. mercury fulminate or 1.25 grams of H.M.T.D. Methylamine is a basic building block of modern chemistry. It is an intermediary for hundreds of more common chemicals. It is easily obtained or purchased cheaply. Nitric acid does not require highly concentrations with as low as 20% acid strength working

perfectly. This is a good feature as requirements for explosives made with concentrated acids take time to produce and cannot be produced as fast or cheaply. This explosive is simple enough that it would require little experience and few setups in a lab. This explosive is very hygroscopic. It will absorb its weight in water at a relative humidity of 50% in 21 days. The other drawback of this explosive is the fact that it requires larger quantities of primary explosive as other base explosives. Both are acceptable and the hygroscopic nature of the salt can be controlled by loading caps on "dry days" of low humidity. These caps should also be dipped into molten wax to ensure their "waterproofness". This explosive is best used in a cap made with 3/8" tubing because 5 grams of this explosive are required. This will give a detonator 3/8" x 2-3/4". This cap should have the primary loaded first as the base explosive does not need the high density that the primary needs for maximum performance. Load this base charge explosive to a density of 1.2 G/cc. Higher densities will cause the explosive to become insensitive to the primary explosive. This cap should detonate most explosives and will be a great deal more powerful than a #10 blasting cap.

MANUFACTURE - Place 250 ml of 33% methylamine aqueous solution in a stainless bowl or beaker. Add in four portions either 832 G. 70% nitric acid, 971 G. 60% nitric acid or 583 G.100% nitric acid + 250 ml water. A good deal of heat will be generated by this neutralization. The solution will boil due to the heat. Allow the heat from the previous additions to subside before the next addition is made. After the additions have been made check the solution with PH paper (e. mark brand) from your lab supply store. If the PH is above 7 add acid 1/4 teaspoon at a time until the PH is between 6 and 7. If when checked the PH is 6 or below then add methylamine solution until the PH rises to between 6 and 7. This liquid is then put in a vacuum flask with a stopper. This will be placed in a hot oil bath (frying pan filled with good cooking oil). The oil bath should be 75 degrees C. (167 degrees F.). The flask is hooked up to a vacuum source and the vacuum applied. The vacuum will allow the waters removal in a much quicker amount of time. The vacuum source can be an aspirator type (cost around $5.00). This is the ideal source of vacuum. A gauge is placed in the line and the vacuum drawn at first recorded. This vacuum will remain the same until the water is all evaporated. At this point the vacuum suddenly will increase greatly. This signifies the end point. The crystals in the flask are scraped out in a dry (atmospheric humidity) room. This is placed in a sealed container to keep moisture our of the solutions. This is the explosive. It could be toxic if eaten in large quantities but at worst, prolonged handling of this explosive will give only a rash. The only thing to remember is to keep away from moisture and keep in a sealed container. Load large 3/8" diameter caps with 4-6 grams of MMAN as a base charge with large charges of primary explosives. Seal the caps immediately by dipping in hot molten wax. These caps are powerful and will take most of a forearm

off a foolish person.

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TETRYL (2,4,6-trinitrophenylmethylnitramine)

DETONATION VELOCITY - 7260 M/sec. @ 1.6 G/cc

FRICTION SENSITIVITY - Comparable to T.N.T.

BEHAVIOR TO FLAME - Burns slowly very rarely exploding.

This is one of the better base charge explosives. This is still used in the military but R.D.X. and P.E.T.N. are replacing it. Generating 4.4 million P.S.I. upon detonation this is a good choice. The corrosiveness of the salt to brass limits it's use to copper tubing caps manufacture. It also is not made of the most common ingredients but these could be found if the desire was great enough. Very sensitive to primary explosives but not sensitive to normal handling. More powerful than picric acid. Could be an interesting possibility for improvised blasting caps.

MANUFACTURE-

Sixty grams of dimethylaniline is dissolved in 850 grams sulfuric acid (janitorial supply) in a quart jar or 600 ml beaker in cool water bath. The temperature of the liquid during this addition should be kept below 25 degrees C. This liquid (solution # 1) is added by pouring into a separatory funnel or similar container equipped with a valve. This is done so solution #1 can be metered out drop by drop. Solution #1 can be metered out drop by drop. Solution # 1 is added drop by drop into 515 grams of 70% nitric acid in a two liter beaker or pyrex equivalent heated in an oil bath to 55 to 60 degrees C. Solution #2 is stirred vigorously, while the temperature is kept at 65 to 70 degrees C.. This addition will require approximately one hour. After all solution #1 has been added to solution #2, the stirring is continued and the temperature is kept at between 65 and 70 degrees C. for an hour longer. The solution is allowed to cool and then filtered with an asbestos filter or fiberglass filter. The solid material is boiled with water for one hour and filtered again on a paper filter. Water will need to be added from time to time to keep the water level constant. This is then ground while wet and dissolved in benzene (industrial solvent) and the solution filtered. The filtrate (liquid) is saved and the liquid allowed to evaporate. The resulting crystals are tetryl and will be yellow in color. These crystals should be of sufficient quality and particle size.

[Yes, the author does not specify solution #2 anywhere... and we probably know by now that solution #1 can be metered out drop by drop :)]

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TETRANITRONAPTHALENE (TeNN)

DETONATION VELOCITY - 7000 M/sec. @ 1.6 G/cc (In 1/4" aluminum Tube)

FRICTION SENSITIVITY - Similar to T.N.T.

BEHAVIOR TO FLAME - Rapid heating can cause detonations!

These yellow crystals are prepared by the nitration of naphthalene flakes in a two stage nitration. The product of the first stage is the dinitronapthalene. This "di" product is nitrated to the "tetra". This is done in two different nitration steps. This product can be considered the equivalent of T.N.T. in power with a slightly greater detonation rate. This tetra compound is stable even at elevated "magazine" temperatures and is an explosive of greater power and brisance than T.N.T.. Has been proposed an artillery shell filler. T.N.T. has been cheaper due to continuous manufacture processes. It is however a powerful explosive with detonator usage promise. It has the same impact properties as does Tetryl with the same potential. It is easily made from naphthalene, nitric acid and sulfuric acid. These compounds are easy to come by and thus would make this a easily manufactured product. Naphthalene flakes, balls or powder are used as insecticides and are familiarly known as "Moth balls". Sulfuric acid is easily obtained from plumbing and janitorial supplies. Nitric acid can be made see "Kitchen Improvised Plastic Explosives" Recovery of spent acids in both steps will reduce acid demand and can be done by heating the spent acid until white fumes are produced.

CAUTION: Care should be taken to avoid all fumes from heated acid mixtures and that this spent acid being recovered is free of nitronapthalene products. Failure to do this could result in a very violent explosion! Great care should be used to ensure the lack of remaining nitro compounds in the spent acid solutions. Caps should have a 1.5 G.+ charge of TeNN for best performance. This explosive should be loaded to a density of 1.6 G/cc. This explosive will melt around 200-210 C.

CAUTION: This meltable explosive should be used in its crystalline form. The melt loading should only be attempted by someone with chemistry lab experience. Rapid heating will most likely cause a high order detonation and fatalities! This heating would be done slowly as rapid heating could cause detonation. This melted compound could then be cast into the detonator case prior to loading the primary explosive. This could produce charges that required greater amounts of primary explosive to ensure detonation!

MANUFACTURE:

Tetranitronapthalene is produced by nitration of naphthalene. Napthalene is a coal tar or synthetic petrochemical. It is readily

available in the form of moth balls, moth flakes or moth crystals. Place 64 grams in a 2 liter beaker of "pyrex"container. 'To this add 105 cc distilled water. Slowly add 287 grams (160 cc) concentrated sulfuric acid of a concentration of greater than 90% strength (Specific gravity 1.8).

CAUTION: Addition should always be acid to water and never water to acid. The acids used in this process are very dangerous and should be used with great care. Goggles and full protective gear should be worn. Fumes produced should be avoided at all costs. This whole process should be done under a vent hood or in a very well ventilated place!

The temperature of this acid mixture will rise immediately. To this is added 115 grams (81 cc) of 70% nitric acid. This mixed acid is allowed to cook to room temperature. 150 grams of naphthalene is added slowly with stirring in small portions over a three hour period while the temperature is allowed to rise to 50 degrees C. When all the naphthalene is added, the beaker or "Pyrex" container is heated to 55 degrees in a oil bath, which melts the crude mononitronapthalene. The stirring is then stopped and the MNN allowed to solidify. This solid MNN is broken up off the top and placed in a second acid mixture. This acid mixture is prepared by placing 130 cc water in a 1000 cc beaker or "Pyrex"container. To it is slowly, carefully added 293 G. sulfuric acid (162 ml) density 1.8 G/ cc. (95% +). This mixture will heat up when mixed and should be cooled to 25 degrees C. by placing in an ice bath. When the acid mixture is at 25 degrees 152 grams of potassium nitrate is added. The mixture is stirred vigorously and the addition of the MNN from above is begun. It is added in small quantities keeping the temperature between 38-45 degrees C. by the speed of the addition. During this addition (1 hour +), the temperature is not allowed to rise to over 45 degrees C. After one hour, the temperature is allowed to rise to 55 degrees C. and the stirring is continued. This is continued until the emulsion is replaced by the formation of MNN crystals. These crystals are then filtered out by a glass fiber filter (fiberglass). These crystals are washed six times with cold water and allowed to dry. These are then dissolved in boiling acetone. Not all will dissolve. Filter this solution while hot and allow to cool. Chill this solution and crystals will form. Filter out the crystals that form. Reduce the volume of the acetone by 1/2 and chill again and filter. Add the crystals together from these acetone recrystallization steps and allow to dry. These crystals will be a good grade of 1.8 Dinitrotapthalene. These crystals will be nitrated, in the process below, to the tetro form.

Place 750 ml fuming nitric acid, of90% or greater strength (See Kitchen Improvised Plastic Explosives), in a two liter "pyrex" container or a 2000 ml beaker. Add to this very slowly and carefully 750 ml concentrated sulfuric acid. This acid mixture is stirred and cooled in a ice bath until the temperature drops below 20 degrees C. The 1.8, DNN from above is added in small quantities while the temperature is not allowed to rise above 20

degrees C. When all the DNN has been added, the temperature is allowed to rise slowly. Heat will need to be applied. This heating should be done such that the temperature rises from 20 to 80 degrees C. for three hours and then allowed to cool. The solid formed is filtered out and the filtrate (liquid remaining after filtering) drowned in twice it's volume of ice water. This step will drop more crystals out of the filtrate. These are filtered out and added to the crystals filtered out of the reaction mixture. These are then washed three times with water and then dissolved in hot from 95% ethanol. This alcohol is chilled and then the crystals formed are filtered out. This last step is not necessary, but highly desirable to give a very storage stable product.
These crystals are 1,3,6,8-tetranitronapthalene. They should be dried by heating in a shallow pyrex dish by the way of a hot water bath.

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NITROGUANIDINE

DETONATION VELOCITY - 5630 M/sec. @ 1.0 G/cc.
7650 M/sec. @ 1.5 G/cc.

FRICTION SENSITIVITY - Very insensitive

BEHAVIOR TO FLAME - Melts with sublimation and decomposition.

Nitroguanidine is a powerful explosive. First made from bat guano, by extraction and formation of guanidine nitrate and subsequent treatment of this nitrate with sulfuric acid (95% +) and filtration of the product. This explosive is similar in performance to picric acid and T.N.T.. While not being quite as brisant as these two explosives the ease of manufacture and lack of friction sensitivity make nitroguanidine an attractive choice for a blasting cap base charge explosive. It is a cool explosive and does not give a high temperature of detonation but gives a larger volume of gases upon detonation. This base charge explosive, should be loaded in the caps with the density not exceeding 1.35 G./cc. Excess loading densities will render the base charge undetonatable with 1.5 G. charges of H.M.T.D.. This explosive will work and work well and is very storage stable. Larger diameter cap containers (3/8" +) should be used to ensure propagation of the detonation through the entire cap. Given below is the manufacture techniques for production of nitroguanidine. This procedure will work well but is rather lengthy and labor intensive.

MANUFACTURE

Obtain two clay flower pots with a small hole in their bottoms. Fitted to one of these is
stainless steel tubing. A refractory made from "firebrick" and fired by charcoal

should
be built. The flower pots will need to fit into this refractory and have ample room around them to pack the charcoal. An air blower (e.g. hairdryer, vacuum cleaner is hooked up to blow air through the coal to generate the heat needed. In the bottom flower-pot, a stainless steel screen will be needed to keep from clogging the stainless
steel tubing from the ammonia inlet tube. Place 200 grams of calcium carbonate (Limestone, chalk) in the bottom flower pot, with the stainless tubing attached. Place
the other flowerpot upside down directly on top of the bottom pot. Place this in the refractory furnace and place a pyrometer or high temperature thermometer into the hole in the top clay flower pot. Start the furnace and blow air through the burning charcoal until the temperature inside the pots reaches 700 degrees C.. At this time begin to pass ammonia gas through the stainless tubing into the lime inside. The temperature should never go over 820 degrees C. as the lime will decompose. The ammonia generator the gas generator in the TACC section. The amounts needed in the
generator are 170 G. ammonium nitrate fertilizer, 100 G. sodium hydroxide and adding 100 ml water to the mixture. This water addition would be done in small portions to ensure the absorption of the gas by the calcium carbonate. This gas needs
to be generated slowly! When all the ammonium nitrate has been added and the gas
ceases to generate from the generator deprive the charcoal of oxygen to extinguish the
flame. Let the refractory furnace cool and remove the flowerpots from it. The black material in the bottom is calcium cyanamide.

Place 216 grams of urea in a stainless steel pan. Heat until it
begins to melt. Add in small portions 1300 grams ammonium nitrate.

CAUTION: This is dangerous and extreme care should be used in this step.
This mixture could explode if allowed to burn. Water should be
used if a fire does break out by immediate dilution and quenching
of the reaction mixture!!

Keep the temperature of the melt at 120 degrees centigrade. When
the addition of the ammonium nitrate is complete and the mixture is liquid
and at 120 degrees C. the calcium cyanamide from above is added in portions
over a twenty minute period. This mixtures temperature is held at 120
degrees C. for two hours and then diluted with 720 ml water. This liquid is
heated to 95 degrees C. and then filtered through several coffee filters or
a "fast" filter paper. The liquid thus obtained is allowed to cool to 25
degrees C. and then the crystals formed are filtered out. The liquid is
reduced to 1/2 its volume by boiling. It is cooled and filtered and the
crystals obtained are added to those from the first filtration. These
crystals are washed with 40 ml cold water. They are then dried in a shallow

pyrex dish while heated in a hot oil bath at 110 degrees C. for two hours. These crystals are guanidine nitrate (90% purity).

Immerse a one liter flask, containing 500 ml. concentrated sulfuric acid, in cracked ice. This acid is stirred until the temperature drops to 10 degrees C. or less. In small portions, add 400 grams of dry guanidine nitrate to the acid with stirring to keep the temperature below 11 degrees C.. When all the guanidine nitrate is dissolved, pour the now milky liquid into three liters of cracked ice and water. Let this stand until the nitroguanidine is completely crystallized out of the liquid. Filter these crystals out and dissolve in four liters of boiling water (distilled if possible). Allow to cool by standing overnight and filter the crystals out. Dry these crystals by heating gently in a container placed in a pan of boiling water. This dried material is then ready to store in a plastic container or to load into finished caps.

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KITCHEN IMPROVISED PLASTIC EXPLOSIVES, VOLUME 1

By Tim Lewis

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Foreword

In a nation of free people, the right to know and the freedom of information are essential to the evolution of freedom. This knowledge should never be curtailed. I advise my fellow Americans to be watchdogs looking and fighting the coming regulation of such knowledge. This loss will mark the reduction of our freedoms and liberties that our forefathers sought to obtain for their descendants. In a police state, this regulation is another way to control the people.

It saddens me greatly to see the youth of our great nation lose the desire for knowledge. This knowledge is the only way that we as Americans can ever even hope to keep our freedom. You can bet that this book would never be published or even available in the Soviet Union. This book can be the beginning of low cost blasting, demolition and explosives as well as many new manufacture applications.

I hope and pray that this information is never used to kill innocent people. It is the lowest form of life that kills innocent people with a randomly placed bomb. These people should die the most horrible death imaginable when convicted, but the sad part is that usually they are never caught.

If the world is ever caught in the grips of a nuclear war perhaps this information will help the survivors "get by" and hammer a new society out of the ashes. I hope and pray this will never happen and God will give the leaders of our great country the wisdom to somehow lead us away from a nuclear holocaust.

WARNING !!!

The procedures in this book can be dangerous. The compounds produced in these procedures are or can be dangerous. The actual manufacture of explosives is illegal and classified as a felony. These processes are given as information and information only! The actual use of this information by persons not familiar with proper laboratory procedures and safety can be dangerous if not fatal. Students of explosives should obtain a good college level chemistry book and laboratory procedure handbook.

Reasonable care has been used in the compilation of this book and this information has been presented for its educational value only. Due to the nature of these explosive compounds, neither the publisher or the author can or will accept any responsibility for this info and its subsequent use. All responsibility is assumed by the reader!

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CHAPTER 1 - AMERICAN PLASTIQUE EXPLOSIVES

Since the first part of WWII, the armed forces of the United States has been searching for the perfect plastique explosives to be used in demolition work. This search led to the development of the C composition plastique explosives. Of this group, C-4 being the latest formulation that has been readily adopted by the armed forces.

This formulation was preceded by C-3, C-2, and Composition C. In this chapter we will cover all of these explosives in their chronological progression as they were developed and standardized by the armed forces. All of these explosives are cyclonite or cyclonic based with various plasticizing agents used to achieve the desired product. This plasticizer usually composes 7-20% of the total weight of the plastique. The procedure for the manufacture of plasticized RDX will be given at the end of this chapter.

All of these explosives are exceedingly powerful and should be used with the utmost care (detonation velocity from 7700 - 8200M/sec.). All of these C composition plastique explosives are suitable for and usually the explosives of choice for all demolition work using shaped charges, ribbon charges,and steel cutting charges. All these explosives are relatively easy to detonate with a #6 blasting cap, but as with all explosive charges the highest efficiency is obtained through the use of a booster in conjunction with the blasting cap.

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COMPOSITION 'C'

This explosive is just a copy of a British explosive that was adopted early in WWII. This explosive is the 'C' explosive of choice for home manufacture due to its ease of manufacture and the more easily obtained compound. This explosive was available in standard demolition blocks. The explosive was standardized and adopted in the following composition:

```
R. D. X.           88.3 %
Heavy Mineral Oil       11.1 %
Lecithin            0.6 %
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In this composition, the lecithin acts to prevent the formation of large crystals of RDX which would increase the sensitivity of the explosive. This explosive has a good deal of power. It is relatively non-toxic except if ingested and is plastic from 0-40 deg. C.. Above 40 deg., the explosive undergoes exudation and becomes gummy although its explosive properties go relatively unimpaired. Below 0 deg. C., it becomes brittle and its cap sensitivity is lessened considerably. Weighing all pros and cons, this is the explosive of choice for the kitchen explosives factory due to the simple manufacture of the plastique compound.

Manufacturing this explosive can be done in two ways. The first is to dissolve the 11.1% lecithin in unleaded gasoline and mixing with the RDX and then allowing the gasoline to evaporate until the mixture is free of all gasoline. All percentages are by weight.

The second method is the fairly simple kneading of the plasticizing compound into the RDX until a uniform mixture is obtained. This explosive should be stored in a cool dry place. If properly made, the plastique should be very stable in storage, even if stored at elevated temperatures for long periods of time. It should be very cap sensitive as compared to other military explosives. With this explosive, as mentioned earlier, a booster will be a good choice, especially if used below 0 deg. C.. The detonation velocity of this explosive should be around 7900 M/sec..

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COMPOSITION C-2

Composition C-2 was developed due to the undesirable aspects of composition 'C'. It was formerly used by the United States armed forces, but has been replaced by C-3 and C-4. It's composition is much the same as C-3 and it's manufacture is safe also.

I won't go into much detail on this explosive because of its highly undesirable traits. It is harder to make than C-4 and is toxic to handle. It also is unstable in storage and is a poor choice for home explosives manufacture. It also has a lower detonation velocity than either C-4 or C-3. But for those of you that are interested, I will give the composition of this explosive anyway. It is manufactured in a steam jacketed (heated) melting kettle using the same procedure used in incorporation of C-3. Its composition is as follows:

RDX	80%
Mononitrotolulene	5%
Dinitrotolulene	5%
TNT or Guncotton	5%
Dimethylformide	5%

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COMPOSITION C-3

This explosive was developed to eliminate the undesirable aspects of C-2. It was standardized and adopted by the military as the following composition:

RDX	77%
Mononitrotolulene	16%
Dinitrotolulene	5%
Tetryl	1%
Nitrocellulose(Guncotton)	1%

C-3 is manufactured by mixing the nitrogenous agent in a steam-jacketed melting kettle equipped with a mechanical stirring attachment. The kettle is heated to 90-100 deg. C. and the stirrer is activated. Water wet RDX is added to the plasticizing agent and the stirring is continued until a uniform mixture is obtained and all water has been driven off. Remove the heat source but continue to stir the mixture until it has cooled to room temperature.

This explosive is as sensitive to impact as TNT. Storage at 65 deg. C. for four months at a relative humidity of 95% does not impair its explosive properties. C-3 is 133% as good as an explosive as is TNT. The major drawback of C-3 is its volatility which causes it to lose 1.2% of it's weight although the explosive's detonation properties are not affected. Water does not affect the explosive's performance. It therefore is very good for U.D.T. uses and would be a good choice for these applications. When stored at 77 deg. C., considerable exudation takes place. It will become hard at -29 deg. C. and is hard to detonate at this temperature.

While this explosive is not unduly toxic, it should be handled with utmost care as it contains aryl- nitro compounds which are absorbed through the skin. It will reliably take detonation from

a #6 blasting cap but the use of a booster is always suggested. This explosive has a great blast effect and was and still is available is standard demolition blocks. It's detonation velocity is approximately 7700 M / sec..

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COMPOSITION C-4

C-4 was developed because of the hardening and toxicity that made C-3 unreliable and dangerous due to the dinitrotolulene. The following composition is the standardized plastique explosive as adopted by the armed forces:

RDX	91.0%
Polyisobutylene	2.1%
Motor Oil	1.6%
Di-(2-ethylhexy)sebecate	5.3%

The last three ingredients are dissolved in unleaded gasoline. The RDX explosive base is then added to the gasoline-plasticizer and the resultant mass in allowed to evaporate until the gasoline is completely gone (this can be done quickly and efficiently under a vacuum). The final product should be dirty white to light brown in color.

It should have no odor and have a density of 1.59 gm/cc. It does not harden at -57 deg. C. and does not undergo exudation at 77 deg. C.. It can be reliably detonated with a #6 blasting cap. The Brisance of this explosive (ability to do work or fragment munitions) is 120 % greater than C-4 is the best plastique explosive available in the world and probably will remain so for quite some time. This is the #1 demolition explosive in the world and if you've never seen this stuff used it is absolutely amazing. The detonation velocity of C-4 is 8100 M/sec..

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CHAPTER 2 - MANUFACTURE

Cyclotrimethylenetrinitramine or cyclonite is manufactured in bulk by nitration of hexamtehylenetetramine (methenamine, hexamine, etc.) with strong red 100 % nitric acid. The hardest part of this reaction is obtaining this red nitric acid. It will most likely have to be made. More on this later.

Hexamine Manufacture

The hexamine or methenamine can usually be bought in bulk quantities or hexamine fuel bars for camp stoves can be used, but they end up being very expensive. To use the fuel bars they need to be powdered before hand. The hexamine can also be made with common ammonia water (5%) and the commonly available 37% formaldehyde solution. To make this component, place 400 g. of clear ammonia water in a shallow pyrex dish. To this add 54 g. of the formaldehyde solution to the ammonia water.

Allow this to evaporate and when the crystals are all that remains in the pan, place the pan in the oven on the lowest heat that the oven has. This should be done only for a moment or so to

drive off any remaining water. These crystals are scraped up and plaecd in an airtight jar to store them until they are to be used.

Red Nitric Acid Manufacture

To make the red nitric acid, you will need to buy a retort with a ground glass stopper. In the retort, place 32 grams of sulfuric acid (98-100%) and to this add 68 g. of potassium nitrate or 58 g. of sodium nitrate. Gently heating this retort will generate a red gas called nitrogen trioxide. This gas is highly poisonous and this step as with all other steps should be done with good ventilation.

This nitric acid that is formed wiil collect in the neck of the retort and form droplets that will run down the inside of the neck of the retort and should be caught in a beaker cooled by being surrounded by ice water. This should be heated until no more collects in the neck of the retort and the nitric acid quits dripping out of the neck into the beaker. This acid should be stored until enough acid is generated to produce the required size batch which is determined by the person producing the explosive.

RDX Nitration Reaction

Of course the batch can be bigger or smaller but the same ratios should be maintained. To make the RDX, place 550 g. of the nitric acid produced by the above procedure in a 1000 ml. beaker in a salted ice bath. 50 g. of hexamine (methamine) is added in small portions making sure that the temperature of the acid does not go above 30 deg. C.. This temperature can be monitored by placing a thermometer directly in the acid mixture.

During this procedure, a vigorous stirring should be maintained. If the temperature approaches 30 deg. C., immediately stop the addition of the hexamine until the temperature drops to an acceptable level. After the addition is complete, continue the stirring and allow the temperature to drop to 0 deg. C. and allow it to stay there for 20 minutes continuing the vigorous stirring.

After the 20 minutes are up, pour this acid-hexamine mixture into 1000 ml of finely crushed ice and water. Crystals should form and are filtered out of the liquid. The crystals that are filtered out are RDX and will need to have all traces of the acid removed.

To remove the traces of acid, first wash these crystals by putting them in ice water and shaking and refiltering. These crystals are then placed in a little boiling water and filtered. Place them in some warm water and check the acidity for the resultant suspension with pH paper. You want them to read between 6 and 7 on the pH scale. If there is still acid in these crystals, reboil them in fresh water until the acid is removed, checking to see if the paper reads between 6 and 7. Actually the closer to 7 the better.

To be safe, these crystals should be stored water wet until ready for use. This explosive is much more powerful than TNT. To use, these will need to be dryed for some manufacture processes in this book. To dry these crystals, place them in a pan and spread them out and allow the water to evaporate off them until they are completely dry.

This explosive will detonate in this dry form when pressed into a mold to a density of 1.55 g./cc at a velocity of 8550 M./sec..

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CHAPTER 3 - FOREIGN PLASTIQUE EXPLOSIVES

Italian Plastique Explosives

During World War II, the Italian military adopted RDX and P.E.T.N. as their standard explosive. Naturally then their plastique explosive are RDX based. Their explosive suits itself very well to home manufacture. It is mixed together by kneading the components together until a uniform mixture is obtained. This explosive is composed of the following:

RDX	78.5%
Nitroglycerin or Nitroglycol	17.5%
Petrotroleum Jelly	4.0%

This is a very powerful explosive composition as are most that contain RDX Its major drawback is toxicity. Since it contains nitroglycerin or glycol, these components can be absorbed through the skin. These are cardiovascular dialators and handling them will give the most intense headaches and are poisonous. Therefore, skin contact should be avoided. This explosive is almost as powerful as C-4 and will work very well. It is equivalent to C-3 in power and can be considered its equivalent in charge computation. It is less toxic than C-3 and a little more plastic. Its detonation velocity is approximately 7800 M/sec.

Oshitsuyaka Japanese Plattique Explosive

An explosive that will lend itself to home manufacture is this explosive that was used by the Japanese in WWII. It is an explosive that was used in ribbon charges and demolition rolls. Of course, the main ingredient is RDX which composes most of the explosives weight. This being a plastique explosive with a wax plastisizer is limited in the tempcrature that can be used. These properties can be improved on somewhat by the substitution of short fiber grease (wheel bearing grease) or bees wax for part of the percentage of wax. Their composition is as follows:

RDX	80%
Wax (l/2 wax, 1/2 wheel bearing grease)	20%

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CHAPTER 4 - PLASTIQUE EXPLOSIVE FROM BLEACH

This explosive is a potassium chlorate explosive. This explosive and explosives of similar composition were used in World War I as the main explosive filler in grenades, land mines, and mortar rounds used by French, German and some other forces involved in that conflict.

These explosives are relatively safe to manufacture. One should strive to make sure these explosives are free of sulfur, sulfides, and picric acid. The presence of these compounds result in mixtures that are or can become highly sensitive and possibly decompose explosively while in storage.

The manufacture of this explosive from bleach is given just as an expediant method. This method of manufacturing potassium chlorate is not economical due to the amount of energy used to boil the solution and cause the 'dissociation' reaction to take place. This procedure does work and yields a relatively pure and sulfide free product.

These explosives are very cap sensitive and require only a #3 cap for initiating detonation. To manufacture potassium chlorate from bleach (5.25% sodium hypochlorite solution) obtain a heat source (hot plate, stove etc.) a battery hydrometer, a large pyrex or enameled steel container (to weigh chemicals), and some potassium chloride (sold as salt substitute).

Take one gallon of bleach and place it in the container and begin heating it. While this solution heats, weigh-out 63 g. potassium chloride and add this to the bleach being heated. Bring this solution to a boil and boil until when checked with a hydrometer, the reading is 1.3 (if a battery hydromcter is used it should read full charge). When the reading is 1.3, take the solution and let it cool in the refrigerator until it is between room temperature and 0 deg. C..

Filter out the crystals that have formed and save them. Boil the solution again until it reads 1.3 on the hydrometcr and again cool the solution. Filter out the crystals that are formed and save them. Boil this solution again and cool as before. Filter and save the crystals. Take these crystals that have been saved and mix them with distilled water in the following proportions: 56 g. per 100 ml. distilled water. Heat this solution until it boils and allow it to cool.

Filter the solution and save the crystals that form upon cooling. The proccss of purification is called fractional crystalization. Thesc crystals should be relatively pure potassium chlorate. Powder these to the consistancy of face powder (400 mesh) and heat gently to drive off all moisture.

Melt five parts vaseline and five parts wax. Dissolve this in white gasoline (camp stove gasoline) and pour this liquid on 90 parts potassium chlorate (the crystals from the above operation) in a plastic bowl. Knead this liquid into the potassium chlorate until imtimately mixed. Allow all the gasoline to evaporate. Place this explosive in a cool dry place.

Avoid friction and sulfur, sulfides and phosphorous compounds. This explosive is best molded to the desired shape and density (1.3 g./cc) and dipped in wax to water-proof. These block type charges guarantee the highest detonation velocity. This explosive is really not suited to use in shaped charge applications due to its relatively low detonation velocity. It is comparable to 40% ammonia dynamite and can be considered the same for the sake of charge computation.

If the potassium chlorate is bought and not made, it is put into the manufacture process in the powdering stages preceding the addition of the wax-vaseline mixture. This explosive is bristant and powerful. The addition of 2-3 % aluminum powder increases its blast effect. Detonation velocity is 3300 M/sec.

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CHAPTER 5 - PLASTIC EXPLOSIVE FROM SWIMMING POOL CHLORINATING COMPOUND (HTH)

This explosive is a chlorate explosive from bleach. This method of production of potassium or sodium chlorate is easier and yields a more pure product than does the plastique explosive from bleach process. In this reaction the HTH (calcium hypochlorite-CaClO) is mixed with water and heated with either sodium chloride (table salt, rock salt) or potassium chloride (salt substitute). The latter of these salts is the salt of choice due to the easy crystalization of the potassium chlorate.

This mixture will need to be boiled to ensure complete reaction of thc ingredients. Obtain some HTH swimming pool chlorination compound or equivalent (usually 65% calcium hypochlorite). As with the bleach, it is also a dissociation reaction. In a large pyrex glass or enameled steel container place 1200 g.HTH and 220 g. potassium chloride or 159 g. sodium chloride.

Add enough boiling water to dissolve the powder and boil this solution. A chalky substance (calcium chloride) will be formed. When the formation of this chalky substance is no longer formed, the solution is filtered while boiling hot. If potassium chloride was used, potassium chlorate will be formed. This potassium chlorate will drop out or crystalize as the clear liquid left after filtering cools.These crystals are filtered out when the solution reaches room temperature.

If the sodium chloride salt was used this clear filtrate (clear liquid after filtration) will need to have all water evaporated. This will leave crystals which should be saved. These crystals should be heated in a slightly warm oven in a pyrex dish to drive off all traces of water (40-75 deg.C.). These crystals are ground to a very fine powder (400 mesh).

The potassium chloride is the salt to use as the resulting product will crystallize out of solution as it cools. If the sodium chloride salt is used in the initial step, the crystallization is much more time consuming and it will have a tendancy to cake and has a slightly lower detonation velocity. The powdered and completely dry chlorate crystals are kneaded together with vaseline in plastic bowl.

ALL CHLORATE BASED EXPLOSIVES ARE SENSITIVE TO FRICTION, AND SHOCK, AND THESE SHOULD BE AVOIDED

This explosive is composed of the following:

```
Potassium or sodium chlorate  90%
Vaseline                      10%
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The detonation velocity can be raised to a slight extent by the addition of 2-3% aluminum powder substituted for 2-3% of the vaseline. The addition of this aluminum will give this explosive a bright flash if set off at night which will ruin night vision for a short while. The detonation velocity of this explosive is approximately 32OO M/sec. for the potassium salt and 290O M/sec. for the sodium salt based explosive.

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CHAPTER 6 - PLASTIQUE EXPLOSIVE FROM TABLE SALT

This explosive is perhaps the most easily manufactured of the chlorate based explosives. Sodium chlorate is the product because rock salt is the major starting ingredient. This process would work equally as if potassium chlorate were used instead of the sodium chloride (rock salt).

The sodium chlorate is the salt I will cover due to the relatively simple acquisition of the main ingredient. The resulting explosive made from this process would serve as a good cheap blasting explosive and will compare favorably with 30% straight dynamite in power and blasting efficiency.

This explosive can be considered the same as 30% straight dynamite in all charge computation. These explosives and similar compositions were used to some extent in World War I by European forces engaged in conflict.It was used as a grenade and land mine filler. Its only drawback is its hygroscopic nature (tendancy to absorb atmospheric moisture).

These explosives also have a relatively critical loading density. These should be used at a loading density of 1.3 g./cc. If the density is not maintained, unreliable or incomplete detonation will take place. These shortcomings are easiiy overcome by coating the finished explosive products with molten wax and loading this explosive to the proper density. This explosive is not good for shaped charge use due to it's low detonation rate (2900 M/sec.).

The major part of the manufacture of this explosive from rock salt is the cell reaction where D/C current changes the sodium chloride to chlorate by adding oxygen by electrolysis of a saturated brine solution. The reaction takes place as follows:

$NaCl + 3 H_2O \rightarrow NaClO_3 + 3 H_2$

In this reaction the sodium chloride (NaCl) takes the water's oxygen and releases its hydrogen as a gas. This explosive gas must be vented as sparks or open flame may very well cause a tremendous explosion. This type of process or reaction is called a 'cell' reaction. The cell should be constructed of concrete or stainless steel.

I won't give any definite sizes on the cell's construction because the size is relative to the power source. This cell would have to be large enough to allow the brine to circulate throughout the cell to insure as uniform a temperature as possible. The speed of the reaction depends on two variables. Current density is a very important factor in the speed of the reaction.

The advantages of high current densities are a faster and more efficient reaction. The disadvantages are that cooling is needed to carry away excess heat and the more powerful power sources are very expensive. For small operations, a battery charger can be used (automotive). This is the example I will use to explain the cell's setup and operation (10 amp/12 volt). The current density at the anode (+) and cathode (-) are critical.

This density should be 50 amps per square foot at the cathode and 30 amps per square foot at the anode. For a 10 amp battery charger power source, this would figure out to be 5 5/16" by 5 5/16" for the cathode. The anode would be 6 15/16" by 6 5/16". The anode is made of graphite or pressed charcoal and the cathode is made of steel plate (1/4").

These would need to be spaced relatively close together. This spacing is done with some type of non-conducting material such as glass rods. This spacing can be used to control the temperature to some extent. The closer together they are, the higher the temperature. These can be placed either horizontaily or vertically although vertical placement of the anode and cathode would probably be the ideal set up as it would allow the hydrogen to escape more readily. The anode would be placed at the bottom if placed horizontally in the cell so that the chlorine released could readily mix with the sodium hydroxide formed at the cathode above it. As the current passes through, the cell chlorine is released at the anode and mixes with the sodium hydroxide formed at the cathode. Hydrogen is released at the cathode which should bubble out of the brine. This gas is explosive when mixed with air and proper precautions should be taken.

PROPER VENTILATION MUST BE USED WITH THIS OPERATION TO AVOID EXPLOSION.

Temperature control is left up to the builder of the cell. The temperature of the cell should be maintained at 56 deg. C. during the reaction. This can be done by the circulation of water through the cell in pipes. But the easiest way would be to get an adjustable thermostatic switch adjusted to shut the power source off until the cell cools off. This temperature range could be from 59 deg. C. shut off to a 53 deg. C. start up. An hour meter would be used on the power source to measure the amount of time the current passes through the cell.

If the water-cooling coil design appeals to the manufacturer and an easily obtained cheap source of cool or cold water is available, this would be the quickest design to use. Again, a thermostatic type arrangement would be used to meter the cooling water through the cell. The cooling coils would best be made of stainless steel to overcome the corrosiveness of the salts although this is not entirely necessary. A thermostatic valve would be set to open when the brine electrolyte was heated above approximately 58 deg C. and set to close when the temperature fell to approximately 54 deg C..

Again, this would be the best and most efficient method and the waste heat could be used relatively easily to heat either a house or perhaps even a barn or shop. To run the cell, after the cell has been constructed and the concrete has been sealed and has set and cured for several weeks, is very simple. First, to seal the concrete I suggest Cactus Paint's CP 200 series, two componant epoxy paint or an equivalent product.

To fill the cell, place 454 g. sodium chloride in thc cell (rock salt is excellent here). Place four liters of distilled water into the cell with the salt. The liquid should cover the anode and the cathode completely with room to spare. Remember that some of the water will be used in the reaction. Thirty three grams of muratic acid, which should be available from a swimming pool supply store is then added to the liquid in the cell.

BE CAREFUL WHEN HANDLING ANY ACID!!!

Then 7 grams of sodium dichromate and 9 grams of barium chloride is added. The cell is then ready to run if the plates are connected to their respective cables. These cables are best made of stainless steel (the most corrosion resistant available). The power supply is then hooked up and the cell is in operation. The power is best hooked up remotely to lessen the chance of explosion. Any time the cell runs it will be making hydrogen gas.

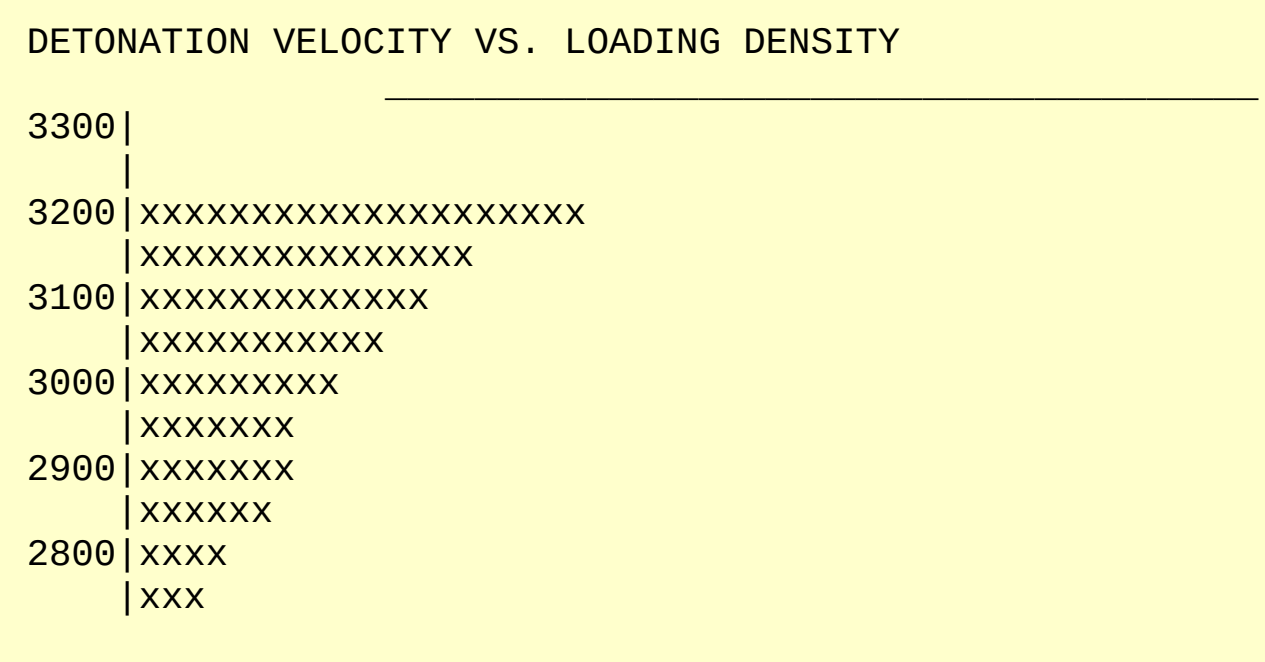
THIS GAS IS EXPLOSIVE WHEN MIXED WITH AIR AND ALL SPARKS, FLAME, AND ANY SOURCE OF IGNITION SHOULD BE KEPT WELL AWAY FROM THE CELL. THIS CELL SHOULD ONLY BE RUN WITH VERY GOOD VENTILATION.

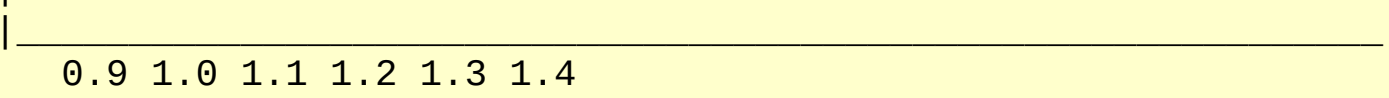
The steel plate cathode should be hooked to the negative side of the power source and the anode hooked to the positive side. Again these are hooked to the power supply via stainless steel cables. This cell is then run at the proper temperature until 1800 amp-hours pass through (amount per pound of sodium chloride) the electrolyte.

The liquid in the cell is then removed and placed in an enameled steel container and boiled until crystals form on liquid. It is cooled and filtered, the crystals collected being saved. This is done twice and the remaining liquid saved for the next cell run. The process will become easier as each run is made. It is a good idea to keep records on yields and varying methods to find out exactly the best process and yield. To purify these crystals place 200 grams in 100 ml distilled water. Boil the solution until crystals are seen on the surface. Let cool and filter as before. Save this liquid for the next cell run. These purified crystals are placed in a pyrex dish and placed in the oven at 50 deg C.for two hours to drive off all remaining water.

The explosive is ready to be made. The crystals of sodium chlorate are ground to a face powder consistancy. Ninety grams of this sodium chlorate are kneaded with 10 grams of vaseline until a uniform mixture is obtained. This explosive is sensitive to shock, friction, and heat. These should be avoided at all cost. This explosive works best at a loading density of 1.3-1.4 g./cc. If this explosive is not used at this density, the detonation velocity will be low and detonation will be incomplete.

To load to a known density measure the volume of the container in which the explosive is to be loaded. This can be done by pouring water into the container until the container is filled. Then the water is measured and the total number of ml will equal the cc's of the container. Multiply this number times 1.3 and load that much explosive (in grams of course) into the container after the container has been dried of all water. This procedure should be used with all chlorate explosives (plastique explosive from bleach, plastique explosive from HTH). This explosive is cheap and relatively powerful and is a good explosive.





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CHAPTER 7 - PLASTIQUE EXPLOSIVES FROM ASPIRIN

This explosive is a phenol derivative. It is toxic and explosive. Compounds made from picric acid are poisonous if inhaled, ingested, or handled and absorbed through the skin. The toxicity of this explosive restricts its use due to the fact that over exposure in most cases causes liver and kidney failure and sometimes death if immediate treatment is not obtained.

This explosive is a cousin to TNT but is more powerful than its cousin. It is the first explosive used militarily and was adopted in 1888 as an artillery shell filler. Originally this explosive was derived from coal tar but thanks to modern chemistry, you can make this compound easily in approximately 3 hours from acetylsalicylic acid (purified aspirin).

This procedure involves dissolving the acetylsalicylic acid in warm sulfuric acid and adding sodium or potassium nitrate which nitrates the purified aspirin and the whole mixture drowned in water and filtered to obtain the final product. This explosive is called trinitrophenol. Care should be taken to ensure that this explosive is stored in glass containers. Picric acid will form dangerous salts when allowed to contact all metals except tin and aluminum. These salts are primary explosives and are super sensitive. They also will cause the detonation of the picric acid.

To make picric acid, obtain some aspirin. The cheaper buffered brands should be avoided. Powder these tablets to a fine consistancy.To extract the acetylsalicytic acid from this powder, place this powder in warm methyl alcohol and stir vigorously. Not all of the powder will dissolve. Filter this powder out of the alcohol. Again, wash this powder that was filtered out of the alcohol with more alcohol but with a lesser amount than the first extraction. Again filter the remaining powder out of the alcohol. Combine the now clear alcohol and allow it to evaporate in a shallow pyrex dish. When the alcohol has evaporated, there will be a surprising amount of crystals in the bottom of the pyrex dish.

Take 40 grams of these purified acetylsalycilic acid crystals and dissolve them in 150 ml of sulfuric acid (98%, specific gravity 1.8) and heat to dissolve all the crystals. This heating can be done in a common electric frying pan with the thermostat set on 150 deg F. and filled with a good cooking oil. When all the crystals have dissolved in the sulfuric acid, take the beaker that you've done this dissolving in (600 ml), out of the oil bath.

This next step will need to be done with a very good ventilation system (it is a good idea to do any chemistry work such as the whole procedure and any procedure in this book with good ventilation or outside). Slowly start adding 58 g. of sodium nitrate or 77 g. potassium nitrate to the acid mixture in the beaker very slowly in small portions with vigorous stirring. A red gas (nitrogen trioxide) will be formed. (Caution: This red gas nitrogen trioxide should be avoided. Very small amounts of this gas are highly poisonous. Avoid breathing vapors at all cost!). The mixture is likely to foam up and the addition should be stopped untit the foaming goes down to

prevent the overflow of the acid mixture in the beaker.

When the sodium or potassium nitrate has been added, the mixture is allowed to cool somewhat (30-40 degC.). The solution should then be dumped slowly into twice its volume of crushed ice and water. Brilliant yellow crystals will form in the water. These should be filtered out and placed in 200 ml of boiling distilled water. This water is allowed to cool and the crystals are then filtered out of the water. These crystals are a very, very, pure trinitrophenol. These crystals are then placed in a pyrex dish and placed in an oil bath and heated to 80 deg C. and held there for 2 hours. This temperature is best maintained and checked with a thermometer. The crystals are then powdered in small quantities to a face powder consistancy.

These powdered crystals are then mixed with 10% by weight wax and 5% vaseline which are heated to melting temperature and poured onto the crystals. The mixing is best done by kneading together with gloved hands. This explosive should have a useful plasticity range of 0-40 deg C.. The detonation velocity should be around 7000 M/sec.. It is toxic to handle but simply made from common ingredients and is suitable for most demolition work requiring a moderately high detonation velocity. It is very suitable for shaped charges and some steel cutting charges. It is not as good an explosive as is C-4 or other RDX based explosives but it is much easier to make.

Again this explosive is very toxic and should be treated with great care. Avoid handling bare handed, breathing dust and fumes and avoid any chance of ignition. After utensils are used for the manufucture of this explosive retire them from the kitchen as the chance of poisoning is not worth the risk. This explosive, if manufactured as above, should be safe in storage but with any homemade explosive storage is not recommended and explosive should be made up as needed.

AVOID CONTACT WITH ALL METALS EXCEPT ALUMINUM AND TIN!!

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CHAPTER 8 - NITRO-GELATIN PLASTIQUE EXPLOSIVE

This explosive would be a good explosive for home type manufacturer. It is very powerful and is mostly stable. It's power can be compared favorable with the RDX based plastique explosives. The major drawbacks are the problems with headaches in use and its tendancy to become insensitive to a blasting cap with age. It is a nitroglycerin based explosive and therefore the manufacturer would need to be familiar with the handling of nitroglycerin and know the safety procedures associated with its handling. All of the explosive's bad points could be overcome through planning ahead and careful handling of its explosive components.

Gloves should be worn at all times during this explosive's manufacture and use. The nitro headache can be avoided by avoiding skin contact and avoidance of the the gases formed when the explosive would be detonated. This explosive would need to be made up prior to its use to ensure cap reliability and a high detonation rate. Nitroglycerin is sensitive to shock, flame and impurities. Any of these can and possibly would cause the premature detonation of the nitroglycerin. This is something to remember because the detonation of nitroglycerin is very impressive. Nitroglycerin, discovered in 1846, is still the most powerful explosive available.

This explosive is nitroglycerin made plastic by the addition of 7-9% nitrocellose. It is possible to make this nitrocellose but much more practical to buy it. It is available as IMR smokeless powder as sold by Dupont. It should be easily obtained at any area sporting goods store. To make this explosive, take 8% IMR smokeless powder and mix it with a 50/50 ether-ethyl alcohol mix until a uniform mixture is obtained. This should be a gummy, putty like substance which is properly called a collidon. To this collidon is added 92%, by weight, nitroglycerin.

This is very, very carefully mixed by kneading with gloved hands. In chapter 10, nitroglycerin and nitroglycol manufacture is covered. A uniform mixture should be obtained by this kneading.

THERE IS DANGER IMVOLVED IN THIS STEP AND THIS SHOULD NOT BE ATTEMPTED UNLESS THE MANUFACTURER IS WILLING TO TAKE THIS RISK.

This nitro-gelatin is then ready for use. It is not recommended that this explosive be kept for any length of time. It should be used immediately. If this is impossible the explosive can be stored with a relative degree of safety if the temperature is kept in thc 0-10 deg C. range. This explosive is a good choice if the RDX based plastique's cannot be made. The plastic nature of this explosive will deteriorate with age but can be made pliable again with the addition of a small percentage of 50/50 % ether-ethyl alcohol. The detonation of velocity of this explosive should be around 7700-7900 M/sec.. This is a good explosive for underwater or U.D.T. type demolition work.

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CHAPTER 9 - GELATIN EXPLOSIVES FROM ANTI FREEZE

This explosive is almost the same as the previous formula except it is supple and pliable to -10 deg C.. Antifreeze is easier to obtain than glycerin and is usually cheaper. It needs to be freed of water before the manufacture and this can be done by treating it with calcium chloride to the antifreeze and checking with a hydrometer and continue to add calcium chloride until the proper reading is obtained.

The antifreeze is filtered to remove the calcium chloride from the liquid. This explosive is superior to the previous formula in that it is easier to collidonize the IMR smokeless powder into the explosive and that the 50/50 ether-ethyl alcohol can be done away with. It is superior in that the formation of the collidon is done very rapidly by the nitroethylene glycol. Its detonation properties are practically the same as the previous formula.

Like the previous formula, it is highly flammable and if caught on fire, the chances of are good that the flame will progress to detonation. In this explosive as in the previous formula, the addition of 1% sodium carbonate is a good idea to reduce the chance of residual acid being present in the final explosives. The following is a slightly different formula than the previous one:

```
Nitro-glycol              75%
Guncotton (IMR smokeless)  6%
Potassium nitrate         14%
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Flour (as used in baking)  5%
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In this process, the 50/50 step is omitted. Mix the potassium nitrate with the nitroglycol. Remember that this nitroglycol is just as sensitive to shock as is nitroglycerin. The next step is to mix in the flour and sodium carbonate. Mix these by kneading with gloved hands until the mixture is uniform. This kneading should be done gently and slowly.The mixture should be uniform when the IMR smokeless powder is added.

Again this is kneaded to uniformity. Use this explosive as soon as possible. If it must be stored, store in a cool dry place (0-10 deg C.). This explosive should detonate at 7600-7800 M/sec.. These last two explosives are very powerful and should be sensitive to a #6 blasting cap or equivalent. These explosives are dangerous and should not be made unless the manufacturer has had experience with this type compound. The foolish and ignorant may as well forget these explosives as they won't live to get to use them. Don't get me wrong, these explosives have been manufactured for years with an amazing record of safety. Millions of tons of nitroglycerin have been made and used to manufacture dynamite and explosives of this nature with very few mishaps. Nitroglycerin and nitroglycol will kill and their main victims are the stupid and foolhardy. This explosive compound is not to be taken lightly. If there are any doubts ... DON'T.

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CHAPTER 10 - NITROGLYCERIN AND NITROGLYCOL MANUFACTURE

Glycerin and ethylene glycol are related chemically to one another and are grouped as alcohols. Both of these oily substances can be nitrated to form a trinitro group. These trinitro groups are both unstable and will explode with tremendous violence and power. Impurities in this form of the substance will also cause the decomposition of the oil. Glycerin is used for soap manufacture and should be easily bought without question.

Ethylene glycol is sold as common antifreeze and should be easily acquired. Ethylene glycol renders a better product and would be the item of choice plus the manufacture of plastique explosives from this oily explosive is much easier than from the glycerin nitro form. If ethylene glycol is used, it is easier to buy the anhydrous form than to dessicate the water from the antifreeze version of this chemical. The glycerin is also best if bought in its anhydrous form. The use of the anhydrous form (water free) prevents the watering down of the nitration acids and thus gives a much higher yield of the final product. This nitration is achieved by the action of an acid mixture on the glycerin or glycol. This acid is composed of the following :

```
Nitric acid (70%)   30%
Sulfuric acid (98%) 70%
or
Nitric acid (100%)  38%
Sulfuric acid (98%) 62%
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Of course, this is by weight as all the percentages in this book. The first acid mixture won't give as good a yield of nitro compound as the second acid mixture. The first acid strength is the only

one that is readily availabie and be bought readily. The 100% nitric acid is however readily made and is really worth the extra trouble because the yield of nitroglycerin or glycol is so much higher. The actual nitration should be carried out in a glass (pyrex) or enameled steel container.

The acids are poured into the container. First the sulfuric and then the nitric very slowly. A great deal of heat is generated by this acid mixing. This container should have been previously placed in a salted ice bath. A thermometer is placed in the acid. A stirring apparatus will need to be rigged up. This will be stirred with a fish tank aerator and pump. This compressed air is the only thing that's really safe to stir this mixture as nitration is taking place.

As the acid mixture cools, a weight of glycerin or glycol should be measured out. For glycerin, it should equal to 1/6 the total weight of the acid mixture. For the glycol, it should also equal 1/6 of the total weight of the acid. When the temperature of the acid mixture reaches 0-5 deg C., the addition of the glycerin or glycol is begun after the mixed acids have begun being stirred by the air. Again this agitation of the mixed acids is very important. It will create a gradual rise in temperature and ensures the complete nitration of the glycerin or glycol as it is added.

The glycerin-glycol is added in small quantities with a careful eye kept on the temperature of the acids. If at any time, the temperature of the acids rises above 25 deg. C., immediately dump the acid-glycol-glycerin into the ice bath. This will prevent the overheating of the nitroglycerin or glycol and its subsequent explosion. If the temperature rises close to the 25 deg C. mark, by all means, stop the addition of the glycerin or glycol. Wait until the temperature starts to fall before continuing the addition.

The glycol will generate more heat during the nitration than will glycerin. The ice bath may need more ice before the reaction is complete, so add when necessary. After the addition of the glycerin or glycol is complete, keep the agitation up and wait for the temperature of the glycerin to fall to 0 deg C.. Stop the agitation of the mixed acids and the nitroglycerin. Let the mixture set. Keep a watch on the temperature just in case.

A layer of nitroglycerin or nitroglycol should form on top of thc acid mixture. This should be removed with a glass basting syringe. Carefully place this with its own volume of water (distilled) in a beaker. To this add small quantities of sodium bicarbonate to neutralize any acid remaining in the nitro compound. In all steps with this nitro oil, keep the oil at ten degrees C. or colder for the glycol.

When the addition of the bicarbonate no longer causes a fizzing (reacting with the excess acid), check the water-nitro with litmus paper. The reading should be around 7. If it is below 6.5, add more bicarbonate until the reading is seven or close to it. The nitroglycerin or nitro glycol should be settled. It should again be sucked up off the bottom into the clean basting syringe (glass).

USE EXTRA CAUTION WHEN HANDLING THIS NITROGLYCERIN OR NITROGLYCOL, BECAUSE THE SLIGHTEST BUMP OR JAR COULD POSSIBLY EXPLODE. WHEN SUCKING THIS OIL OFF THE BOTTOM OF THE WATER, DO NOT BUMP THE BOTTOM WITH THE TIP OF THE BASTING SYRINGE.

If neccssary, suck up some of the water and remove it from the nitroglycerin or glycol with forceps and small pieces of calcium chloride. The calcium chloride is placed in such a way that it only contacts the residual water in the nitroglycerin or nitroglycol. To make this oil safer to

handle, add acetone to the nitroglycerin or glycol in the following proportions:

acetone	25%
nitroglycerin or nitroglycol	75%

This will make the oil less sensitive to shock, etc.. This oil when so mixed will still be sensitive to a #8 blasting cap. Remember that the oil contains this acetone when measuring out the oil to be used in other explosives. It may be mixed in the formulas that call for nitroglycerin or nitroglycol and will usually improve the incorporation of these mixtures. To obtain maximum cap sensitivity the acetone should be allowed to evaporate before use of the finished explosive compound.

This oil should not be stored if at all possible. But if completely necessary, store in a cool or cold, dry, place when it is free of acidity. Acidity in this oil can cause the explosive decomposition of this oil in storage.

This oil, if handled or the fumes breathed, will cause tremendous headaches and should be avoided at all costs. They are cardiovascular dialators when contacted and extreme care should always be used when handling these explosives.

As stated earlier, these explosive oils have been produced in large quantities and therefore should be reasonably safe. This manufacture process should never be tried by someone that is unfamiliar with chemistry, chemistry lab procedure, and the explosive compounds produced and their dangers.

Nitroglycerin and nitroglycol detonate at approximately 6700-8500 M/sec. depending on the power of the detonators - the stronger, the higher the velocity.

Well that's about it. Good luck and hope you enjoyed the info.

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GUN COTTON

Gun cotton is one of the first modern explosives used in war. Nitroglycerin was more powerful, but much more dangerous to use. And, of course, it was one of the first real substitutes for black powder as a weapons propellant. You can nowadays buy military surplus smokeless powder (gun cotton) from any number of sources for about $8-10 a pound. Probably cheaper than you can make it, and definitely of much more uniform quality and strength than you could make at home. If you buy smokeless powder to use for this, make sure that it's single and not double based powder. Double based contains nitroglycerin which will make you sick as a dog if you touch it. Single based is harmless to touch.

The information here came mainly from an old book called "Compressed gun cotton for military use with an introduction on Modern gun cotton, its manufacture, properties and analysis" by Max von Förster, 1886. It's presented as it is for the most part. Some archaic terminology and irrelevant information has been changed or deleted.

Also presented is a patent for making various types of explosives and propellants from smokeless powder. It's been edited for clarity and conciseness. You can see the whole patent here

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PREREQUISITES FOR QUALITY GUN COTTON

1. The cotton must be pure white absorbent cotton.
2. The strongest acids available must be used. 1 part, by weight, nitric acid of specific gravity 1.485 and 3 parts sulphuric acid of specific gravity 1.84, the total weight of acid being 20 times that of the cotton.
3. After the first immersion, which lasts only a few minutes, the cotton must be steeped in a fresh mixture of acids in the same proportion.
4. The steeping must be continued for 48 hours.
5. The gun cotton must then be squeezed and thoroughly purified by washing in a stream of running water for several weeks, dipped in a solution of sodium carbonate (or baking soda) and again washed.

Unless these precautions are observed the products are not uniform. If any acid is left in the gun cotton it is liable to spontaneous decomposition, hence the need for careful washing.

The sulphuric acid acts simply to absorb the water already present in the commercial nitric acid and also that produced in the change, and thus serves to keep the nitric acid concentrated.

THE PROCESS

The acid mixture consists of 3 parts by weight of sulphuric acid, specific gravity of 1.84, to 1 part nitric acid, specific gravity of 1.48. The acids are slowly mixed together in small amounts and the mixture is allowed to stand for several hours to become cold.

About 12 gallons of the acid mixture is drawn off into a deep stoneware pan standing in cold water. The

cotton, when cold, is weighed out in quantities of 1 lb. each, carried to the dipping pan and immersed, a pound at a time, in the acid, and stirred about for two or three minutes. It is then placed on a grate or perforated shelf, attached to the pan, the excess of acid is squeezed out with the stirrer and the cotton allowed to drain. Enough acid is added from the acid bottle to replace that which has been absorbed by the cotton, and more cotton is treated in the same way.

The cotton is next transferred to pots well covered, standing in a shallow trough containing water, and is covered with about 10 or 15 times its weight of acid, and allowed to remain about 48 hours.

The gun cotton is now washed by a stream of water and whirled about in the water in the washing vessel, so that it comes in contact with a large quantity of water, and its temperature is not raised appreciably. It is again drained in the centrifugal machine and the washing repeated. It is then soaked in stirring tanks for two or three weeks, and afterwards boiled in large vats. The purified gun cotton is transferred to the blender were it is shredded to a fine pulp and then transferred to another tank where it's washed for another 48 hours in warm water with frequent stirring. The water is drawn off and renewed until the gun cotton passes the heat test which is now applied.

The pulp is now mixed with a little sodium carbonate It is then drained and a measured quantity placed in the cylinder of a hydraulic press, through the perforated bottom of which most of the water is drawn off by a suction pump, and the press is then applied. It is pressed again in a more powerful press, and is thus obtained in the form of disks or cylinders of various sizes, having a density of 1.1 or 1.2, which are afterwards soaked in water until they contain about 25 per cent. of that liquid.

Granulated gun cotton is made by placing the pulp from the blender in a centrifugal machine, where its water is reduced to 33 per cent and the gun cotton is made fibrous, and then passing it through sieves, which break it into granules. It is then revolved for half an hour in a drum, mounted on a horizontal axis, for fifteen minutes, the drum revolving fast enough to cause the granules to roll rapidly down its surface, but not so fast as to carry the granules around with it.

You could also make them by taking a chunk of pressed dry gun cotton and roll it into a ball in your hands.

TESTING FOR QUALITY

The finished gun cotton is examined by the following tests:

1. The density must be over 1.
2. The moisture is determined by drying it at 60' C.
3. The combustion of 2 grams of gun cotton must leave a residue less than 0.08 grams in weight.
4. The gun cotton should dissolve entirely in ethyl acetate, which would leave unconverted cotton undissolved.
5. Fifty grains of the gun cotton should suffer little loss in weight when heated for two or three hours with four ounces of a mixture of 1 volume alcohol (40%) and 2 volumes distilled ether, which would dissolve any collodion cotton.
6. 4 grains are heated in a test tube placed in an oil bath, and containing a slip of paper moistened with a solution of potassium iodide and starch. No tinge should be imparted to the paper till the temperature of the oil reaches 88' C

7. Four grains, heated as above, should give no visible brown tinge below 175' C.
8. One grain is heated in a test tube, placed in an oil bath, till it explodes, which should not happen below 179'

PROPERTIES

Gun cotton resembles cotton wool in appearance, but is harsher to the touch; it becomes powerfully electric when rubbed, crackling and phosphorescing, and emitting sparks in the dark. It remains unaltered in contact with water, and can be worked and stored in the wet state without danger. On ignition it burns quietly when dry and leaves no residue; wet gun cotton is not combustible. Gun cotton is insoluble in alcohol and ether or a mixture of the two, but is dissolved by acetic ether and by a mixture of ordinary ether with ammonia. Strong sulphuric acid dissolves it without carbonization, strong potash lye will also dissolve it, especially if heated to 70' C. A solution of potassium sulphydride reduces it to cellulose. When properly prepared it remains unaltered-it has been kept stored for 12 years without chance.

Dry gun cotton inflames by percussion, but is never exploded, even by the passage of a bullet fired at short range, unless confined. Its explosive effect is greatest when detonated by means of a primer of mercury fulminate, in which case no confinement is necessary. The rate of propagation of the detonation in a mass of dry compressed gun cotton is about 5,500 meters per second.

Wet gun cotton is not affected by percussion, and can be detonated only by the detonation of an amount of dry gun cotton bearing a certain ratio to the weight of wet gun cotton employed. Its explosive effect is much greater than that of dry gun cotton.

The temperature at which gun cotton explodes when heated is about 179' to 181' C., under the most favorable circumstances, but usually a much higher temperature is required. The temperature resulting from the explosion is about 4400' C. One gram of gun cotton, on explosion, gives a quantity of gaseous products calculated to occupy at O' C. and 760 mm. Hg, 753 c.c., which, at the temperature of explosion, would be expanded to 12,889 c.c. The pressure produced by the detonation is estimated at 160 tons per square inch.

Cylinders about 3 inches long and 2.5 inches in diameter weigh 1 lb. Cylinders 30 mm. high and 25 mm. in diameter, with a central canal 5 mm. in diameter, weigh 25 grams dry.

USING GUN COTTON AS AN EXPLOSIVE

Dry gun cotton is much easier to detonate than wet gun cotton, but it's not as powerful. And trying to compress a large quantity of gun cotton to the required density is a pain. The solution the book presented was to take granulated gun cotton (large granules over 1 inch cubed), fill the container with the granules, and then fill the gaps with melted paraffin wax to consolidate it into a single mass. Then a primer of dried granules (about 20% by weight of wet granules) is placed into the container, gaps filled with wax, and it is this that is primed with the detonator.

An important detail about the granules is that they are taken damp from the tumbler that's granulated them and dipped in acetate to form a tough skin on the outside of the granules to keep them moist inside. Buying amyl acetate is an option, but you can buy a product that is perfect for this called "Big D Lemon Room Deodorant", product #346. It's manufactured by Big D Industries, Inc, Oklahoma City, OK, 73148.

It's a mixture of ethyl and amyl acetate dissolved in isopropanol. Available from institutional suppliers.

Once you have your granules ready, put them on a tray and spray them till they're wetted with the lemon spray. Let it evaporate to dryness. Make sure you get all sides and ends.

PATENT # 3,969,167

(NOTE: the term "measured parts" as used herein is meant as parts by volume. Dimethyl ketone is probably acetone.)

This invention relates to explosive compositions which have a number of advantages over those previously available.

Virtually any single base or double base nitrocellulose may be employed in making these compositions. Also, mixtures of single base and double base nitrocellulose may be employed.

The procedure by which the compositions of the present invention are made will depend to some extent upon the character of the nitrocellulosic constituent employed and the properties wanted in the final composition. Thus, the nitrocellulose can in some cases be combined directly with the ketone or ketone derivative. Typically, however, from 1 to 100 measured parts of a C_1C_6 alcohol per 8 measured parts of nitrocellulose (In parts by weight the explosive compositions of the present invention will typically include from 1 to 100 parts of the ketone constituent and, optionally, from 1 to 100 parts of alcohol per 100 parts of nitrocellulose.) will first be added to the nitrocellulose at room temperature and allowed to stand to dissolve from the nitrocellulose any coating it may have. Thereafter, the excess alcohol may be poured off and the ketone constituent added.

(I have also made explosive compositions in accord with the present invention in which neither the alcohol nor the coating freed from the nitrocellulose were removed before the ketone constituent was added.)

This constituent is mixed with the treated nitrocellulose at room temperature in a vessel of polyethylene or other material which is inert with respect to its contents. The addition of the ketone constituent is accompanied by an increase in the temperature of the mixture (typically on the order of 25.degree.C) which would indicate that exothermic chemical reactions are taking place. At the same time the nitrocellulose decomposes into a stringy mass and increases in bulk.

(The temperature rise and ultimately the characteristics of the final product can be controlled by varying the amount of alcohol present when the ketone constituent is added. In tests in which all of the alcohol was first removed, temperature rises as high as 50.degree.C. were observed.)

The consistency of the material continues to change as the stirring is continued. At the end of approximately one hour, it becomes a soft, plastic, homogeneous mass of reacted material which can be molded, extruded, etc. The material can be retained in this form indefinitely by keeping it in an oxygen-free environment with appropriate packaging. This makes these compositions useful as plastic explosives and also permits them to be formed into propellant grains and other shapes long after they are initially made.

If the plastic material is converted into granules, pellets, etc., they can be dried to a very high strength simply by exposure to air at room temperature(Air drying at ambient temperatures will typically take from 1/2 to 48 hours). Or, to speed the drying process, air heated to a temperature of not more than 300.degree.F. can be circulated into heat transfer relationship with the explosive composition.

Infrared and ultraviolet drying can also be employed although care must be exercised to insure that the flash point of the material being dried (typically at least 550.degree.F.) is not exceeded. This may require that the radiant source be placed up to two feet away from the drying material.

Before it is dried, the composition can be washed in hot water, if desired, to remove any residues which may be present. This step is normally optional, however, and can generally be omitted without adverse effects on the final composition.

If stirring is continued for periods on the order of 24 hours, the nitrocellulose material will assume a syrupy, laquerlike consistency (the viscosity can further be controlled by the amount of ketone used) and can be sprayed, cast onto a glass or plastic surface to form a sheet or film, or cast into blocks, etc. or into shells, bomb casings, or the like. The composition can then harden to a solid by exposure to air at room temperature, heated air or by infrared like those more viscous or plastic forms of the composition. The less viscous formulations can also be kept in their unhardened state indefinitely by keeping them in an airtight container.

One of the major advantages of the present invention is its versatility.This explosive compositions can be made in a variety of physical forms ranging from plastic through granular and extruded forms to cast configurations. Also, the ignition and detonation rates can be varied over a wide range, making various forms usable as propellants, high explosives, and as pyrotechnics.

Following the process outlined above will produce compositions useful as propellants (Propellants can be ignited with conventional primers or by electric sparks.). The characteristics of the propellant can be varied to optimize its performance in a given application by a variety of techniques. One variable is of course the nitrocellulosic material which is employed. Variations in ignition rates can be obtained by employing double as opposed to single base nitrocelluloses, coated rather than uncoated materials, etc.

Variations in ignition rates can also be obtained by using a particular alcohol or by altering the amount of alcohol added to the nitrocellulose or the time it remains in contact with the nitrocellulose (I have satisfactorily varied this time from approximately 95 seconds to 48 hours) as well as by altogether omitting the step of removing the coating from coated nitrocelluloses before the ketone constituent is combined with the nitrocellulose.

Materials made as described above can also be used as high explosives although they are relatively insensitive and must be detonated by a Composition B or other high energy booster. Commonly, therefore, I modify the basic ketone/nitrocellulose composition if it is to be used as a high explosive One way in which this may be done is to add from 1/4 to 2 measured parts of diethyl ether per 8 measured parts of nitrocellulose to the nitrocellulose after the addition of the ketone constituent. The resulting compositions can be detonated by a blasting cap or detonating cord and have great explosive power.

Useful high explosives may also be made by mixing other explosives such as PETN, picric acid and its derivatives, TNT, etc. The explosive or explosives may be used in amounts ranging from 1 to 100 percent based on the weight of the composition of the present invention. The proportions of the two constituents can be varied although I typically use equal parts of them.

Other additives that can be incorporated to produce useful high explosives are powdered metals include zinc, aluminum, magnesium, and bronze and oxidizers including ammonium and alkali metal chlorates and nitrates such as potassium chlorate and ammonium, potassium, and sodium nitrates. Such additives can be employed in various combinations and amounts ranging from 1 to 100 percent by weight of the basic composition and can also be used in admixture with TNT or other high explosives.

Another important advantage of these explosive compositions is that they have a high strength factor when hardened and do not crumble or otherwise disintegrate like many propellants and high explosives. This property makes them unusually valuable in caseless ammunition and similar applications.

Yet another important advantage of the present compositions is that they are not hygroscopic, have a high degree of resistance to moisture, and can indeed be made entirely waterproof, if desired. These properties are advantageous in many applications, but are particularly important in that they make the compositions particularly satisfactory as underwater explosives and in adverse weather conditions.

A further important advantage is that they leave virtually no residue (less then 0.01 percent) when ignited or detonated, which clearly distinguishes them from other nitrocellulose propellants and explosives. This lack of residue is significant for several reasons.

First, the lack of residue is because the compositions are very efficient; that is, they have a greater energy release per unit weight than other nitrocellulose or conventional explosives, which typically liberate only 50-60 of their theoretically available energy when they are detonated. Also, the lack of residue reduces the amount of cleaning and prolongs the life of gun barrels, especially those of larger calibers. Further, the lack of residue means that there is no smoke when the composition deflagrates or detonates, a property which is important in military applications and which distinguishes these compositions from TNT, Composition B, Composition C4, etc.

As suggested above, another significant advantage of these high explosive compositions is that they are relatively insensitive although they can be readily detonated (for example, they are not detonated by small arms fire). These compositions are also not susceptible to sympathetic detonation. They are, moreover, stable and do not deteriorate in storage unlike conventional explosives such as dynamites, nitroglycerins, TNT, and others which become unstable over a period of time; with temperature changes; and also, if they freeze. (Explosive compositions as described have been held at temperatures as low as -10.degree.F and also submerged in near boiling and freezing water for extended periods of time without loss of stability or energy release.)

A related and also important advantage is that, unlike conventional explosives, the compositions are not susceptible to partial detonation (meaning that only part of it explodes and the rest is scattered around). This is also of obvious importance from the safety point-of-view. A further related advantage is that these compositions do not present the fire hazard of conventional explosives because of their insensitivity to temperature changes.

Also, the manufacturing does not involve the presence or formation of any unstable compounds or complexes or any highly exothermic reactions. Consequently, they can be produced without the hazards associated with the manufacture of conventional high explosives.

Yet another important advantage is that they are relatively inexpensive to manufacture and store. The constituents are relatively inexpensive, and the manufacturing process does not require the customary elaborate safety precautions as mentioned above. Similarly, elaborate storage procedures are not needed

because of the insensitiveness to large temperature changes, sympathetic detonation, etc. possessed by such compositions and their high moisture resistance.

These compositions do not react with or adhere to polyethylene or similar polymers. This also contributes to ease of manufacture and packaging.

This invention has the following advantages:

1. Can be easily and economically manufactured and stored.
2. doesn't present a high hazard in the manufacturing process or in storage.
3. Presents a much lower fire hazard than conventional high explosives.
4. Is made from relative non-hazardous materials by a process which does not involve the formation of dangerous intermediates or violent chemical reactions
5. Is insensitive though easily detonated, not susceptible to sympathetic detonation, and stable, even under wide variations in temperature and in the presence of moisture.
6. Can be prepared in a wide variety of physical forms.
7. Is water resistant or waterproof and are therefore well-suited for applications where moisture or water are present such as underwater blasting and demolition and for use in adverse weather conditions.
8. Can be readily modified to optimize their properties for different applications.
9. Can be stored indefinitely in a liquid or plastic form.
10. Is highly efficient.
11. Leaves only a negligible residue of non-corrosive character and which cause only minimal erosion of gun barrels and the like when used as propellants.
12. Have significantly greater physical strength than typical conventional explosives.
13. Isn't susceptible to partial detonation.

EXAMPLES

EXAMPLE 1

A propellant for caseless ammunition was made by adding 125 mls of ethyl alcohol to 8 ounces of a double base nitrocellulose (DuPont 4831) with stirring at room temperature. The mixture was allowed to stand for 95 seconds and the excess alcohol (approximately one-half of the original amount) was then poured off.

The nitrocellulose with the remaining alcohol was transferred to a polyethylene reactor equipped with an agitator. 125 mls of dimethyl ketone was added and the reactor sealed to isolate it from the ambient surroundings.

The agitator was then started with the reactor and contents at room temperature. The temperature of the mixture rose rapidly to 25 degrees C above room temperature, remained at this temperature for a short period of time, and then returned slowly to room temperature.

Stirring was continued for 1 hour with the nitrocellulose mixture first becoming stringy and fibrous and

then turning into a plastic, homogeneous mass. At the end of the one hour period, portions of the resulting composition were transferred to 0.361 inch diameter molds. A pressure of 35,000 pounds was applied for 95 seconds with a ram and piston.

This produced pellets which were removed from the molds, dried, and attached to the bases of 9 mm bullets. The bullets were fired through an eight inch test barrel.

The mean muzzle velocity of the rounds which ignited was 1048 feet per second, a surprisingly high velocity for caseless ammunition. None of the propellant pellets suffered any physical deterioration while being handled.

EXAMPLE 2

In a procedure similar to that described in Example 1, 1 pint of ethanol was mixed with 1 pound of nitrocellulose (DuPont 4831). The mixture was allowed to stand for 4 hours. One-half of the mixture was then added with stirring to one-half pint of dimethyl ketone and the stirring continued until a dark, viscous mixture formed. The remaining nitrocellulose/alcohol mixture was then added with stirring, producing a substance with the consistency of a commercial laquer which could not be detonated with a blasting cap or ignited by a match.

Samples of the laquerlike substance were exposed to air at approximately room temperature. After approximately 5 minutes, the composition had assumed a plastic or putty-like consistency and could readily be extruded, molded, and otherwise formed into different shapes. At this stage the composition would burn slowly but still could not be detonated with a blasting cap.

EXAMPLE 3

A composition as described in Example 2 was extruded through a die under 3500 psi into flat sheets. These sheets were cut into flakes, producing a propellant which resembled a conventional powder. 10 gauge shells were loaded with 30 grains of this propellant and 1 7/8 ounces of shot. These rounds produced velocities significantly greater than those obtained from conventional loads.

EXAMPLE 4

A propellant as described in Example 2 was extruded under 35,000 psi through a die having a 0.067 inch cylindrical opening. The extrusion was cut into pellets weighing 30 grains. Shotshells loaded with these pellets also produced higher velocities than conventional shotshell loads of the same gauge.

EXAMPLE 5

To further demonstrate the invulnerability to moisture of these compositions, a powder as described in Example 3 was soaked in water for several hours. The powder was then removed and excess water shaken off. Shells were then loaded with the powder as in the tests discussed in Example 4 and the shells fired. There was no discernable deterioration in the performance of the rounds.

EXAMPLE 6

In yet another test demonstrating the unique water resistance of these compositions, a 1 pound block of composition prepared as described in Example 1 and then molded and dried was left outside in an exposed location for an entire winter season. The block was then retrieved and inspected. There was no

significant visible sign of deterioration.

The block of explosive was then detonated. It detonated completely and with as much energy release as comparable blocks which had not been exposed to the elements.

EXAMPLE 7

As mentioned previously, compositions of the type disclosed herein can be washed to remove residues before they are dried, if desired. Thus, a sample of material prepared as described in Example 1 was washed with hot water at the rate of 1 gallon of water per pound of composition to remove excess alcohol and ketone and then dried. The resulting material was similar in appearance to that dried in air without washing except for greater surface porosity; its explosive properties were comparable to those of the unwashed composition.

EXAMPLE 8

As indicated above, one of the important advantages of these compositions is that they can be kept in a plastic or even less viscous form for indefinite periods if they are isolated from air. To demonstrate this, a sample of a plastic composition as described in Example 1 was sealed in an evacuated container to isolate it from air. After 12 months the plasticity of the composition had not changed to a detectable extent. This verifies that the compositions are useful as plastic explosives and for other applications where it is an advantage to be able to form the propellant or explosive to shape long after the composition has been prepared.

EXAMPLE 9

To demonstrate the preparation of another particularly important form into which compositions of the type disclosed herein may be made a composition according to the present invention was prepared as described in Example 1 except that the reaction mixture was stirred for 2 hours and the amount of acetone was increased to 1000 mls. At the end of the 2 hour period the nitrocellulose/alcohol/ketone composition had the consistency of a commercial laquer.

A portion of the composition was poured onto a polyethylene plate. A second sheet of polyethylene was pressed on the explosive composition to make its thickness more uniform; and the composition was allowed to harden. The resulting film or sheet was released from the plate by contacting it with steam (hot water may also be used as a release agent).

This sheet type propellant is useful in conventional munitions and, especially, in rocket motors and mortar ammunition.

EXAMPLE 10

Another technique which can be used for forming compositions of the type described in the preceding example into usable configurations is spraying. A sample of the liquid composition was sprayed into air at high pressure (500 psi). The liquid dried upon contacting the air, forming a fine grain powder with irregularly shaped particles which are useful for a variety of purposes.

EXAMPLE 11

A high performance solid rocket propellant can be made by mixing 40 parts by weight of glycerin with

100 parts by weight of a plastic explosive composition as described in Example 10, molding the mixture into the desired configuration, and allowing the mixture to harden. The solid propellant produced gas pressures of 50,000 psi, well above those which can be obtained from conventional solid rocket propellants.

EXAMPLE 12

As a variation of the technique described in Example 10, the liquid composition can be dropped through a screen into air. The result will be spherical particles; i.e., a ball type powder which can be used in smaller caliber munitions typically with a deterrent coating to control its burning rate.

EXAMPLE 13

To demonstrate the unusually high efficiency of these compositions as well as their utility as underwater explosives, one and one-quarter pounds of composition prepared as described in Example 1 was molded into a block and allowed to harden. An 18 inch deep hole was dug in highly compacted sand in a location in which ten inches of water was standing. The charge was placed in the hole, tamped, and detonated with a high energy booster and an electric blasting cap. The explosion produced a conical crater 8 feet in diameter and approximately 10 feet deep. The crater was free of debris.

EXAMPLE 14

As indicated previously, useful high explosives can be made by mixing conventional explosives with these compositions. To demonstrate this, equal parts by weight of TNT and a plastic composition prepared as described in Example 1 were thoroughly mixed. The resulting formulation was readily detonated with a high release of energy by an electrically primed booster.

EXAMPLE 15

In a similar test 1 part by weight of TNT and 2 parts by weight of powdered aluminum were mixed with 10 parts by weight of explosive composition of the formulation of Example I. This resulted in a plastic high explosive which could be molded to shape and then readily detonated with a high energy release.

EXAMPLE 16

In another test designed to illustrate the versatility of these compositions, a slurry type explosive was made by dissolving 4 measured parts of explosive composition as described in Example I in 3 measured parts of acetone and blending 1 1/2 measured parts of ammonium nitrate into the solution. This explosive was also readily detonated with a high energy, electrically primed booster; the efficiency of the explosive was again high.

EXAMPLE 17

In yet another test dealing with high explosive formulations, 20 parts by weight of powdered aluminum was mixed with a portion of composition in accord with the present invention having a laquerlike consistency. The mixture was blended with a composition prepared as described in Example 1 in a bladed mixer while the composition was plastic (the explosive composition totalled 80 parts by weight). A noticeable increase in the density of the plastic material occurred.

The mixture was then shaped and hardened by exposing it to air (it will stay plastic if kept in an airtight

container). The result was a powerful, waterproof high explosive which was particularly satisfactory for underwater demolitions and blasting.

EXAMPLE 18

Example 17 was repeated using 15 parts by weight of TNT and 15 parts by weight of powdered magnesium in the stead of the aluminum. The resulting explosive proved to be particularly well suited for quarry blasting.

EXAMPLE 19

Example 17 was repeated, substituting 70 parts by weight of nitrocellulosic composition and 30 parts by weight of powdered magnesium for the aluminum. This produced an explosive which is a good general purpose blasting agent.

EXAMPLE 20

High explosives which can be detonated by a blasting cap alone (i.e., without a booster) can be made by incorporating ether in the basic compositions of the present invention as discussed above. This was demonstrated by making an explosive in accord with the procedure of Example 1 except that 4000 mls of acetone and 250 mls of ether were added to the nitrocellulose/alcohol mixture while the nitrocellulose was being dissolved in the ketone. Also, stirring was continued for two hours until the characteristic homogeneous plastic mass formed. The plastic mass was molded to shape and hardened by drying in air. The resulting high explosive could be readily detonated by a number 6 blasting cap and also by detonating cord. Ether can also in some cases advantageously be added as described above to the nitrocellulose, ketone or ketone derivative mixture (whether or not it contains alcohol), in making explosive compositions of propellant character. The ether will give the grains, pellets, or other forms into which the composition is shaped a roughened surface texture. This facilitates ignition of the propellant as well as uniform burning.

EXAMPLE 21

As indicated previously, the removal of the coating from coated nitrocelluloses is not essential in the practice of the present invention. To demonstrate this, 1 pound of single base nitrocellulose was added with stirring to one-half pint of dimethyl ketone. The stirring was continued for 2 hours, turning the mixture into a gelatinous mass.

The composition was then formed into a propellant and loaded into shotshells as described in Examples 4, which were fired with similar results.

EXAMPLE 22

As discussed above, the compositions of the present invention may be treated by a number of techniques to impart particular properties to them or to optimize their propeties for specific applications. To illustrate this, high explosives and propellants having a formulation as described in Example 1 were coated with a material consisting of 25 percent colloidon, 40 percent polyethylene polymer, 15 percent graphite, and 20 percent ether. This coating fireproofed the explosives and propellants.

EXAMPLE 23

In a somewhat related test, propellant compositions as described in Examples 10 and 12 were coated with a mixture of 74.5 percent diphenylamine, 1 percent dinitrotoluene, and 23.5 percent graphite. This coating controlled the burning rate of the grains and granules and made them burn more uniformly.

EXAMPLE 24

To demonstrate that the nature of the ketone constituent employed in these explosive compositions is not critical as long as it is within the class specified above, and to further illustrate the variations in the proportions of the ingredients which will produce satisfactory results, a composition was prepared following generally the procedure described in Example 15 from the following ingredients:

```
Nitrocellulose (DuPont 4831) 25 Pounds
Acetone 30 Pounds
Ammonium Nitrate 50 pounds
Aluminum 1 pound
```

18 pounds of this explosive was detonated at ground level with a high energy booster, producing a fireball approximately 10 feet in diameter and 12 feet high. Shock waves resulting from the detonation were detected at a location approximately 10 miles from the site of the detonation.

This particular type of composition is well suited for military applications. It is, in this regard, much more powerful than widely used military explosives such as Composition B.

Explosive and Propellant Composition #1

An explosive and propellant composition is obtained by mixing finely powdered ascorbic acid and a nitrate-containing oxidation agent, such as potassium nitrate.Mixing can be carried out dry at room temperature. The composition upon ignition gives off no sulfurous fumes, and leaves little or no carbon residue; and causes no corrosion with contacted metal surfaces.

It has been known that compositions having explosive or propellant properties can be prepared from organic or inorganic nitrates. For instance, conventional gunpowder also referred to as black powder, is typically composed of sulfur, potassium nitrate and charcoal. Other combustible compositions which are utilizable as ammunition, explosives or propellants also contain nitrates as the oxidizer portion of the composite blend. Usually, ammonium nitrate or alkali metal nitrates are employed as preferred oxidizers in many such applications.

The present invention is based on the discovery that mixtures of ascorbic acid and a nitrate-containing oxidation agent (or "oxidizer") provide a novel composition which is useful, as a dry powder or in a compressed shape, in various explosive or propellant applications.

The composite blend of this invention offers the advantages of simplicity and greater safety in its mode of preparation. Unlike certain previous explosive-propellant mixtures, the present composition is prepared without degrading the ascorbic acid. Mixing and blending of the ingredients at room temperature, without any degradation or pre-degradation step, produces a consumable material which upon ignition burns cleanly, emits no sulfurous fumes, leaves little or no carbon residue, and is non-corrosive to contacting metal surfaces. Further, the composition has less tendency to absorb moisture upon standing and can be stored for extended periods without the necessity for the extraordinary precautions a more hygroscopic material would require.

Before use in preparing the composition of this invention, the ingredients may be ground or otherwise reduced in size from the particle size of the powder or crystals sold commercially. Experience has shown that smaller particle sizes for the ascorbic acid and nitrate-containing oxidizer often result in better ballistic performance, with particle sizes of 10 microns or less being preferred. Comminution of the particles may be accomplished by mechanical milling. Alternatively, the ingredients may be dissolved individually in an aqueous or organic liquid medium and precipitated from the medium in the form of more finely divided particles.

In one procedure which is applicable to this invention, potassium nitrate crystals of greater than 10 microns in size are dissolved in water at temperatures of 60.degree.-65.degree. C., and the aqueous solution is poured quickly into vigorously stirred acetone cooled to 0.degree.-10.degree. C., resulting in the precipitation of particles of potassium nitrate of 10 microns or less, which are then filtered, washed and dried.

The relative proportions of the ascorbic acid and nitrate-containing oxidation agent can vary widely in the composition, depending on specific applications and particular requirements for such applications. In general, the weight ratio of the ascorbic acid to nitrate-containing oxidation agent will vary between 10:90 and 50:50, and more usually between 20:80 and 45:55.

For ballistic applications especially, it has been found that best results are achieved when the ascorbic acid and nitrate-containing oxidizer are utilized in amounts which are stoichiometrically balanced, or nearly so. For such applications, an especially suitably composition will comprise from about 30 to about 45 grams of ascorbic acid and from about 70 to about 55 grams of potassium nitrate, for each 100 grams of the two ingredients combined.

As the nitrate-containing oxidizer it is preferred to use an alkali or alkaline earth metal nitrate or ammonium nitrate These nitrates can be employed individually or in various combinations. Potassium nitrate is most preferred. Other oxidizing agents such as potassium chlorate and ammonium and potassium perchlorate can also be utilized.

Organic nitrates can also be used as the nitrate-containing oxidation agent. The term "organic nitrate" is intended to refer to any carbon-containing nitrate having a stoichiometric excess of oxygen and which is suitable for use in pyrotechnic, explosive or propellant formulations. Such materials include nitrocellulose, nitroglycerine and pentaerythritol nitrate, as well as other organic nitrate esters conventionally used as liquid plasticizers for explosive materials and rocket fuels.

To obtain formulations which are compressible into self-sustaining shapes such as rods, cones, pellets, or the like, it is necessary to add a material which functions as a binder for the ascorbic acid and nitrate containing oxidizer. Preferred for this purpose is vegetable starch, especially corn starch, or ethyl cellulose. The binder material is added in an amount sufficient to impart a self-sustaining shape to the composition when compressed, usually 1 to 5 percent by weight.

The composition is prepared conveniently by forming an admixture of the ascorbic acid and nitrate-containing oxidizer in particulate form, alone or together with any additional ingredients to be included in the formulation. The preparation can be carried out by blending the ingredients in the dry state at room temperature for a sufficient length of time to form a homogeneous mixture. Alternatively, the ascorbic acid and nitrate-containing oxidizer can be dissolved or suspended in water, or an organic solvent, or mixture of both mixed thoroughly, then collected in a conventional manner by precipitation, filtration, evaporation, etc.

These procedures will typically result in a free flowing powder. For certain applications, it may be desirable or necessary to granulate the powder. This can be done in a conventional manner, for instance, by compacting the powder into rods or tablets with a suitable binder material having been added, comminuting the compacted powder into particles, and fractioning to obtain the desired sizes.

As mentioned, the composition of the invention is useful for a variety of explosive and propellant applications. To indicate just a few specific applications, the product can be utilized for the manufacture of artillery shells or rifle cartridges, for illuminating or signal munitions, for rockets, blasting devices and fireworks.

The composition can, for instance, be employed as the powder changes in an antique firearm or as the explosive propellant in a consumable firearm cartridge comprising a priming means, a projectile means and a molded cartridge case containing the explosive composition.

The following Examples illustrate preferred embodiments of the invention and methods of their preparation, without any intention to be limiting.

EXAMPLE 1

380 grams of ascorbic acid (USP grade) and 620 grams of crystalline potassium nitrate were milled in a ceramic ball mill at room temperature for 281/2 hours. A fine white powder was obtained.

A portion of the powder was evaluated for burning characteristics. Upon ignition, the sample flash-burned and left little residue.

A sample of approximately 16 grams of the powder was placed in a dessicator and exposed to an open tray of water within the dessicator. After 24 hours, the 16-gram sample had absorbed only 0.23 grams of water (about 1.4%). When removed from the dessicator and exposed to the atmosphere, the sample reverted to its original weight after 6 hours. It was concluded that the material is not hygroscopic; the slight increase in weight when stored in the dessicator was attributable to surface moisture only.

EXAMPLE 2

This Example illustrates the preparation and use of a compactible explosive-propellant composition in accordance with this invention.

200.6 grams of ascorbic acid (ultra fine powder, USP grade), 327.4 grams of potassium nitrate (sievable through 230 on 325 mesh, U.S. Standard Sieve), and 22 grams of corn starch were mixed well by shaking in a closed container for approximately 15 minutes. The resulting mixture was compressed into rods of about 3/4 inches in diameter, having a weight of 5-10 grams each, using a Carver press and an applied pressure of ten tons. The rods were broken up into smaller chunks, then crushed into granules and sieved into fractions. Three fractions of approximately one hundred grams each were obtained, having the following mesh sizes:

(A) through 20 on 30

(B) through 30 on 40

(C) through 40 on 60

The product exhibited good ballistic properties upon testing with 60-grain loads, with velocities of about 1200 feet per second or higher and chamber pressures of greater than 4000 lead units of pressure (L.U.P.) being obtained.

EXAMPLE 3

This Example illustrates two different methods by which a composition in accordance with the invention was prepared to obtain end products with different physical properties.

185 grams of ascorbic acid (ultra fine powder, USP grade), 310 grams of potassium nitrate (precipitated and sieved through 325 mesh screen, particle size approximately 10 microns), and 5 grams of corn starch were mixed thoroughly for 30 minutes in a three-liter flask equipped with a Teflon paddle stirrer. The procedure was repeated to give a second batch of an identical amount of the material. The first batch was utilized in a dry compacting process and the second batch was utilized in a wet extrusion process, as follows:

A. Dry Compaction Process

The mixed material prepared as described above was compressed into tablets using a one-inch die and an applied pressure of 20,000 pounds. The tablets were crushed and sieved into the three fractions shown in the Table below.

B. Wet Extrusion Process

204 milliliters of ethanol (90%) was added to 500 grams of the mixed material prepared as described above and the material was worked into a "dough ball", extruded through a 20 mesh sieve, then dried at 100.degree. C. for one hour. The dried material was crushed and sieved into three fractions as shown in the Table.

The respective materials were evaluated for bulk density, burn rate, gas generation, and ballistic performance. The burn rate, gas generation and ballistic performance were measured as follows:

Burn Rate

A two-foot aluminum ruler with a groove 1/8 inch wide and the same depth was constructed. The groove was filled with test material having a defined mesh size and weight. Ignition at one end allowed measurement of the time it took to burn two feet, using a stop watch.

Gas Generation

Pellets of test material were formed by compression in a Carver press at 10,000 lbs. for five minutes. The pellets were ignited individually by a Bunsen burner in a 100 ml. Hoke bomb. Ignition was observed on the attached manometer by the sudden surge of pressure to approximately 400 lbs. After cooling the bomb to room temperature under running water, followed by five minutes in a water bath at 20.degree. C., the gas volume was measured using toluene displacement.

Ballistic Performance

All firings were done using a 32-inch rifled, .45 caliber muzzle loading pressure test barrel on an indoor range at ambient conditions. Projectibles were Hornady #6060 round balls 0.451 inch diameter, weighing 138.0 grains. Connecticut Bally Arms #11 percussion caps were used. Balls were seated with lubricated cotton patches.

Sample	Mesh Size	Bulk density g/mL	Charge in Grams	Burn Rate sec/2 ft.	Gas Generation mL/g	Ballistic Performance ft/sec
(A)(1)	20/30	.761	6.21	1.68	278	1099
(A)(2)	30/40	.732	ND	ND	ND	1110
(A)(3)	40/60	.725	ND	ND	ND	1445
(B)(1)	20/30	.534	4.27	1.97	313	1214
(B)(2)	30/40	.522	ND	ND	ND	1435
(B)(3)	40/60	.508	ND	ND	ND	1282

ND = Not Determined

EXPLODING INCENDIARY GEL

This is some very interesting stuff. You light it, it burns for a minute or two, then it explodes, spraying flaming napalm even further. And the explosion is powerful enough to damage or destroy whatever the gel happens to be burning at the time. And the chemicals are easily obtained. The patent specifies Hydrazine Nitrate and Lead Azide as the preferred chemicals, but it also states that Ammonium Nitrate and primary explosives besides Lead Azide can be used. Acetone Peroxide and HMTD come to mind as possible substitutes.

View the original US Patent #3,957,550.

This invention relates to incendiary compositions for military applications and more particularly to a flame-explosion couple, that is to say, a composition which when ignited burns for a predeterminable period of time and thereafter explodes and spreads burning material over an extended area.

The value of flame weapons used in support of tactical operations has been well established in actual combat situations. They are employed for their psychological and physiological effects on enemy personnel and for their destructive effect on combustible targets. However, flame weapons have heretofore suffered from the limitation that in many situations their effect has been limited to the immediate vicinity of the point at which they are brought to bear. For example, an enemy may be concealed in a relatively inaccessible maximum security location such that the flame weapon cannot be brought directly to bear on him. Under these circumstances because of the limited area of effectiveness of conventional flame weapons the enemy might feel relatively safe from attack and not compelled to withdraw from his position.

In accordance with the present invention, this disadvantage of conventional flame weapons is overcome by providing a flame-explosion couple, that is, a composition which burns for a certain period of time and then explodes to project burning masses of the composition for considerable distances. In some cases the projected masses themselves later explode and thus with the present compositions a considerable area can be blanketed with the flaming incendiary material.

It is accordingly an object of the invention to provide a flame weapon of increased effectiveness. It is another object to provide a novel type of incendiary composition which is effective over a greater area than prior incendiary compositions. It is still another object of the invention to provide an incendiary composition of this type that is relatively easy and inexpensive to manufacture. Other objects of the invention will be in part obvious and in part apparent as the description proceeds.

The objects and advantages of the present invention can be achieved in general by formulating a composition which is an intimate mixture of a major amount of a combustible liquid, a minor but substantial amount of a secondary explosive or a strong oxidizer and a small amount of a primary explosive. When the composition is ignited, combustion is initially supported by the

combustible liquid or fuel. As burning proceeds, the concentrations of the explosive components and the temperature of the composition both increase. After a certain time interval which depends upon the nature of the ingredients and the proportions in which they are used in the composition, the primary explosive is activated to detonate the secondary explosive and thereby project flaming portions of the composition for considerable distances.

The combustible liquid component of the composition may be any of a wide variety of organic liquids, particularly those that are known to be useful as fuels. Thus the fuel component may be gasoline or individual hydrocarbon compounds such as pentane, hexane and heptane. Amines such as alkylamines, hydrazine and alkyl-substituted hydrazines may be used, as well as alcohols, organic acids, esters, ethers, carbonyls and nitriles. In fact any fairly volatile liquid fuel can be employed as the combustible liquid of the composition. The preferred fuels are hydrocarbons or mixtures of hydrocarbons, having say 4 to 8 carbon atoms.

The combustible liquid component may also have combustible solid ingredients dissolved or dispersed therein. For example, combustible polymers, e.g., polystyrene, polyisobutylene, poly-methylmethacrylate and/or poly-butylmethacrylate, may be incorporated in the liquid component. Also powders of metals such as aluminum and magnesium may be used.

Secondary explosives that may be used in the present compositions include hydrazine and ammonium perchlorates and nitrates, di- and trinitrotoluene, nitromethane, tetranitromethane, trinitrophenylmethylnitramine (Tetryl), cyclotrimethylenetrinitramine (RDX), pentaerythritrol tetranitrate (PETN), picric acid, ammonium picrate and ethylenediaminedinitrate (EDNA). The primary explosive may be a conventional explosive primer and includes such materials as lead azide, mercury fulminate, lead styphnate, diazodinitrophenol and nitromannite. Especially effective results have been obtained when using hydrazine nitrate as a secondary explosive and lead azide as the primary explosive.

It has been further found that strong, inorganic oxidizers can be used in place of, or in addition to, the secondary explosive component. Such oxidizers form with the combustible liquid an explosive mixture which, after an initial burning period, is detonated by the primary explosive. Useful oxidizers for this purpose include sodium, potassium and lithium perchlorates, sodium nitrate and the like. It will be noted that certain of the secondary explosives mentioned above, e.g., ammonium perchlorate, can be considered both secondary explosives and oxidizers.

It has been found desirable in most cases to incorporate a small amount of a gellant in the present compositions. The gellant performs a number of functions. Thus in cases where either or both of the explosive components is insoluble in the fuel component, the gellant insures uniform distribution of the explosive materials through the composition. Also a composition having a somewhat viscous consistency is easier to handle and apply and more effective in use.

A further advantage of using the gellant arises out of the fact that it provides a means of controlling the rheological properties of the composition. In general, the composition should desirably have a thinly viscous consistency, but the desirable consistency varies to some extent depending upon the nature of the surface to which the composition is to be applied. Thus if the

composition is applied to an irregular surface, the surface irregularities tend to confine the composition during the burning period and prevent excessive spreading thereof. If on the other hand the composition is applied to a smooth horizontal surface, there is a tendency for the composition to spread out excessively and prevent either activation of the primary explosive or detonation of the secondary explosive. In the latter case the proportion of gellant is desirably increased to increase the viscosity of the composition and prevent such excessive spreading. The quantity of gellant used normally falls within the range 0.5 to 10 percent by weight of the composition.

Gellants suitable for use in the present compositions are known in the art. They include, for example, metal soaps of fatty acids, e.g., the aluminum soap of a mixture of oleic, cocoanut oil and naphthenic acid sold under the trade designation "M-1" and an aluminum soap of a mixture of isooctanoic acids sold under the trade designation "M-4." Commercial mixtures of such soaps with minor amounts of silica aerogel may also be used, as well as thickeners based on natural rubber latex and other thickeners or gellants known to be useful in thickening liquid hydrocarbon compositions.

As indicated above, the use of a gellant is not essential in all cases. Thus it may be omitted in compositions wherein the explosive components are either soluble in or remain suspended in the combustible liquid.

In accordance with a preferred procedure for formulating the present compositions the combustible liquid is first added to the primary explosive and mixed therewith. The secondary explosive or oxidizer is then added to this mixture and thereafter the gellant, if used, is added. In the case of small quantities the mixture may be hand shaken whereas in preparing larger quantities a mechanical mixer such as a paint mixer may be used. In either event, thorough mixing of the components is desirable. The preferred compositions contain from 40 to 89 percent by weight of combustible liquid, from 10 to 50 percent by weight of secondary explosive, 0.5 to 5 percent by weight of primary explosive, and from 0.5 to 10 percent by weight of gellant.

The preferred mixing procedure is desirably used in the case of compositions whose behavior is sharply dependent on rheological properties. However, in other cases acceptable results can be achieved by simply mixing the ingredients without regard to the order in which the ingredients are mixed.

In order to point out more fully the nature of the present invention the following specific examples are given of compositions prepared in accordance with the invention.

EXAMPLE 1

A flame-explosion couple having the following composition in parts by weight was prepared and tested.

Component	Parts by Weight

Gasoline	10
Hydrazine Nitrate (Fine Crystals)	3
Undextrinated lead azide	0.25
M-4 Gellant	1

Approximately 15 grams of this composition was put in each of three 2-inch diameter aluminum cups and ignited. In each case the material burned for about 2 minutes and then exploded with considerable force.

EXAMPLE 2

A flame-explosion couple was prepared having the following composition.

Component	Parts by Weight
Pentane	10
Hydrazine nitrate	3
Lead azide	0.25
M-4 Gellant	1.5

This composition was tested to determine its effect on a test panel, namely, a five-layer, half-inch thick piece of plywood measuring 9 .times. 11 inches and supported in a horizontal position at its edges. About 15 grams of the above composition was poured on the plywood panel to form a circular puddle about 2.5 inches in diameter. Upon ignition the material burned for a period of about 2 minutes and then detonated. The explosion blew a clean hole through the board about the size of the sample, i.e., about 2.5 inches in diameter.

In another test the same amount of the same composition was poured on the horizontal portion of a plywood "corner" and ignited. The resulting detonation shattered the base of the test piece and blew the vertical members apart.

EXAMPLE 3

A composition was prepared like that of Example 2 except that hexane was used in place of pentane and the concentration of M-4 gellant was 2.0 percent. Samples of this composition when tested gave burning times of 171 to 198 seconds prior to detonation.

EXAMPLE 4

A composition was prepared like that of Example 3 except that heptane was used in place of hexane. Samples having this composition when ignited gave burning times of 109 to 183 seconds prior to detonation.

EXAMPLE 5

A flame-explosion couple was prepared having the following composition:

Component	Parts by Weight
Gasoline	72
Ammonium Perchlorate	25
Lead Azide	3
M-1 Gellant	1

Samples of this composition were placed in two-inch diameter aluminum test cups and ignited. They burned for about 2 minutes and thereafter exploded with considerable force.

EXAMPLE 6

A composition was prepared similar to that of Example 5 except that ammonium nitrate was substituted for ammonium perchlorate. The resulting composition when tested as in Example 5 gave similar results.

EXAMPLE 7

In order to indicate the manner in which burning time prior to detonation varies with variations in the proportions of the components of the composition, data are given below on several compositions prepared with gelled gasoline, hydrazine nitrate, and lead azide. The values given are averages of the results obtained from testing a number of samples.

Gelled Gasoline	HN	Lead Azide	Burn Time in Seconds
73.3	24.2	2.5	165
50	48.1	1.9	104
88.1	9.9	2	181

EXAMPLE 8

A flame-explosion couple was prepared having the following composition:

Component	Parts by Weight
Pentane	40
Ammonium Perchlorate	9
Hydrazine nitrate	6
Polystyrene (1-3 mm particles)	40
Lead Azide	2.5
M-4 Gellant	2.5

A quantity of the foregoing composition was placed on an aluminum sheet and ignited. After several minutes of burning it gave a high order detonation.

EXAMPLE 9

A flame-explosion couple was prepared having the following composition:

Component	Parts by Weight
Pentane	56
Lithium Perchlorate	40
Laed Azide	3
M-4 Gellant	1

A quantity of this composition was placed on a wood panel and ignited. After a brief burning period it detonated with moderate energy.

It is evident that compositions of the type described herein should not only be effective in use but should also be reasonably safe to handle prior to use. To determine the safety of the present compositions shock sensitivity tests were run in a modified Trauzl block. The test blocks were standard lead cylinders 2.5 inches high and 2 inches in diameter with an internal bore one inch in diameter. A No. 8 electric blasting cap was used as the initiating source. In the tests from 0.5 to 2.0 grams of the flame-explosion couple material was charged into a glass vial and placed into the cylinder along with the blasting cap. The cap was electrically detonated and the test block examined thereafter to determine the amount of deformation that had occurred.

In one series of tests compositions like those of Example 1 were prepared with varying amounts of hydrazine nitrate therein. It was found in these tests that no detonation of the composition occurred until the hydrazine nitrate content had reached about 90 percent. In another series of tests the lead azide concentration was varied and it was found that no detonation occurred at lead azide concentrations within the range claimed in the present application, i.e., at concentrations below 6 percent by weight. Thus these tests indicated that the present compositions can be safely handled prior to ignition.

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(1 of 1)

United States Patent ***3,957,550***
Tannenbaum , et al. **May 18, 1976**

Flame-explosion couple

Abstract

A flame-explosion couple is disclosed which upon ignition burns for a period of time in a relatively stable manner and thereafter explodes to produce fragments which continue to burn for a further period of time. The composition may comprise from 40 to 89 percent by weight of a volatile liquid fuel, from 10 to 50 percent by weight of a secondary explosive or strong metal salt oxidizer and from 0.5 to 5 percent by weight of an explosive primer. It is usually desirable to incorporate a gellant in the composition to give it a jellylike consistency of a desired viscosity. The composition may optionally contain combustible metal powders and combustible polymers.

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Intern'l Class: C06B 035/00
Field of Search: 44/7 149/18,19,20,26,35,36,42,43,76,78,33,34

References Cited [Referenced By]

U.S. Patent Documents

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Primary Examiner: Sebastian; Leland A.

Claims

1. A flame-explosion couple comprising an intimate mixture of a major amount of a volatile liquid fuel, a minor but substantial amount of a component which is a secondary explosive selected from the group consisting of hydrazine, ammonium perchlorate, ammonium nitrate, dinitrotoluene, trinitrotoluene, nitromethane, tetranitromethane, trinitrophenylmethylnitramine, cyclotrimethylenetrinitramine, pentaerythritrol tetranitrate, picric acid, ammonium picrate and ethylenediaminedinitrate or a strong oxidizer selected from the group consisting of sodium, ptassium, lithium and ammonium perchlorates and sodium nitrate and a small amount of a primary explosive selected from the group consisting of lead azide, mercury fulminate, lead styphnate, diazodinitrophenol and nitromannite.

2. A flame-explosion couple comprising an intimate mixture of from 40 to 89 percent by weight of a volatile liquid fuel, from 10 to 50 percent of a component which is a secondary explosive selected from the group consisting of hydrazine, ammonium perchlorate, ammonium nitrate, dinitrotoluene, trinitrotoluene, nitromethane, tetranitromethane, trinitrophenylmethylnitramine, cyclotrimethylenetrinitramine, pentaerythritrol tetranitrate, picric acid, ammonium picrate and ethylenediaminedinitrate or a strong oxidizer selected from the group consisting of sodium, potassium, lithium and ammonium perchlorates and sodium nitrate and from 0.5 to 5 percent of a primary explosive selected from the group consisting of lead azide, mercury fulminate, lead styphnate, diazodinitrophenol and nitromannite.

3. A flame-explosion couple comprising an intimate mixture of from 40 to 89 percent by weight of a volatile liquid fuel, from 10 to 50 percent of a component which is a secondary explosive selected from the group consisting of hydrazine, ammonium perchlorate, ammonium nitrate, dinitrotoluene, trinitrotoluene, nitromethane, tetranitromethane, trinitrophenylmethylnitramine, cyclotrimethylenetrinitramine, pentaerythritrol tetranitrate, picric acid, ammonium picrate and ethylenediaminedinitrate or a strong oxidizer selected from the group consisting of sodium, potassium, lithium and ammonium perchlorates and sodium nitrate and from 0.5 to 5 percent of a primary explosive selected from the group consisting of lead azide, mercury fulminate, lead styphnate, diazodinitrophenol and nitromannite and from 0.5 to 10 percent by weight of a gellant.

4. A composition according to claim 3 and wherein the volatile liquid fuel is a liquid hydrocarbon.

5. A composition according to claim 3 and wherein the primary explosive is lead azide.

6. A flame-explosion couple comprising an intimate mixture of a major amount of a volatile liquid fuel, a minor but substantial amount of a component which is a secondary explosive selected from the group consisting of hydrazine, ammonium perchlorate, ammonium nitrate, dinitrotoluene, trinitrotoluene, nitromethane, tetranitromethane, trinitrophenylmethylnitramine, cyclotrimethylenetrinitramine, pentaerythritrol tetranitrate, picric acid, ammonium picrate and ethylenediamine dinitrate or a strong oxidizer selected from the group consisting of sodium, potassium, lithium and ammonium perchlorates and sodium nitrate and a small amount of a primary explosive selected from the group consisting of lead azide, mercury fulminate, lead styphnate, diazodinitrophenol and nitromannite.

7. A flame-explosion couple comprising an intimate mixture of from 40 to 89 percent by weight of a volatile liquid fuel, from 10 to 50 percent of a component which is a secondary explosive selected from

the group consisting of hydrazine, ammonium perchlorate, ammonium nitrate, dinitrotoluene, trinitrotoluene, nitromethane, tetranitromethane, trinitrophenylmethylnitramine, cyclotrimethylenetrinitramine, pentaerythritrol tetranitrate, picric acid, ammonium picrate and ethylenediaminedinitrate or a strong oxidizer selected from the group consisting of sodium, potassium, lithium and ammonium perchlorates and sodium nitrate and from 0.5 to 5 percent of a primary explosive selected from the group consisting of lead azide, mercury fulminate, lead styphnate, diazodinitrophenol and nitromannite.

8. A flame-explosion couple comprising an intimate mixture of from 40 to 89 percent by weight of a volatile liquid fuel, from 10 to 50 percent of a component which is a secondary explosive selected from the group consisting of hydrazine, ammonium perchlorate, ammonium nitrate, dinitrotoluene, trinitrotoluene, nitromethane, tetranitromethane, trinitrophenylmethylnitramine, cyclotrimethylenetrinitramine, pentaerythritrol tetranitrate, picric acid, ammonium picrate and ethylenediaminedinitrate or a strong oxidizer selected from the group consisting of sodium, potassium, lithium and ammonium perchlorates and sodium nitrate and from 0.5 to 5 percent of a primary explosive selected from the group consisting of lead azide, mercury fulminate, lead styphnate, diazodinitrophenol and nitromannite and from 0.5 to 10 percent by weight of a gellant.

9. A composition according to claim 8 and wherein the volatile liquid fuel has a combustible polymer dispersed therein.

10. A composition according to claim 8 and wherein the volatile liquid fuel has an aluminum or magnesium powder dispersed therein.

Description

This invention relates to incendiary compositions for military applications and more particularly to a flame-explosion couple, that is to say, a composition which when ignited burns for a predeterminable period of time and thereafter explodes and spreads burning material over an extended area.

The value of flame weapons used in support of tactical operations has been well established in actual combat situations. They are employed for their psychological and physiological effects on enemy personnel and for their destructive effect on combustible targets. However, flame weapons have heretofore suffered from the limitation that in many situations their effect has been limited to the immediate vicinity of the point at which they are brought to bear. For example, an enemy may be concealed in a relatively inaccessible maximum security location such that the flame weapon cannot be brought directly to bear on him. Under these circumstances because of the limited area of effectiveness of conventional flame weapons the enemy might feel relatively safe from attack and not compelled to withdraw from his position.

In accordance with the present invention, this disadvantage of conventional flame weapons is overcome by providing a flame-explosion couple, that is, a composition which burns for a certain period of time and then explodes to project burning masses of the composition for considerable distances. In some cases the projected masses themselves later explode and thus with the present compositions a considerable area can be blanketed with the flaming incendiary material.

It is accordingly an object of the invention to provide a flame weapon of increased effectiveness. It is another object to provide a novel type of incendiary composition which is effective over a greater area

than prior incendiary compositions. It is still another object of the invention to provide an incendiary composition of this type that is relatively easy and inexpensive to manufacture. Other objects of the invention will be in part obvious and in part apparent as the description proceeds.

The objects and advantages of the present invention can be achieved in general by formulating a composition which is an intimate mixture of a major amount of a combustible liquid, a minor but substantial amount of a secondary explosive or a strong oxidizer and a small amount of a primary explosive. When the composition is ignited, combustion is initially supported by the combustible liquid or fuel. As burning proceeds, the concentrations of the explosive components and the temperature of the composition both increase. After a certain time interval which depends upon the nature of the ingredients and the proportions in which they are used in the composition, the primary explosive is activated to detonate the secondary explosive and thereby project flaming portions of the composition for considerable distances.

The combustible liquid component of the composition may be any of a wide variety of organic liquids, particularly those that are known to be useful as fuels. Thus the fuel component may be gasoline or individual hydrocarbon compounds such as pentane, hexane and heptane. Amines such as alkylamines, hydrazine and alkyl-substituted hydrazines may be used, as well as alcohols, organic acids, esters, ethers, carbonyls and nitriles. In fact any fairly volatile liquid fuel can be employed as the combustible liquid of the composition. The preferred fuels are hydrocarbons or mixtures of hydrocarbons, having say 4 to 8 carbon atoms.

The combustible liquid component may also have combustible solid ingredients dissolved or dispersed therein. For example, combustible polymers, e.g., polystyrene, polyisobutylene, poly-methylmethacrylate and/or poly-butylmethacrylate, may be incorporated in the liquid component. Also powders of metals such as aluminum and magnesium may be used.

Secondary explosives that may be used in the present compositions include hydrazine and ammonium perchlorates and nitrates, di- and trinitrotoluene, nitromethane, tetranitromethane, trinitrophenylmethylnitramine (Tetryl), cyclotrimethylenetrinitramine (RDX), pentaerythritrol tetranitrate (PETN), picric acid, ammonium picrate and ethylenediaminedinitrate (EDNA). The primary explosive may be a conventional explosive primer and includes such materials as lead azide, mercury fulminate, lead styphnate, diazodinitrophenol and nitromannite. Especially effective results have been obtained when using hydrazine nitrate as a secondary explosive and lead azide as the primary explosive.

It has been further found that strong, inorganic oxidizers can be used in place of, or in addition to, the secondary explosive component. Such oxidizers form with the combustible liquid an explosive mixture which, after an initial burning period, is detonated by the primary explosive. Useful oxidizers for this purpose include sodium, potassium and lithium perchlorates, sodium nitrate and the like. It will be noted that certain of the secondary explosives mentioned above, e.g., ammonium perchlorate, can be considered both secondary explosives and oxidizers.

It has been found desirable in most cases to incorporate a small amount of a gellant in the present compositions. The gellant performs a number of functions. Thus in cases where either or both of the explosive components is insoluble in the fuel component, the gellant insures uniform distribution of the explosive materials through the composition. Also a composition having a somewhat viscous consistency is easier to handle and apply and more effective in use.

A further advantage of using the gellant arises out of the fact that it provides a means of controlling the

rheological properties of the composition. In general, the composition should desirably have a thinly viscous consistency, but the desirable consistency varies to some extent depending upon the nature of the surface to which the composition is to be applied. Thus if the composition is applied to an irregular surface, the surface irregularities tend to confine the composition during the burning period and prevent excessive spreading thereof. If on the other hand the composition is applied to a smooth horizontal surface, there is a tendency for the composition to spread out excessively and prevent either activation of the primary explosive or detonation of the secondary explosive. In the latter case the proportion of gellant is desirably increased to increase the viscosity of the composition and prevent such excessive spreading. The quantity of gellant used normally falls within the range 0.5 to 10 percent by weight of the composition.

Gellants suitable for use in the present compositions are known in the art. They include, for example, metal soaps of fatty acids, e.g., the aluminum soap of a mixture of oleic, cocoanut oil and naphthenic acid sold under the trade designation "M-1" and an aluminum soap of a mixture of isooctanoic acids sold under the trade designation "M-4." Commercial mixtures of such soaps with minor amounts of silica aerogel may also be used, as well as thickeners based on natural rubber latex and other thickeners or gellants known to be useful in thickening liquid hydrocarbon compositions.

As indicated above, the use of a gellant is not essential in all cases. Thus it may be omitted in compositions wherein the explosive components are either soluble in or remain suspended in the combustible liquid.

In accordance with a preferred procedure for formulating the present compositions the combustible liquid is first added to the primary explosive and mixed therewith. The secondary explosive or oxidizer is then added to this mixture and thereafter the gellant, if used, is added. In the case of small quantities the mixture may be hand shaken whereas in preparing larger quantities a mechanical mixer such as a paint mixer may be used. In either event, thorough mixing of the components is desirable. The preferred compositions contain from 40 to 89 percent by weight of combustible liquid, from 10 to 50 percent by weight of secondary explosive, 0.5 to 5 percent by weight of primary explosive, and from 0.5 to 10 percent by weight of gellant.

The preferred mixing procedure is desirably used in the case of compositions whose behavior is sharply dependent on rheological properties. However, in other cases acceptable results can be achieved by simply mixing the ingredients without regard to the order in which the ingredients are mixed.

In order to point out more fully the nature of the present invention the following specific examples are given of compositions prepared in accordance with the invention.

EXAMPLE 1

A flame-explosion couple having the following composition in parts by weight was prepared and tested.

Component	Parts by Weight
Gasoline	10
Hydrazine nitrate (fine crystals)	3

Undextrinated lead azide	0.25
M-4 Gellant	1

Approximately 15 grams of this composition was put in each of three 2-inch diameter aluminum cups and ignited. In each case the material burned for about 2 minutes and then exploded with considerable force.

EXAMPLE 2

A flame-explosion couple was prepared having the following composition.

Component	Parts by Weight
Pentane	10
Hydrazine nitrate	3
Lead azide	0.25
M-4 Gellant	1.5

This composition was tested to determine its effect on a test panel, namely, a five-layer, half-inch thick piece of plywood measuring 9 .times. 11 inches and supported in a horizontal position at its edges. About 15 grams of the above composition was poured on the plywood panel to form a circular puddle about 2.5 inches in diameter. Upon ignition the material burned for a period of about 2 minutes and then detonated. The explosion blew a clean hole through the board about the size of the sample, i.e., about 2.5 inches in diameter.

In another test the same amount of the same composition was poured on the horizontal portion of a plywood "corner" and ignited. The resulting detonation shattered the base of the test piece and blew the vertical members apart.

EXAMPLE 3

A composition was prepared like that of Example 2 except that hexane was used in place of pentane and the concentration of M-4 gellant was 2.0 percent. Samples of this composition when tested gave burning times of 171 to 198 seconds prior to detonation.

EXAMPLE 4

A composition was prepared like that of Example 3 except that heptane was used in place of hexane. Samples having this composition when ignited gave burning times of 109 to 183 seconds prior to detonation.

EXAMPLE 5

A flame-explosion couple was prepared having the following composition:

Component	Parts by Weight
Gasoline	72
Ammonium perchlorate	25
Lead Azide	3
M-1 Gellant	1

Samples of this composition were placed in two-inch diameter aluminum test cups and ignited. They burned for about 2 minutes and thereafter exploded with considerable force.

EXAMPLE 6

A composition was prepared similar to that of Example 5 except that ammonium nitrate was substituted for ammonium perchlorate. The resulting composition when tested as in Example 5 gave similar results.

EXAMPLE 7

In order to indicate the manner in which burning time prior to detonation varies with variations in the proportions of the components of the composition, data are given below on several compositions prepared with gelled gasoline, hydrazine nitrate, and lead azide. The values given are averages of the results obtained from testing a number of samples.

Gelled Gasoline	HN	Lead Azide	Burning Time in Seconds
73.3	24.2	2.5	165
50	48.1	1.9	104
88.1	9.9	2.0	181

EXAMPLE 8

A flame-explosion couple was prepared having the following composition:

Component	Parts by Weight
Pentane	40
Ammonium perchlorate	9

Hydrazine nitrate	6
Polystyrene (1-3 mm particles)	40
Lead azide	2.5
M-4 gellant	2.5

A quantity of the foregoing composition was placed on an aluminum sheet and ignited. After several minutes of burning it gave a high order detonation.

EXAMPLE 9

A flame-explosion couple was prepared having the following composition:

Component	Parts by Weight
Pentane	56
Lithium perchlorate	40
Lead azide	3
M-4 Gellant	1

A quantity of this composition was placed on a wood panel and ignited. After a brief burning period it detonated with moderate energy.

It is evident that compositions of the type described herein should not only be effective in use but should also be reasonably safe to handle prior to use. To determine the safety of the present compositions shock sensitivity tests were run in a modified Trauzl block. The test blocks were standard lead cylinders 2.5 inches high and 2 inches in diameter with an internal bore one inch in diameter. A No. 8 electric blasting cap was used as the initiating source. In the tests from 0.5 to 2.0 grams of the flame-explosion couple material was charged into a glass vial and placed into the cylinder along with the blasting cap. The cap was electrically detonated and the test block examined thereafter to determine the amount of deformation that had occurred.

In one series of tests compositions like those of Example 1 were prepared with varying amounts of hydrazine nitrate therein. It was found in these tests that no detonation of the composition occurred until the hydrazine nitrate content had reached about 90 percent. In another series of tests the lead azide concentration was varied and it was found that no detonation occurred at lead azide concentrations within the range claimed in the present application, i.e., at concentrations below 6 percent by weight. Thus these tests indicated that the present compositions can be safely handled prior to ignition.

It is of course to be understood that the foregoing Examples are intended to be illustrative only and that numerous changes can be made in the ingredients and proportions disclosed therein without departing from the spirit of the present invention as defined in the appended claims.

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POISONS

Poisons have been used since before recorded history to eliminate ones enemies. Poison are silent, usually unsuspected, and can be very difficult, if not impossible to detect. They can be very quick and dramatic like cyanide or slow and stealthy like ricin.

Poisons are very useful for murder because an amount of poison sufficient to kill dozens of people can be hidden in tiny, everyday objects like a button or necklace bead. Something guns and explosives are incapable of. And dogs aren't trained to sniff out poisons like they are with drugs and explosives.

Some of the poisons listed in this section, while capable of being used like chemical weapons (like ricin), are rightfully listed here as poisons, because, unlike war gases, they need to be ingested or injected to be effective.

---

1. Home-made Cyanide NEW! 01/29/2000
2. Ricin

HOMEMADE CYANIDE

Cyanide is the granddaddy of synthetic poisons. Easily made from common chemicals, cyanide is used as is for poisoning bullets and food, and is used in the making of Hydrogen Cyanide, Cyanogen Chloride, Tabun, and numerous other poison gases.

A dose as small as 50 milligrams (ingested) can kill an adult man. Of course, the more the better.

To make cyanide, you must first make ferrocyanide. This can either be made, or preferably, bought.

Ferrocyanide Preparation

Ferrocyanide is obtained by heating 10 parts (by weight) potassium (or sodium) carbonate; 10 parts coke. cinders, or coal; and 3 parts iron turnings, all in coarse powder. to a full red heat in an open crucible, stirring occasionally until small jets of purple flame arc no longer seen. When cool, the soluble matter is dissolved out of it, the solution filtered, evaporated, and crystallized. The crystals obtained are redissolved in hot water and cooled very slowly, forming large yellow crystals of the ferrocyanide.

In order to obtain a pure form, melt dried ferrocyanide in a glass vessel and let cool, dissolve the fused mass in water, neutralize any excess of alkali with acetic acid (vinegar), and precipitate the salt by adding strong alcohol to the solution. Wash the precipitate with a little weak alcohol, redissolve it in water, and crystallize.

Sodium Ferrocyanide (Na4Fe(CN)6-10H2O, FW 484.07, mp 82C, CAS# 13601-19-9, AKA Yellow Prussiate of Soda) can be ordered quite cheaply from www.sciencealliance.com. Catalog #s and prices are: C7435-100 100g $4.12, C7435-500 500g $8.96. And there's no hazardous shipping fees for it either. Cyanide costs about $47 a pound plus $15 hazardous.

Cyanide Preparation

To convert the ferro to cyanide do this (please note that these instructions were for the potassium not sodium salt. I'm assuming that the ratios are similar for both); Mix thoroughly 8 parts of dry sodium ferrocyanide and 3 parts dry sodium carbonate (pool pH adjuster), heat them in a steel container (cleaned oil filter can works nicely), with constant stirring (use clothes hanger, straightened out), with a propane torch or other intense heat source till it melts into a clear liquid. Heating is continued until the mix no longer fizzes and the fluid portion is colorless. After a few minutes rest, to allow the contents to settle, the clear portion is poured from the heavy black sediment (iron) at the bottom at the bottom of the crucible and onto to a clean slab or steel bowl. It's then broken up while still warm and stored in airtight bottles. This will be

almost pure cyanide.

RICIN

Ricin is just about the easiest, and at the same time, most toxic poison that a criminal can make. Less than a milligram (1/1,000 of a gram) injected or inhaled will kill a person several times over. For individual killings, it has the advantage of being undetectable in toxicology scans since the poison is a catalyst the starts a chain reaction in the body, and is destroyed before the symptoms begin to show.

With properly sized and dispersed dry particles, ricin is at least 10x more toxic than the most potent nerve gas. A 1% water solution atomized with a small explosive burster has the same effectiveness as sarin nerve gas. The only disadvantage ricin has is the time it takes for the victims to die is about 1 - 2 weeks. So you won't have the quick tactical effect of nerve gas. But this can also be good in that, using a covert dissemination, the criminal has time to escape before the attack is detected.

The information presented below is from a US Patent #3,060,165, assigned to the US Army.

Tips

Here's a few things you need to know to make your production go much easier.

1. The seeds are readily available through wholesale seed suppliers for about $20 for a pound of seeds.Castor bean seeds are very tough to crack or peel. Soak them for an hour in a solution of 2 tablespoons lye in 1 cup water. Then use pliers to crack the shell. The shell will peel of the bean easily then.
2. Use a 1/2 cup of acetone to every ounce of bean pulp. Blend well. Let sit for several days with occasional shaking. Pour off the acetone and add an additional 1/2 cup of acetone and repeat. This will remove almost all the castor oil from the seeds.
3. The patent doesn't mention it, but you can use magnesium sulfate (Epsom salt) instead of sodium sulfate. Epsom salt is easily available in any drug store for just about a dollar a pound.
4. Use a plastic membrane filter if you can get them. The ricin forms a layer that is difficult to remove from a regular coffee paper filter without scraping off fibers as well.
5. Wear a gas mask and gloves. Try to keep the ricin wet at all times to avoid generating any dust (DEADLY!). And always shower and change clothes after handling.

Preparation

Ricin is a protoplasmic poison prepared from castor beans after the extraction of castor oil therefrom. It is most effective as a poison when injected intravenously or inhaled, the latter requiring extreme commutation and small particle size to be effective, It is believed that the toxic action is catalytic rather than stoichiometric which probably accounts for the high toxicity

of the agent.

Because of its relative instability ricin must be handled with extreme care. In neutral aqueous solution it is stable only up to 60"-75" C., and in solid form up to 100"- 110" C., although for short exposures, temperatures up to 130" may be tolerated. It is sensitive to acids, alkalis and halogens and may also be inactivated by mechanical working such as grinding or pulverizing. These factors are of great importance in developing a satisfactory method for preparing the material.

Although ricin has been prepared in crystalline condition in the laboratory in small quantities, it becomes necessary, for purposes of toxicological warfare, to prepare relatively large quantities in a high state of purity. This necessitates that as much as possible of the non-toxic material present be removed in the process.

In preparing the protein material, the castor beans are first ground and pressed to remove most of the oil. The pressed cake still retains about 15% oil and this may be removed by means of solvents which will extract an additional 150 pounds of oil per ton of beans and reduce the oil retained in the cake to a little over 1%. In the event that the expressing step is supplemented by solvent extraction, it is important to prevent detoxification of the protein during the solvent removal step. If residual solvent is removed from the ground beans by blowing with steam, considerable detoxification results. Blowing with nitrogen effectively prevents detoxification but is expensive when carried out on a large scale.

After the oil has been removed, the pressed cake or pomace is extracted by agitating with water at a pH of 3.8+-0.1 at 25" C. which removes substantially all of the toxic protein. The extraction process is operative within a pH range of about 3 to 4.5 although the preferred range is about 3.5 to 4. The optimum operating point is a pH of 3.8+-.1, as indicated above. A careful pH control is essential in order that as much non-toxic protein as possible may be eliminated and also that the filtration rate may be held at a satisfactory value. Either HCl or H_2SO_4 may be used to get the desired pH for the extraction water, but H_2SO_4 is preferred due to its lower corrosion rate and ease of handling in concentrated form. The acid should be used in reasonably dilute form to prevent undue local concentrations during its addition. A 5% concentration is satisfactory.

Following the extraction, the slurry is filtered using either a conventional recessed plate filter or a continuous string discharge vacuum filter. With the latter about 7% of filter aid, based on meal weight, was found necessary for satisfactory filtration.

The filtrate from the water extraction step, which contains the ricin, was treated with a 16.7% solution of Na_2SO_4 to precipitate the protein. This solution is composed of 20 pounds of salt in 100 pounds of water and the amount used was such that the salt content equaled 20% of the filtrate weight. This amount and concentration of salt solution was about optimum considering the factors of cost and toxin recovery. Somewhat higher concentrations and larger amounts of solution can be used, however.

The precipitation process is not limited to the use of Na_2SO_4 since a saturated solution of NaCl can be used successfully, but Na_2SO_4 solution gives better nitrogen fractionation, more rapid precipitation, and can be operated under wider pH limits. It is desirable to raise the pH to about

7-8 before precipitation as this gives better recovery and greater non-toxic nitrogen removal. The pH was raised to this value by using NaOH or Na2CO3 the latter being preferred. The base used was quite dilute in order to prevent detoxification due to high local concentrations in the solution. A 5% solution of NaOH was used, whereas with Na2CO3 a 12% solution was preferred.

In general, this higher pH during precipitation gave a greater non-toxic nitrogen fractionation and at the same time maintained the toxin loss at less than 2%. After precipitation, the slurry was filtered using from 1 to 4% filter aid, based on slurry weight, for satisfactory filtration, the amount of filter aid needed being dependent on the type of press used. Washing the filter cake with Na2SO4 solution removed additional non-toxic nitrogen which is desirable. In this washing step a 16.7% solution of Na2SO4 was again used. This washing step removed an additional 15% of non-toxic nitrogen from the cake.

After filtration the filter cake which contains the ricin in combination with the Na2SO4 may be dried and slurried with CCl4 to separate the ricin by flotation. Separation of the ricin after a single precipitation and washing step is possible, but it is preferred to carry the process through an additional extraction and precipitation step. This is accomplished by slurrying the filter cake in three times its weight of water and the pH of the slurry is again brought to 3.8+-.1 by means of 5% H2SO4 The slurry is filtered and a second precipitation is brought about by adding Na2SO4 solution. Although pH control here is not wholly essential it is advantageous to bring the pH to approximate neutrality by adding 12% Na2CO3.

A precipitation time of 45 minutes was necessary to obtain complete removal of the toxin. In filtering out the precipitate, no filter aid was used and the filter cake was washed with Na2S04 solution on the filter whereby an additional amount of non-toxic nitrogen was removed from the cake. This washing was effective only the first time and repeated washings had little effect in removing further non-toxic nitrogen.

The ricin-Na2SO4 precipitate was dried at about 50" to 60" C. on a hot air tray dryer. The dried product was ground to pass a 40 mesh screen and agitated with 5 times its weight of CCl4 which served the separate the ricin from the Na2SO4 by flotation. After settling. the ricin was skimmed off the top. This reduced the Na2SO4 content of the mixture from a previous 40 to 50% down to 15 to 18%. About 1 to 2% of nitrogen remained in the Na2SO4 salt which could then be used for subsequent precipitations.

The final precipitation produced a particle size of 1-2 mu. On drying the wet cake, however, the ricin cemented together forming larger particles. These could not be broken down to their original size by ordinary grinding methods and since a very line particle size was necessary in order that the product might be used as a toxic weapon, it was thought desirable to seek some method to prevent the agglomeration or cementing process that took place on drying.

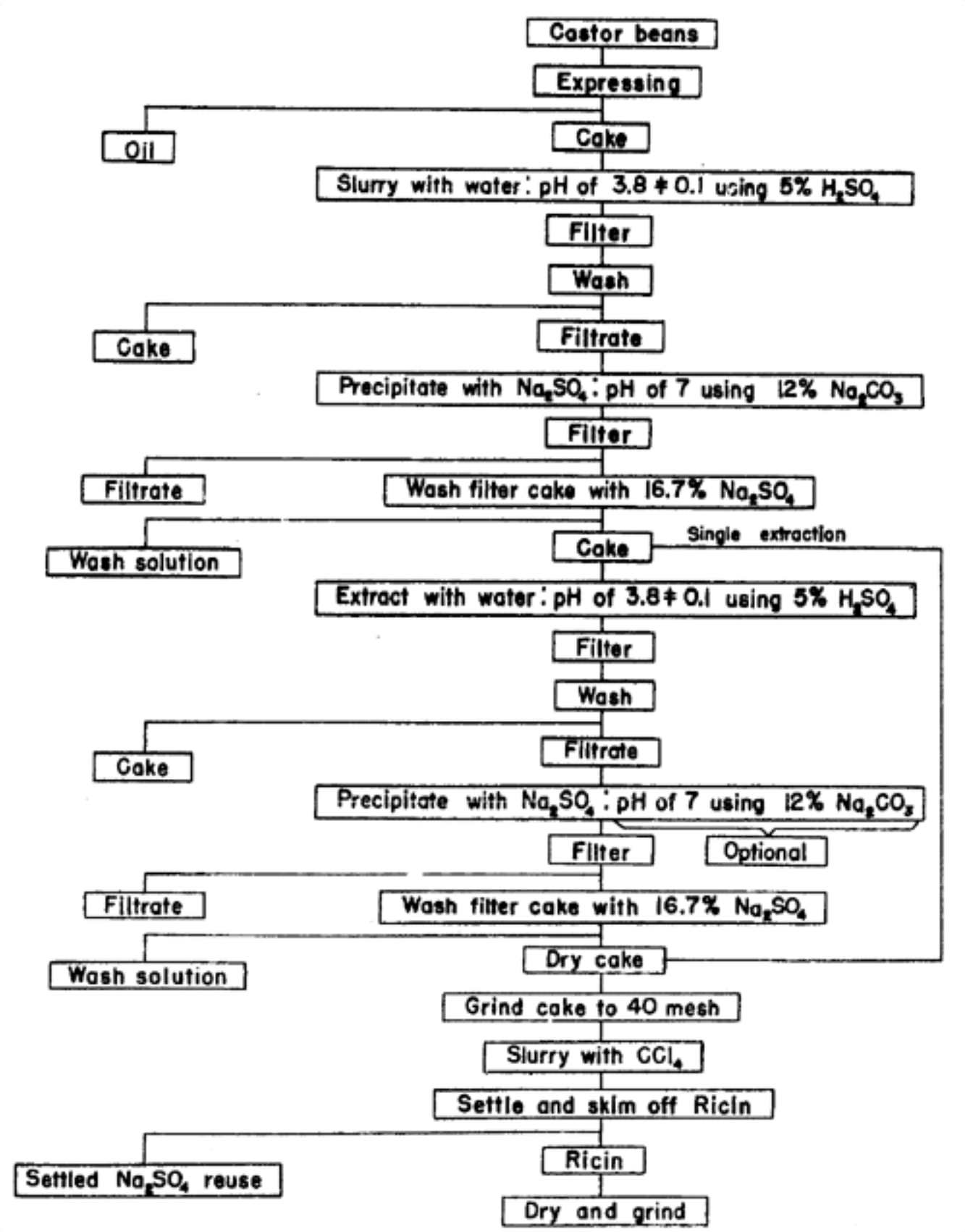
To attempt lo affect this result, physical conditions prevailing under the precipitation process were changed. This included changing the temperature of precipitation and the rate of agitation. Other changes included precipitation with only partial saturation of Na2SO4 and the use of wetting and seeding agents. None of these expedients produced any significant improvement in particle size. Ordinary dry ball and hammer milling of the dried ricin produced considerable detoxification perhaps due to the generation of excess heat. The use of CCl4 slurry plus the

use of low temperature and low moisture content of the ricin reduced detoxification during ball milling.

Spray drying proved to be an even better method of securing a reasonably small particle size. Best results were achieved by using a solution having about 20% solids, an inlet temperature of 150" C. and an atomizing air pressure of 150 to 180 p.s.i. The particle size secured was 6 to 8 mu.

The best means of securing a small particle size was by air grinding. This was carried out in an apparatus having a chamber with conical top and bottom. The material to be ground has been fed into this chamber and is withdrawn from the bottom and forced back into the center of the chamber tangentially through a venturi. Compressed air of about 100 p.s.i. was fed to the venturi to provide the grinding force. The fines are drawn off the top and the large particles settle to the bottom to be recirculated and reground. This process produced particles having a mass median diameter of 2.5 to 3.5 mu.

Numerous variations are possible in the several steps of the process commencing with the water extraction and precipitation which may be a single or multiple step. Although a single extraction step can be used, as indicated before, some process modifications are necessary for its successful operation on a plant scale. Double extraction proved to be quite efficient but additional steps beyond the second extraction step were not found necessary. The drawing is self-descriptive and shows the various steps of the process described.



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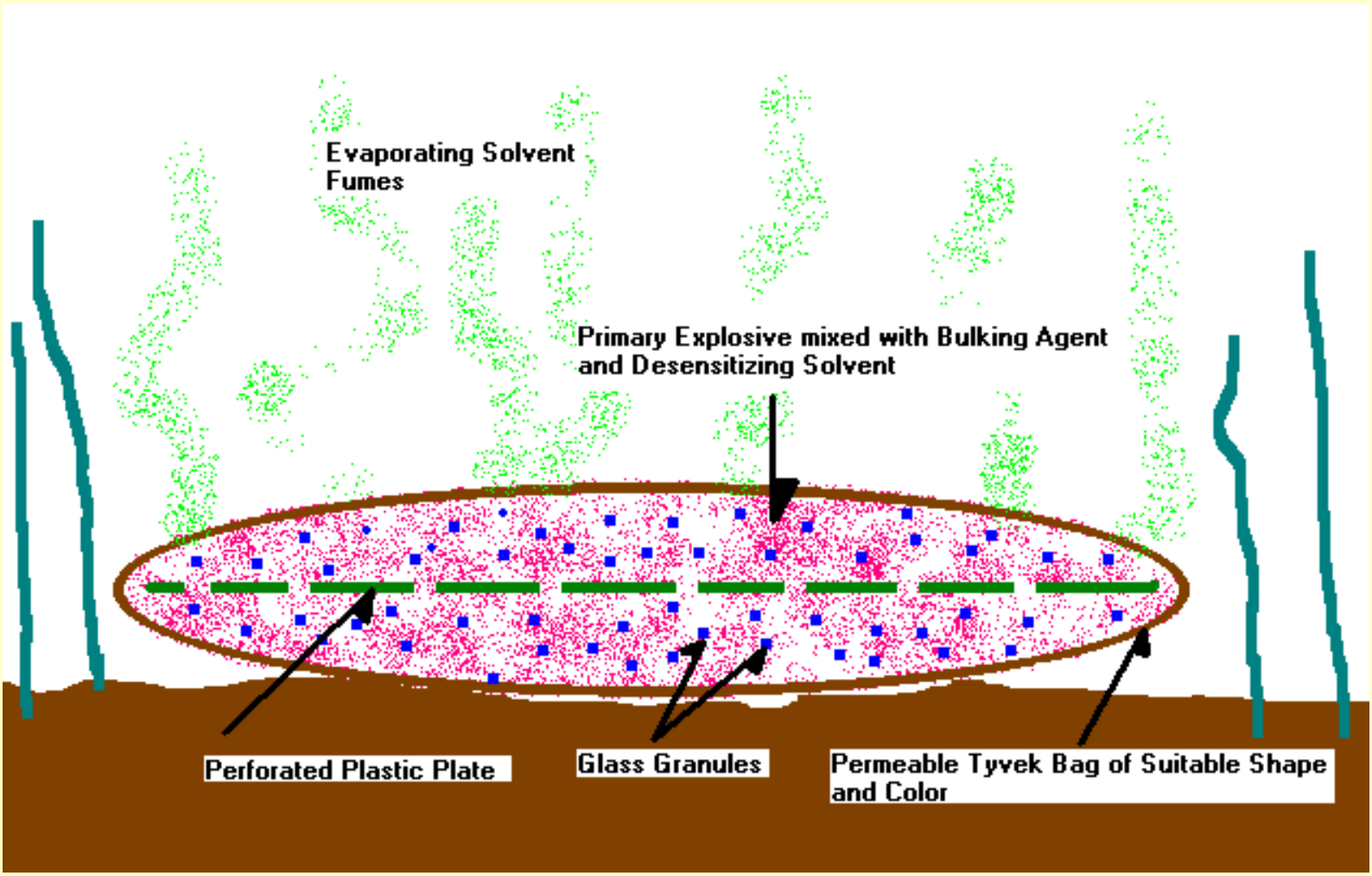
Super Simple Land Mine



This land mine design comes from an Army patent, United States Patent: 4,218,974 and is the most simple design I have ever seen. The best points of this mine is:

1. Easy access to all materials needed to construct it.

2. Very simple design that is practically fool-proof.

3. Safe to build and transport.

4. Cheap to make.

The mine is made by taking Tyvek cloth or similar type material and making a 3 sided bag by heat sealing the edges together. It's best to use an earth colored material for camouflage purposes. The bag can be any size or shape, but square is the easiest to make and 2x2 to 3x3 inches per side the best.

The explosive filler is made by mixing (in the following order) a sensitive primary explosive like Acetone Peroxide or Lead Azide with an inert material like diatomaceous earth (used as a filter aid for pool filters) then with granules of glass or sand. Be SURE that the explosive, granules, and inert material are wet with the desensitizing fluid before you mix them together! Use a volatile organic solvent that won't dissolve the Tyvek or explosive. You'll have to figure what's best yourself because of the variety of materials and explosives that can be used, but generally alcohol or water is safe.

Mix the filler in the following proportions (by volume); 80% explosive, 10% inert, and 10% granules with enough solvent to keep everything wet. Be very gently mixing them together. Best to mix it in a plastic baggy by rolling it back and forth.

Place a stiff perforated plastic plate cut to fit inside the tyvek bag and gently pour in the explosive filler evenly on both side about 3/4 full. Gently wipe the edge of the bag making sure that NO explosive filler remains on the edge of the bag, then glue or heat seal the open end of the bag to seal the mine. You have now made your first land mine.

Immediately place the mine in an airtight container that contains an amount of solvent sufficient to keep the mine moist. When your ready to use your mines (always use several to be sure of results) just take them out of their container, and strew them about.

You will probably want to test them ahead of time to make sure you did it right and to see how effective they are. You can do this by placing one under a tree that has a large brick suspended by a string over a branch. A 5 pound brick dropped about 4-6 inches will detonate the mine after all the solvent has evaporated off.

Unless you used a very volatile solvent like acetone or ether, it may take a few hours for the mine to arm, depending on how warm or humid the air is. Test your mines under varying weather conditions so you'll know how long your mines take to arm. This way you can safely travel through your own mine field if you are forced to (although this is NOT recommended).

Another possibility with this type of mine is that it is self disarming if you use a volatile explosive like Acetone Peroxide, which will evaporate completely over the course of a few weeks in warm weather. This is a very good feature to have because one day you may want to use the land that you've mined, and you don't want to have to risk blowing yourself up finding these things.

If you've used pure chemicals, clean materials, and store them in cool, airtight containers, there's no reason why these mines can't be stored for years.

MINE INJURIES

Toe-Popper Injuries

Small mines of this type typically don't remove the entire foot, only gaping chunks. But, depending on where the foot lands on the mine, it could be as little as a few toes (tip of boot) to the entire foot at the ankle (heel of boot). A hard surface like concrete will cause more damage to the foot since less of the explosions energy will be absorbed by the ground. Sand would absorb more energy and thus lessen the damage.

Mid-foot

Another mid-foot

Blast Mine Injuries

Larger AP blast mines (8+ ounces) will, depending on size and design, remove the entire entire foot on 1 leg, all the way up to the complete destruction of both legs up past the knees (somethimes to the hip). Mines of this type will typically kill the victim outright from the shock and loss of blood withing a few minutes.

Traumatic double-amputation below the knees. Fatal.

As you can see from the above picture, large mines are very destructive. But they're also wasteful of explosives since the most desirable injuries are non-fatal ones that require at least 1 other person to help the injured man. Dead men can be left where they lie until the fight is over. Screaming casualties have to be helped, otherwise unit morale will drop through the floor. By tying up 1 man for each casualty, you're effectively getting 2 casualties for the price of 1.

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United States Patent **4,218,974**
Heinemann **August 26, 1980**

Scatterable ***antipersonnel*** mine

Abstract

An ***antipersonnel*** mine having a pressure sensitive explosive diluted and dnsitized by an inert bulking agent and a volatile liquid to temporarily unarm the explosive until the volatile liquid is evaporated. A method for desensitizing the mine by addition of the volatile liquid before the explosive sensitizer is added.

Inventors: **Heinemann; Robert W.** (Dover, NJ)
Assignee: **The United States of America as represented by the Secretary of the Army** (Washington, DC)
Appl. No.: **618269**
Filed: **February 16, 1967**

U.S. Class: **102/8**
Intern'l Class: F42B 023/10
Field of Search: 149/2,35 102/8,70,20,22,23

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Primary Examiner: Jordan; Charles T.
Attorney, Agent or Firm: Edelberg; Nathan, Gibson; Robert P., Erkkila; A. Victor

Claims

1. A scatterable ***antipersonnel*** mine capable of arming within a specified delay time comprising,

an explosive mixture comprising a high explosive base charge mixed with a sensitized initiating material and a bulking agent wetted with a volatile liquid adapted to dilute and temporarily desensitize said initiating material, and thereby prevent the immediate operation of said mine,

said bulking agent providing for a larger quantity of the desensitizer liquid to be in contact with the explosive mixture,

a porous outer housing of woven cloth covering said explosive mixture whereby said volatile desensitizer liquid may evaporate there through and thereby resensitize and rearm said material and said mine,

and a flat stiffener plate positioned within said housing with said explosive mixture in contact therewith on either side thereof to provide resistance against which said mixture may be ground upon in response to external pressure exerted on said mine, thereby to effect detonation following said resensitizing and rearming delay.

2. A scatterable ***antipersonnel*** mine as defined in claim 1, wherein said explosive mixture is placed within said housing on either side of said stiffener plate;

and wherein said stiffener plate is provided with a plurality of apertures therethrough which permit evaporation of said volatile desensitizer liquid from said explosive mixture from either side through said plate.

3. A scatterable ***antipersonnel*** mine comprising,

a porous pliable woven cloth bag providing a flexible outer housing therefor, a body of explosive material contained in said housing capable of detonating in response to pressure of the type exerted by the weight of a human body in stepping on said housing,

a volatile desensitizing agent included within said explosive material to delay the propagation of detonation in said material during the period required to evaporate said agent therefrom, whereby said mine is armed after a predetermined delay, and

a flat stiffener plate mounted in and extending transversely through said housing and the body of explosive material to provide substantially equal amounts of said explosive material on either side thereof and to provide resistance to movement of said explosive material in response to said pressure being exerted on said housing, thereby to effect detonation of said explosive material and firing of said mine,

said stiffener plate being provided with a plurality of substantially uniformly spaced apertures therethrough, whereby a portion of said desensitizing agent which may in use be positioned below said plate may more easily be evaporated.

4. A scatterable ***antipersonnel*** mine as defined in claim 3, wherein said body of explosive material

includes a sensitized initiating mixture as a primary explosive and a high explosive base charge as a secondary explosive, and wherein said desensitizing agent includes a bulking agent wetted with a volatile liquid.

Description

This invention relates to an ***antipersonnel*** mine, and particularly, to a mine containing a pressure sensitive explosive which may be desensitized for a limited time to facilitate safe packing and shipping and which is capable of being scattered from a moving vehicle without detonating.

The need for a low cost scatterable ***antipersonnel*** mine capable of delayed arming and yet capable of being safely manufactured, transported and used has been a formidable challenge to the munition designer. One way of solving the problem was to employ fuze mechanisms adapted to this purpose. This method has been found generally to involve costly and complex fuzing problems.

Another possible and available approach to the solution of this problem was to use a single explosive material, and then attempt to disarm it for a limited time. This was completely unsatisfactory for this application because the explosive material available, such as cyanuric triazide, proved to be extremely complex to manufacture and too sensitive and toxic to use. Furthermore these explosives would generally sublime and selfdetonate during manufacture and storage.

In general, the inventive apparatus comprises an improved ***antipersonnel*** mine which has overcome the disadvantages of the prior art and has resulted in a low cost, easily handled explosive device which is higly effective as a mine barrier system.

The inventive apparatus comprises a body of sensitized initiating explosive material which will detonate when external pressure is exerted upon it. To facilitate handling and shipping of the mine and to enable the mine to be scattered over an area without detonation occuring, a quantity of inert material wetted with a volatile liquid is added to and mixed with the initiating explosive. The wet material dilutes and temporarily desensitizes the explosive concentration by separating the explosive crystals from each other. Rearming of the mine occurs when the volatile liquid is evaporated and the initiating explosive is again sensitized for detonation. Thus, a delayed arming time is obtained.

The entire mixture is housed in a porous cloth bag to facilitate the evaporation of the volatile liquid therethrough when the mine is exposed to the air. A flat rigid back-up plate is inserted in the housing in contact with the explosive mixture to provide equal amounts of the mixture on either side of the plate. The plate provides resistance for the explosive mixture when external pressure is applied to the housing following the rearming delay, and thereby a larger amount of energy is exerted on the explosive being crushed.

The back-up plate is provided with a plurality of spaced apertures through its surfaces. Since the explosive mixture is positioned on either side of a flat plate, and the mine is scattered randomly on the ground in operation, the explosive mixture would tend to arm on top of the back-up plate, but would remain unarmed for a longer time period underneath the plate; that is the arming of the explosive mixture on the side of the mine lying on the ground would be retarded. Therefore, the apertures provided in the plate permit the necessary evaporation of the volatile liquid required from the explosive mixture below the plate to maintain equal sensitivity throughout the mine.

In the drawing,

FIG. 1 is a top view partially in section, of an ***antipersonnel*** mine embodying the invention, and

FIG. 2 is a side view, in cross section, of the mine of FIG. 1, taken on the section line 2--2 thereof, as it appears in operation and showing further details of construction in accordance with the invention.

The invention may be more fully understood by recourse to the drawing, wherein like reference numerals apply to like parts throughout. Referring now to FIGS. 1 and 2 of the drawing, there is shown a mine housing 5 constructed of a porous material. The housing is preferably a woven poplin fabric of dacron and cotton fibers but is not limited to this particular material. A sateen fabric, or a microporous polyethylene material may also be used with similar results. The housing 5, or cloth bag, is cut in the desired shape and seamed around its edges (not shown) after the contents of the mine have been inserted within the boundary of the edges. These include an explosive charge or body 6 of an explosive chemical mixture and a perforated flat rigid or semi rigid stiffener or back-up plate 7.

The explosive mixture 6 is placed within the housing on either side of the stiffener or back-up plate 7. The stiffener plate provides the necessary resistance against which the explosive mixture may be ground upon in response to external pressure exerted on the housing 5. By way of example, the stiffener plate may be constructed from a 90.degree. vulcanized fiber sheet or fireboard separator of the type manufactured by the Spaulding Fibre Company. An aluminum or plexiglass sheet may also be used.

The explosive mixture 6 comprises a primary explosive sensitized with granulated glass to obtain a body of pressure sensitive material. To this material a bulking agent and a desensitizer liquid are added to temporarily desensitize and disarm the mine for operation. A high explosive base charge or secondary explosive may also be added to the mixture to augment the shattering or crushing effect of the explosive mixture. The sensitized material can then act as the initiating element for the explosive train terminating with the additional high explosive base charge.

The initiating explosive element can be a mixture of lead azide (RD 1333) sensitized with ground pyrex glass of a mixed mesh size, such as 18/32. Other primary explosives can be readily used in place of lead azide and also other abrasive sensitizers, such as sand or carborundum, may be used in place of glass.

The high explosive base charge may comprise cyclonite (RDX), but this is only one example of several other high explosives that can readily be used instead.

The bulking agent is a low density inert material or a diatomaceous-type earth (calcium silicate), such as Cab-O-Sil, manufactured by Godfrey L. Cabot, Inc.

The entire mixture is wet with a volatile desensitizing liquid which, in conjunction with the bulking agent, dilutes and separates the explosive crystals from each other, thereby as above explained, to temporarily desensitize the mine and provide an unarmed pressure sensitive explosive. The liquid may be a fluorinated or chlorinated hydrocarbon, such as chlorothane (1,1,1 trichloroethane), but other desensitizer liquids, such as ethers and alcohols are useable.

The mine becomes sensitized and thereby armed when the volatile liquid is evaporated from the explosive mixture. Therefor, arming of the mine is a function of the vaporization of the liquid used. By

adjusting the amount of bulking agent employed, and by proper selection of the desensitizing liquid, a wide range of delayed arming times may be obtained.

The housing 5, as mentioned before, is made of a porous material in order to permit the volatile desensitizer to escape and arm the mine. Upon exposure to the air, the liquid evaporates and the mine becomes armed for detonation in response to pressure of the type exerted by the weight of a human body in stepping on said housing.

In operation, the unarmed mines may be scattered over a large area for use as a personnel mine barrier. The terrain to be protected may consist of sand or soft earth, and thereby present an arming problem. The mine would normally land with the stiffener plate lying parallel to the ground, thereby exposing one portion of the explosive mixture to the air, while the other portion would be lying on and surrounded by the material of the soft terrain as in FIG. 2. That is, the explosive mixture above the stiffener plate would tend to arm much faster than the identical explosive mixture below the plate, due to the retarded evaporation of the desensitizer liquid contained below the plate.

To overcome this problem the stiffener plate 7 is provided with a plurality of spaced apertures 8 through the surface of the plate. The apertures permit the necessary evaporation required from the explosive below the plate, or rather the apertures provide for evaporation from either side through the plate, thereby to eliminate any necessity for the mine to be positioned in a predetermined manner with respect to the ground and to maintain the sensitivity of the mine.

To insure safe handling and storage of the unarmed mines before they are to be employed in operation, the mines are packed in leak-proof, hermetically sealed containers. The shape of the mine was chosen to be quarter-circular, or pie-shaped to facilitate easier and safer packing of the unarmed mine. It is to be understood that the mine is not limited to this particular shape, but may take any desired form and still be effective. The present preferred embodiment though, improved storageability in that a large number of mines may be packed in a tear strip cylindrical metallic can with great ease. As an example, cans containing 8 layers of 4 mines each have been exposed to extreme environmental testing and none have produced any leaks, whereby the mines remained desensitized and unarmed. To insure desensitization, the mines are packed in a bulking-agent desensitizer liquid gel before the top of the container is sealed.

To insure safe loading of the mine, the lead azide is consistently maintained in the wet stage by a water/alcohol mixture. The water/alcohol mixture in the lead azide may be replaced through a washing with absolute alcohol, followed by the organic desensitizer liquid. Mixing of the lead azide, bulking agent, high explosive and desensitizer liquid are conducted together. Loading may be conducted manually by a spooning technique with the glass added separately to the mine. The concentration of desensitizer is maintained at a level, which is in equilibrium with liquid desensitizer just touching the mine. The bulking-agent was wet in an identical fashion until the amount of liquid absorbed was in equilibrium with the liquid reservoir which it touched. When this gel is used in firmly packing the mines, there is a minimum amount of liquid transfer which takes place as a result of dialysis between the liquid in the mines and in the gel, and therefor, the liquid concentration of the mine remains stable until placed in operation. The gel further acts as a reservoir of desensitizer and provides additional safety should the containers inadvertently leak.

While the invention has been shown and disclosed with reference to an ***antipersonnel*** mine which may be remotely scattered or merely thrown on the ground for example, it is obvious that it may be applied to a missile or other aerial dispersal systems which would allow the mines to be ejected in flight and

thereby cover very large or small and well defined areas.

The significant aspects of the mine of the present invention involve the mixing of the primary explosive material with an abrasive sensitizer, a low density bulking agent and a volatile desensitizer liquid to obtain an unarmed pressure sensitive explosive. A high explosive may also be added to augment the shattering or crushing effect of the mixture. The mixture, when loaded into a porous housing and surrounding a stiffener plate with apertures in it, arms upon exposure to the air and evaporation of the volatile desensitizer liquid.

* * * * *

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CHEMICAL WEAPONS

Chemical weapons have often been referred to as "The Poor Mans Nuke". They certainly can be! 1 person with a chemical weapons can wipe out an entire building full of people without a sound. As the father of modern chemical warfare, Fritz Haber, once said; "It's a higher form of killing"

My goal is to give you the knowledge to take readily available chemicals that can be bought without suspicion, and to convert them into powerful chemical weapons that will kill your enemies by the score.

The more complex nerve agents (Sarin and VX for instance) require a good understanding of chemistry and lab procedures. This is beyond my ability to teach here. I'm posting that kind of information so it will be readily available when, or if, your ready. In the meantime, there are plenty of other chemicals to choose from.

WARNING! Chemical weapons are by their very nature insidious and extremely dangerous! Making them without using proper protection will likely kill you. ALWAYS wear a gas mask when making and weaponizing. And protective clothing if your making vesicants or nerve agents. I'll include links to military manuals on lab and field procedures to use with chemical weapons.

The vesicants and nerve agents will be added later.

Phosgene UPDATED 01/28/2000

Chloropicrin NEW! 01/08/2000

Chloroacetone NEW! 01/29/2000

PHOSGENE

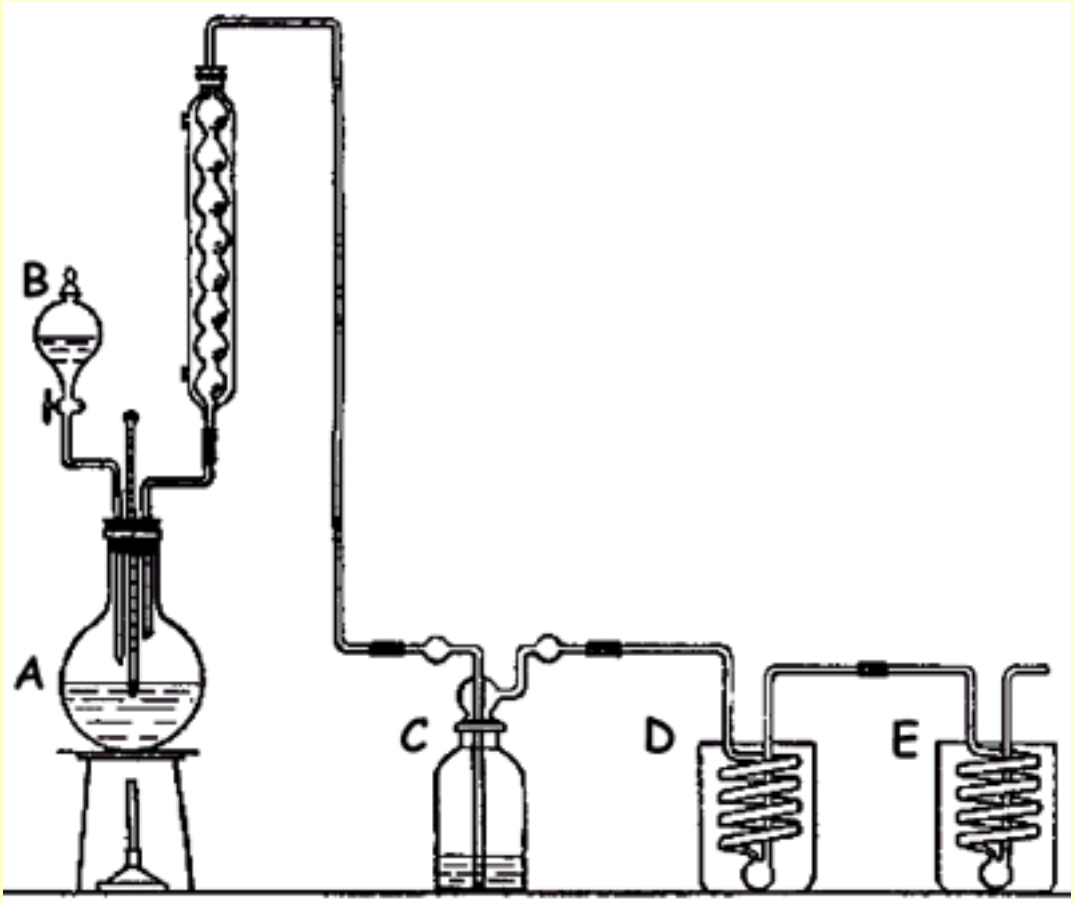
Phosgene is a toxic gas that was originally used in WW1 as a chemical weapon. It would be used today for terrorist actions since much more effective chemicals (Nerve Gases) are used for war. This preparation would be suitable for making a small amount of phosgene for killing a single person or small group of people like at a meeting.

Technical Details

Synonyms	carbonic dichloride, carbon oxychloride, carbonyl (di)chloride, and chloroformyl chloride
Military Symbol	CG
CAS Registry #	75-44-5
Merck Index Reference	# 7310, pg. 1165 (11th ed.)
Formula Weight	98.92
Melting/Boiling Points	MP -128° C / BP 8.2° C (a gas above 47 degrees Fahrenheit (8.2° C)
Vapor Density	3.4 at bp (air = 1.0)
Vapor Pressure	1180 mmHg at 20° C
Appearance	Due to hydrolysis from atmospheric water, it appears as a white cloud in an outdoor environment.
Solubility in Water	0.9% (Phosgene hydrolyzes rapidly; hydrolysis of a 1 percent solution of phosgene in water is complete within 20 seconds at 0° C.)

Preparation

Synthesis from Sulphuric Acid and Carbon Tetrachloride



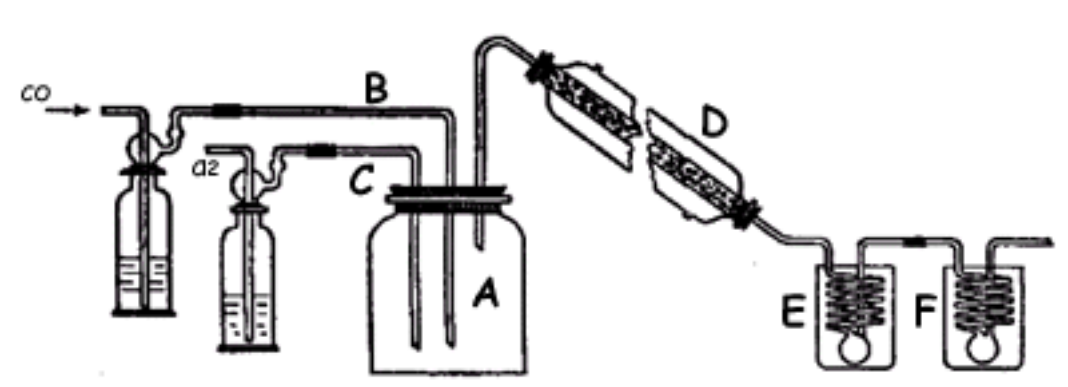
A flask with a short reflux condenser (A), a dropping funnel (B), and delivery tube leading to an wash bottle containing sulphuric acid (C) are fitted into the top of the condenser. The wash bottle is connected to cooled receivers (D and E). 100% sulphuric acid (H2SO4), to which 2% by weight of ignited kieselguhr has been added, is placed in the flask. Carbon tetrachloride is introduced into the dropping funnel. The sulphuric acid is heated to 120-130° C in an oil bath and the carbon tetrachloride is allowed to drop in slowly, the resulting phosgene is condensed in the receivers while the hydrogen chloride passes on.

The reaction is:

$3CCL_4 + 2H_2SO_4 \rightarrow 3COCl_2 + 4HCl + S_2O_5Cl_2$

Another way to do it is to use the same setup as above with the delivery tube leading to an empty wash bottle fitted into the top of the condenser. The wash bottle is connected to a flask 1/2 filled with toluene, which acts as a receiver. The resulting phosgene being absorbed in the toluene, while the hydrogen chloride passes on.

Synthesis from Chlorine and Carbon Monoxide.



A wide-mouthed vessel (A) is closed with a stopper pierced with three holes. Through two of these holes glass tubes (B and C) pass to the bottom of the vessel, while through the third a very short tube passes and connects with a condenser (D) filled with granules of activated carbon. The other end of the condenser is connected with two receivers (E and F) externally cooled with a freezing mixture of ice and calcium chloride, or preferably dry ice and rubbing alcohol.

Carbon monoxide (prepared by passing CO_2 (dry ice) through a pipe filled with charcoal and heated red hot in a fire, passing the resulting CO through sodium hydroxide to remove excess CO_2, and finally drying with sulphuric acid) is passed through a wash bottle containing sulphuric acid, and then by means of tube B into the vessel A where it mixes with chlorine introduced through the other tube C. The chlorine is passed in at the rate of five or six bubbles a second and the carbon monoxide at eight or nine bubbles a second. As the two gases pass through the charcoal, the latter becomes heated, and water is therefore circulated through the outer tube of the condenser to cool it. The phosgene as it forms gradually condenses in the two externally cooled receivers

1 gram of phosgene dissolves (at 20° C) in 1.5 grams of toluene, 1.2 grams of gasoline (poison gas molotov cocktails?), 1.6 grams glacial acetic acid, 1.7 grams chloroform, and 3.6 grams of carbon tetrachloride.

Any phosgene not condensed or absorbed should be destroyed by bubbling through a 20% solution of Sodium Hydroxide (lye)

A quick and dirty improvised way to make it would be to use methylene chloride, a commonly used chemical paint remover, or other chlorinated solvent near a heat source with red hot elements (hot air gun, electric radiator, hair dryer), allowing the release of phosgene.

Usage

There would be 2 ways of using this. Either a slow, gradual buildup so that the victim become desensitized to the smell of the gas. Or, a massive overdose that will fatally injure them in 1 breath. I would personally go for the massive overdose.

Phosgene is lethal at .5 ounces per 1,000 cubic feet for a 10 minute exposure, and at 2 ounces per 1,000 cubic feet for a 2 minute exposure. You can assure the 2 minute exposure by mixing a large amount of chloropicrin or other tear gas in with the phosgene to blind the victims and

impede their escape. And locking the doors shut wouldn't hurt either.

For a personal hit, a thick walled glass capsule 1/2 filled with liquid phosgene can be placed where the victim will break it (under a car seat) or rigged with a blasting cap to shatter it. You fill the tube by cooling it in dry ice/alcohol slurry, adding the phosgene, and sealing the open end with a propane torch, keeping the liquid in the freezing mix to keep it from boiling away.

Once the capsule warms to room temperature, the phosgene in the capsule will stay liquid because it's under pressure. Once the capsule is broken, the phosgene will instantly convert back into a gas. 2 ounces of liquid phosgene released in an average car would create a concentration equal to 20 ounces of phosgene per 1,000 cubic feet. More than 8 times the immediate lethal dose.

Medical Aspects

The damage caused by phosgene is due to the presence of a highly reactive carbonyl group attached to 2 chloride atoms. The gas dissolves slowly in water, but when it occurs, it allows the breakdown to carbon dioxide and hydrochloric acid. This slow dissolution allows phosgene to enter the pulmonary system without significant damage to the upper airways. However, in the lower airways and alveoli, the tissue undergoes necrosis and inflammation.

After the first few hours of exposure, the carbonyl group attacks the surface of the alveolar capillaries, causing leakage of serum into the alveolar septa. The tissue fills with fluid, causing hypoxia and apnea. Massive amounts of fluid (up to 1 L/h) leak out of the circulation, leading to a non-cardiogenic pulmonary edema, with associated hypoxemia and volume depletion.

Symptoms

PULMONARY:

Cough (initially non-productive, later frothy white to yellow colored sputum) or hemoptysis.
Dyspnea (exertional early on, which becomes resting dyspnea).
Chest tightness or discomfort (may be pleuritic in nature but is frequently described as retrosternal burning).
Mucosal irritation is more common with intense exposure.
Eye irritation and tearing.
Nasal irritation (irritation and burning of the nasal passages occurs with phosgene concentrations greater than 3.0 ppm, but lower respiratory tract disease may occur at even lower concentrations).
Throat irritation extending to the retrosternal area is common with exposures greater than .05 OZ./1,000 cubic feet and may be described as a burning sensation.
Sudden death secondary to laryngospasm with large exposures.

CARDIOVASCULAR (due to volume depletion or hypoxemia):

Lightheadedness, palpitations.
Angina.
Headache (believed to be secondary to the hypoxemia as well as the inflammatory response

initiated in the pulmonary parenchyma).
Anorexia, nausea and vomiting.
Flat metallic taste when smoking cigarettes or overall altered taste sensation.
Weakness.
Anxiety/sense of impending doom (likely from the hypoxemia and tachycardia).
Skin burning if the patient has been sweating or if clothing is wet (caused by the breakdown to hydrochloric acid).

A rough estimate of survivability is the degree of cyanosis developed by the patient. Historically, patients with a mouse-grey cyanosis have a worse prognosis than plum-blue cyanosis (quantitative assessment of hypoxemia was not routinely available at the time of these historical observations). A rough indicator of the time until respiratory failure is to double the length of time from exposure to development of crackles (fizzing sound when breathing).

CHLOROPICRIN

Chloropicrin is a pretty simple tear gas to make and is toxic enough to use as a poison gas. Also known as "vomiting gas", chloropicrin was mixed with phosgene during WW1 because the chloropicrin could penetrate the gas masks of the time, making the soldiers puke and remove their gas masks, exposing them to the more lethal phosgene. Modern gas masks are immune to chloropicrin but it can still be used with phosgene to blind the targets so they can't escape before they've been fatally exposed.

Technical Details

Synonyms	Trichloronitromethane, Acquinite, Nitrochloroform, Larvacide 100, Picram, Picfume
Military Symbol	PS
CAS Registry #	76-06-2
Merck Index Reference	# , pg. (th ed.)
Formula Weight	164.5
Melting/Boiling Points	MP -69.2° C / BP 112° C (with decomposition, can be steam distilled without change)
Vapor Density	5.7 (air = 1.0)
Vapor Pressure	17 mmHg at 20° C
Appearance	Slightly oily, colorless, refractive liquid
Solubility in Water	.22 grams in 100 milliliters water at 0° C, .17grams at 20° C

Preparation

This is really quit simple. It's basically the same as the chloroform systhesis found in the drug section. A 5 gallon bucket and a stick will be all the equipment you really need. And a gas mask of course. For the hypochlorite solution you could probably use the 10% pool grade sodium hypochlorite. $4 for 2 gallons. HTH is also possible.

After the reaction has run, just pour off the water from the heavier, bottom layer of chloropicrin. Swish it with some fresh water to remove any last traces of hypochlorite or hydroxide.

From US Patent #3,1065,881:

The process preferably employs a solution of sodium hypochlorite as the chlorinationg agent, although other alkaline hypochlorites are also suitable. It is not necessary to keep the

hypochlorite in excess to obtain relatively high yields of chloropicrin. The reaction between nitromethane and hypochlorite is sufficiently rapid so that there is little chance for the sodium hydroxide which is formed during the reaction to react further with the nitromethane in any appreciable amount.

A slight excess of nitromethane over the theoretical amount necessary to completely react with a given amount of hypochlorite is essential in producing high yields of chloropicrin in high purity. The excess nitromethane serves to replace any nitromethane otherwise reacting with the sodium hydroxide formed by the main reaction.

The theoretical amount is the amount of nitromethane which completely reacts with a given amount of hypochlorite and where all three hydrogen atoms on the carbon atom next to the nitrogen atom are replaced by chlorine atoms, thereby forming chloropicrin. A slight excess of nitromethane over the theoretical amount is defined as being any amount between the theoretical amount and up to 10 percent over the theoretical amount.

The following examples are the results obtained using varying amounts of excess nitromethane in this process thereby obtaining high yields of chloropicrin.

Example 1:
To 500 gallons of 16% sodium hypochlorite by weight was added 550 gallons of water. To the resulting mixture was added 25 gallons of 61% nitromethane by volume over a period of 8 minutes with agitation. The amount of nitromethane was 2% in excess of the theoretical amount. The yield of chloropicrin was 43.5 gallons, or 94.5% of the theoretical amount possible.

Example 2:
To 540 gallons of 16% sodium hypochlorite by weight was added 500 gallons of water. Then 45 gallons of 61% nitromethane bv volume was added over a period of 25 minutes with agitation. The amount of nitromethane was 4% in excess of the theoretical amount. The yield of chloropicrin was 45 gallons, or 90% of the theoretical amount possible.

Example 3:
To 335 parts by weight of water were added 94 parts by weight of sodium hydroxide and 8O parts by weight chlorine. To the sodium hypochlorite solution thus formed were added 600 parts by weight of water and 24.2 parts by weight of nitromethane. The amount of nitromethane was 5 % in excess of the theoretical amount. The yield of chloropicrin was 58.3 parts by weight, or 95% of the theoretical amount possible.

Example 4:
To 40 parts by weight of water were added 10.5 parts by weight of sodium hydroxide and 9.0 parts by weight chlorine. To the sodium hypochlorite solution thus formed was added 70 parts by weight of water and 2.76 parts by weight of nitromethane. The amount of nitromethane was 7% in excess of the theoretical amount. The yield of chloropicrin was 6.53 parts by weight, or 94% of the theoretical amount possible.

Example 5:
To 112 parts by weight of water were added 29 parts by weight of sodium hydroxide and 25 parts by weight of chlorine. To the sodium hypochlorite solution thus formed was added 195 parts by weight of water and 7.9 parts by weight of nitromethane. The amount of nitromethane

was 8% in excess of the theoretical amount. The yield of chloropicrin was 18.4 parts by weight, or 95% of the theoretical amount possible.

Usage

The minimum concetration producing tearing is .019 ounces per 1,000 cubic feet. It becomes intolerable at .05 ounces per 1,000 cubic feet.

Chloropicrin is about 6 times more toxic than chlorine and only a little less toxic than phosgene. But, unlike phosgene, it will last for at least an hour outdoors in summer, and even longer in winter or indoors. It's insoluble in water so it's difficult to destroy or neutralize with common chemicals. A 0.8 oz /1,000 CFT concentration will be fatal in either 10 or 30 minutes exposure (I'm going on memory here folks.).

If even a little bit (a drop or two) is ingested, the victim will soon be heaving their guts out, and they'll have bloody diarrhea for weeks as the poison causes them to shed their intestinal lining. Nice, huh? You could make some in a test tube and measure it out with an eye dropper into someones food or drink. It's got a sweet taste to it so it won't be noticed. Cold foods that would be immediately ingested would be best so no irritating vapors would have time to build up enough to be noticed.

CHLOROACETONE

Chloroacetone is a very easily made tear gas. Everything you need to make it can be bought at any hardware store. And it would be very cheap to make in mass quantities

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Technical Details

Synonyms	Chloro-2-propanone
CAS Registry #	78-95-5
Merck Index Reference	# , pg. (th ed.)
Formula Weight	92.5
Melting/Boiling Points	MP -44.5° C / BP 119° C
Vapor Density	3.2 (air = 1.0)
Appearance	Clear liquid
Solubility	Sparingly soluble in water, but easily in alcohol, ether, chloroform and other organic solvents

Preparation

80 grams of acetone and 20 grams of calcium carbonate (plain white chalk, or maybe baking soda instead) in clumps are placed in a wide necked flask fitted with a 3 hole stopper. Through one of the holes in the stopper a reflux condenser passes, through the second a tap funnel (a large syringe is easier) and through the third a delivery tube for the chlorine gas. The calcium carboate is added to neutralize the hydrochloric acid created in the reaction.

Chlorine (made by adding Hydrochloric acid to HTH pool chlorinating powder) is passed through the acetone, and 30-40 milliliters of water is gradually added from the tap funnel (syringe). The temperature is raised to 60° C on a water bath. Chlorine is added until the calcium carbonate in the flask is almost exhausted, then the gas current is stopped and the mixture allowed to stand overnight. The liquid then settles into two layers. The top layer is separated and fractionally distilled. The last step is unnecessary if your going to use it within a few days, but essential for any long term storage.

I don't forsee any difficulty in scaling up the amounts to multi-gallon quantities. I think you could put 2 gallons of acetone in a metal 5 gallon can, add a quart of water and a couple of pounds of chalk, and pass in chlorine till the reaction is done.

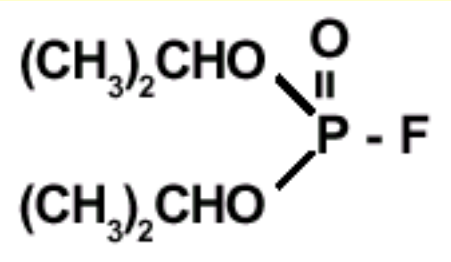
Usage

The minimum concetration producing tearing is .018 ounces per 1,000 cubic feet. It becomes intolerable at .1 ounces per 1,000 cubic feet. Chloroacetone decomposes in contact with iron or steel, so it can't be loaded directly into pipes or such. A plastic or wax liner is needed. It will eventually turn into a solid substance with no tear gas ability, but that will take about a year.

Chloroacetone would be ideal, I think, for spraying large areas since it is so cheap to make in mass quantities. It's not as potent as CS or CN, but it ease of manufacture coupled with the low cost and ready availability of the materials would make it ideal for home manufacture.

EASY NERVE GAS (DFP)

DFP is the easiest true nerve agent that can be made at home. By easy, don't get the idea that I mean you can whip up a batch in a bucket. You can't. But compared to Sarin or VX it's quite easy.



DFP molecule

Technical Details

Synonyms	DFP, diisopropyl phosphorofluoridate, Dyflos, isopropyl fluophosphate
Military Symbol	?
CAS Registry #	55-91-4
Merck Index Reference	#5029, pg 678. (9th ed.)
Formula Weight	184.15
Specific Gravity (Density)	1.055 (H_2O = 1)
Melting/Boiling Points	MP -82° C / BP 183° C (decomposes), 62° C / 9mm
Vapor Density	6.3 (air = 1.0)
Vapor Pressure	0.579mmHg at 20° C
Appearance	Clear, practically odorless, mobile liquid
Solubility	H_2O (25° C) 1.54% w/w (dec.; pH ~ 2.5). Soluble in vegetable oils; not very soluble in mineral oils.

Preparation

180 grams (3 mols) of anhydrous isopropyl alcohol is dissolved in 100 milliliters of carbon tetrachloride (CCl_4), and 137.5 grams (1 mol.) of phosphorus trichloride (PCl_3) is added slowly without external cooling in a 1 liter flask.

It's necessary for the mixture to warm to about 50 - 60° C in order for the reaction to proceed at a reasonable speed.

When the PCl_3 addition is complete, the mixture is kept under reduced pressure with a stream of dry air passing through it for 1 hour. The product is then chlorinated at 0° C by a moderate stream of chlorine gas, until a permanent green color is obtained (about 2 hours).

The liquid is then treated with a stream of dry air under reduced pressure to remove excess chlorine and hydrogen chloride. This usually takes about 3 hours, although the period can often be substantially reduced. (It is essential, however, to remove as much hydrogen chloride (HCl) as possible before fluorination.)

The fluorination is carried out by adding more carbon tetrachloride (about 40 milliliters) to replace that lost by evaporation, and then adding 94.5 grams (2.25 mols) of dry, finely powdered sodium fluoride (NaF) . The mixture is then mechanically stirred and then warmed.

After the initial fairly vigorous reaction subsides, the mixture is gently refluxed for 3 hours, during which time no fuming (indicating moisture or HCl) should have occurred. The product is cooled, filtered, and the carbon tetrachloride distilled off under reduced pressure, and the residual liquid distilled.

A very small fraction is collected at 70 - 75° C / 21mm, followed by the main fraction (138 grams, 75% based on phosphorus trichloride) at 78 - 84.5° C / 21mm of very nearly pure diisopropyl fluorophosphonate. This main fraction distilled almost entirely at 82 - 83° C / 21mm giving the pure compound.

When done preparing the DFP, decontaminate the glassware. 2% aqueous sodium hydroxide (lye(NaOH)) should be kept in readiness in the hood. The flask and other contaminated equipment should be immersed into the solutions and allowed to stand several days. It is important to know that decontamination by cold dilute alkali is effective only when accompanied by vigorous agitation. This point should be kept in mind when dealing with apparatus contaminated by DFP.

When working with DFP, amounts chemically undetectable can cause miosis, even when protective measures are taken. Minute traces of the vapour adhering to clothing can produce significant miosis.

Useage

DFPs main use would be as a lethal inhalant similar to phosgene or hydrogen cyanide. While it is capable of being absorbed through the skin, the amount needed and the length of time for effect rules out its intentional use as such, except for assassinations.

DFP would ideally be atomized by compressed air into a fine mist to be inhaled by the targets. It can also be atomized by explosives. Placing a bottle of DFP close to a pipe bomb so it will be shattered in the explosion would be a very effective way of increasing the killing power of both. Not only would you kill the immediate target with shrapnel, but then anyone responding to the explosion would be lethally exposed to this invisible, odorless nerve gas.

Police, firefighters, paramedics, and bystanders could all fall prey to this "higher form of killing". As an added bonus, future bombing victims would be more likely to die since responding help

would be leery of another nerve gas attack.

It could also be used to poison bullets, sprayed on victims covertly to kill them, or tiny amounts could be injected into an area to temporarily blind a group of people as a harassment technique.

Experiments show that the L.C. 50 (Toxicity by inhalation (L.C. 50) is expressed as the concentration in milligram/liter required to kill 50% of the targets exposed) for DFP for 10 minute exposures (deaths within 2 hours) was 0.44 milligram/liter for mice and 0.36 milligram/liter for rats. So, on average, 0.4 ounces per 1,000 cubic feet would be fatal on 10 minutes exposure.

A concentration of DFP of 1 part in 10,000 parts in the air killed 18/23 of the animals exposed for 10 minutes, all the deaths taking place within 25 minutes of the beginning of the exposure.

This means that the compound is more toxic than phosgene, cyanogen chloride, or chloropicrin. For exposures of less than about 13 minutes the compound is slightly less toxic, and for exposures longer than 13 minutes, more toxic than hydrogen cyanide. The symptoms were salivation, muscular weakness, gasping, and finally cessation of breathing.

The compound is very volatile, has the quick "knock-out" action comparable to that produced by hydrogen cyanide, and resembles hydrogen cyanide and parathion in toxicity.

Pure DFP is a stable chemical that can be stored in sealed containers for years without change but it may develop pressure, therefore it should be stored in a refrigerator or cool place out of sunlight.

Below is a table showing the melting point for various mixtures of mustard gas with DFP. This would be useful as a dual-effect weapon, mustard gas as a vesicant and DFP as a nerve gas. Plus, the DFP allows mustard to be sprayed as a liquid at temperatures that it would otherwise be a solid at.

Mustard Gas	DFP	Melting Point
90.54	9.46	8.9
82.73	17.27	6.3
75.11	23.89	4.8
68.21	31.79	2.8
65.66	34.34	2.1
61.44	38.56	0.4
54.46	45.54	-3.3
0	100	-82
13	87	-36
22.99	77.01	-22
31.94	69.06	-15
37.42	62.58	-11

42.76	57.24	-7.5
47.27	52.73	-5.4
51.11	48.89	-4.2

Decontamination

For disposal, add to a large excess of 2% sodium hydroxide solution. Let stand (with occasional stirring) at least 48 hours to ensure complete hydrolysis (pH should be above 9). Neutralize and flush solution with copious amounts of water.

Medical Aspects

DFP is a powerful inhibitor of cholinesterase, and possesses powerful myotic action (constriction of the pupils of the eyes). DFP is highly toxic by all routes of administration.

Miotic effect
DFP was tested on persons who entered a 10 cubic meter chamber containing a concentration of 1 in 1,000,000 (i.e., 0.0082 milligram/liter)for 5 minutes. Practically nothing was observed until some 5 minutes after leaving the chamber; severe miosis then set in. This often persisted for as long as 7 days, and there was usually no sign of relaxation until after 72 hours.

The eye effects may be summarized as follows :

. Pupil constriction. All subjects affected. The amount of light entering the eye was greatly reduced, and darkness set in. The incapacitation was worse in poor light (e.g., at twilight).

B. Visual acuity affected. Varied from individual to individual.

C. Powers of accommodation affected. The younger subjects usually suffered most.

D. Photophobia and headaches almost always accompanied the miosis. Pain was experienced when changing from a bright to a dull light.

E. Congestive iritis was caused by rather higher concentrations than the above, e.g., at 0.05 milligram/liter for 5 minutes.

Symptoms

Mild - headache, anorexia, nausea, weakness, dizziness, blurred vision and myosis.

Moderate - vomiting, abdominal cramps, diarrhea, salivation, lachrymation, sweating, dyspnea, substernal tightness, slow pulse, tremors of extremities, muscular cramps and ataxia.

Severe - fever, cyanosis, pulmonary edema, areflexia, loss of sphincter control, convulsions, coma, heart block, shock and respiratory failure.

NONLETHAL WEAPONS: TERMS AND REFERENCES

USAF Institute for National Security Studies
USAF Academy, Colorado

I don't usually put up a page that's not completely formatted, but I'm having trouble with my computer right now, and rather than risk losing what I've already done, I'm just going to post this as is and put up the completed version when I'm able to.

The Department of Defense defines these weapons as follows:

Weapons that are explicitly designed and primarily employed so as to incapacitate personnel or materiel, while minimizing fatalities, permanent injury to personnel, and undesired damage to property and the environment. Unlike conventional lethal weapons that destroy their targets principally through blast, penetration and fragmentation, non-lethal weapons employ means other than gross physical destruction to prevent the target from functioning. Non-lethal weapons are intended to have one, or both, of the following characteristics: a. they have relatively reversible effects on personnel or materiel, b. they affect objects differently within their area of influence [229:1-2]

The entries in this paper are organized into seventeen categories for nonlethal weapons technology and five areas for concepts associated with the use of nonlethal technology. The citation protocol for entries list the reference material number and the page number as follows: [Reference Number: Page Number]. If an entire document is cited, no page numbers are given. For the purpose of accuracy, many terms have been directly quoted from a single referenced source, while others combined reference sources.

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1. Nonlethal Weapons

A. Acoustics

Acoustic Beam. High power, very low frequency beam emitted from weaponry under development. Envisioned to be a piston-driven or detonation-driven pulser which forces compressed air into tubes to generate a low frequency wave [543,546].

Blast Wave Projector. Energy generation from a pulsed laser that will project a hot, high pressure plasma in the air in front of a target. It creates a blast wave with variable but controlled effects on hardware and troops [543].

Acoustic Bullets. High power, very low frequency waves emitted from one to two meter antenna dishes. Results in blunt object trauma from waves generated in front of the target. Effects range from discomfort to death. A Russian device that can propel a 10-hertz sonic bullet the size of a baseball hundreds of yards is thought to exist. Proposed fixed site defense [16,113,212,543]. Also known as sonic bullets.

Curdler Unit. A device which is plugged into an HPS-1 sound system to produce a shrill

shrieking, blatting noise. It is used to irritate and disperse rioters and had a decibel range just below that of the danger level to the human ear. It is used in night operations to produce a "voodoo" effect and effectively breaks up chanting, singing and clapping [2:279-280,82:184,84,529].

Deference Tones. Devices which can project a voice or other sound to a particular location. The resulting sound can only be heard at that location [176:86].

Doppler Effect Alarm. Any movement in the area between a transmitter and a receiver causes a slight variation in the sound pattern received. By measuring this variation an alarm system can be made to be activated [23:204].

High Intensity Sound. Loud music was used by American forces to drive Manual Norriega from the Vatican Embassy in Panama in 1990. Also known as polysound [354:45].

HPS-1 Sound System. A 350 watt sound system with an audible voice range of 2 1/2 miles. Used by the military in Indo-China and then supplied to law enforcement. First used by police forces at San Francisco State College and at Berkeley in the 1960s [2:277-279,82,84]. See also Acoustic, Curdler Unit

Infrasound. Very low-frequency sound which can travel long distances and easily penetrate most buildings and vehicles. Transmission of long wavelength sound creates biophysical effects; nausea, loss of bowels, disorientation, vomiting, potential internal organ damage or death may occur. Superior to ultrasound because it is "in band" meaning that its does not lose its properties when it changes mediums such as from air to tissue. By 1972 an infrasound generator had been built in France which generated waves at 7 hertz. When activated it made the people in range sick for hours [23,302,546].

Squawk Box. Crowd dispersal weapon field tested by the British Army in Ireland in 1973. This directional device emits two ultrasonic frequencies which when mixed in the human ear become intolerable. It produces giddiness, nausea or fainting. The beam is so small that is can be directed at specific individuals in a riot situation [451,452,504].

Teleshot. Cartridge projecting a powerful sonic device delivered by a 12-gauge shotgun. Experimental use in 1972 [529].

Ultrasound. A very high frequency sound whose wavelength is "out of band" making it less effective than infrasound because it losses its properties when it changes mediums. Example, from air to human tissue. Like infrasound a lot of power is required to generate these waves which create biophysical effects. See also Acoustic, Infrasound

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B. Acoustics & Opticals

Air Burst Simulator. A diversionary device normally used to simulate the air burst of artillery rounds during infantry training. The device is fired via a 37-40mm launching device and has an 8 second fuze prior to ignition.

Cod-Weight. A heavy, (2 pounds or greater) weight to which a diversionary device is attached to allow it to be thrown through window screens, window glass, bushes and similar materials. The name is derived from the original weights used for deep-sea fishing for Cod.

Diversionary Device. A hand thrown pyrotechnic device which emits a loud bang and dazzling light when ignited. The device is designed to create a sensory overload which temporarily causes confusion and an inability to effectively respond to a tactical team's actions. Sometimes called a flash-bang grenade.

Diversionary Device, Launched. A diversionary device which can be launched from a 12 gauge shot gun [373].

Flash Stick. A stick or pole to which a diversionary device is affixed, allowing it to be precisely placed and held during ignition. Often used for exact insertion through chain link fences, windows, heavy brush and so forth.

Painter's Pole. An extendible pole to which a diversionary device is affixed allowing it to be precisely placed and held during ignition. Often used for supporting second story entries from beneath. The name is derived from the pole used by painters to hold paint rollers when painting overhead.

Photic Driver. A crowd control device developed by a British company prior to 1973 which uses ultrasound and flashing infrared lights which penetrate closed human eyelids. Potential for epileptic fits because of the stroboscopic flashing effect. May have been employed by South African Police during interrogations [23,450].

Psycho-Correction. A technology invented by a Russian scientist that involves influencing subjects visually or aurally with imbedded subliminal messages [318].

Stun Grenade. A non-lethal grenade, XM84, in development to be used by Army military police [338].

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C. Antilethals

Antilethal. Technologies which provide counter-sniper, counter-mortar, antimissile and high-precision weapons capabilities. Advanced forms of camouflage and sensors which defeat lethal weapons are additional forms of this technology [418:24].

Camouflage-Active. Created by dynamically matching the object to be camouflaged to its background colors and light levels rendering it virtually invisible to the eye. This is conceptually the same camouflage process as that used by a chameleon. This is accomplished through a sophisticated color and light sensor array which detects an object's background color and brightness. This data is then computer matched and reproduced on a pixel array covering the viewing service of the object to be camouflaged. Also known as chameleon camouflage [245,302].

Camouflage-Metamorphic. Uniforms or paint which change color due to either light or heat

sensitivity. Extremely useful for night and day operations and those taking place in urban environments [245,302].

Counter-Sniper. Electronic sniper-locating systems based on acoustic, shock wave or infrared measuring technologies. Provides the location of a hostile sniper to a sniper team or to an automated counter-sniper system which can fire either a kinetic round or a low-energy laser at the hostile sniper [2:300-301,505].

Electronic-False Target Generation. An electronic device that creates and presents an image of a target to a precision laser-guided weapon that causes that weapon to aim at the false target. Used as a countermeasure to those precision guided weapons [468:14].

Electronic-Shell Detonator. A system fielded by U.S. troops in Bosnia which creates an electronic field that causes mortar and artillery shells to explode prematurely by signaling to them that they have reached their target [183].

Electromagnetic Shielding. A form of defense against microwave attack. A metal box, known as a "Faraday Cage," can sometimes function as one by excluding electromagnetic fields [356:39].

Food Bomb. Humanitarian use of nonlethal weapons. Place concentrated food pellets rather than anti-personnel bomblets in a cluster bomb unit. For use in cities under siege on the verge of starvation [609].

Laser Protection. Protection is achieved in three ways: absorption using dyes, reflected using optical coatings and the blocking of specific wavelengths [287].

Laser Protection-BLPS. Ballistic and Laser Protective Spectacles. Since 1988, these devices have been issued to high priority Army and Marine Corps units. The BLPS are dye-filled polycarbonate plastic filters which will protect eyesight against the low-energy lasers most likely encountered on today's battlefield, specifically the two or three wave lengths used by common range finders and target designators based on Nd:YAG and ruby lasers. They will not give protection against frequency-agile low energy laser weapons [1:185].

Laser Protection-Smoke. Smoke's attenuative properties allow it to serve as a passive defense against blinding laser weaponry. Large-area smoke generation may provide a means to offer continuous protection for forward elements of U.S. combat forces [115:38].

Low Energy Laser. An Air Force project, known as Have Glance, in which a pod-mounted, low energy laser would be mounted on an aircraft to confuse the heat-seeking function of infrared missiles [1:161].

Sensor-Acoustic. Remote acoustic sensors placed in an area overwatch position in urban zones to detect and locate gunfire within that area [429].

Sensor-Facial Recognition Technology. Experimental information systems which recognize human facial features and compare them to databases of wanted suspects. Great potential for apprehending terrorists in airport terminals and criminals in large crowds. More advanced subdermal systems will be required as a follow-on to these systems as a counter to

criminals/non-state soldiers who surgically alter their facial features [642].

Sensor-Ground Penetrating Radar. Sensor that can detect nongeologic objects and human engineered structures beneath the ground by analyzing the return of electromagnetic waves traveling through geologic structures. Detection of buried mines and discovery/mapping of underground bunkers represent practical, nonlethal applications [215:10].

Sensor-Nonimaging Portable Radar. A radar unit which weighs less than 10 pounds, uses rechargeable batteries, is small enough to fit into a briefcase and will detect motion through nonmetallic walls and floors. Using sounds instead of images, it detects motion and can transmit to a receiver up to a distance of 200 feet [302].

Sensor-Retroreflectivity. A theory based on the reflection of light. Common example is seeing an animal's eyes at night in your headlights. Allows for an electro-optical sensing mode that can be used to find opposing electroptics looking into the night for location and targeting purposes.

Smart Gun. A gun which can only be used by the proper user or users. Identification is automatic and would be carried out by radio frequency signals or other technologies [620].

White Light Goggles Experimental goggles which "gate out" bright white light so that the user will not be affected by them along with the targets [330:6].

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D. Antiplant Agents

Antiplant Agent. Compounds used to destroy plants or crops function in one of two general ways. Growth regulators and desiccants kill or defoliate by stimulating the leaf fall process (growth regulator) or by drying the leaf blade (desiccant). The other category, soil sterilizers, contaminate the soil, preventing or retarding growth. Uses of antiplant agents include destruction of crops and foliant removal to deny/degrade camouflage [13:77-78].

Agent Blue. Fast acting antiplant desiccant containing sodium dimethyl. The desiccant, unlike anti-plant growth regulators, works by drying the leaf blade of the plant rather than simulating the plant's leaf fall process [13:77-78].

Defoliants. Any of a variety of chemical compounds that either stimulate the leaf fall process, dry the leaf blade or sterilize the soil [13:77-78].

Operation Ranch Hand. A defoliation program conducted during the Vietnam War from 1962 to 1970. The primary purpose of the operation was to deny cover to enemy forces, thereby making ambushes more difficult. Crop destruction missions were also conducted in northern and eastern central areas of South Vietnam [22:66-67].

Agent Orange. Antiplant growth regulator containing n-butyl esters of dichlorophenoxyacetic acid and trichlorophenoyacetic acid. Publicized for its use in Operation Ranch Hand in the Vietnam War from 1962-1970 [13:77-78].

Agent Purple. Growth regulator similar to Agent Orange but contains, in addition, the isobutyl

ester of trichlorophenoxyacetic acid [13:77-78].

Agent White. Antiplant growth regulator composed of a mixture of tri-iso-propanolanime salt of dichlorophenoxyacetic acid and picloram in water [13:77-78].

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E. Barriers

Air Bag, Backseat An automobile airbag designed to hold in place a suspect placed in a police car. Designed because of the frequency of violent behavior once suspects have been handcuffed and placed in a police car for transport.

Air Bag Mine. A nonlethal vehicular mine based on a type of air bag [339].

Caltrops. A personnel and vehicular barrier device with four projecting spikes so arranged that when three of the spikes are on the ground, the fourth points upward. The term caltrop is derived from an English water chestnut which was used to impede the mobility of heavy cavalry during the Middle Ages. Caltrops were used in Somalia by the Marines during United Shield to supplement key barrier systems at night during the final hours of the withdrawal [378].

Coating-Slick. Teflon-type lubricants which create a slippery surface because of their chemical properties. These chemical agents reduce friction with the intent to inhibit the free movement of the target. In the 1960s the term''Instant Banana Peel'' was coined to describe the capability provided by Riotril. When applied to a hard surface and wetted down, this dry, relatively-inexpensive, non-toxic, non-corrosive white powder becomes ice slick. It becomes virtually impossible for an individual to move or stand up on a hard surface so treated. Tire-type vehicles are also unable to get traction. Riotril, if allowed to dry, can easily be peeled away or, because of its water-soluble nature, can also be hosed away with high-pressure streams [2:302-303,16,91, 356,565]. Also known as low-friction polymers, slick'ems,' and superlubricants.

Coating-Sticky. Polymer adhesives used to bond down equipment and human targets. Also known as stick'ems' and superadhesives [16].

Emulsifier. Agents, contained in a mixture of mutually insoluble liquids, which were dispersed over the Ho Chi Minh trail to degrade the logistical lifeline of Viet Cong forces during the Vietnam War. Used in tandem with clouding seeding. Also known as soil destabilizers [434].

Fence-RPG. Conventional fencing, usually 6 ft high, with barbed wire on top. While the anti-mobility utility of such fencing is apparent it also had an anti-lethal capability. In Vietnam this fencing was erected as a rocket propelled grenade (RPG) screen in front of armored fighting positions and around command vehicles. RPGs which hit this screen either had their fusing systems disabled (RPG7's) or prematurely detonated (RPG2's). Also known as cyclone fencing [635,637:109].

Foam-Aqueous. Originally derived from a fire fighting compound used to put out airplane fires. Barrier foam is a derivative which is thicker in consistency. This technology employs a safe, biodegradable form of suds which can be piled up to as high as four feet. Barrier foam can be

applied over fences, concertina wire, ditches to be seeded with caltrops (a four pointed device designed to puncture tires) to prevent vehicular passage. By applying the foam over obstacles, it impedes the ability to defeat them. Barrier foam, as its name implies, is used to deny entry or passage. The conceptual origins of this foam date back to 1965 [2:300,82,302,378].

Foam-Aqueous, Generator. Concept involves blowing air through nylon net kept wet with mixture which creates aqueous foam [529].

Foam-Aqueous Riot Control Agent. The ordinary suds of barrier foam can be enhanced with the addition of substances such as oleoresin capsicum, the primary ingredient in "pepper spray," or CS [165].

Foam-Sticky. A name given to a polymer-based superadhesive agent. The technology first began appearing in commercial applications such as "super glue" and quick setting foam insulation. It is extremely persistent and is virtually impossible to remove without a liquid solvent which has a pleasant citrus odor. The solvent can be applied as a spray or poured on. The foam then appears to dissipate, releasing its hold and allowing suspects to be arrested and safely transported. Sticky foam came to public attention on February 28, 1995 when U.S. Marines used it in Mogadishu, Somalia, to prevent armed intruders from impeding efforts to extricate United Nation forces from that county [302,378].

Foam-Sticky, Dispenser. An interior barrier system, operated by either intruder penetration or command, which administers a sticky-foam barrier in a passageway from floor to ceiling [506].

Rope, Launcher. Nylon rope dispersed by a compressed air launcher using mounted on a truck. Thirty cubic feet per minute [529].

Smoke-Cold. A thick, disorienting "cold smoke" which can be generated in areas from 2,000 to 50,000 cubic feet. It restricts an intruders eye-hand coordination and interactions among members of an intruding group [506].

Barrier, Spike. An angle-cut metal rod driven into an unsurfaced road's wheel pit. A 1/2 inch diameter rod, protruding only about 3 inches, is blunt enough so as to not penetrate a shoe sole under a person's weight, yet a heavy vehicle will drive it through a tire [15:92].

Spiked Strip. Flat strip resembling a fire hose with retractable hollow spikes designed to flatten the tires of a target automobile. When the strip is activated, hollow spikes extend vertically and puncture the tires as the vehicle rolls over the strip. Also known as road spikes [566:2].

Stakes. A sharp stake, often of wood or bamboo, that is concealed in high grass, deep mud or pits. It is often coated with excrement, and intended to wound and infect the feet of enemy soldiers. Can be utilized both as a booby trap and as a barrier. Commonly known as punji stick or punji stakes.

Wire/Tape-Barbed, Launcher. Dispensing systems for flat barbed tape and barbed wire which could be quickly deployed into concertina form [82,529].

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F. Batons

Biotechnical-Injector. A baton with an automatic self-injecting syringe for administering the antidote to nerve gas built into it's tip and filled with calmatives or other biotechnical agents [165].

Breakaway. A baton made of a substance that will break if used incorrectly [529].

Electrical. Standard dimension baton which delivers an electric charge of low voltage, powered by standard flash-light cells [2:240,23,529]. Also known as stun baton or shok baton.

Expandable. Measures 6" to 7" in closed position. The three telescopic sections rapidly flick open to an extended 16" to 18". Also known as extensible billyclub [529].

Riot Control Agent. 12-26" plastic baton which is able to project riot control agents [2:211-212].

Side-Handle. A baton with a side-handle attachment which allows it to be twirled for greater impact and used more effectively to block an opponent's blows..

Straight. Wooden, plastic, metallic rod from 12" to 36" used as a swung impact weapon. Can either hang from a leather throng or be held in a holster. Smaller version, 6" to 8." Also known as nightstick or billyclub..

.Straight, Flashlight. Heavy shock resistant flash light which can be swung like a baton.

Straight, Flashlight-Riot Control Agent. Shock resistance polyethylene flash light. Besides providing a light source, this flashlight can be used as a baton and to project a riot control agent [2:216].

Two-Handed Riot The 36 in. long riot baton is employed like a rifle and bayonet-- overhead blows could be fatal. Short, one-handed batons are not appropriate for close-quarter riot actions [74,95].

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G. Biotechnicals

Behavior-Altering Drugs. See Biotechnical, Calmatives Suggested delivery in a gaseous form for terrorist and hostage situations in 1987 [556].

Biodegrading Microbes. Microbes which turn storage tanks full of aviation fuel into useless jelly. Such microbes may produce acids or enzymes which can be tailored to degrade almost anything, even concrete and metal, so their potential use as nonlethal weapons could be extensive [171:2,356:38].

Calmatives. Biotechnical agents which are sedatives or sleep-inducing drugs; includes alfentinil, fentanyls, ketamine and BZ. Several of them make ideal choices for this application when mixed with dimethyl sulfoxide (DMSO), which promotes absorption through skin to quickly

sedate persons contacted. DMSO introduces the calmative agent into the bloodstream by increasing the epidermal absorption rate by about 1,000 percent. The explosion of a flash bang (sometimes called a diversionary device) represents one method of dispersing DMSO and a calmative agent. Calmatives were reportedly used by the Soviets against the Mujahideen in Afghanistan [16,176:83,302,431,556]. Also known as sleep agents.

Disease Organisms. Nonfatal diseases targeted toward troops and civilians. Such viral agents were developed by Iraq to be used against Western forces during the Gulf War so as to create long term disabling injuries. Agents being considered for use were those that cause hemorrhagic conjunctivitis, chronic diarrhea, yellow fever and Crimean Congo hemorrhagic fever [627].

DM. Diphenylaminechloroarsine. A sickening agent no longer in use by the military because of health risks. Probably ruled out of use in Vietnam by October, 1965. Effects include sneezing, shortness of breath, retching and vomiting, hemorrhaging, and possible death. Mixed with CN for immediate effect [13:19,529].

Genetic Alteration. The act of changing genetic code to create a desired less-than-lethal but longterm disablement effect, perhaps for generations, thereby creating a societal burden.

Hypodermic Syringe-Dart Modified shotgun or handgun in which the projectile is a drug-filled syringe activated by a small charge on impact. Wide variety of drugs available including emetic (vomiting) agents [2:293,165,529].

Malodorous Agents. Foul-smelling gases and sprays such as hydrogen sulphide (H_2S) or a compound known as NaS_8 which is used in making plastics. Could be delivered by a grenade. Past work on "cultural specific" agents has also been undertaken [356,529]. See also Biotechnical, Project Agile

Neuro-Implant. Computer implants into the brain which allow for behavioral modification and control. Current research is experimental in nature and focuses on lab animals such as mice [636].

Pheromones The chemical substances released by animals to influence physiology or behavior of other members of the same species. One use of pheromones, at the most elemental level, could be to mark target individuals and then release bees to attack them. This would result in forcing them to exit an area or abandon resistance [195].

Project Agile Series of military science studies in Asia conducted by Battele Memorial Institute in May 1966 for Advanced Research Projects Agency (ARPA). One such study centered on developing 'stink' bombs which were race specific [320].

Wetware Advanced technology devices which are surgically implanted into the body rather than worn. These devices can be used to enhance memory and the human senses, modify behavior or to locate allied troops. Pacemakers represent an early form of wetware. New concept developed in this document.

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H. Electricals

Armored Personnel Carrier. Standard armored personnel carrier fitted with a gate-like apparatus in the front and charged to a high voltage. Used by West German police to clear streets or round up small groups of people [165].

Electric Fence.A fence which delivers a nonlethal electrical shock. It can be employed as an effective barrier against intruders [74:66].

Flashlight. A type of flashlight designed with electrodes on the base. Effective range is minimal [556].

Glove. A glove with an electric impulse generator in the palm and the bottom sides of the glove fingers. A close-in device similar to the electric stun gun and the electric flashlight [556].

.High-Voltage Telsa Coil. Passed from public scene because of their indiscriminate use against blacks in several Southern states in the mid-1960s. Example, electric baton or electric cattle prod [165].

Homemade Body Armor. Newspapers and magazines stuffed down inmates' clothing and/or the use of mattresses as shields to counter the effects of stun guns [385].

Police Jacket. Police jacket which jolts anyone who touches it [165].

Projector. An advanced version of the standoff stun gun, where no wires are required. The charges are delivered through the air through pre-ionized air channels or by charging a low energy projectile which releases the charge at impact. Another approach is to launch a low energy projectile that releases the electrical charge at impact by compressing a piezo-electric element [195:8].

Stun Belt. A command activated belt worn by prisoners which delivers a mild electric shock when they become combative [385].

Stun Gun-Close In. A small, two-pronged, hand held electrical discharge weapon. Effective range is less than an arm length. It works by affecting the muscle signal paths, disturbing the nerve system [556].

Stun Gun-Standoff. A form of stun gun with a range of 20 feet. It fires small, barbed electrical contactors, via a fine trailing wire, which snare a victim's clothing. A 3-4 second lapse takes place before the target is subdued. The development of this device was inspired by the Watts Riots in 1965 [408,529].

Water Stream. A mobile unit projects a water stream charged with high voltage, low amperage. Another method cites 2 water jets, 1 negatively charged and 1 positively charged, which meet to close the circuit [529].

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Projectile, Bag-Stun, Launcher An obsolete gun which delivered a cartridge containing a 4" diameter stun-bag loaded with 1/5 to 1/2 lb. of shot. It could be used as handgun or with an extension as a shotgun. It has been replaced by the 12 gauge shotgun and the 37 (and 40) mm launchers [529]. Also known as the stun gun.

Projectile, Ball-Rubber, Grenade An explosive anti-riot device which hurtles a large number of small "stinging" rubber balls at rioters when ignited. May or may not contain riot control agents [373]. Also known as stingball or stinger grenade.

Projectile, Ball-Rubber, Round The common usage of this term now refers to a number of 5/8 in. rubber balls fired from a 12 ga. shotgun. The 3/8 in. ball is also common. Both have a hardness of about 50 shore. These rounds have maximum effect when fired in confined spaces, where multiple bounces augment the number of impacts on the target with sufficient force to sting rather than hurt. The eyes are the most at risk of damage, due to the small size and velocity of the balls. The older use of this term refers to a rubber ball fitted with a "Blake" attachment to a shotgun. The ball can be solid or filled with liquid or gas. Various designs existed for point or area targets [529].

Projectile, Barricade Penetrating. Any projectile which delivers a riot control agent into a barricade situation via a window or plate-glass. One such projectile is a fin stabilized injection-molded plastic device which disperses a highly-volatile liquid CS agent [2:150,82].

Projectile, Baton-Plastic A PVC cylinder 1/2 inches in diameter and 4 inches long. Instead of being bounced off of the ground these rounds are directly fired at the intended target. Causes a bruising impact blow with a claimed effective range of 30 to 65 yards. At point blank range this round can be fatal. First used by the British Army in Northern Ireland in February of 1973 as a replacement for rubber bullets [2:159,511:672]. Also known as riot baton round, plastic bullets or PVC bullets.

Projectile, Baton-Rubber Pliable rubber cylindrical projectiles delivered from the riot gun or British Army signal gun. Aimed at crowd's legs or at the ground for ricochet effect into a crowd [165,529]. Also known as rubber baton or rubber bullet 6-inch.

Projectile, Baton-Wooden Wooden cylinder delivered by a riot gun or by a British Army signal gun [529]. Also known as broomstick round.

Projectile, Baton-Wooden Multiple A 37-38mm round which disperses 5 wooden pellets which can be fired from a distance or ricocheted into the mob. Direct fire at close or point blank range can cause serious or fatal injuries [2:158].

Projectile, Baton-Wooden Whistling A short fluted cylinder made of wood and fired at low-velocity for crowd dispersal. This round makes a whistling sound when fired. Whistling sound and visibility of round valued over kinetic impact. Fired by a Hong Kong Pellet Gun [165].

Projectile, Chaff-Ceramic Dropped or fired in front of an aircraft which when ingested by a jet engine will destroy its turbine blades and other mechanisms [356:35].

Projectile, Gas Vortex If a gas vortex, a highly stable phenomenon, was projected at some velocity, the difference in pressure on the leading and trailing edges would produce an impact.

Potential use in crowd and riot control situations [556:19].

Projectile, Launcher-ARWEN Anti-Riot Weapon Enfield. A hand-held, cylinder fed, shoulder-launched 37mm anti-riot weapon which is used to launch a variety of impact devices such as bean bags, pellets, rubber and wooden baton rounds, etc.

Projectile, Launcher-Blake Impact Gun Aluminum alloy-type, golf ball sized projectile fitted to a bolt-action shotgun [529].

Projectile, Launcher-Velocity Adjusting Small arms weapon with an adjustable muzzle velocity intended for delivery of less-than-lethal munitions such as rubber or PVC bullets. The purpose of the adjustment is to tailor the velocity to the range [35].

Projectile, Launcher-Very Pistol A 37mm pistol used to fire tear gas and other nonlethal projectiles.

Projectile, Liquid Filled Several types of hollow rubber projectiles have been manufactured. The most recent, in a 12 ga. shotgun size, is filled with a liquid dye to mark the target for subsequent identification, in addition to the impact effect. The working range is from 5 to 75 feet. Older types included a 3 inch diameter, .5 lb. rubber ball filled with water, to be used as an impact projectile. The range was 75 ft. The launcher was large and heavy [529].

Projectile, Mine-Claymore Modular Crowd Control Munition. A nonlethal claymore-type mine which disperses blunt impact ordnance for crowd control purposes [373].

Projectile, Muzzle Launch Ordnance [MLO] MLO MA/RA 88 less-than-lethal shot for the M16A2 Rifle. Must disorient targets at effective ranges of 30-70 meters, not create shrapnel, and be of minimal hazard [338,373].

Projectile, Ricochet-Soft Plastic Polyethylene pellets 1/16" in diameter delivered from a standard 12-gauge shotgun aimed to ricochet. Available in larger sizes [529].

Projectile, Ring Airfoil Grenade, Launcher Launcher Adapter, M234 Designed for attachment to M16A1 rifle. Uses blank cartridge (M755) to propel either Soft Ring Airfoil Grenade (M742) or Sting Ring Airfoil Grenade (M743).

Projectile, Ring Airfoil Grenade-Soft. Soft RAG, M742. A rubberized donut shape with airfoil cross-section that is launched spinning from M234 adapter attached to M16A1 rifle. A series of cavities in the projectile body contain packets of CS powder. Target impact opens the CS packets and disseminates the chemical (powder). This system has been replaced by the Non-Lethal 40mm Sponge Grenade.

Projectile, Ring Airfoil Grenade-Sting Sting RAG, M742. A rubberized donut shape with airfoil cross section that is launched spinning from the M234 adapter attached to M16A1 rifle. Intended as an initial deterrent via kinetic energy impact. Can also be used as a training round. This system has been replaced by the Non-Lethal 40mm Sponge Grenade.

Projectile, Rock Salt Large salt crystals fired from shot guns. Crowd dispersal method.

Projectile, Rubber These projectiles can be solid (homogeneous) or clad (composite). Solid

rubber projectiles can be further classified by density, ranging from high density (hard), to soft (foam). The shape of the homogeneous projectiles varies from a right cylinder (35mm diameter by 3 inches long) to a cylinder with a hemispherical nose, to short cylinders (35mm diameter by 1 1/2 inches long-multi-projectiles, soft foam) to hard, finned shape projectiles (12 gauge), and balls about 5/8 inch. The large cylinders fired to strike the ground in front of the target individuals, bouncing up to hit them. Depending on the distance from the ground impact to the target, the impact point can range from the knees to the head, producing different results. Past experience with this method of firing has shown that.

Projectile, Shards-Ceramic Fired against aircraft to disable their engines or to degrade their stealth capabilities [16].

Projectile, Splatt-Thixotropic Special Purpose Low Lethality Anti-Terrorist. Any projectile that deforms at impact, without penetrating the body. One materiel preparation designed to accomplish this action is described in the patent. The whole projectile is made of this substance, not just the tip. The older usage of this term referred to any caliber shotgun shell with grease or soft putty on the tip which would deform at impact [529].

Projectile, Sponge Grenade 40mm nonlethal projectile developed for the M203 grenade launcher made out of spongy material. Can either be used as a kinetic weapon or with the inclusion of a CS or marking dye wafer. Potentially fatal within 25 meters or if an eye shot occurs. Successor to the discontinued Soft/Sting Airfoil Grenade System.

Projectile, Water Stream Mobile unit which projects a continuing stream of water for riot control purposes [529].

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P. Reactants

Reactant, Acetylene, Grenade One pound bomb containing calcium carbide and water. Upon detonation, forms a bubble of acetylene gas seven feet in diameter. When sucked into the air intake of a diesel at concentrations as little as one percent, the gas would cause the fuel in each cylinder to ignite prematurely, with enough force to break piston rods [144,387].

Reactant, Chemical Compounds Chemical compounds which are magnitudes more powerful than hydrofluoric acid. A mixture of hydrochloric acid (HCI) and nitric acid (H_2NO_3) will dissolve most noble metals, such as gold and platinum, and organic compounds. Could be delivered by binary weapons to attack structures, armored fighting vehicles, roads, roof tops and optical systems [16,246,356]. Also known as supercaustics, superacids, supercorrisive bases, C+, and tire eaters.

Reactant, **Cloud Seeding** Silver iodide dropped into clouds over the Ho Chi Minh trail during the Vietnam War in order to promote additional rainfall which would degrade Viet Cong logistics [434]. See also Reactant, Operation Popeye

Reactant, Combustion Alteration. This technology consists of chemical additives that either contaminate or change the viscosity characteristics of fuel to degrade standard engine performance. The additives may be ingested as a vapor through air intakes, mixed with fuel

during the intake cycle or applied directly to a fuel source causing almost instant engine failure [302:13,16].

Reactant, Liquid Metal Embrittlement [LME] Agents operate by altering the molecular structure of base metals or alloys and could significantly interfere with the operation of the aircraft, vehicles, metal treads and bridge supports to which they were applied. LMEs are clear and have little or no perceptible residue, whether sprayed on or applied with felt-tip markers. Some ambiguity exists because LMEs may refer to both liquids and liquid metals [16,302,356].

Reactant, LME Graffiti Graffiti used to mask an LME strike against a bridge or other target. Great potential for terrorist use. Example, phone call to law enforcement stating that an LME strike has been conducted against one of a number of bridges in a city using red LME graffiti.

Reactant, **Operation Popeye** The cloud-seeding campaign conducted by the U.S. military during the Vietnam War. 2,602 Popeye flights were flown through 1972 in hopes of interdicting the flow of Communists troops and supplies along the Ho Chi Minh Trail [434].

Reactant, Pyrophoric Particles Particles which when ingested in a combustion chamber give off heat and thus overheat the chamber which causes thermal failure. Caesium would be one likely candidate [144,356]. Also known as polystyrene peanuts.

Q. Riot Control Agents

Riot Control Agent, Area Dispensers RCA dispensers mounted in the walls and ceilings of prison facilities. They provide law enforcement personnel the ability to move groups out of or from one area to another through CS and OC dispersement [385].

Riot Control Agent, CA 4-Bromobenzylcyanide. CA was one of the first tear agents used. It is not as effective as CN or CS and is obsolete. CA produces a burning sensation of the mucous membranes and severe irritation and tearing of the eyes with acute pain in the forehead [584:52]. Also known as BBC, larmine, and camite.

Riot Control Agent, Chemical Mace Small spray can containing a 0.9 per cent solution of agent CN in a variety of petroleum based carriers including a mixed freon/hydrocarbon solvent. First introduced in 1966. CS-Mace then developed in 1968 by suggestion of the U.S. Army [2:213-214,165].

Riot Control Agent, CN Chloroacetophenone. A lacrimator that causes irritation to the upper respiratory passages and may cause irritations to the skin. On average, it incapacitates for approximately 3 minutes. Discovered by the German chemist Graeber in 1869. Replaced for most purposes by CS [13:19,529].

Riot Control Agent, CR Dibenz-(b,f)-1,4-oxazepine. Newer riot control irritant developed in England in 1962 by the British chemists Higginbottom and Suchitzsky. About 5 times more effective than CS. In addition, CR is much less toxic than CS. CR is not used in its pure form (a yellow powder) but dissolved in a solution of 80 parts of propylene glycol and 20 parts of water to form a 0.1-percent CR solution. It is used in solution as a riot control agent. Eye pain, discomfort and excessive tearing occur with sometimes painful sensitivity to strong light or temporary blindness. Symptoms can persist for 15 to 30 minutes. Dubbed "fire gas" by the

media because of the burning sensation it caused to the skin of rioters when used in Northern Ireland from 1973-1974. Authorized U.S. Army use in 1974 [2:180,67,584:59].

Riot Control Agent, CS Ortho-chlorobenzalmalononitrile was made the standard riot control agent by the Army in 1959. The term "CS" is derived from the two scientists, B.B. Carson and R.W. Sloughton, who first prepared it in 1928. First used by U.S. civilian law enforcement in 1968 during the riots in Washington D.C. While an effective riot control agent, which incapacitates on average from 5 to 10 minutes, decontamination and cross-contamination is a considerable problem in urban environments [13:19,82,337].

Riot Control Agent, CS1 Specially formulated to prolong persistency and increase the effectiveness of CS. Unlike CS, CS1 is a free-flowing (micropulverized) agent powder consisting of 95-percent crystalline CS blended with 5-percent silica aerogel. This formulation reduces agglomeration and achieves the desired respiratory effects when dispersed as a solid aerosol [584:59].

Riot Control Agent, CS2 CS blended with silicone-treated silica aerogel, which causes it to repel water. This treatment improves the physical characteristics of CS by reducing agglomeration and hydrolysis. This form of CS prolongs the effectiveness for both immediate and surface contamination effects. When disturbed, CS2 reaerosolizes to cause respiratory and eye effects. A cloud of waterproofed CS can be kicked up by people walking in the street or grass two months after it has settled [13:50,584:59].

Riot Control Agent, CSX A form of CS developed for dissemination as a liquid rather than as a powder. One gram of powdered CS is dissolved in 99 grams of trioctylphosphite (TOF). As with CS, CSX stings and irritates the eyes, skin, nose, throat, and lungs of exposed personnel [584:59].

Riot Control Agent, Disperser-Fogger Conventional insecticide blower adopted for CS and CN dispensing in Vietnam. Produces a fog-type emission for up to a 15 minute period. Conceptual basis was to fill Viet Cong tunnel complexes with large amounts of the CS agent. Another fogger was a handheld gasoline-operated device which dispenses either CS, CN or inert fog at 0.7 gallon/hour [2:178,165]. Also known as mighty mite (M-106) and pepper fogger.

Riot Control Agent, Disperser-Liquid An Army riot-control agent disperser visually resembling a man-carried flamethrower. Fully loaded weight is approx. 55 pounds. Disperses CS mixed with a trioctylphosphate solvent. [2:178,165]. Also known as liquid stream projector.

Riot Control Agent, Disperser-Powder Modified Dry-Powder Fire Extinguisher. Powdered CS and CN dispersal [165].

Riot Control Agent, Grenade Electrically Activated A riot control grenade with a male, electrically activated screw-in socket connection in place of a standard fuse. This enables the grenades to be incorporated into electrical systems, in fixed installations, where they can be activated by a trip device or switch, at will. This is of special importance in security of buildings, and vital installations, providing a dependable, economical protective system that can be locally installed. This system, with variations, is now in use in commercial security systems, as well as

in U.S. government and embassy installations [2:133].

Riot Control Agent, Grenade-M73A Army riot control grenade in use prior to the M47-Type CS Grenade. As of 1992, the M7A3 was still in use because of technical problems with the M47 [67].

Riot Control Agent, Grenade-M47 CS Basic riot control grenade employed by the Army. Its contents are expelled as a vapor from a taped-over port in the grenade body, causing the grenade to "skitter" around on the ground, making it difficult for rioters to throw back. As of 1992, it has not seen tactical action [67].

Riot Control Agent, Homemade Face Filters Wet rags and other devices made by prison inmates to counter the effects of riot control agents [385].

Riot Control Agent, Lacrimator A riot control irritant that will cause blinding tears upon contact with the eyes [444]. Also see Riot Control Agent, CN

Riot Control Agent, Launcher-Handy Andy U.S. Army hand-hold type throwaway munition consisting of an aluminum tube with a hand-activated striker in the base. On ignition, the E24 propels a cylindrical rubber projectile containing 50 grams of CS burning formulation to distances of 70-100 yards [2:179].

Riot Control Agent, Launcher-Riot Gun A weapon designed specifically to fire tear gas munitions of 37-mm diam. [444:2]. Also known as 1 1/2-in gun, 38-mm gun, gas gun, and tear gas launcher.

Riot Control Agent, Mine An anti-personnel mine filled with a riot control agent. For perimeter use around detention camps or secured facilities.

Riot Control Agent, OC Oleoresin Capsicum. A food product obtained from chili peppers which are dried and ground into a fine powder. When mixed with an emulsifier such as mineral, vegetable, soy oil or water, it may be sprayed from a variety of dispensers and used as an irritant for safely controlling violent persons or vicious animals and/or restoration and maintenance of order.

Riot Control Agent, Ring Airfoil Grenade-Soft See Projectile, Ring Airfoil Grenade-Soft

Riot Control Agent, Sponge Grenade See Projectile, Sponge Grenade

Riot Control Agent, Tear Gas-Invisible Invisible tear-gas clouds are produced by blast munitions loaded with dust or liquid agents. Invisible tear gas cannot be seen by rioters once it first emerges from a grenade or mechanical dispenser and therefore produces a greater psychological panic-producing effect than tear smoke [2:161-162].

Riot Control Agent, Tear Gas-Visible Visible tear-gas clouds (tear smoke) emanate from burning grenades and projectiles. Tear smoke is highly visible and plainly indicates the area covered to police and rioter alike [2:161-162].

II. Nonlethal Weapons Concepts

A. Ethical

Ethical, Biological Weapons Convention [BWC], 1972. This convention prohibits the development, production, stockpiling or retention of microbial or biological agents for use as weapons. Would likely preclude the use of biodegrading microbes [16,508].

Ethical, Blinding Laser Ban, 1995. The Department of Defense prohibits the use of lasers specifically designed to cause permanent blindness of unenhanced vision and supports negotiations prohibiting the use of such weapons. However, laser systems are absolutely vital to our modern military. Among other things, they are currently used for detection, targeting, range-finding, communications and target destruction...accidental or incidental eye injuries may occur on the battlefield as the result of the use of legitimate laser systems. This prohibition was initiated by the United States in concurrence with other, mostly Western, nations [457].

Ethical, Certain Conventional Weapons Convention, 1980. Prohibits or restricts weapons which are deemed to be excessively injurious or to have indiscriminate effects. Microwave, radio-frequency radiation, and visible light pulsing at brain-wave frequency may violate this convention [20:49-54,508:45]. Also known as Inhumane Weapons Convention.

Ethical, Chemical Weapons Convention [CWC], 1993 This convention, while not in force, precludes the use of toxic chemicals as a method of warfare. A toxic chemical is one which 'though its chemical action on life processes can cause death, temporary incapacitation or permanent harm to humans or animals.' How supercaustics would be interpreted within this convention is unknown [16,508].

Ethical, Environmental Modification Techniques Ban, 1977 Found in Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD). Bans any technique for changing- through deliberate manipulation of natural processes- the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere and atmosphere, or of outer space which will have widespread, long-lasting or severe effects as the means of destruction, damage or injury to any other State Party [20:68-69].

Ethical, Geneva Protocol, 1925 Whereas the use in war of asphyxiating, poisonous or other gases, and of analogous liquids, materials or devices, has been justly condemned by the general opinion of the civilized world; and Whereas the prohibition of such use has been declared in Treaties to which the majority of Powers of the world are Parties; and To the end that this prohibition shall be universally accepted as part of International Law, binding alike the conscience and the practice of nations. Extended to bacteriological methods of warfare. The United States has interpreted the Protocol of 1925 as not prohibiting the use of riot control agents [20:57-58].

Ethical, New Martyrdom A potential form of martyrdom arising from the long-term incapacitation capacity that some nonlethal weapons provide. Examples are permanently blinding or disrupting the nervous systems of opposing soldiers. Those living, rather than dead, would represent a new form of

martyr. References to the horrors of the gassings of the First World War would undoubtedly be made [149:10-11].

Ethical, Tennessee vs. Garner A 1985 court case (475 U.S. 1) which held that the use of deadly force to

apprehend an apparently unarmed, nonviolent fleeing felon is unreasonable seizure under the Fourth Amendment. Stimulated law enforcement interest in less-than-lethal weapons.

B. Functional

Functional, Bouchon. The complete metal fuze assembly of a diversionary device or similar grenade, usually consisting of a safety pin, safety "spoon," and a percussion type ignition device.

Functional, Deflagrate To burn; consume; to burn rapidly with intense heat and dazzling light.

Functional, Deflagrating Canister A canister which is designed to burst or burn. When used with a diversionary device, this type of canister is designed to burst or burn at a low enough pressure to prevent the bouchon from being thrown.

Functional, Deflagrating Explosive Any explosive which deflagrates rather than detonates. Also called a "low" explosive, it is characterized by relatively slow burning processes with progressive reaction rates and buildup of pressure which creates a heaving action.

Functional, Deployment Sequence The first of three functions when a diversionary device is deployed. It refers to the manner and place in which a diversionary device is deployed. See also Functional, Ignition Sequence and Functional, Firing Sequence

Functional, Detonate To explode violently and noisily; also called a "high" explosive it is characterized by very rapid chemical reactions, thus causing tremendously high pressure and brisance (shattering action).

Functional, Detonating Explosive Any explosive which detonates rather than deflagrates. Also called a "high" explosive, it is characterized by very rapid chemical reactions, thus causing tremendously high pressure and brisance (shattering action).

Functional, Firing Sequence The second of three functions when a diversionary device is deployed. It refers to the mechanical action of the bouchon, (fuze assembly). See also Functional, Deployment Sequence and Functional, Ignition Sequence

Functional, Fuse A narrow tube filled with combustible material, or a wick saturated with such material, for setting off an explosive charge. A pyrotechnic device which serves as the initiator to an explosive charge (e.g. M-3A1, friction type fuse).

Functional, Fuze Any of various devices for detonating bombs, projectiles, or explosive charges. A mechanical device used as the initiator to an explosive charge (e.g. M-201A1, percussion type fuze).

Functional, Hybrids Weapons that can be switched from "lethal" to "nonlethal" by a simple mechanism, having multiple barrels, or using ammunition which can be switched at launch (single barrel, lightened logistic chain) [529].

Functional, Ignition Setting a thing on fire, to cause something to burn.

Functional, Ignition Sequence The third of three functions when a diversionary device is deployed. It refers to the events which take place during the burning of the charge. See also Functional, Deployment

Sequence and Functional, Firing Sequence

C. Operational

Operational, Brevity Code A one or two word phrase which, when transmitted on a radio, carries a much larger meaning. Used to keep transmission time to a minimum without unduly tying up valuable "air time." Usually repeated twice to ensure understanding.

Operational, Denial System Components of a security system that prevent an intruder or adversary from completing an intrusive hostile act on a fixed sight [359].

Operational, Dirty Battlefield A battlefield operational environment in which civilians and other noncombatants are mixed in with combatants [56].

Operational, Environmental Warfare A form of attack based on purposeful environmental degradation by a state or non-state group against an opponent. An early example would be the salting of the fields of Carthage by the Romans. The most recent example would be the blowing up of 732 oil wells in Kuwait and the releasing of oil into the Persian Gulf by Iraq in 1991.

Operational, Immediate Action Drill Any action, technique or procedure which is initiated by an event rather than a signal [5].

Operational, Lethal-Nonlethal Coordination A process by which hardkill and softkill weapons are made to enhance the effects of one another rather than degrade each others' performance. Applied to the defensive systems of a warship [570].

Operational, Long Term Disablement The outcome of the application of nonlethal force that affects the opponent beyond duration of the confrontation or conflict. Blinding, maiming or psychologically deranging the opponent represent forms of long term disablement. This form of disablement burdens a society and is anathema to the Western definition of nonlethality.

Operational, Mobile Security System Area/fixed site denial or delay systems that are portable, leveraging on nonlethal technology and minimal installation costs [402].

Operational, Mobile Tactics A procedure used against rioters in which an anti-riot team is embarked on vehicles, rapidly driven near rioters, whereupon they quickly disembark and rush toward the crowd, followed by another team which repeats the procedure and exploits the momentum gained by the original team.

Operational, Nonlethal-Lethal Effect A nonlethal attack which purposefully sets up an opposing soldier or vehicle for a fatal attack. Example, a soldier struck to the ground by a stick'em' and then shot by a conventional round or killed by an artillery barrage.

Operational, Nonlethal Weapons, Non-Western Weapons which are designed to cause long-term disablement to military personnel and civilians. These weapons may be employed by either non-state forces or non-Western nation-states. Forms of nonlethal non-Western weapons include blinding lasers, disease organisms, and genetic alteration [149:3].

Operational, Nonlethal Weapons, Western Weapons that are explicitly designed and primarily employed so as to incapacitate personnel or materiel, while minimizing fatalities, permanent injury to

personnel, and undesired damage to property and the environment. Unlike conventional lethal weapons that destroy their targets principally through blast, penetration and fragmentation, non-lethal weapons employ means other than gross physical destruction to prevent the target from functioning. Non-lethal weapons are intended to have one, or both, of the following characteristics: a. they have relatively reversible effects on personnel or materiel, b. they affect objects differently within their area of influence [229:1-2].

Operational, Passive Deterrents A genre of nonlethal weapons that does not affect the physiology of the target individual. Includes dyes, personal alarms, and scent sprays.

Operational, Rules of Engagement [ROEs]. Generally, rules that provide implementation guidance on actions to exercise 1. the inherent right and obligation of self-defense and 2. the application of force for mission accomplishment by national/multinational military forces in international not domestic situations. The many boundaries to ROE's include international laws and treaties, national policy and custom. Standing Rules of Engagement refer to those generally intended for all situations, but tailored ROE's for specific situations may augment those standing rules. This is a general, not legal, description.

Operational, Second Order Effect A nonlethal attack ultimately resulting in an unintentional death. For example, a pilot, blinded by a laser unable to safely land his or her aircraft or a patient dies because the power to an incubator or iron long in a hospital is cut off due to the destruction of a power plant.

Operational, Short Term Disablement A form of disablement which has relatively reversible effects on personnel or

materiel [230:1].

Operational, Tailored Weaponry Alternative, and likely more accurate, term for nonlethal weaponry. Such weaponry is qualitatively advanced over traditional firearms and munitions because it allows for precision control over the application of politico-military force. Rather than killing (100% force) or not-killing (0% force) an opponent these weapons offer new capabilities in the 1-99% range between no action and lethal force.

D. Physiological

Physiological, Acetylcholine Effect. The temporary effect an organism experiences after long periods of high stress, characterized by a total emotional surrender. Derived from an overabundance of the compound acetylcholine which is active in the transmission of nerve impulses.

Physiological, Diversion A diversion which acts directly on a person by affecting one or more of the five senses.

Physiological, Impulse Noise Noise which lasts less than one second.

Physiological, Lag Time The physiological time lag which occurs between the time a stimulus is perceived until the body responds. In a healthy, well-rested human, this takes about three-quarters of a second.

Physiological, Rhodopsin A purplish protein pigment, contained in the rods of the retina, that is transformed by the action of light and is necessary for vision in dim light.

Physiological, Sensory Overload A temporary inability of an organism to correctly interpret and appropriately respond to life's stimuli because of the volume of input.

Physiological, Ulster Techniques. Psychophysiological techniques employed by the British in Northern Ireland based on sensory deprivation which can lead to long-lasting post-traumatic neurosis. Methods used included hooding, masking noise, wall standing, inadequate diet, sleep deprivation and some physical brutality [532].

E. Theoretical

Theoretical, Environmental Security The recognition that the natural environment in which humans exist must be protected for their continued benefit. Because of the magnitude of many environmental problems, they require regional not national level solutions.

Theoretical, Fourth Epoch War Strategic level theory of war utilizing an energy paradigm of Western civilization. The magnitude of change forecast is equivalent in scale to the Dark Ages, 378-732, and the European Renaissance, 1346-1648. During these transformations a new energy source is demonstrated on the battlefield, the dominant polity form "fails," the non-state soldier achieves dominance on the battlefield, crime and war blur, a new economy emerges, social classes shift, and advanced forms of battlespace and weaponry develop [633:23-25].

Theoretical, Fourth Generation Warfare Operational level theory of warfare which views military change based upon advances in either technology or ideas. The emerging "idea based" fourth generation is thought to be based on terrorism and low intensity conflict [633:19-21].

Theoretical, MTR A military technical revolution was declared by the Soviets to be taking place back in the 1980s. This revolution is based on emerging technologies, electronic and information systems and non-nuclear deep strike munitions, and will qualitatively alter the conduct of future war. The MTR is the conceptual forerunner to the revolution in military affairs (RMA) [640:2]. See also Theoretical, RMA

Theoretical, New Gunpowder Revolution The perception that the wide scale application of nonlethal technology on the battlefield will be as significant as the fielding of gunpowder based firearms during the European Renaissance [149:9].

Theoretical, Nonlethality The theory that overwhelming nonlethal force could be used to defeat lethal force [418:24].

Theoretical, Post-Engine, Mechanical, Energy For more advanced forms of nonlethal weaponry such as lasers and acoustics to properly function post-engine (mechanical) forms of energy will be required [149:7]. See also Theoretical, Fourth Epoch War

Theoretical, RMA Revolution in Military Affairs. Operational level theory which views military technical, doctrinal, and force structure changes now taking place equivalent in magnitude to the 1920's and 1930's when armored warfare, strategic bombing, and amphibious and carrier operations developed. The RMA is generally accepted by the U.S. Armed Forces and Office of Net Assessment [640].

Theoretical, RPMA Fourth Epoch War theory perception that a revolution in political and military affairs (RPMA) is taking place. Far larger than a revolution in military affairs (RMA), this historical transition will result in the eventual demise of the nation-state, the blurring of crime and war, and the rise of new competing polity forms [633]. See also Theoretical, Fourth Epoch War

Theoretical, Sixth Generation Warfare Soviet (Russian) view of future warfare based upon faulty historical modeling which does not differentiate between strategic and operational level change. The current military revolution is said to be equivalent in magnitude to the 1920s & 1930s or the 1950s & 1960s. Attributes of the new form of warfare developing will include the ascendancy of aerospace operations, the growing importance of electronic warfare and the computerization of armed combat [634]. See also Theoretical, MTR

Theoretical, Third Wave War Theory of future war modeled on "waves" of economic based civilizations. First wave civilizations are agricultural, second wave civilizations are industrial and emerging third wave civilizations are informational. Future warfare will be informational based with the Gulf War representing the first of these conflicts. Magnitude of current change now taking place viewed as equivalent to that of the Industrial Revolution [633:21-23].

Theoretical, Twenty-First Century Politico-Military Force Matrix Nonlethal technology, when coupled with traditional forms of lethal weaponry, allow for the application of short-term incapacitation, long-term incapacitation, and deadly force against the physical and mental/perceptual attributes of human targets and the hardware and software attributes of machine targets. This advanced form of politico-military force application can be expressed in a matrix [149:4].

Theoretical, War, **Clausewitzian** A struggle between nation-states or their coalitions over the preservation and extension of national sovereignty.

Theoretical, War, Post-Clausewitzian A struggle between competing forms of social and political organization over which the eventual successor to the nation-state will be built [633:27].

Theoretical, Weapons of Mass Protection Nonlethal, antilethal, and information warfare weapons [418:16].

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IV. Addendum

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Anti-Helicopter Weapons & Tactics

The helicopter is one of the most effective police weapons in tracking fleeing suspects and coordinating ground units for the kill. So it is of the highest priority that a criminal plan on dealing with this threat.

Now your asking yourself "So I know they have choppers, what can I do about it?". There's several things you can do. You can

1. Avoid operating in an area with 'copters.
2. Schedule your operations when 'copters aren't flying.
3. Evade a 'copter through the use of deception and countermeasures.
4. Actively hunt and kill 'copters.

We're going to cover the above 4 methods in order.

#1. Avoid operating in an area with 'copters

To avoid operating in an area with police 'copters, you first have to know if they have any in your area. This is easy to find out. If you live in a major city like Los Angles, New York, or other city like that, you have 'copters. In LA and NY, you have more than a dozen of them. Most smaller cities have at least 1 or 2.

Now most rural areas don't have a locally located police 'copter. If there is a 'copter presence, it is most likely Search and Rescue or State Police. If you live in the area, you'll have seen them if they're around. If your new to the area, ask long time residents in the course of a casual conversation if they've seen any. If they want to know why your asking, tell them you used to live in some big city and the police 'copters used to buzz around over peoples houses, you got tired of it and all the other big city crap and your looking to buy or rent in the area.

Another good way is to go to the local library and read some local papers, watch the local news shows, and even call the cops themselves with some bullshit story and ask them. Say your kid is writing a story about the local police and all the "good" work they do.

#2. Schedule your operations when 'copters aren't flying.

Helicopters are delicate machines despite their appearances. This means a lot of down time for maintainence and repairs. That means that they have to have a place where they can be repaired. This is usually at the police station or a local airport (sometimes a military base). If your area has only one 'copter, then obviously when it's at it's base, it's not flying around. As long as someone is watching it, ready to page you with a warning that it's taking off, your clear.

If there are multiple 'copters, this tactic won't work. Instead, you'll have to rely on the weather. Copters generally won't fly during extreme weather. This means high winds (40+ MPH), hail, lightning storms, tornados, hurricanes, dust storms,dense fog, or extremely heavy rain. If they are flying, it is as a rescue operation, not a police chase. Generally, if the local airport is closed because of the weather, the cops aren't flying around.

In addition to the weather, there are certain days of the year when the police ground their 'copters. These are New Years Day and The Fourth of July. Why? Because of the number of people shooting their guns and fireworks into the air. This applies to the major cities mostly. Rural areas don't have the numbers of people needed to make this a likely occurance. Other countries would have other holidays, but since most countries ban private gun ownership, they probably don't ground their 'copters.

#3. Shaking a 'copter through evasion, deception and countermeasures.

Shaking a 'copter is not something you should strive for because that means that you fucked up and got one following you. But shit happens sometimes and you have to deal with it. So how do you lose a 'copter? 3 ways:

. Evasion (outmaneuvering or hiding)
b. Deception (making them think your somewhere your not)
c. Countermeasures (obscuring or blinding their sensors)

A. Evasion

Evading a 'copter when it's on you is a difficult task because it can outrun you no matter what kind of ground vehicle your using, let alone trying to outrun it on foot. And it can outmaneuver you because it doesn't have to follow the streets or terrain. But that is also its weakness. It can't get down on the street and follow you into tunnels, underground garages, multi-story parking lots, and such.

So don't be a fool and try outrunning a 'copter. Instead, lose yourself in the urban environment. A large shopping mall (not a strip mall) offers many different entrances and exits in a large, totally enclosed environment where a 'copter can't see you. Major cities have malls that cover many acres with dozens of different exits in every direction, both above and below ground. As long as you have a minute or two lead time on the ground cops and you can keep your cool, you can blend into the crowd and slip out another exit. But you have to be quick about it because the police will quickly man every obvious exit and have security use the surveillance cameras to look for you.

Pull a Ninja Turtle move and disappear down into the sewer system. To do this you'll need to have a map of the sewer system (available from the county office), the equipment to deal with the toxic gases, and the balls to handle the dark, wet, cramped, and dangerous conditions. The advantages (if you can handle the risks) are numerous. The cops can't follow you (poisonous atmosphere), they can't shoot you without risking a major explosion, dogs can't track you 'cause they can't breath the air, and sewers go in every direction (not just following the streets but also running underneath the blocks)

For detailed information on this technique and uses of the sewers for crime go to this page Sewers and their Uses

It might be possible to preposition a hiding spot in an area that you know well. And I don't mean a room or shack. Too obvious. You ever see one of those large green utility boxes? The kind that a person could comfortably sit in? People see them all the time but no one thinks about them. They're just part of the surroundings.

Lay out a concrete slab on some vacant lot and put the utility box on it. Bolt it down and lock it up. If a 'copter's on you, you go to this area and lay down a thick IR obscurant smoke screen. Then, rather than run, you go into the box and sit tight. The police will search around, cordon off the area and call in the dogs. The dogs will probably lead the cops right to the box, but since it's "only" a utilities box and locked too, they'll think the dog is wrong.

To increase the realism of this illusion, you could use a car battery powered circuit to drive a humming circuit to simulate electrical humming, and maybe even a false front in case they force it open. The most important aspect of the evasion is to keep the 'copter from seeing the switch from your car to the box. You could possibly move a manhole cover so they think you went down there.

B. Deception

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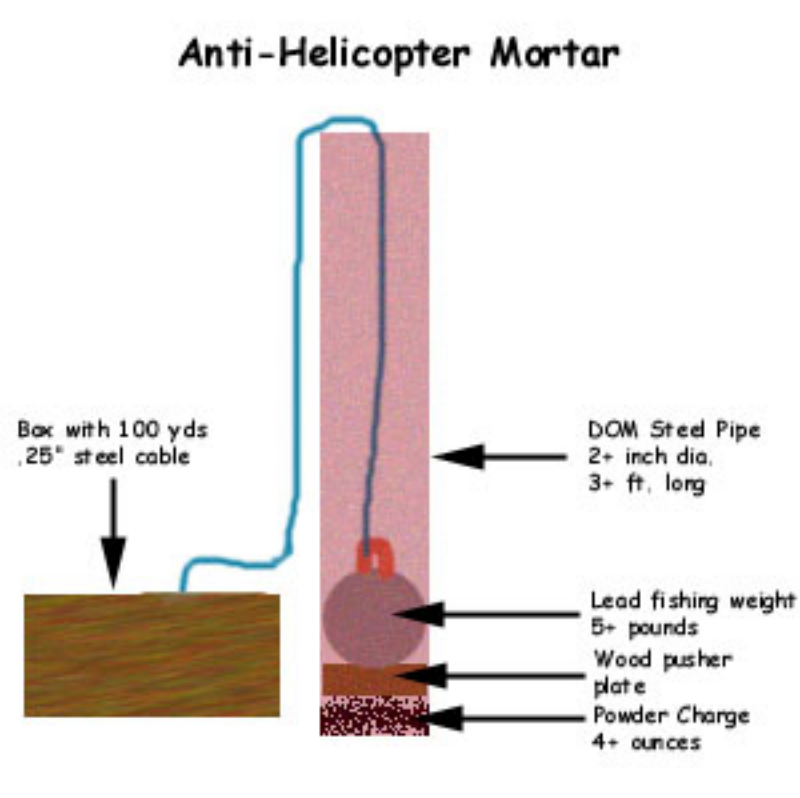
#4. Actively hunt and kill 'copters.

#4 is the most effective deterrent to future police helicopter operations because you'll be destroying multi-million dollar equipment, killing highly skilled pilots, and putting fear in other pilots who will be extremely cautious, staying far and high which decreases their effectiveness.

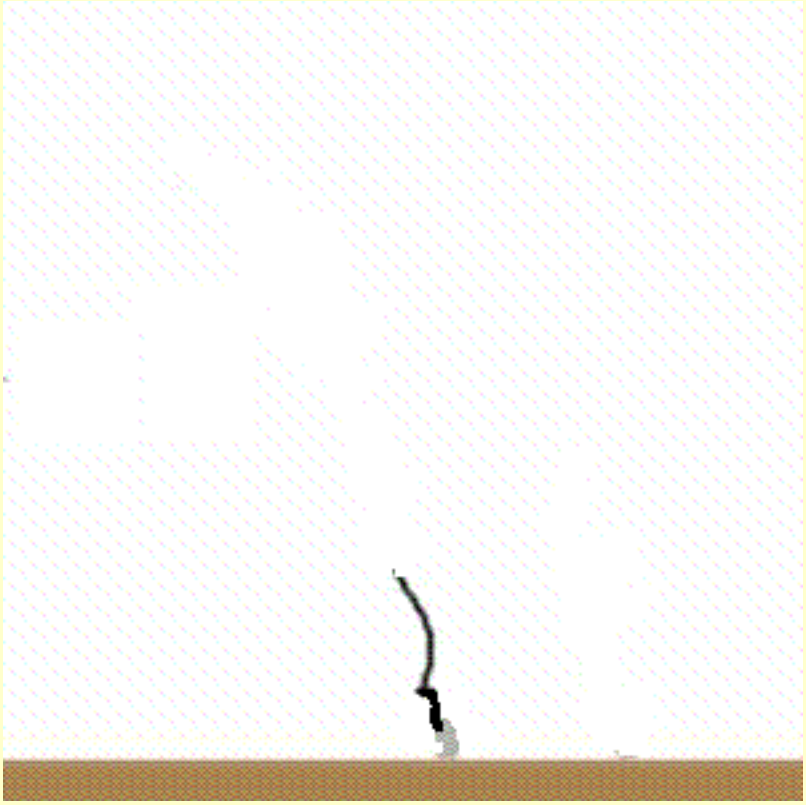
The mortar idea is adapted from a WW2air field defense weapon. The allies used rocket pulled cables to shear the wings off attacking fighters. My adaptation uses mortars because they are cheaper and easier to make than rockets.

The mortars could cost as much as $100 each, and you'll want several dozen to ensure success. I can hear you screaming through cyberspace "That's more than $20,000!". True, but when you figure a helicopter costs more than $2,000,000, you have a 100 to 1 cost to benefit ratio. Hell, an anti-aircraft missile costs $500,000.

This shows the construction of the mortar. The basic purpose of the mortar is to launch a weight, with steel cable attached, up into the air with sufficient speed and height to intercept the blades of a helicopter. When the helicopters blades hit the cable, they are sheared off, and the helicopter crashes. It's important that you adjust the powder charge correctly so that the weight is lofted up high enough to pull up the cable clear of the ground, but not so high that it will pull the end of the cable higher than the helicopters minimum expected altitude (usually at least 100+ feet). This will insure the maximum probability of a hit. You would normally bury the mortar ahead of time in preparation of an ambush. This is for camouflage purposes. You could also use PVC instead of steel if



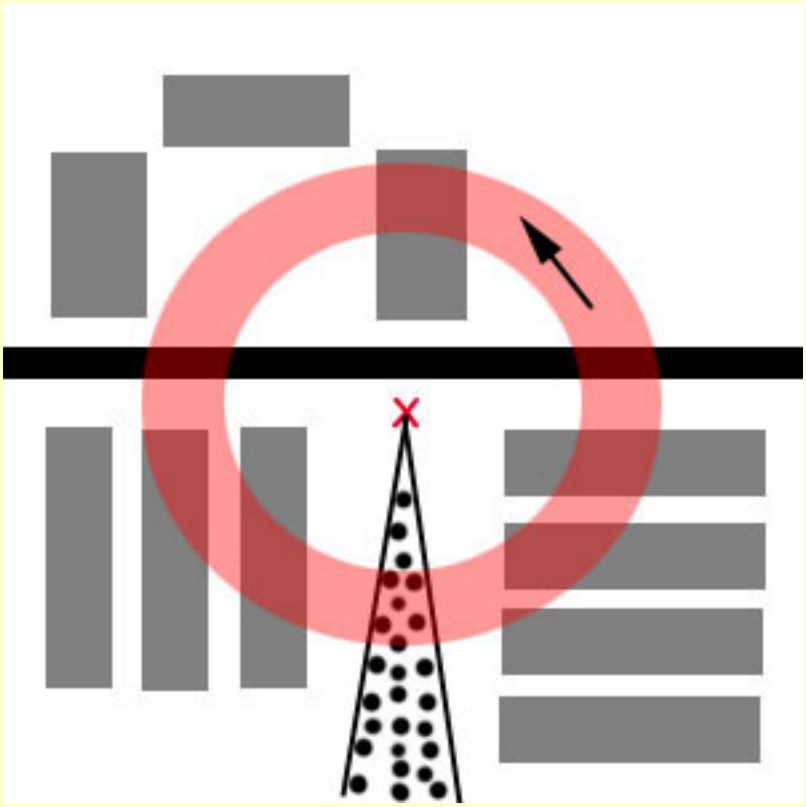
you packed the hole with "dirtcrete". This would greatly save you money.



When firing the mortars, you want the ones closest to the 'copter to fire first, the next closest 2nd, and so on. This way you can be sure that the 'copter will hit at least one cable or more. If you fired them in the opposite order, the 'copter might fly past the line of fire as the weight flies up at it. Also, to improve your hit probability, aim the mortars at a 20-30 degree angle towards the expected path of approach. This way the cable might fall down on top the copter if you shoot the mortars prematurely rather than fall straight back down..

If your really lucky, you'll catch the 'copter dead on with a fist size lead ball straight in the engine. That would likely blow it up in midair.

If you don't see the animation, hit refresh and scroll down quickly.



Police 'copters almost always orbit in a counter-clockwise circle. This is because the pilot is on the left hand side and has to see the target (you) so he can track it. In urban areas they will generally orbit in a narrow circular path (as shown) at a range of 300 yards or less, and an altitude of 300 feet or less. This is because of buildings and other obstacles that obstruct their view. In the country side, they will orbit at a much further distance and height to maximize the field of view for their imaging equipment, and to act as coordinators for the ground forces. You would want the mortars in a wedge formation that widens the further away it goes from you. This is to compensate for errors in timing judgement.

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Sewers and their Uses

Sewers haves many other uses besides getting rid of your morning shit. They've been used for centuries by guerillas and criminals to evade detection and capture. You can move invisibly across a city without ever being seen, pop up anywhere, and disappear without a trace. This is the most effective evasion technique, but also one of the most dangerous. If your not careful you could easily kill yourself any number of ways. The best way to get ready for this is to go to the library or bookstore and get some books on the subject. You may have a hard time finding them, but they are out there.

After studying, practice before you need to use this technique under fire. Start by opening up the manhole (be ready for the weight) and testing the air. Do this by lowering a small animal (like a canary or mouse) in a cage down on a string. Give it 5 or 10 minutes. If the animal is still alive, climb down and just stand there a bit to get a feel for the surroundings. Storm drains (during the dry season) are usually safe and dry, sanitary sewers have shit and filth.

If you don't get instant claustrophobia, walk a little ways down the tunnel into the dark. Stand there a minute or two than go back up. You don't want to freak yourself out the first time. Repeat this experience a few times, staying down longer each time. If you have a friend or crime partner, bring him along for moral support.

After you got some experience under your belt, go exploring (bring the caged animal). This will give you the confidence to operate in this environment, and if the time comes, you'll have the skills the cops chasing you don't have.

Now,of course, if the police are chasing you, your not going to have the luxury of testing the air and being careful. Your going to have to hustle your ass down the hole, possible while being shot at. Pop off a couple of smoke grenades to blind the cops while your pulling up the manhole cover. Drop down the duffle bag with an activated light stick attached. Once your down the hole, you need to use life support equipment like a small SCUBA tank to breath. You also can't do or use anything that may cause a spark or flame. That could cause an explosion (not good), so no shooting at the cops or using a grenade or smoke bomb.

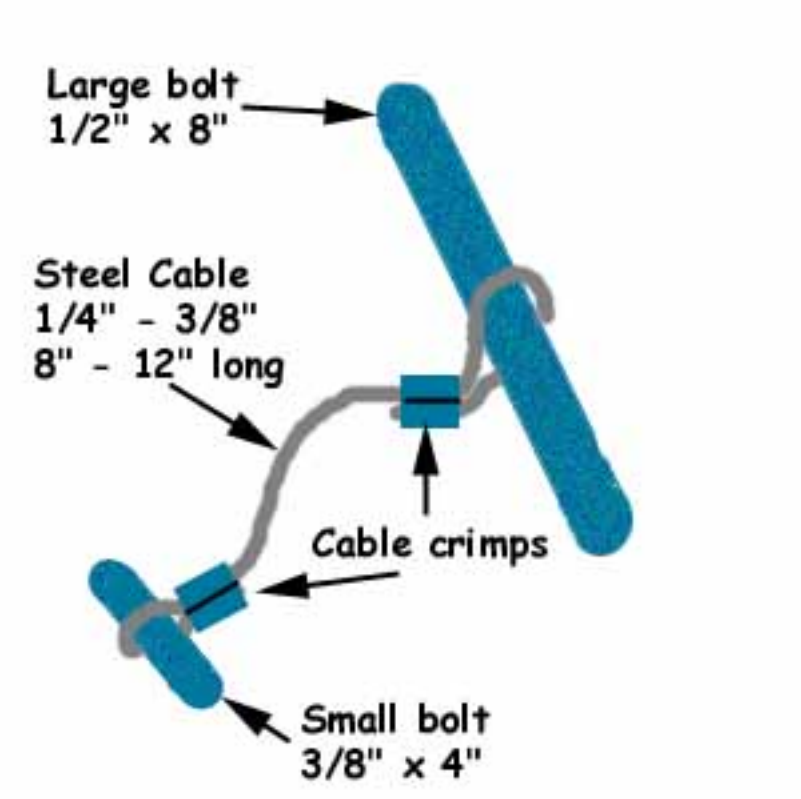
Once your down, you smash down a pint soda bottle (glass) filled with hydrochloric (pool) acid and wrapped in a thick layer of aluminum foil. This will generate a thick cloud of acid fumes that not only obscures the cops vision, but also makes it impossible to pursue you

To get around down there, you will need light. The safest and most reliable lights are chemical light sticks. You should also have at least 2 of these in your sewer kit. And another source of light is mandatory, something like a pelican light or other explosion proof flashlight.

Once you are well clear of the scene, you should put on coveralls to keep from getting filthy. Take out your map (you have one, right?) and find your way to an underground garage or something of that nature. You want to come up somewhere where no one will see you, 'cause your escape down the sewer will probably be make the news. Change into your spare clothes before you go up.

You will need to have a kit for sewer escape ready made. It should contain the following:

1. Sturdy duffle bag to carry everything
2. SCUBA tank (pony bottle type) with regulator
3. Dark colored sturdy coveralls
4. Sturdy gloves
5. Hard hat
6. Knee high rubber boots
7. Chemical light sticks (2 minimum)
8. Explosion proof flashlight and spare batteries
9. Spare set of cloths
10. Acid bottle bomb
11. Smoke bombs (bursting type)
12. Map of the sewer system
13. Map book like a Thomas Brothers.
14. Police scanner
15. Sewer key



Use plastic coated cable, and cover the exposed parts of the bolts with vinyl tubing. This prevents sparking and protects your hands from cuts.The cable is held centered on the bolts with a washer on both sides of the cable, these held in place with nuts. I would have drawn them in if I had the skill to draw it realistically.

HEAVY WEAPONS

Let's face it. Sometimes a gun or grenade just isn't enough.

When you need to lob explosives further than you can throw or launch with a grenade launcher, or more explosives than a grenade holds, that's when you need a mortar. With a homemade mortar, you can lob large shrapnel shells for a kilometer (3,000+ feet) in any direction. In a city, people won't even know they're about to die because the buildings will block the sound of the mortar firing (and the shells don't whistle in real life).

And sometimes a gun just doesn't have the firepower to kill enough people quick enough. That's when a flamethrower is useful. Imagine the terror and panic you would unleash on a crowd with a jet of fire. Burning people screaming and running blindly through the crowd. People trampling each other to death in the panic to reach the exits. And don't forget the terror in the public when the news shows the burned corpses and charred wreckage of what used to be a theater, bar, or school (don't want to exclude the "precious" children).

And you'll probably need to deal with a heavily armed and armored SWAT team. That's when it would be nice to have a flamethrower to burn them alive. After all, kevlar is NOT fireproof.

So to these ends, I've included this "Heavy Weapons" index. There's only these 2 right now, but I'm sure I'll come across other useful weapons that will fit here in the future.

1. Mortar
2. Flamethrower

Home-made Mortar

OCR'd from "Ragner's Big Book of Homemade Weapons"

Below is a section that I scanned in from one of Ragner Bensons' books. This will save you the expense of paying $30 for a book that is more than 50% filler and fluff. The section on grenade launchers doesn't even tell you how to make the ammo for it!

The benefits and uses of mortars in urban warfare are many. I won't get into them here, but click here to download some .PDF (acrobat) files from military manuals that explain the tactics to use with mortars.

Building a workable mortar in one's home workshop is so simple you'll wonder why you waited so long to do it. Most of the parts can be purchased off-the-shelf from your friendly plumber's supply house. The challenge, if there is one, relates to acquisition rather than to any complex building, welding, or tooling.

Mortar tubes can be constructed from 3" pipe in any length from 18 inches up to about 6 feet. Obviously, shorter lengths would be easier to hide and to pack around, and they are also far less costly. Yet they sacrifice quite a bit in terms of accuracy, reliability, and range. Most builders favor tubes in the range of 36 to 44 inches

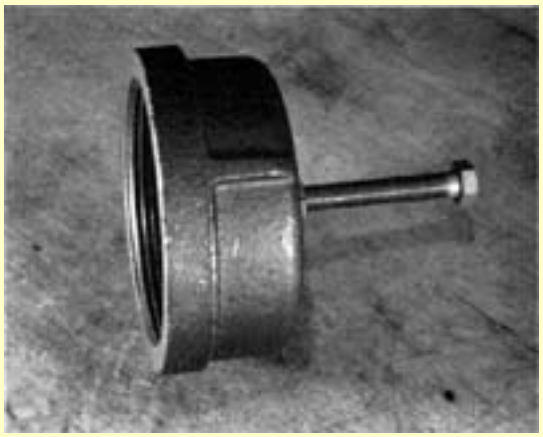
Having decided on the length, go to your most user-friendly, convenient machine shop or steel supply house. Purchase whatever length you want in 3" inside diameter tube. With any luck, the machine shop you choose will have some good used drawn-over mandrel (DOM) seamless pipe at reduced rates.

Regular 3" plumber's pipe will work if seamless is not available, but it is not as strong nor, in

many ways, as easy to work with. Common 3" pipe sells for about $3.50 per foot. DOM seamless runs about $2.50 to $3.00 per inch new. Unless one scrounges and searches, a new 40-inch long tube could cost up to $120. Under many circumstances, good mortar tubes are worth far more than $120, but usually it's much more money than you have to pay.

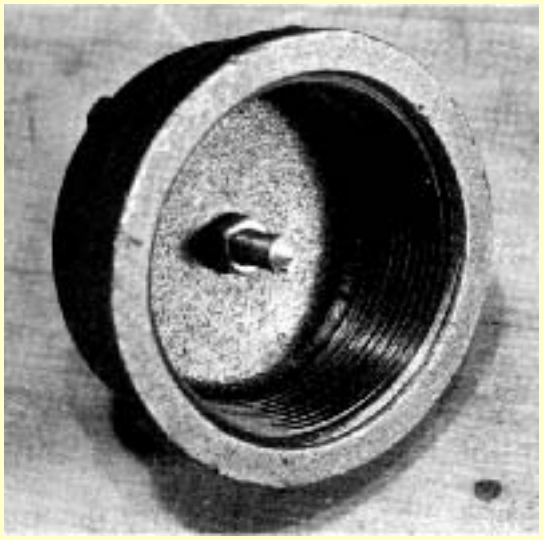
If high-quality DOM is available in good, unpitted, basically rust-free used condition, buy the correct length and have the machine shop put a thread on one end of the pipe. You may also ask them about constructing a solid steel end cap for the tube. Tell them the outfit is to be used as a steel fence post-pounder. Custom constructing a steel end cap will cost some bucks, but it is far better than simply threading an issue cast-iron pipe cap onto a good, solid-steel tube.

If the device fails, it is almost certainly the result of cracking of the cast-iron end cap. Although quite a lot can be done to reduce the cracking of regular stock 3" cast-iron caps, expect them to fail with regularity. Pressures within the tube are relatively low, despite the heavy load being tossed out. Certainly it can happen, but I have not seen even a pipe-type tube crack in a number of years.



At this point, I will assume home builders have a 40" tube with one threaded end and either a custom-built end cap or an off-the-shelf plumber's variety. Find the exact center of the pipe cap. Carefully drill a vertical 5/32" pilot hole through the center of the cap. Purchase a hardened 3/8" machine bolt 4 inches long plus two correct machine thread buts for the bolt.

Using a regular 3/8" by 24" NF die, cut threads from top to bottom on the bolt. Carefully sharpen the end of the bolt to a fast, quickly beveled point. Do not make a long, thin point because it it will break too easily. Drill out the pilot hole in the tube cap to 21/64 inch. Thread with a 3/8 inch by 24 NF tap. Be very careful to thread the cap in a perfectly vertical manner. This is the most complex part of home manufacture of a mortar tube. An adjustable firing pin is necessary if one is to produce a working mortar. Eventually this pin must be set so that it just barely detonates a cap on the projectile when it is dropped down the barrel.



Place a locking nut on the back of the bolt. Thread the bolt through the cap with the pin extending through the concave portion of the cap. Extend the point up past the surface of the cap about 1/2". This is a trial-and-error procedure that is best done with inert rounds containing a primer but no propelling charge. Drop sufficient inert rounds till you are certain that the firing pin protrudes up through the cap just enough to detonate the primer and that it is centered properly.

Unscrew the cap off the tube. Using a camp stove, propane torch, or other heat source, melt about two pounds of plumber's lead containing at least 5% tin. After the lead is liquefied, pour it into the concave portion of the mortar tube end cap. Pour it only into the bottom edge of the threaded portion of the cap, not up in the area where it will prevent the cap from being securely screwed to the mortar tube. This quantity of lead will warp when cooling but, in spite of this, will cushion the cap, extending its life at least fivefold.

Give the bolt firing pin a quick turn or two, loosening it as the lead hardens. After the assembly cools, tighten the buck nut down onto the back of the cap, securing it to the cap and lead buffer. It is imperative that the firing pin be adjustable in and out after the lead cools and that it be adjusted down so that the firing assembly reefs against the lead block.

Leading the cap will strengthen it, but after prolonged firing with heavier charges, the cap will still crack. It is best to make two or three extra caps now before the time of critical need. It is sometimes difficult to get the firing pin absolutely centered in a home workshop, so builders may wish to have this cap work done in a machine shop.

Solid-steel caps are less apt to crack but are much more expensive and difficult to purchase. Screw the cap securely back onto the end of the mortar tube.

From either a scrap pile or a cooperative steel supplier, get one piece of 1" mild steel, 1/4" strap, 15 inches long. Using a heavy hammer with the tube as a template, place the strapping on a heavy long anvil or scrap of tube-size pipe and beat it into a round shape that clasps nicely around and onto the tubes.

Drill holes through the ends of the steel straps and, using 1/2" bolts, securely fasten the strap about 12 inches down from the top of the upright tube.

Purchase two pieces of 3/4" to 1" diameter steel rod 30" long. Weld or braze two 1/2" washers to the top of each steel leg. Run the 1/2" bolt used to secure the tube clamp through the washers on the two legs. Since the legs have to move in and out a bit, it helps to place a couple of flat washers next to the welded washers. Ideally, the legs should flex in and out so that the tube can be angled up or down a bit.

These legs become the upright support for the tube. Shooters can move them to provide more horizontal distance as opposed to additional vertical distance when launching the projectile. This arrangement is not super accurate, but it works nicely over a distance of 400 to 700 yards. Since the blast radius of these rounds is about 30 feet, users don't have to get the bomb right on target for it to be effective. As mentioned, I have traditionally not used a base plate, relying instead on coarse gravelly ground rocks, logs, or wooden planks on which to place my mortar tube. I leave all of these at places where I believe I may deploy my mortar.

Constructing mortar bombs is a bit more difficult, but it is still far from exacting work. Again,

patronizing one's favorite plumbing supply house, secure a 2" black pipe nipple 6" long, two 2" pipe caps, and a 4" long 3/4" nipple. At a hardware store, purchase a 1/2" fender washer, which conveniently is just shy of 2 inches in diameter. Also purchase a little 1/4" washer at this time.

Find the precise center of the 2" pipe cap and drill a 5/32" pilot hole through one cap. If a 3/4" by 14" pipe cap is available, drill the center pilot hole in the cap out to 15/16". Thread the hole through the tap so that the 4" long, 3/4" diameter nipple can be threaded securely into the cap. As an added measure, I braze the nipple top and bottom to the cap. This assembly must be on absolute center, or numerous misfires will result.

Measure down from the pipe cap 1 1/2" on the the threaded 3/4" nipple. Working only above this line, drill at least ten 5/16" holes through the pipe, perforating it thoroughly. These holes bleed off the propellant charge from the 12-gauge shell when it fires.

A 12-gauge shot shell will fit easily into the end of the 3/4" nipple. A small piece of electrician's tape may be needed to bush the shell so that it does not fall out of the pipe when it is carried around roughly. Use only shot-shell primers to test the mechanism. When certain that the mechanism is working, graduate to propellant and inert practice rounds.

Propellant should be 30 to 60 grains or more of Bullseye or Herco shotgun powder or a 12-gauge case full of Hodgins' Pyrodex CTG. Exact loading will depend on the weight of the projectile, the distance over which one wishes to fire, and the quality of the steel in the tube.

As an initial experiment, load the projectile body with 1 1/2 pounds of sand, gravel or other convenient filler. Some users construct plastic break-apart tubes filled with powdered lime that make a nice white cloud when they hit. Screw the top cap on securely and bush both caps with electrical tape so that the round will fall straight down the barrel. I find it necessary to use a full 6" long piece of 2" pipe so that sufficient distance between contact surfaces holds the 3/4" nipple rigidly in the center of the tube. Off-center propellant tubes are prone to misfires. At first, misfires will be a constant problem. Simply dump the round out of the tube, adjust the firing pin, change end caps or straighten the 3/4" nipple on the round. In the field, doing all this can be exasperating.

Practice shooting inert projectiles over the country in which you plan to operate. It is helpful to paint the rounds red or silver so that they can be retrieved and fired again. I recommend not loading the rounds with explosives until one has successfully fired at least 100 inert rounds.

Fuzing and charging these rounds when the time comes is relatively straightforward. In my book on homebuilt M-79s and M-203s (Part 6), 1 described a point-detonating device, but these are probably much too dangerous for home manufacturers to fool with, especially when only modestly dangerous fuzed rounds are available as an alternative.

As with all homebuilt destructive devices, the ultimate secret that makes this work is knowing how to home manufacture C-4. With this material, a great number of things are possible.

Start by testing your dynamite fuze to determine burn rate. Cut off a section of fuze that is certain to provide 12 seconds' burn time before detonation.

Using heavy glue, secure a small 1/4" washer inside a 1/2" fender washer. Fortunately, the outside diameter of the 1/4- inch washer just about matches the inside diameter of the 2-inch fender washer. Allow the two to dry thoroughly.

Push the segment of dynamite fuze through the 1/4" hole and split it back about half an inch. Securely glue these split halves onto the washer face. Be careful that no glue gets onto the internal powder train of the fuze. Cut a match head from a strike-anywhere match and, using a little dab of contact cement or Duco glue, fasten the match head into the center of the powder train. Crimp a number 6 dynamite cap onto the fuze. As an added precaution, glue an inch of 50-grain primer cord to the cap as a booster for the explosive.

After securely fastening the bottom cap with the 3/4" pipe nipple attached to the projectile body, drop the fender washer and fuze in from the top of the projectile. The spread fuze and match

head should "look" straight down the center of the 3/4" propellant pipe nipple.

Using large amounts of heavy glue (such as Goop), secure the fender washer in place over the 3/4" nipple in the projectile body. Allow at least two days for the glue to harden. It would be better to weld this in place, but because of the proximity of the dynamite cap, this is not possible.

Using a wooden tongue depressor or other blunt wooden probe, tamp a lightweight plastic bag into the pipe body. This is a difficult task, given the fuze and cap sticking back into the pipe center, but make sure every corner is filled by plastic bag. This plastic liner seals the chamber and keeps air and moisture out of the powdered ammonium nitrate, which is easily ruined by air or moisture.

Carefully tamp in layer after layer of tightly packed, powdered, washed ammonium nitrate into the tube. Keep track of the amount used so that a correct amount of nitromethane can be set aside for later use. After filling with ammonium nitrate, seal the plastic bag and set the top end cap securely in place. Make sure that enough pressure is exerted on the washer's fuze assembly, packing the powder into place. The force of the firing blank tends to dislocate the washer and fuze. Code the small plastic bottle of nitromethane and keep it with the round. Shortly before use remove the top cap, open the bag, and pour in the nitromethane. Charged rounds can be held several weeks in this ready state, but I see no reason to do so because of the added risk.

A dozen 12-gauge propellant cartridges can be made ahead of time. Use a thumb-tip-size piece of cotton as wadding over the powder. Seal that with six or eight drops of Elmer's glue. Allow the glue to thoroughly dry.

A mortar complete with HE round is not quite as easy to assemble as this brief description might indicate. At first, misfires are common. Even very small adjustments on the firing pin make a considerable difference. Mortars are dangerous, and they can be erratic. Exercise extreme caution if you decide to build a mortar for use with anything other than inert practice or smoke rounds.

Paramilitary survivors often find smoke rounds useful. They can be used to confuse the enemy and to obscure one's movements from firing position to firing position. Construct a smoke-generating round for your mortar by drilling twenty or thirty 3/8" holes in the 2" diameter nipple at random along its 6" length. Line the inside of the projectile body with a plastic bag as with the HE rounds. Instead of a dynamite cap, split the end of the 12-second fuze segment and glue four strike-anywhere match heads to the fuze in such a way that they light when the fuze burns down.

Fill the body of the projectile with sugar chlorate powder thoroughly mixed with 8% (by volume) powdered charcoal. Common, finely ground barbecue brickettes are fine for this purpose. The rounds are propelled and detonated with a 12-gauge blank round exactly like the HE rounds. (Please note that sugar-chlorate mixtures are explosive. Safer and more effective smoke formulations can be found here).

The last time we fired mortars, conditions were ideal. We selected a neatly cut and baled alfalfa

field that was bare as a billiard ball. It was relatively easy to spot our practice rounds after they landed in the dust. Pleasant little breezes did little to spoil our aim.

My accomplice, who seldom had an opportunity to fire a mortar, set up the tube on a piece of thick canvas tarp in an attempt to minimize involvement from the thick dust that lay over the field like a mantle. We had twelve projectile bodies with which to practice along with about four boxes of 12-gauge propellant cartridges loaded up the previous week. All contained 40 grains of Bullseye powder, which was not a maximum load as we soon discovered, but one that was fun to play with.

I measured off 400 paces up the gentle rise from the point at which shooting would be done. My friend, while not terribly experienced with mortars, was a seasoned pro with numerous other weapons. He understood trajectories and throw distances much better than I would have supposed.

With intense concentration, he fired the first round downrange, being cautious that it traveled at least 50 yards in front of me. Theoretically, we should have been able to see the giant pipe projectiles arcing through the blue, thus avoiding being hit on the head. But as with all things human, the leap from theory to practice is often corroded with errors.

I saw the smoke from the discharge a second or so before hearing it. Sounds from mortars are very subdued. It was only possible to see the round arcing through the sky after it was out about 60 or 80 yards. Then at the top of its arc, I lost contact. It looked as though the round was for enough to my front, but instinctively I put my hands over my head and started walking backward. An incredible combination of poor luck and circumstances would have to align themselves for me to be hit with a projectile, but at the moment I wished to take no chances.

Finally after what seemed like-and probably was-5 seconds, the round hit well ahead of me in the dust. The shooter had tried to get it even with my position, succeeding very nicely.

Satisfied with the test, the shooter picked out a patch of low-growing morning glories that provided an unusually green splotch on the ground. The target was about another one hundred yards past my position.

His second shot landed beyond the patch, a fact that I quickly relayed back. His next ten shots all landed within 20 feet of the patch. He used a little piece of split pine log about 20 inches long as a base plate. After a shot or two, recoil from the tube drove it down into the soft wood, indenting it in the shape of the end cap and firing pin.

Hauling twelve heavy empties back to him was more of a chore than one would first imagine. Even after only one shot, one of the nipples was bent sufficiently to preclude use. We were down to eleven practice rounds.

Next he turned his attention to shelling a high weed patch out about 600 yards to the side. His first round went way wide. Eight of the others were reasonably close, while two were completely erratic.

This time we lost one round, and one was damaged. We spent the remainder of the morning plopping those inert rounds downrange, retrieving, sorting for damage, and firing again. It really

was great fun, as well as a challenge to do well. Eventually, we lost or damaged all twelve of the bodies. Some were fired eight or ten times.

Finally it was time for the big one we saved for the last. I picked the loaded HE round out of the box in which it traveled. My friend slipped a 12-gauge propellant charge into the 3/4" tube.

Gingerly, we let it slide down the tube till it hit bottom with the customary soft metallic ping. We wondered if this would be another erratic round. As before, we saw the round going up to the top of its arc, but perhaps helped by either practice watching or the smoking fuze, it fell down toward the target. At the target it bounced twice, and then, as if held magically in midair, it detonated with an incredible roar.

We vividly recall pieces of the projectile kicking up little dust trails around the impact zone for perhaps 50 feet or more. Then the cloud of dust stirred up by the detonation obscured the field.

It was an extremely gratifying experience.

SECURE COMMUNICATIONS

. Face to Face

b. Telephone

c. Cell-Phone

d. Pager

- General info and risks
- Police tricks
- Security measures

- Computer (e-mail)
- Written

4. PAGER

General Info and Risks

Pagers are the de facto means of communication for drug dealers and most other criminals. The reasons are pretty obvious. It's cheap, it's simple, and it's impossible to trace the location of the pager.

Unfortunately it's not secure at all. Anyone who gets access to your pager can get all the info they need to make a clone copy of your pager and get every number you get. And anyone with a scanner and the know how can listen in and get your pages that way.

For details on how anyone (even you) can do it go to http://www3.l0pht.com/~oblivion/blkcrwl/cell/pager/pager.html. The cops have specially made devices for this purpose, go here to see what your up against.

These threats can be countered with the techniques you'll learn here.

Before you learn how cops can copy your pager or listen in, you need to know how a pager works. Basically a pager is a radio receiver that listens for it's unique capcode (serial number) at a certain frequency. Only after it hears it's capcode will it show the number sent with the capcode. The capcode is usually a 6-9 digit number attached to your pager. For more technical details read this.

Anyone who get's physical access to your pager can copy down the frequency and capcode, change the crystal in their pager to match your pagers frequency, and using a simple circuit, copy the capcode into their pager. They now have a clone of your pager.

The barcode has been blurred and the capcode altered for my own security. But it's probably overkill since the case is from a pager I found in the trash anyways. This is just representitive of what most pagers are like. The exact arrangment may be different on your pager.

Police Tricks

A trick that cops often use is to stop someone for something petty (like a traffic stop), search them, copy down the pager info, then let them go. While your doing your thing, the cops are copying down every number you get on their clone. Then, when the time is right, they start calling the numbers (the ones they know aren't pay phones) and say that your out of town or something and that they'll be handling your business. Then they bust them when they meet. They usually do this just before or after they bust you.

If someone got arrested, you (and they) wouldn't think that it's because of your pager, you'd think it's just a fluke. But when you go to trial, the cops will have a list of the numbers you've been paged with and use them as evidence to show connections between you and other people. Guilt by association is the name of the game.

Of course, the cops don't have to go through the trouble of cloning your pager if they go to the paging service you use and tell them to keep a list for them. But if the cops don't have a warrant and the paging service won't co-operate, then they clone. Using the numbers they get off the illegal clone copy, they bust someone who's paged you and pressure them to rat on you. Using the rats story, they go to a judge and get a warrant for a legal copy of your pager records.

Security Measures

The first of these concern the pager itself. The case that came with your pager should be changed with another pager case with different freq. and capcode #. At the very least the sticker that has the capcode should be removed or, even better, replaced with a sticker with a fake capcode. The case swap is best though because, with just the frequency, the cops can find the service provider for your pager service and track it down from there.

After you've done a case swap (or capcode removal), the next thing you need to do is rotate your pager service provider on a regular basis. If you have the same pager # for months and years on end (like some people I've known) eventually the cops are going to find it on someone they arrest or in someones phone book.

By changing your service provider every month, you greatly decrease the chances of the cops finding your current pager #. It also allows you to control who has your #. If someone is annoying you, within a few weeks you'll have changed your number and never hear from them again.

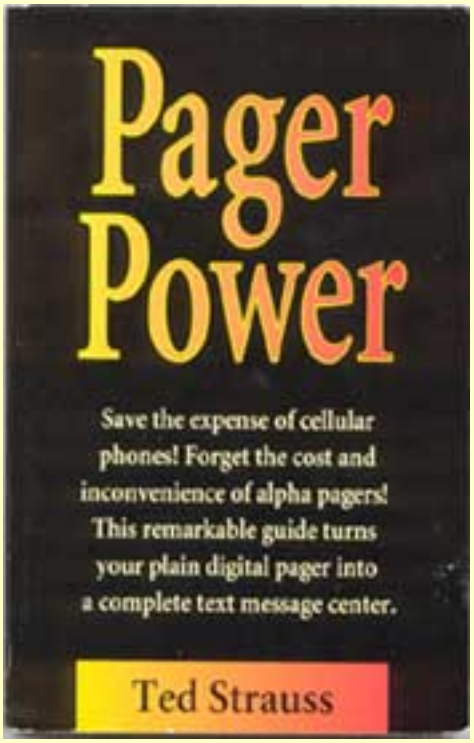
In large cities there are literally dozens of places that provide pager service. Just go to a different one every month. Of course you don't have the service in your real name. Most places don't ask for ID and give them the address of an empty house. Most places also have a monthly rate that is higher than a quarterly or annual rate, but that's the price you pay. Don't be cheap. An extra $10 a month is better than sitting in prison.

When you give someone your #, drill it into them that if ANYONE besides you answers their page, that they are to hang up immediately, assume it's the police, and never call it again. Also, they should NEVER page you from their home, work, or cell phone. All pages are to be from and to pay phones ONLY. This way the cops can't prove a connection between you (your pager) and someone else (their phone records).

Enrforcing this maybe difficult though. The best way is to let them know that any time they page you from a number that you know is theirs, your not going to call back. That way they're forced to go to other phones to call you. They may call from a friend or neighbor, but at least that muddies the waters for the cops.

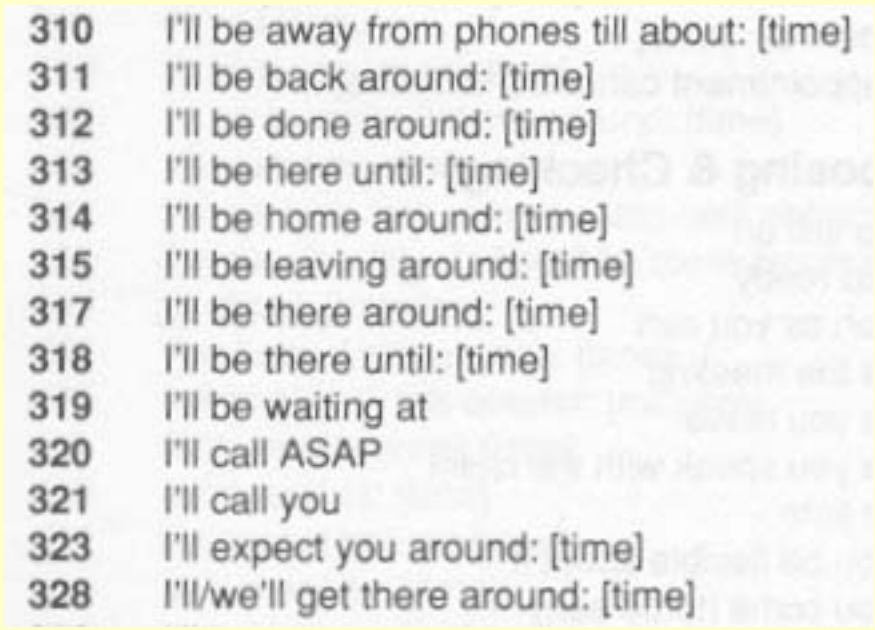
The next step is to use a code. Most people use some sort of simple code like "711-1030-5" (7-11 store, 10:30 tonight, 5 grams). But this is too simplistic and easy to figure out. If the cops are monitoring your pager and see you go to 7-11 at 10:30, it's not to hard to figure out what the 5 means. And if your using anything less obvious, the cops only have to bust one of your customers to get them to tell what the numbers mean.

You need to use a code that not only is impossible to figure out, but also one that allows more complex messages, and that can't be breached by busting a customer.



This is the book you'll use. It's called "Pager Power". The author is Ted Strauss, published by Ten Speed Press, ISBN# 0-89815-625-4, Price $4.95. 3.5" x 5.5" (pocket sized).

Using this book, some dice, and some photocopies of a worksheet you'll make up, you can be sure of unbreakable, secure pager messages



310	I'll be away from phones till about: [time]
311	I'll be back around: [time]
312	I'll be done around: [time]
313	I'll be here until: [time]
314	I'll be home around: [time]
315	I'll be leaving around: [time]
317	I'll be there around: [time]
318	I'll be there until: [time]
319	I'll be waiting at
320	I'll call ASAP
321	I'll call you
323	I'll expect you around: [time]
328	I'll/we'll get there around: [time]

This is an example of the codes you'll find inside. The book has more than 11,000 codes in a 208 page book. As you can see from the picture, you could condense a sentence down to a few digits. It even has a way for you to create your own custom code phrases. But using the codes straight out of the book is not secure at all. Only by using random numbers to scramble the code numbers will you have true security.

Once you have the book you have a couple of choices to make. Do you make your customers and associates buy a copy or do you make a list of the codes they're most likely to use? I would say for customers use a list of likely phrases. For associates or "employees" use the book. If your the boss or the connect, they don't have much choice.

To make a list for customers you'll need to figure out what they would need to tell you in most situations. I would think along the lines of what they need, how much they need, and when they need it. And of course such things as "I'll be late" or "Cancel the order".

If they have a pager (who doesn't) you'll also need some codes for your use. Things like "The price is now $??? an ounce" or "Can't meet you now, call later" What exactly you'll need is up to you depending on your situation.

Once you've made your list (should be less than 50 total), you make up your work sheets.

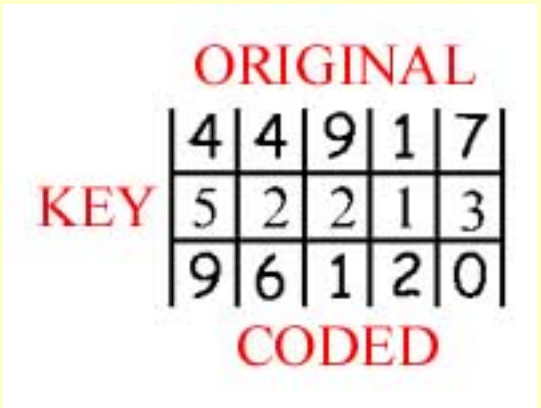
These consist of a grid (see picture below) where the middle (key) row is filled out ahead of time with a randomly created key. There are 5 spaces in each grid box. This makes it easy to work with the numbers but don't group the numbers when sending them. Send them according to the books instructions. Arrange 5 or 6 of the grids in a row, 4 or 5 rows total. This should be sufficient for a week of messages at least.

The grid rows are arranged at the top of the page and the codes are on the bottom half. The grids are filled out top to bottom, left to right. As a grid is filled up, it's torn off and destroyed. This way, if the cops find it, they can't decode your past messages. But they could send a message impersonating the person they got it from. This can be countered, details later.

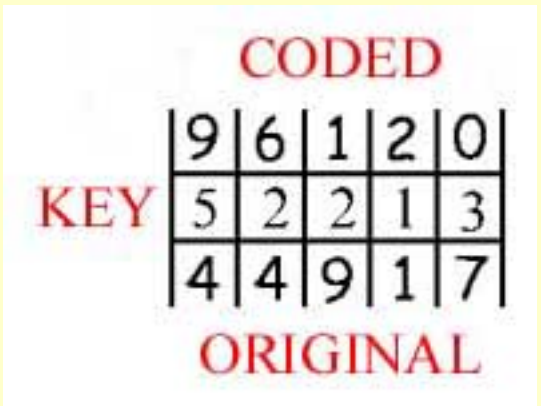
The key is created by taking 5 dice, putting them in a small box and shaking them up. You tilt the box so that all the dice line up and you copy down the order they appear in left to right. You then write this down in the key row on your grid.

A critical detail to remember is that everyones list must use different key numbers. If 2 or more people have the same key numbers, the loss or capture of 1 persons worksheet would compromise the others. If everyones key numbers are different, than the loss of a worksheet only compromises that person. This also means that for every person you want to communicate with you have to have a diffferent worksheet. You'll know who's communicating with you by a unique 1 or 2 digit # that they send with the encoded page.

randomly generated key



The original message code (44917) is entered in the top row. The key is already in the center row. The numbers are added using non-carrying addition. That means that any numbers equaling 10 or more have the 10 dropped. For example 9+2=1 (9+2=11 11-10=1) and 7+3=0 (7+3=10 10-10=0) This is done to keep the message the same size as the original. The coded results are written in the bottom row. This is the message that would be sent to someones pager.



When the recipient gets the message, they write it in the top row of their grid and subtract the key from the code. If a coded number is smaller than the key code, mentally add 10 to the coded number than subtract the key. For example 9-5=4 and 1-2=9 (1+10=11 11-2=9). The result is the original message code.

TECHNICAL PAGER INFORMATION

This info was ripped from the www.l0pht.com website. It's a little dated but still valid. It's presented exactly as it is on the l0pht website.

==Phrack Magazine==

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The Wonderful World of Pagers

by Erik Bloodaxe

Screaming through the electromagnet swamp we live in are hundreds of thousands of messages of varying degrees of importance. Doctors, police, corporate executives, housewives and drug dealers all find themselves constantly trapped at the mercy of a teeny little box: the pager.

Everyone has seen a pager; almost everyone has one. Over 20 million pagers are on the streets in the US alone, sorting out their particular chunk of the radio-spectrum. Another fifty-thousand more are put into service each day.

But what the hell are these things really doing? What more can we do with them than be reminded to call mom, or to "pick up dry-cleaning?"

Lots.

** PROTOCOLS **

Pagers today use a variety of signalling formats such as POCSAG, FLEX and GOLAY. The most common by far is POCSAG (Post Office Standardization Advisory Group), a standard set by the British Post Office and adopted world-wide for paging.

POCSAG is transmitted at three transmission rates--512, 1200 and 2400 bps. Most commercial paging companies today use at least 1200, although many companies who own their own paging terminals for in-house use transmit at 512. Nationwide carriers (SkyTel, PageNet, MobileComm, etc.) send the majority of their traffic at 2400 to make the maximum use of their bandwidth. In other words, the faster they can deliver pages, the smaller their queue of outgoing pages is. Although these carriers have upgraded their equipment in the field to broadcast at 2400 (or plan to do so in the near future), they still send out some pages at 1200 and 512 to accommodate their customers with older

pagers. Most 512 and 1200 traffic on the nationwide services is numeric or tone-only pages.

POCSAG messages are broadcast in batches. Each batch is comprised of 8 frames, and each frame contains two codewords separated by a "synchronization" codeword. A message can have as many codewords as needed to deliver the page and can stretch through several batches if needed. The end of a complete message is indicated by a "next address" codeword. Both addressing and user data are sent in the codewords, the distinction being the least significant bit of the codeword: 0 for address data, and 1 for user-data.

Standard alphanumeric data is sent in a seven-bit format, with each codeword containing 2 6/7 characters. A newer 8-bit alphanumeric format is implemented by some carriers which allow users to send data such as computer files, graphics in addition to regular alphanumeric messages. The 8 bit format allows for 2.5 characters per codeword.

Numeric data is 4 bit, allowing up to 5 numbers to be transmitted per codeword. Tone and voice pages contain address information only.

(NOTE: Pager data uses BCH 32,21 for encoding. I don't imagine very many of you will be trying to decode pager data by building your own decoders, but for those of you who may, take my interpretation of POCSAG framing with a grain of salt, and try to dig up the actual POCSAG specs.)

** THE PAGING RECEIVER **

Paging receivers come in hundreds of shapes and sizes, although the vast majority are manufactured by Motorola. Numeric pagers comprise over fifty percent all pagers in use. Alphanumeric comprises about thirty percent, with tone and voice pagers making up the remainder.

Pagers are uniquely addressed by a capcode. The capcode is usually six to eight digits in length, and will be printed somewhere on the pager itself. Many pager companies assign customers PIN numbers, which are then cross-referenced to a given capcode in databases maintained by the service provider. PIN numbers have no other relationship to the capcode.

Tone pagers are by far the most limited paging devices in use. When a specified number has been called, an address only message is broadcast, which causes the intended receiver to beep. Wow. Tone pagers usually have 4 capcodes, which can correspond to different locations to call back. Voice pagers are similar, except they allow the calling party to leave a 15 to 30 second message. The voice message is broadcast immediately after the capcode of the receiver, which unsquelches the device's audio.

Numeric pagers, although seemingly limited by their lack of display options have proven otherwise by enterprising users. Most numeric data sent is obviously related to phone numbers, but numerous users have developed codes relating to various actions to be carried out by the party being paged. The most prolific users of this have been the Chinese who have one of the most active paging networks in the world. I suppose the next biggest users of code-style numeric paging would be drug dealers. (2112 0830 187 -- get to the fucking drop site by 8:30 or I'll bust a cap in your ass!) :)

Alphanumeric pagers are most often contacted through a dedicated service that will manually enter in the message to be sent onto the paging terminal. One such service, NDC, offers its phone-answering and message typing services to various pager companies. Next time you are talking to a pager operator, ask him or her if they are at NDC. They probably are.

In addition to the capcode, pagers will have an FCC ID number, a serial number, and most importantly, the frequency that the device has been crystaled for imprinted on the back of the device. Although technology exists that would allow pagers to listen on a number of frequencies by synthesizing the frequency rather than using a crystal, pager manufacturers stick to using crystals to "keep the unit cost down."

Pagers may have multiple capcodes by which they can be addressed by. Multiple capcodes are most often used when a person has subscribed to various services offered by their provider, or when the subscriber is part of a group of individuals who will all need to receive the same page simultaneously (police, EMTs, etc.).

Most low-cost pagers have their capcode stored on the circuit board in a PAL. Most paging companies will completely exchange pagers rather than remove and reprogram the PAL, so I don't think it's worth it for any experimenter to attempt. However, like most Motorola devices, many of their paging products can be reprogrammed with a special serial cable and software. Reprogramming software is usually limited to changing baud rates, and adding capcodes.

Additionally, some units can be reprogrammed over the air by the service provider. Using a POCSAG feature known as OTP (over the air programming) the service provider can instruct the paging receiver to add capcodes, remove capcodes, or even shut itself down in the case of non-payment.

** SERVICES **

With the growing popularity of alphanumeric pagers, many service providers have decided to branch out into the information business. The most

common of these services is delivery of news headlines. Other services include stock quotes, airline flight information, voice mail and fax reception notification, and email. Of course, all of these services are available for a small additional monthly premium.

Email is probably the single coolest thing to have sent to your alpha pager. (Unless you subscribe to about a zillion mailing lists) Companies like SkyTel and Radiomail give the user an email address that automatically forwards to your paging device.
IE: PIN-NUMBER@skymail.com. Several packages exist for forwarding email from a UNIX system by sending stripping down the email to pertinent info such as FROM and SUBJECT lines, and executing a script to send the incoming mail out via a pager terminal data port.
One such program is IXOBEEPER, which can be found with an archie query.

Radiomail's founder, (and rather famous ex-hacker in his own right - go look at ancient ComputerWorld headlines), Geoff Goodfellow had devised such a method back in the late 70's. His program watched for incoming email, parsed the mail headers, and redirected the FROM and SUBJECT lines to his alphanumeric pager. Obviously, not many people had alphanumeric pagers at all, much less email addresses on ARPANET back in the 70's, so Geoff's email pager idea didn't see much wide-spread use until much later.

Two RFC's have been issued recently regarding paging and the Internet.
RFC 1568, the Simple Network Paging Protocol, acts similarly to SMTP.
Upon connecting to the SNPP port the user issues commands such as:

PAGE followed by pager telephone number
MESS followed by the alpha or numeric message
SEND
& QUIT

RFC 1568 has met with some opposition in the IETF, who don't consider it worthwhile to implement a new protocol to handle paging, since it can be handled easily using other methods.

The other RFC, number 1569, suggests that paging be addressed in a rather unique manner. Using the domain TPC.INT, which would be reserved for services that necessitate the direct connection to The Phone Company, individual pagers would be addressed by their individual phone numbers. Usernames would be limited to pager-alpha or pager-numeric to represent the type of pager being addressed. For example, an alpha-page being sent to 1-800-555-1212 would be sent as pager-alpha@2.1.2.1.5.5.5.0.0.8.1.tcp.int.

** PAGING TERMINAL DATA PORTS **

Many services offer modem connections to pager terminals so that

computer users can send pages from their desks using software packages like WinBeep, Notify! or Messenger. All of these services connect to the pager terminal and speak to it using a protocol known as IXO.

Upon connection, a pager terminal identifies itself with the following:

ID=

(I bet you always wondered what the hell those systems were)
Paging terminals default to 300 E71, although many larger companies now have dialups supporting up to 2400.

Many such systems allow you to manually enter in the appropriate information by typing a capital "M" and a return at the ID= prompt. The system will then prompt you for the PIN of the party you wish to page, followed by a prompt for the message you wish to send, followed by a final prompt asking if you wish to send more pages. Not every pager terminal will support a manual entry, but most do.

All terminals support the IXO protocol. As there are far too many site specific examples within the breadth of IXO, we will concentrate on the most common type of pager services for our examples.

[Sample IXO transaction of a program sending the message ABC to PIN 123 gleened from the IXOBeeper Docs]

Pager Terminal YOU

ID=
PG1
Processing - Please Wait

ACK
[p
123
ABC
17;

ACK

EOT

The checksum data came from:

STX 000 0010
1 011 0001
2 011 0010

3 001 0011
000 1101
A 100 0001
B 100 0010
C 100 0011
000 1101
ETX 000 0011
---
1 0111 1011
---
1 7 ; Get it? Get an ASCII chart and it will all make sense.

Note: Everything in the paging blocks, from STX to ETX inclusive are used to generate the checksum. Also, this is binary data, guys...you can't just type at the ID= prompt and expect to have it recognized as IXO. It wants specific BITS. Got it? Just checking...

** PAGER FREQUENCIES - US **

[Frequencies transmitting pager information are extremely easy to identify while scanning. They identify each batch transmission with a two-tone signal, followed by bursts of data. People with scanners may tune into some of the following frequencies to familiarize themselves with this distinct audio.]

Voice Pager Ranges: 152.01 - 152.21
453.025 - 453.125
454.025 - 454.65
462.75 - 462.925

Other Paging Ranges: 35.02 - 35.68
43.20 - 43.68
152.51 - 152.84
157.77 - 158.07
158.49 - 158.64
459.025 - 459.625
929.0125 - 931.9875

** PAGER FREQUENCIES - WORLD **

Austria 162.050 - 162.075 T,N,A
Australia 148.100 - 166.540 T,N,A
411.500 - 511.500 T,N,A
Canada 929.025 - 931-975 T,N,A
138.025 - 173.975 T,N,A
406.025 - 511.975 T,N,A
China 152.000 - 172.575 N,A
Denmark 469.750 N,A

Finland 450.225 T,N,A
146.275 - 146.325 T,N,A
France 466.025 - 466.075 T,N,A
Germany 465.970 - 466.075 T,N,A
173.200 T,N,A
Hong Kong 172.525 N,A
280.0875 T,N,A
Indonesia 151.175 - 153.050 A
Ireland 153.000 - 153.825 T,N,A
Italy 466.075 T,N,A
161.175 T,N
Japan 278.1625 - 283.8875 T,N
Korea 146.320 - 173.320 T,N,A
Malaysia 152.175 - 172.525 N,A,V
931.9375 N,A
Netherlands 156.9865 - 164.350 T,N,A
New Zealand 157.925 - 158.050 T,N,A
Norway 148.050 - 169.850 T,N,A
Singapore 161.450 N,A
931.9375 N,A
Sweden 169.8 T,N,A
Switzerland 149.5 T,N,A
Taiwan 166.775 N,A
280.9375 N,A
Thailand 450.525 N,A
172.525 - 173.475 N,A
UK 138.150 - 153.275 T,N,A
454.675 - 466.075 T,N,A

T = Tone
N = Numeric
A = Alphanumeric
V = Voice

** INTERCEPTION AND THE LAW **

For many years the interception of pages was not considered an invasion of privacy because of the limited information provided by the tone-only pagers in use at the time. In fact, when Congress passed the Electronic Communications Privacy Act in 1986 tone-only pagers were exempt from its provisions.

According to the ECPA, monitoring of all other types of paging signals, including voice, is illegal. But, due to this same law, paging transmissions are considered to have a reasonable expectation to privacy, and Law Enforcement officials must obtain a proper court order to intercept them, or have the consent of the subscriber.

To intercept pages, many LE-types will obtain beepers programmed with the same capcode as their suspect. To do this, they must contact the paging company and obtain the capcode associated with the person or phone number they are interested in. However, even enlisting the assistance of the paging companies often requires following proper legal procedures (warrants, subpoenas, etc.).

More sophisticated pager-interception devices are sold by a variety of companies. SWS Security sells a device called the "Beeper Buster" for about $4000.00. This particular device is scheduled as a Title III device, so any possession of it by someone outside a law enforcement agency is a federal crime. Greyson Electronics sells a package called PageTracker that uses an ICOM R7100 in conjunction with a personal computer to track and decode pager messages. (Greyson also sells a similar package to decode AMPS cellular messages from forward and reverse channels called "CellScope.")

For the average hacker-type, the most realistic and affordable option is the Universal M-400 decoder. This box is about 400 bucks and will decode POCSAG at 512 and 1200, as well as GOLAY (although I've never seen a paging service using GOLAY.) It also decodes CTCSS, DCS, DTMF, Baudot, ASCII, SITOR A & B, FEC-A, SWED-ARQ, ACARS, and FAX. It takes audio input from any scanners external speaker jack, and is probably the best decoder available to the Hacker/HAM for the price.

Output from the M400 shows the capcode followed by T, N or A (tone, numeric or alpha) ending with the message sent. Universal suggests hooking the input to the decoder directly to the scanner before any de-emphasis circuitry, to obtain the true signal. (Many scanners alter the audio before output for several reasons that aren't really relevant to this article...they just do. :))

Obviously, even by viewing the pager data as it streams by is of little use to anyone without knowing to whom the pager belongs to. Law Enforcement can get a subpoena and obtain the information easily, but anyone else is stuck trying to social engineer the paging company. One other alternative works quite well when you already know the individuals pager number, and need to obtain the capcode (for whatever reason).

Pager companies will buy large blocks in an exchange for their customers. It is extremely easy to discover the paging company from the phone number that corresponds to the target pager either through the RBOC or by paging someone and asking them who their provider is when they return your call. Once the company is known, the frequencies allocated to that company are registered with the FCC and are public information. Many CD-ROMs are available with the entire FCC Master Frequency Database.

(Percon sells one for 99 bucks that covers the whole country - 716-386-6015) Libraries and the FCC itself will also have this information available.

With the frequency set and a decoder running, send a page that will be incredibly easy to discern from the tidal wave of pages spewing forth on the frequency. (6666666666, THIS IS YOUR TEST PAGE, etc...) It will eventually scroll by, and presto! How many important people love to give you their pager number?

** THE FUTURE **

With the advent of new technologies pagers will become even more present in both our businesses and private lives. Notebook computers and PDAs with PCMCIA slots can make use of the new PCMCIA pager cards. Some of these cards have actual screens that allow for use without the computer, but most require a program to pull message data out. These cards also have somewhat large storage capacity, so the length of messages have the option of being fairly large, should the service provider allow them to be.

With the advent of 8-bit alphanumeric services, users with PCMCIA pagers can expect to receive usable computer data such as spreadsheet entries, word processing documents, and of course, GIFs. (Hey, porno entrepreneurs: beeper-porn! Every day, you get a new gif sent to your pagecard! Woo Woo. Sad thing is, it would probably sell.)

A branch of Motorola known as EMBARC (Electronic Mail Broadcast to A Roaming Computer) was one of the first to allow for such broadcasts. EMBARC makes use of a proprietary Motorola protocol, rather than POCSAG, so subscribers must make use of either a Motorola NewsStream pager (with nifty serial cable) or a newer PCMCIA pager. Messages are sent to (and received by) the user through the use of special client software.

The software dials into the EMBARC message switch accessed through AT&T's ACCUNET packet-switched network. The device itself is used for authentication (most likely its capcode or serial number) and some oddball protocol is spoken to communicate with the switch.

Once connected, users have the option of sending a page out, or retrieving pages either too large for the memory of the pager, or from a list of all messages sent in the last 24 hours, in case the subscriber had his pager turned off.

Additionally, the devices can be addressed directly via x.400 addresses. (X.400: The CCITT standard that covers email address far too long to be worth sending anyone mail to.) So essentially, any EMBARC customer can be contacted from the Internet.

MTEL, the parent company of the huge paging service SkyTel, is implementing what may be the next generation of paging technologies. This service, NWN, being administrated by MTEL subsidiary Destineer, is most often called 2-way paging, but is more accurately Narrowband-PCS.

The network allows for the "pager" to be a transceiver. When a page arrives, the device receiving the page will automatically send back an acknowledgment of its completed reception. Devices may also send back some kind of "canned response" the user programs. An example might be: "Thanks, I got it!" or "Why on Earth are you eating up my allocated pages for the month with this crap?"

MTEL's service was awarded a Pioneers Preference by the FCC, which gave them access to the narrowband PCS spectrum before the auctions. This is a big deal, and did not go unnoticed by Microsoft. They dumped cash into the network, and said the devices will be supported by Chicago. (Yeah, along with every other device on the planet, right? Plug and Pray!)

The network will be layed out almost identically to MTEL's existing paging network, using dedicated lines to connect towers in an area to a central satellite up/downlink. One key difference will be the addition of highly somewhat sensitive receivers on the network, to pick up the ACKs and replies of the customer units, which will probably broadcast at about 2 or 3 watts. The most exciting difference will be the speed at which the network transmits data: 24,000 Kbps. Twenty-four thousand. (I couldn't believe it either. Not only can you get your GIFs sent to your pager, but you get them blinding FAST!) The actual units themselves will most likely look like existing alphanumeric pagers with possibly a few more buttons, and of course, PCMCIA units will be available to integrate with computer applications.

Beyond these advancements, other types of services plan on offering paging like features. CDPD, TDMA & CDMA Digital Cellular and ESMR all plan on providing a "pager-like" option for their customers. The mere fact that you can walk into a K-Mart and buy a pager off a rack would indicate to me that pagers are far to ingrained into our society, and represent a wireless technology that doesn't scare or confuse the yokels. Such a technology doesn't ever really go away.

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The Beeper Buster

Pager Intercept / Electronic Surveillance System / #7100F/4/8

Multi Channel Beeper Buster System

The Beeper Buster pager intercept system allows authorized users to intercept, record and display messages sent to target pagers. From your office you will monitor and record all digital and alpha messages sent to pagers carried by persons under investigation. This reliable, economical, and easy to use system was designed specifically for law enforcement intelligence operations from basic to the most advanced.

The Beeper Buster is available in several versions depending on your needs. The single channel version consists of one receiver and one decoder module, and will monitor up to 200 individual pagers (capcodes) and 50 search strings simultaneously, on one RF channel.

The multi channel version (shown) includes one receiver and decoder module per channel and operates up to eight separate RF channels simultaneously. You will monitor 200 pagers and 50 search strings on each channel, with the system automatically building a searchable database around each individual capcode identified and monitored. This file management capability, where a disk file is opened for each new pager identified by the system, is an extremely potent tool. Once the system captures a target pager, all messages sent to that pager automatically are intercepted, stored and indexed. Various reports built automatically around intercepted pager messages can be printed, stored to disk for later use, or exported into your database.

Single Channel Beeper Buster System

If the bad guys in your jurisdiction use pagers to conduct their business, you need The Beeper Buster. With The Beeper Buster, you can sit in the privacy of your own office and monitor every message sent to any pager. You do not need the cooperation of the paging system operator, nor will the user of the pager know you are monitoring all his messages.

The Beeper Buster can capture all messages sent to a target pager, capture all messages containing a particular "search string" (such as the phone number of a suspect location, pay phone), or any combination of the above. Special techniques are used to determine the unique address (the "capcode") of the pager, meaning you do not need access to the target pager to capture its messages. It's very simple. And, the The Beeper Buster is affordable.

Unlike rival units, The Beeper Buster actually operates faster than the paging system. This means no missed pages, for any format at any speed. Persons using other less capable pager intercept systems are well aware of the problems of missed pages. The high speed and perfect accuracy of The Beeper Buster is due to our extensive use of custom designed high speed hardware. If you need to use captured messages as evidence in court, the specially designed features of The Beeper Buster guarantee the integrity of the data.

Digital hardware is faster than software. This is well known in the industry. Remember the "math coprocessor" chip which used to be an option in computers a few years ago? Adding that circuit speeded up your computer by providing hardware to do math functions rather than relying on software (CPU instructions) which were slower.

Other attempts at pager interception rely heavily on software to do the decoding function. If you spend time on Internet, you may have noticed the hobby attempts at pager decoding software. There are even some "law enforcement surveillance" pager decoders built around these software packages. The problem is, software decoders just aren't fast enough to keep up with today's busy paging channels. For short bursts these systems may seem to decode OK, but what you don't know is these things are missing a lot of the traffic. They can't keep up with the constant high speed flow of paging messages, so they discard entire batches. They don't tell you this, however.

Missed pages are unacceptable. For law enforcement purposes, to maintain the integrity of your evidence, you must intercept and decode 100% of the paging traffic, all the time.

Busy paging systems will overload software-based pager decoders. Even at 2400 baud Pocsag the software engines are fighting to keep up, let alone 6400 baud quad phase Flex.

Software decoding is cheap. Software decoding is easy. Software decoding is the way the others do it. Software decoding has problems and is unacceptable for law enforcement decoding applications.

With The Beeper Buster pager intercept system, we do our decoding in hardware. Several custom designed microprocessors whose only mission in life is to decode pages are much faster than software. Even at a sustained throughput of 6400 baud we are not operating at anywhere near the full capacity of our hardware.

To decode in hardware is a much more involved and difficult engineering task. While others were first to market with their little software decoders, we carefully analyzed the situation, developed a method of attack, then evaluated all the integrated circuit and microprocessor chip sets on the market to determine which was the most suitable for the job. We built and tested several prototypes, but discarded them as unreliable, too slow or too error prone for this critical application. After a lot of testing, decoding literally millions of paging messages, trials in the field, redesign and retesting, we completed our task. We designed and built a practical, reliable and elegant system which decodes paging messages of any format at any speed, with perfect accuracy and without missing any messages. That system is The Beeper Buster.

Since the system operates automatically, it can run for hours, days or weeks unattended. Once you set it up (literally a matter of a few minutes with some experience), it needs no attention. It even resumes operation automatically in case of power failure, without losing any data. This means you no longer have to carry a cloned pager and clipboard everywhere you go. And on a busy weekend, the Beeper Buster will grab messages with perfect accuracy, much quicker than you could write them down from a cloned pager.

There are some things you should know about using the Beeper Buster. If you have ever done pager interception using cloned pagers, you know what a hassle that can be. You have to subpoena information from the paging company, who many times don't like to cooperate because the bad guys mean so much profit to them. So you get your information and maybe a cloned pager, but magically a few days later the bad guy's pager goes dead. What do you think happened? Of course: somebody at the paging company ran their mouth. We've heard of areas where the bad guys even offer a reward to the cellular and pager companies for letting them know when law enforcement has been asking about them.

With The Beeper Buster, these problems no longer exist. Since the paging company no longer is a part of the intercept process, security leaks are a thing of the past. No subpoena, no paperwork. You and the box are all that is needed.

You can use the search string feature of The Beeper Buster to uncover persons involved in an investigation you might otherwise not know about. The search string mode of operation means that you put in a target telephone number, such as a pay phone at a bad street corner, a phone at a crack house, or a bad guy's cellular phone number. The Beeper Buster then monitors all pages on a channel and lets you know who is getting beeped to call that particular phone number you are investigating. For alpha pagers, the search string even can be a target's name, address, gang name, local business establishment's name, etc., and you'll know everybody who was beeped with a reference to that information. With the multi channel system, you can be watching up to 8 separate paging systems on 8 separate frequencies simultaneously, watching hundreds of thousands of unknown pagers over an entire city, looking for any mention anywhere of your target search string.

After a busy weekend, The Beeper Buster might give you a whole group of people you can tie in with your suspect whom you were not aware of previously. The The Beeper Buster will give you the capcodes (pager addresses) of all these guys and automatically start watching them individually, grabbing all pager messages sent to them also. The The Beeper Buster can monitor up to individual 2500 pagers at the same time, and print out separately all messages any of those pagers receives.

If you know the capcode of the pager you want to monitor, you will be up and running very quickly. If you don't know the capcode, there are methods of getting it automatically using The Beeper Buster that take only a few minutes. Our instruction manual is excellent, because it was written by law enforcement officers familiar with the street, not a computer nerd who collects badges as a hobby. And we're a toll free call away, to walk you through operation or answer questions.

Operation of The Beeper Buster is very simple. All functions are menu driven, meaning you don't have to speak computerese to use it. For multi channel systems, drop down menus under Windows 95/98 make operation instinctive. Hot keys and right click menus allow instant access to the most used features, making operation even simpler and quicker.

The Beeper Buster consists of a top quality radio receiver that covers all frequencies used by pagers, our special hardware (the fancy name for the circuits used to decode the pages heard by the receiver), and the programming. The system is so simple there are absolutely no knobs, switches or other controls. Everything is done via software, through the keyboard. The single channel unit itself is about the size of a cigar box. The multi channel system sits on a desktop.

On the single channel The Beeper Buster, the system talks to you through a simple video terminal, and an outboard computer is not required. A simple parallel printer prints the captured data on command. The multi channel The Beeper Buster uses a Pentium computer (supplied) running Windows 95. Both desktop and laptop versions are available.

The Beeper Buster also includes the excellent ICOM PCR1000 receiver. The PCR1000 is a very sensitive and selective professional communications receiver covering 500 KHz to 1800 MHz all frequencies used by any paging system. We do not use consumer hobby scanners for this critical application.

Remember, you don't need cooperation from anyone to use your The Beeper Buster. Just shut your office door, plug it in, and go. No hassles, paperwork or security leaks. And you can watch up to 2500 targets at the same time, on one, four, or eight channels simultaneously.

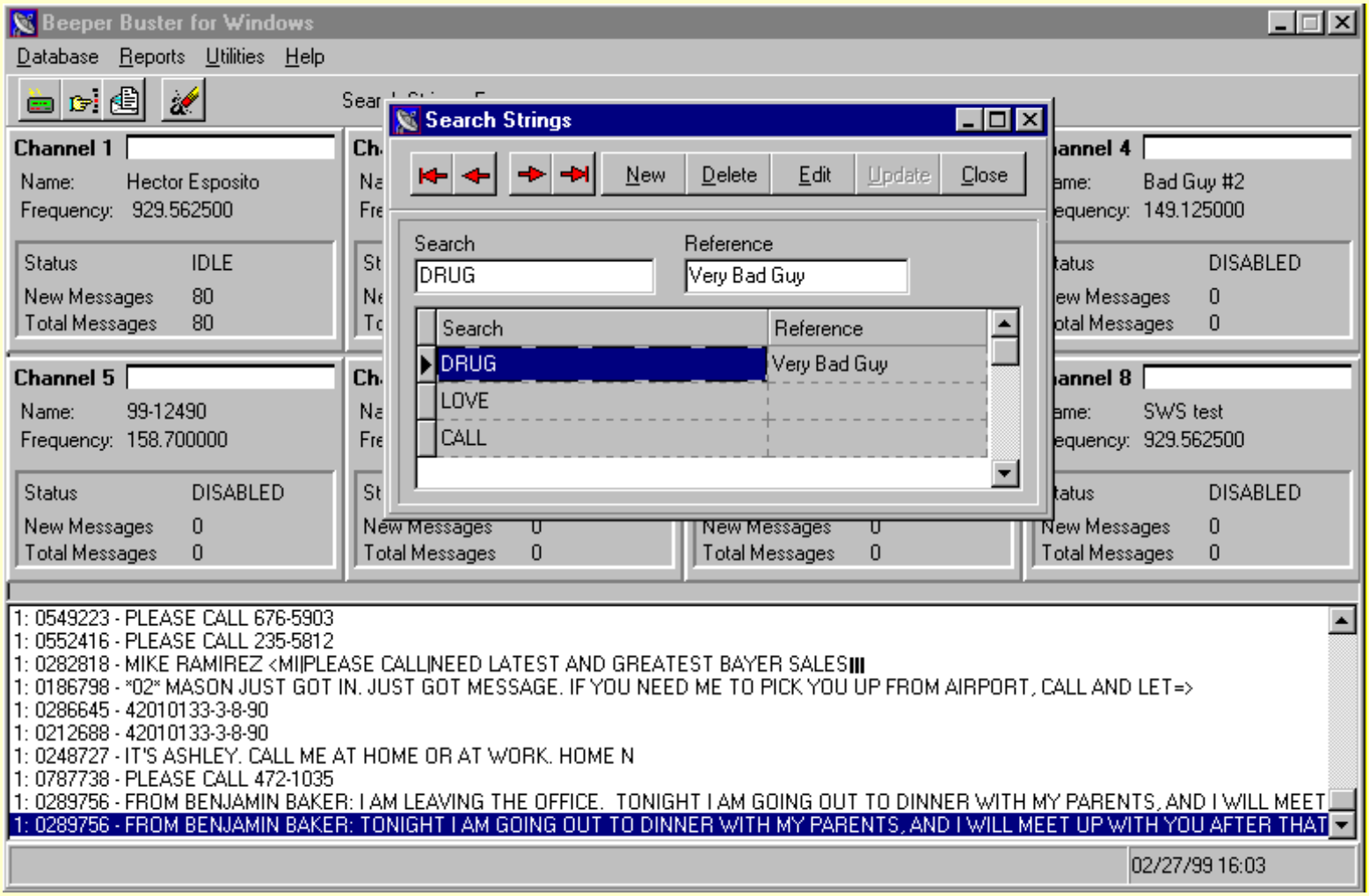
In many areas, "alpha" pagers are being used. These are pagers that let you receive entire sentences (Joe, meet me at Jasper's in an hour...). The The Beeper Buster monitors these alpha pages also. On a busy evening, you'll not only see obvious drug trafficking, you'll see prostitutes running their operation in graphic detail, fences advertising products to move, bookies conducting their affairs, and more. The bad guys know we can hit their phones, so they avoid them. But they think their pagers are secure, and the messages you'll intercept will be very revealing. And, best of all, they'll never know you're watching their every move.

Please review the information on the web site to see how the Beeper Buster can benefit your agency. If you're familiar with pager interception, you'll see the advantages of The Beeper Buster. If you're not familiar, call us and we'll be glad answer any questions.

The Gestapo has been active since 1972 manufacturing and supplying electronic surveillance and

intelligence gathering systems to the professional community. And, as many of our personnel are former law enforcement or intelligence community personnel with direct experience in the trenches, our products are designed based on experience, not theory. Our firm is large enough to support our products, and small enough to be responsive to your needs.

Other products available from the Gestapo include the #2221 Video/Audio Body Wire, wireless video systems and repeaters, custom video and audio intercept packages, covert electronic tracking/direction finding equipment, and custom products for specialized surveillance.



The Beeper Buster Software in Action
Search String Menu

Additional Screen Shots (Click on Button to View Full Sized Image)

Main screen in normal operating mode.
Each smaller window is one channel (one receiver and one decoder module).

Right click menu showing frequency/channel presets and other options.

View of records stored for each captured message.
This raw information can be formatted into any of several standard reports.

Entering or reviewing a capcode entry.

The Beeper Buster offers performance and flexibility to meet any requirement.

Benefits include:

Operates covertly and privately. No coordination with paging carrier necessary. No subpoenas, and no leaks.

Perfect and guaranteed accuracy on sustained high-speed multi format systems where others miss pages.

Single channel system does not require a computer.

Can operate stand alone, portable, or mobile (12 VDC powered).

Multi channel systems run under Windows 95/98 using supplied computer.

Turnkey systems, easy to operate.

System comes configured and ready to operate. Special environments, cabling, or installation is not necessary.

Commercial receivers (not consumer grade hobby scanners) offer superb performance and reliability.

Receiver tuning controlled from system menu. Hot keys control common functions such as memory channel.

Decodes common paging formats including GOLAY, POCSAG 1200/2400 and FLEX 1600, 3200, 6400, quad and bi-phase

Menu driven for instinctive, friendly, non-technical operation. Use by non English-speaking operators is simple.

Single channel system can drive modem for remote or unattended operation.

Internal time date generator time and date stamps all messages. Time updated automatically over the air.

Several note fields can be used for case numbers, notes on individual tracked, officer working

case.

Powerful search features locate desired information (name, date, etc.) in captured message database.

Auto Resume - Unit resumes operation automatically after a power failure (no missed pages).

Small size - 6" x 9" x 1.5" (152 x 229 x 38mm) (single channel) Compact, rugged and portable.

Mature, proven product designed for law enforcement operations.

Not a modified piece of test equipment.

Two year warranty - the best in the business. We know our product is reliable.

The Gestapo has been manufacturing law enforcement systems since 1972 as our only business!

Lease programs, field installation/operation worldwide and 24 hour toll free support available.

If you are involved in enforcement operations involving pager interception, you need the Beeper Buster. The Beeper Buster can keep you ahead of the bad guys.

Important: The Beeper Buster is the only intercept system proven to capture all pages. Competitive systems miss pages.

Note: This is a restricted item and is for use by law enforcement only.

Click Here to See a More Detailed Front View

Beeper Buster Pager Intercept System

Brief Summary of Features and Benefits

The Beeper Buster by The Gestapo is an electronic surveillance system that allows you to intercept and monitor all messages sent to pagers carried by persons under investigation. Both numeric and alpha pages can be monitored. The system is easy to use, extremely powerful, versatile, and affordable. With the Beeper Buster , criminals no longer can use pagers to hide their activities from law enforcement.

Does not miss pages when channel gets busy as do competitive units.

Available in single channel or up to 8 channel configurations.

Menu driven software provides easy operation.

Menu driven software also controls receivers.

Automatically resumes operation after power failure with no data loss.

Turnkey system, easy setup, operating in minutes.

Automatically locates unknown capcode (pager).

Can capture on capcode or search string.

Monitors hundreds of capcodes simultaneously on GOLAY, POCSAG and FLEX.

Powerful database search features finds specific messages.

User notes field for case number, target and agent name or other info.

Automatically builds individual files on capcode or search string.

Several report formats included, or save to disk for later processing.

Two year warranty.

Sales and service facilities in ten countries.

Mature, proven product with several hundred installed.

Specifically designed for law enforcement operations.

Click Here to See a More Detailed Rear View

Beeper Buster Pager Intercept System

Ordering Information - January 1999

See separate price sheet for current prices. All equipment is provided to operate from 110 Volt AC mains. Power supplies for 220 Volts may be substituted at no extra charge at time of order, unless otherwise specified. Please call if you have any questions.

Single channel system is part #7100F

Includes:

Single channel pager intercept system (decoder module and receiver)

AC mains power supply

Whip antenna

Video terminal interface cable

2 year warranty on Beeper Buster , 1 year warranty on receiver

Instruction manual

Optional:

#120 Video terminal, WYSE model 30+, includes interface cable (required)

#155 Parallel printer (includes ribbon, interface cable, initial supply of paper)

Spares/maintenance kit (quoted on request, inquire)

12 VDC mobile power cord

Maintenance contract (quoted on request, inquire)

Multi channel system is part #7100F/4 for a 4 channel system, #7100F/8 for an 8 channel system

Includes:

Four or eight channel pager intercept system (decoder modules and receivers)

AC mains power supply for decoder and receivers

Four or eight whip antennas (one per channel)

Pentium computer, monitor, keyboard, mouse, Windows 98 operating system

Beeper Buster decoding software installed and configured (not sold separately).

Serial multiplexer unit for four or eight channels (installed and configured).

Parallel printer, cable and initial supply of paper.

Surge suppressor multi outlet strip (110 VAC systems only).

Two year warranty on Beeper Buster, manufacturer's warranty on computer and receiver.

Instruction manual

Optional:

#Multi-14 Antenna Multi-coupler for four-channel system (highly recommended)

#Multi-18 Antenna Multi-coupler for eight-channel system (highly recommended)

#Backup Tape Backup System, installed (highly recommended)

Spares/maintenance kit (quoted on request, inquire)

Laptop and mobile installation configuration (special order, inquire)

Maintenance contract (quoted on request, inquire)

Training, onsite setup/installation and onsite maintenance/logistics quoted on request.

Call your dealer for assistance in selecting the proper equipment for your application.

Systems are supplied with software and hardware installed and configured, ready to operate after setup.

Click Here to See a More Detailed Front View

Purchase Specifications

Digital Pager Monitoring System *(January 1999)*

Digital pager monitoring system must meet the following minimum specifications:

Reference is Gestapo #7100 Beeper Buster

1) Must be available in a single channel, 4 channel or 8 channel configuration to permit simultaneous parallel monitoring of separate RF paging channels. One receiver per channel is required. A single receiver scanning or switching to multiple channels is not acceptable.

2) System must be expandable from 4 to 8 channels merely by the addition of receiver and decoder modules. No software changes, unlocking or licensing is acceptable.

3) Multi-channel systems must be offered as turnkey systems, including a computer with all software and I/O installed.

4) Multi-channel software must operate under Windows 95/98 and use pull down menus for all functions. Hotkeys and right click menus for commonly used functions must be provided.

5) Must display alpha and numeric digital pages as received by a receiver capable of monitoring the pager channel on the appropriate frequency. System receiver must cover frequency range of 0.5 - 1300 MHz with continuous coverage, including 800 - 900 MHz. Receivers must be commercial units; consumer, handheld or hobby, scanners specifically are not acceptable.

6) Must not require cooperation or knowledge of the pager user, or the paging system operator (carrier). System must be capable of covert operation from anywhere within the coverage area of the paging system supporting the target pager.

7) Must be capable of monitoring the following paging formats: GOLAY, 512 baud POCSAG, 1200 baud POCSAG, 2400 baud POCSAG, 1600 baud FLEX, 3200 baud FLEX, and 6400 baud FLEX in both quad and bi-phase. All formats and all speeds must be decoded simultaneously and automatically. System must be capable of determining automatically the format of messages sent to a target pager. Manual (only) entry of the target paging format is not acceptable.

8) Must be capable of displaying full content of message sent to target pager, including capcode and content of message in both alpha or numeric format as appropriate.

9) Single channel version must not require a computer for operation. Operation via a dumb video terminal alone is a requirement.

10) Must be fully menu driven for easy operation by non-technical personnel. Receiver frequency and other parameters must be controlled from the software menu. Hot keys to control common receiver functions such as tuning and selection of memory channels will be provided. Manual tuning of the receivers specifically is not acceptable.

11) Must capture and store pager messages on a per capcode basis, saving the message, time and date in a file for that capcode.

12) Must capture and store pager messages on match of search strings in the content of the message.

13) System will create automatically a hard disk file for captured messages meeting the search criteria (capcode or search string), if a file for the capcode does not exist already. If a file does exist, all activity associated with that capcode will be indexed and stored in the file. Files are to be maintained on a per capcode basis.

14) Several reporting operations will be included as standard. Reports will be able to be printed either to a file, the printer, or the screen. Reports must be manually exportable to customer's database.

15) Systems software will provide free form note fields which can be used to enter case numbers, notes on individual tracked, officer working case, etc.

16) Software will permit searching fields in the entire message or capcode database via keyword or date range.

17) System shall not require a special receiver available only from the manufacturer of the paging decoder system. Receiver must be frequency agile; crystal control or fixed frequency is not acceptable.

18) Must include built in time/date clock capable of time and date stamping all intercepted pages. This clock must be maintained via internal battery such that the clock does not need to be set every time the system is used. Once set, the clock must be updated automatically every hour via data transmitted on a Flex paging channel.

19) Must operate in real time, capable of decoding pages simultaneously in all formats such that no pages will be missed, even at maximum sustained (not peak) throughput of a busy paging channel. System must have a proven record of operating with 100% accuracy on sustained operation at any speed or format, supported by references or side by side demonstration.

20) Must be designed specifically for law enforcement pager interception. Systems consisting of modified test equipment or systems adapted from other applications are not acceptable.

21) Must be capable of searching all pages transmitted on a channel for matches to a user supplied or system-generated list of strings and/or capcodes. A minimum of 200 target capcodes and 50 message search strings will be provided. Search strings must be selectable as either numeric, alphanumeric, or both.

22) Must be capable of displaying only selected pages, or (for testing, troubleshooting or training purposes) all pages on a channel, in real time, at maximum sustained (not peak) throughput of the paging system.

23) Single channel system must be capable of driving a modem for unattended or remote operation.

24) Must have the capability to examine, print, enter, delete or modify search strings and capcodes from a menu selection. A single menu entry will be provided to erase all digital and alpha search strings, and all capcodes.

25) Must be capable of firmware and software upgrades in the field to add new capabilities, features or report formats without the unit having to be returned to the factory. E-mail or Internet updates of firmware must be available.

26) System (including receiver) must not be subject to RFI or EMI from any hardware required for operation. Must not radiate any signals which may interfere with other radio or electronic equipment in close proximity. Physical separation of system components to prevent interference is not acceptable. A special environment such as conditioned power, conditioned room environment etc. is not acceptable.

27) System must include an auto resume feature. This feature provides for automatic restart in case of power failure. System must resume operation in the same mode and with same parameters as before power failure. Messages captured by the system prior to power failure must not be lost. This feature is necessary to ensure continuity of evidence and no missed pages.

28) System must be modular in design, with individual receiver and logic decoding modules. This is to allow for quick, non-technical repairs and minimum downtime merely by replacing failed modules. System must be capable of continued operation without operator intervention even with one or more failed modules.

29) Must include toll free technical support and a minimum of a two year 100% warranty on materials and

workmanship.

30) Must be manufactured by an established company with a proven history and whose primary mission is manufacturing and supporting electronic surveillance systems in the specialized government and law enforcement industry.

31) System must have a proven installed base of law enforcement users and may not be a prototype or newly developed unit not proven in the field under intensive use.

This is a Restricted Item and is For Use by Law Enforcement Only

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Contact The Gestapo for more information at:

Gestapo Headquarters
1600 Pennsylvania Avenue
Wahington DC, 10001 USA

" In God we trust. All others we monitor"

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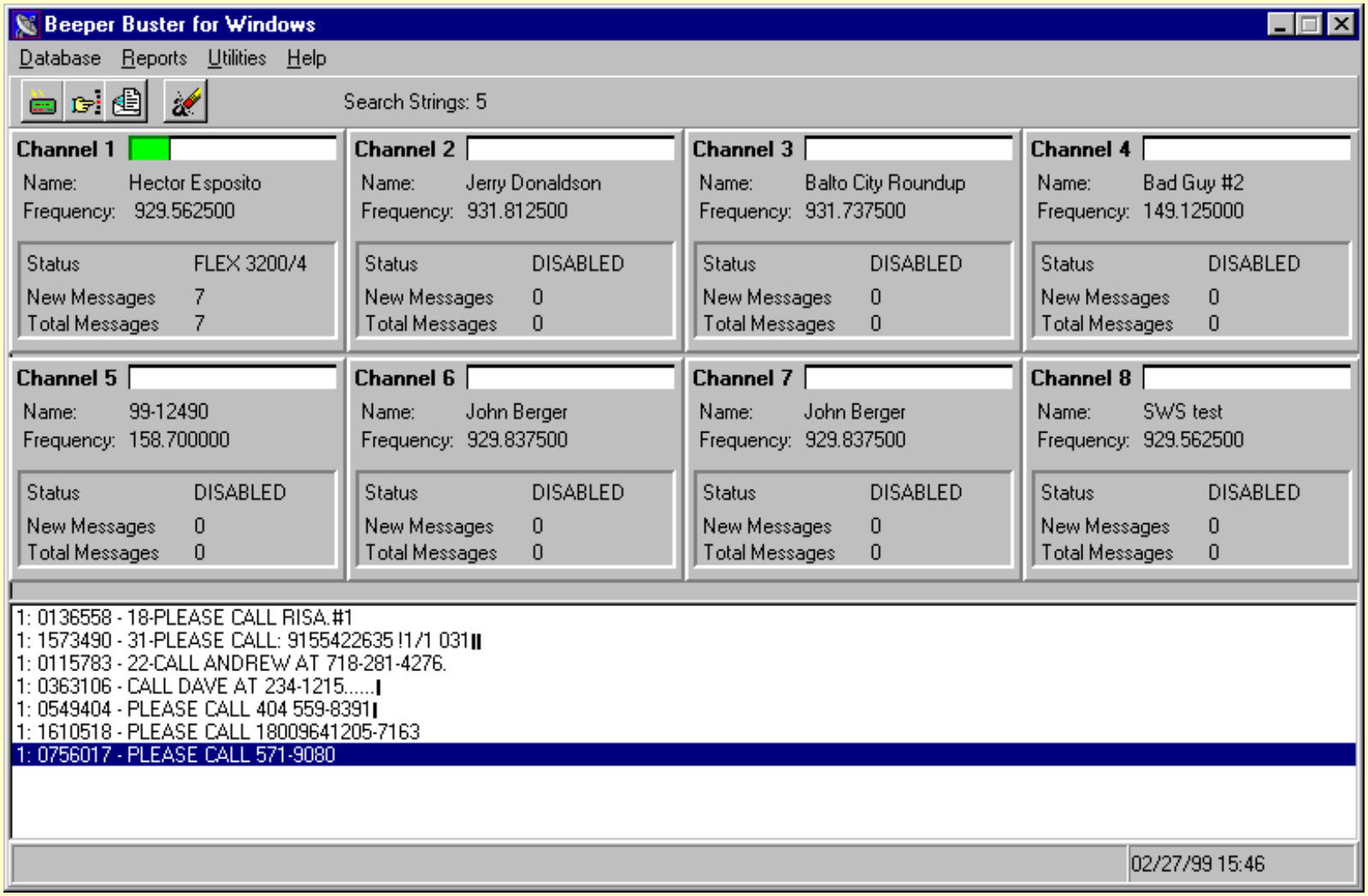
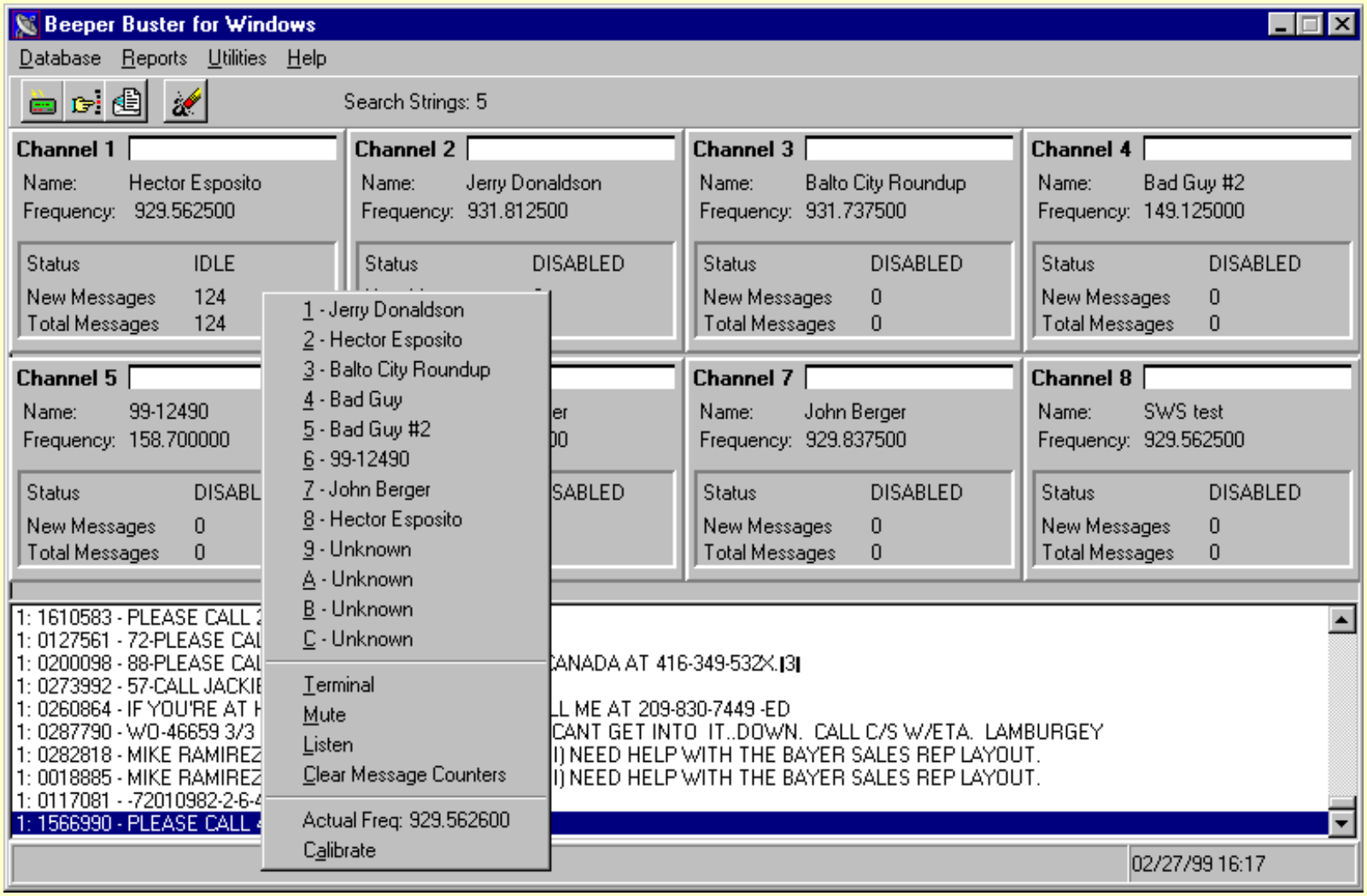
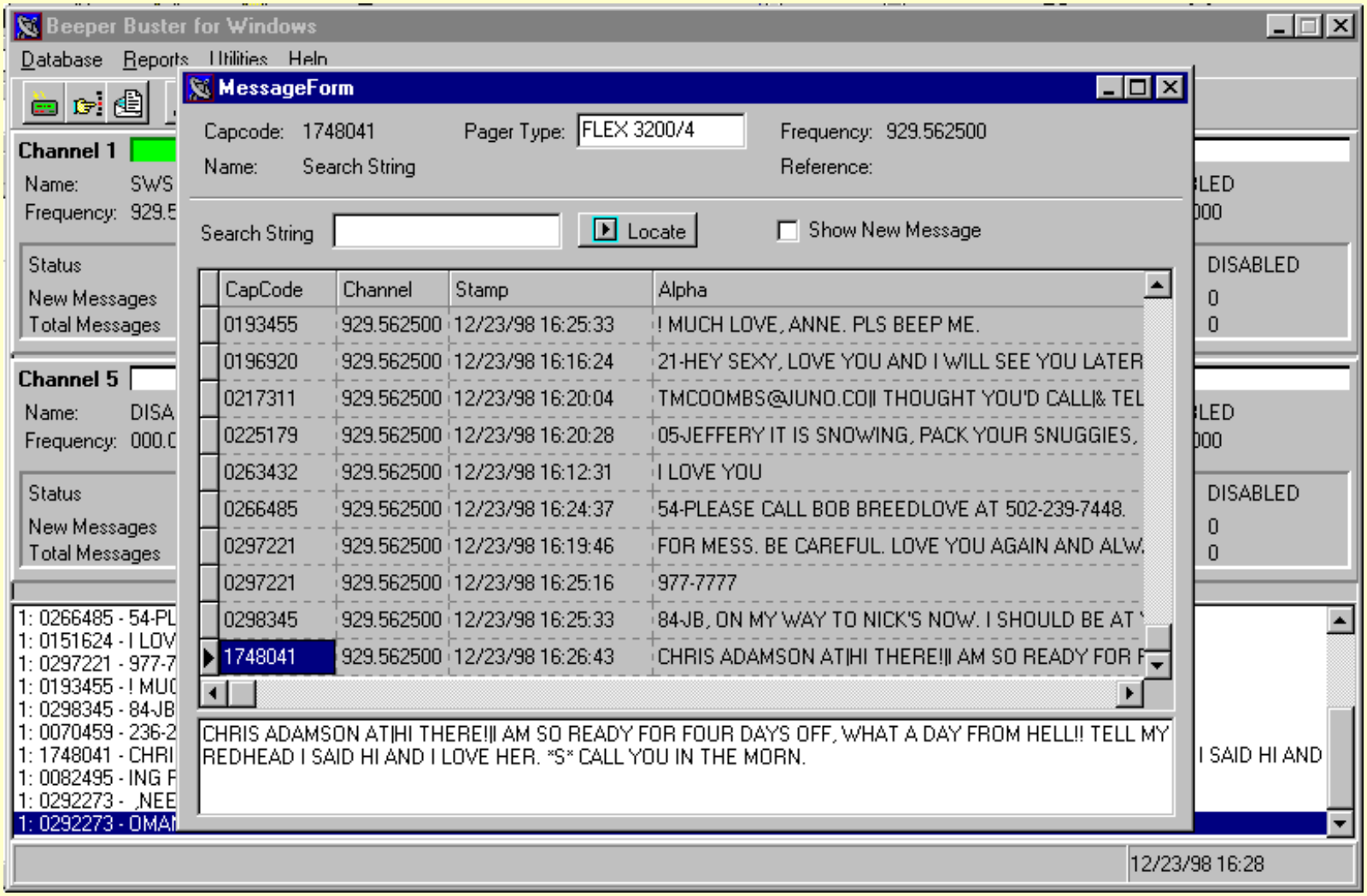
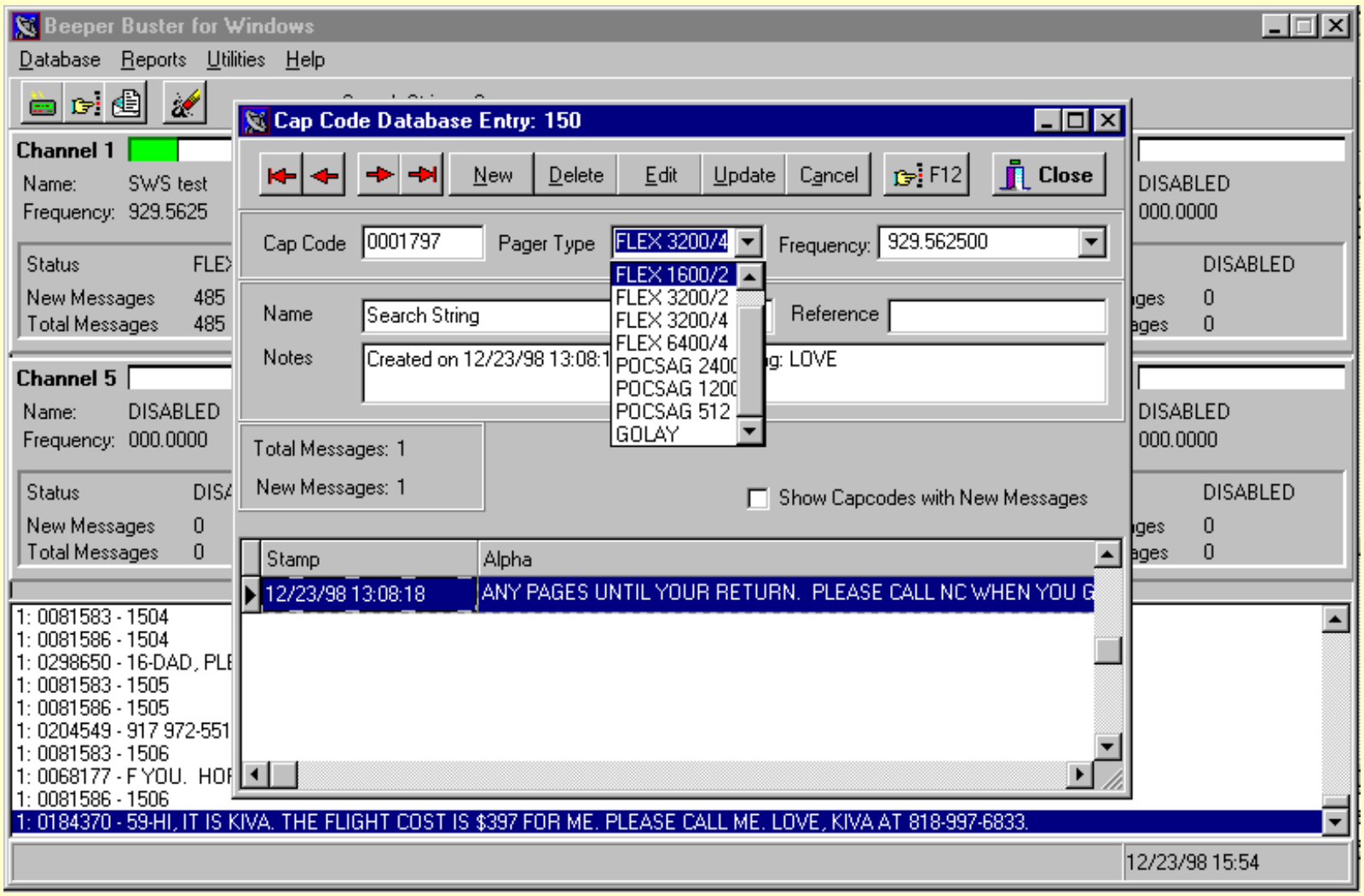

Beeper Buster for Windows
Database Reports Utilities Help
Search Strings: 5
Channel 1
Name: Hector Esposito
Frequency: 929.562500
Status FLEX 3200/4
New Messages 7
Total Messages 7
Channel 2
Name: Jerry Donaldson
Frequency: 931.812500
Status DISABLED
New Messages 0
Total Messages 0
Channel 3
Name: Balto City Roundup
Frequency: 931.737500
Status DISABLED
New Messages 0
Total Messages 0
Channel 4
Name: Bad Guy #2
Frequency: 149.125000
Status DISABLED
New Messages 0
Total Messages 0
Channel 5
Name: 99-12490
Frequency: 158.700000
Status DISABLED
New Messages 0
Total Messages 0
Channel 6
Name: John Berger
Frequency: 929.837500
Status DISABLED
New Messages 0
Total Messages 0
Channel 7
Name: John Berger
Frequency: 929.837500
Status DISABLED
New Messages 0
Total Messages 0
Channel 8
Name: SWS test
Frequency: 929.562500
Status DISABLED
New Messages 0
Total Messages 0
1: 0136558 - 18-PLEASE CALL RISA.#1
1: 1573490 - 31-PLEASE CALL: 9155422635 !1/1 031
1: 0115783 - 22-CALL ANDREW AT 718-281-4276.
1: 0363106 - CALL DAVE AT 234-1215.....
1: 0549404 - PLEASE CALL 404 559-8391
1: 1610518 - PLEASE CALL 18009641205-7163
1: 0756017 - PLEASE CALL 571-9080
02/27/99 15:46


Beeper Buster for Windows
Database Reports Utilities Help
Search Strings: 5
Channel 1
Name: Hector Esposito
Frequency: 929.562500
Status IDLE
New Messages 124
Total Messages 124
Channel 2
Name: Jerry Donaldson
Frequency: 931.812500
Status DISABLED
Channel 3
Name: Balto City Roundup
Frequency: 931.737500
Status DISABLED
New Messages 0
Total Messages 0
Channel 4
Name: Bad Guy #2
Frequency: 149.125000
Status DISABLED
New Messages 0
Total Messages 0
Channel 5
Name: 99-12490
Frequency: 158.700000
New Messages 0
Total Messages 0
Channel 7
Name: John Berger
Frequency: 929.837500
Status DISABLED
New Messages 0
Total Messages 0
Channel 8
Name: SWS test
Frequency: 929.562500
Status DISABLED
New Messages 0
Total Messages 0
1 - Jerry Donaldson
2 - Hector Esposito
3 - Balto City Roundup
4 - Bad Guy
5 - Bad Guy #2
6 - 99-12490
7 - John Berger
8 - Hector Esposito
9 - Unknown
A - Unknown
B - Unknown
C - Unknown
Terminal
Mute
Listen
Clear Message Counters
Actual Freq: 929.562600
Calibrate
1: 1610583 - PLEASE CALL
1: 0127561 - 72-PLEASE CAL
1: 0200098 - 88-PLEASE CAL
1: 0273992 - 57-CALL JACKI
1: 0260864 - IF YOU'RE AT H
1: 0287790 - WO-46659 3/3
1: 0282818 - MIKE RAMIREZ
1: 0018885 - MIKE RAMIREZ
1: 0117081 - -72010982-2-6-4
1: 1566990 - PLEASE CALL
CANADA AT 416-349-532X.
LL ME AT 209-830-7449 -ED
CANT GET INTO IT..DOWN. CALL C/S W/ETA. LAMBURGEY
I) NEED HELP WITH THE BAYER SALES REP LAYOUT.
I) NEED HELP WITH THE BAYER SALES REP LAYOUT.
02/27/99 16:17


Beeper Buster for Windows
Database Reports Utilities Help
MessageForm
Capcode: 1748041
Pager Type: FLEX 3200/4
Frequency: 929.562500
Name: Search String
Reference:
Search String
Locate
Show New Message
CapCode Channel Stamp Alpha
0193455 929.562500 12/23/98 16:25:33 ! MUCH LOVE, ANNE. PLS BEEP ME.
0196920 929.562500 12/23/98 16:16:24 21-HEY SEXY, LOVE YOU AND I WILL SEE YOU LATER
0217311 929.562500 12/23/98 16:20:04 TMCOOMBS@JUNO.CO|| THOUGHT YOU'D CALL|& TEL
0225179 929.562500 12/23/98 16:20:28 05-JEFFERY IT IS SNOWING, PACK YOUR SNUGGIES,
0263432 929.562500 12/23/98 16:12:31 I LOVE YOU
0266485 929.562500 12/23/98 16:24:37 54-PLEASE CALL BOB BREEDLOVE AT 502-239-7448.
0297221 929.562500 12/23/98 16:19:46 FOR MESS. BE CAREFUL. LOVE YOU AGAIN AND ALW
0297221 929.562500 12/23/98 16:25:16 977-7777
0298345 929.562500 12/23/98 16:25:33 84-JB, ON MY WAY TO NICK'S NOW. I SHOULD BE AT
1748041 929.562500 12/23/98 16:26:43 CHRIS ADAMSON AT|HI THERE!|| AM SO READY FOR F
CHRIS ADAMSON AT|HI THERE!|| AM SO READY FOR FOUR DAYS OFF, WHAT A DAY FROM HELL!! TELL MY REDHEAD I SAID HI AND I LOVE HER. *S* CALL YOU IN THE MORN.
Channel 1
Name: SWS
Frequency: 929.5
Status
New Messages
Total Messages
Channel 5
Name: DISA
Frequency: 000.0
Status
New Messages
Total Messages
DISABLED
0
0
1: 0266485 - 54-PL
1: 0151624 - I LOV
1: 0297221 - 977-7
1: 0193455 - ! MUC
1: 0298345 - 84-JB
1: 0070459 - 236-2
1: 1748041 - CHRI
1: 0082495 - ING F
1: 0292273 - ,NEE
1: 0292273 - OMA
I SAID HI AND
12/23/98 16:28


Beeper Buster for Windows
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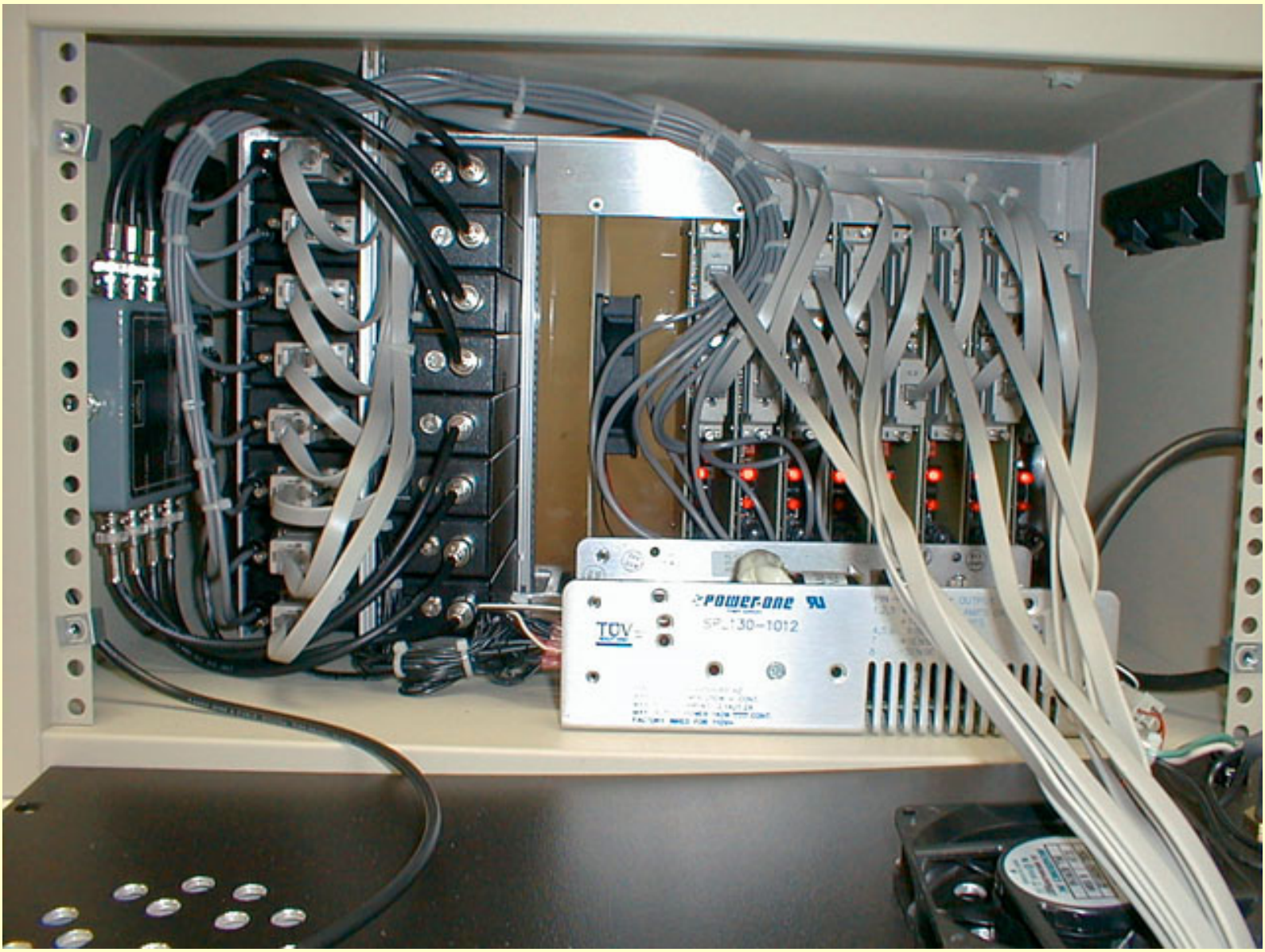
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SWS Security
Beeper Buster

LOCK PICKING, SAFE BREAKING, AND FORCED ENTRY

Let's face it, locks are a fact of life. They get in the way when you need to get somewhere others don't want you to be. And once you get there, there may be a safe locking up what you came for in the first place. That's what this section is going to teach you how to deal with these obstacles in a quick and timely manner.

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1. "Secrets of Lock Picking" by Steven Hampton
2. Master Lock Resettable Combination Lock
3. Master Lock Standard Combination Lock
4. Disc or Moon Type Lock

SECRETS OF LOCK PICKING

By Steven Hampton

This is a complete transcription of the book, minus the chapter on warded locks (These locks are cheap. Use a hammer and a screwdriver).

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1. Introduction
2. Tools
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8. Tubular Cylinder Locks
9. Mushroom and Spool Pin Tumbler Locks
10. Magnetic Locks
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12. Tips for Success

INTRODUCTION

The ancient Egyptians were the first to come up with a complicated security device. This was the pin tumbler lock. We use the same security principle today on millions of applications.

The most commonly used lock today is the pin tumbler lock. A series of pins that are divided at certain points must be raised to these dividing points in relationship to the separation between the cylinder wall and the shell of the lock by a key cut for that particular series of pin divisions. Thus the cylinder can be turned, and the mechanism or lock is unlocked.

Lock picking means to open a lock by use of a flat piece of steel called a pick. Actually, the process requires two pieces of flat steel to open cylinder locks. It amuses me to watch spies and thieves on TV picking locks using only one tool. But it is for the better in a sense. If everyone learned how to pick locks by watching TV, we would all be at the mercy of anyone who wanted to steal from us, and the cylinder lock for the most part would be outdated.

The actual definition of lock picking should be: "The manipulation and opening of any restrictive mechanical or electronic device by usage of tools other than the implied instrument (key or code) used solely for that device." A little lengthy, but more accurate description. With cylinder locks, it requires a pick and a tension wrench.

By picking the lock, you simply replace the function of a key with a pick that raises the pins to their "breaking point," and using a tension wrench one rotates the cylinder to operate the cam at the rear of the lock's cylinder to unlock the mechanism.

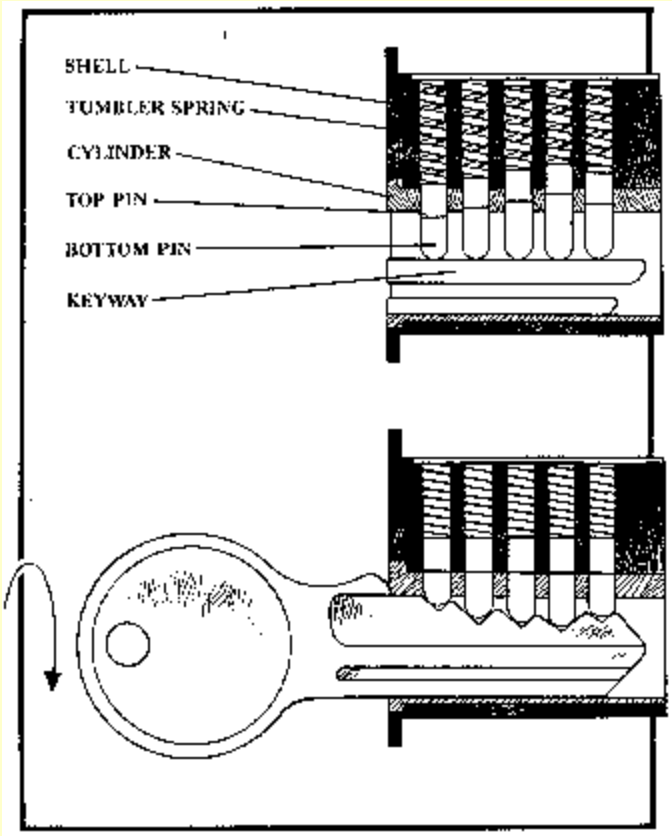

Figure 1. The pin tumbler lock, cutaway view.

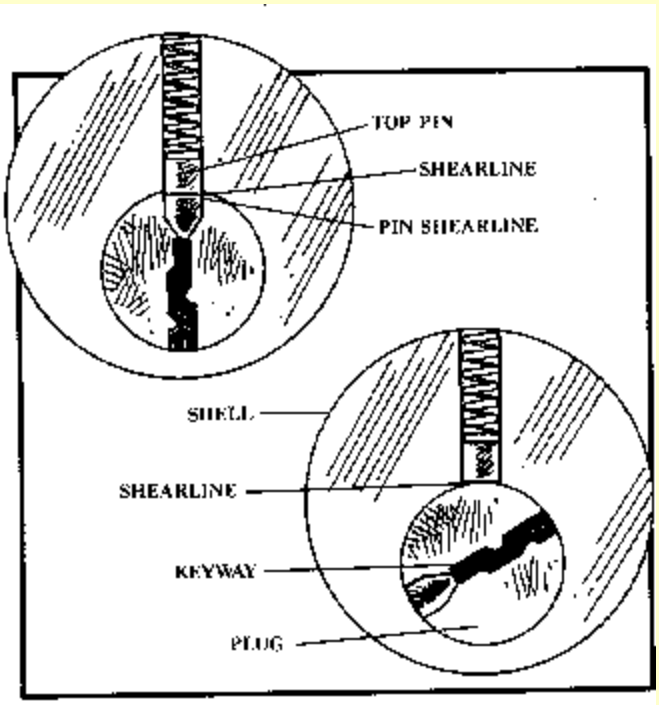

Figure 2. The pin tumbler lock, front view.

The tension wrench is used to apply tension to the cylinder of the lock to cause a slight binding action on the pins as well as to turn the cylinder after the pins have been aligned by the pick; this opens the lock. The slight binding action on the pins caused by the tension wrench allows one to hear and feel each pin as it "breaks" or reaches alignment with the separation of cylinder and shell. The vibration is felt in the knuckles and joints of the fingers, and the sound is similar to that of a cricket in an arm wrestling match-a subtle yet distinct click.

Usually you need very little tension with the wrench while picking the lock. In fact, it takes somewhat of a delicate, yet firm touch. This is the secret to picking locks successfully-a firm and yet gentle touch on the tension wrench. You should be able to feel the pins click into place with the right amount of tension; experience will be your true guide.

Half of your success will be based on your ability to use or improvise various objects to use as tools for your purpose. The other half will depend on practice. I once picked a pin tumbler lock using a borrowed roach clip and a hairpin. A dangerous fire was prevented and probably several lives were saved. The world is full of useful objects for the purpose, so never hesitate to experiment.

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TOOLS

I started picking locks using a small screwdriver and a safety pin. The screwdriver can be used as a tension wrench, and the safety pin is used like a "hook" pick. The last half inch of the screwdriver's tip was bent at a 45 degree angle so as to allow easy entry for the pick (bent safety pin). Do not heat the screwdriver tip to bend it, as this will destroy its temper. Use a vise and hammer to do the job. Bend slowly by using firm and short taps of the hammer, otherwise you may break and weaken the shaft. The safety pin should be about one and a half inches long and bent in the same way.

With the small screwdriver as a tension wrench, you can use more of a turning or twisting movement than with a regular tension wrench so you will generally need less direct force when using it. As I mentioned earlier, with practice you will develop the feeling for the right amount of tension on a cylinder. If the safety pin bends after a short time, use the key way of the lock you are picking to bend it back into shape. Even after several times of bending, it should still be useful. Keep a few spares handy, though. File the tip of the safety pin flat in relationship to the bottom of the pins in the lock. Smooth any sharp edges so that you won't impale yourself. Also, if the tip is smooth, the pick will not get hung up on the pins while picking the lock.

Granted these are not the best tools for the job, but they do work. If you learn to use your junk box as a rich source of equipment, then with your experience real lock picks will give you magic fingers. Also, you'll have the advantage of being able to

improvise should you be without the real things (which are illegal to carry on your person in most parts of the country).

Lock picks are difficult to get. I received my first set when I became a locksmith apprentice. All of my subsequent sets I made from stainless steel steak knives with a grinder and cut-off wheel. They are much more durable than the commercial picks. If you do make your own, make certain that the steel is quenched after every 3 seconds of grinding-do not allow the pick to get hot to the point of blue discoloration.

A diamond pick is the standard pick I use on most all pin and wafer locks. A small diamond pick is used for small pin tumbler locks such as small Master padlocks, cabinet file locks, etc. The tubular cylinder lock pick, we will discuss later. The double-ended, single-pronged tension wrench is used with the diamond pick. It features double usage; a small end for small cylinders and a large end for the larger cylinders. A special tension wrench is used for double-wafer cylinder locks with an end with two prongs on one end and tubular cylinder locks with the single prong on the other end. We will discuss tubular cylinder and double-wafer locks later as well. The steel should be .030 inches to .035 inches thick for the picks and .045 inches to .050 inches thick for the first tension wrench mentioned above. The second tension wrench should be .062 inches square (.062 inches x .062 inches) on the tubular cylinder side (one pronged end), and .045 inches thick on the double-wafer end (two-pronged end). You can accomplish this by starting out with .045 inches in thickness. The two-pronged end should be bent carefully in a vise at a 30 degree angle. This allows easy entry for the pick on double-wafer locks.

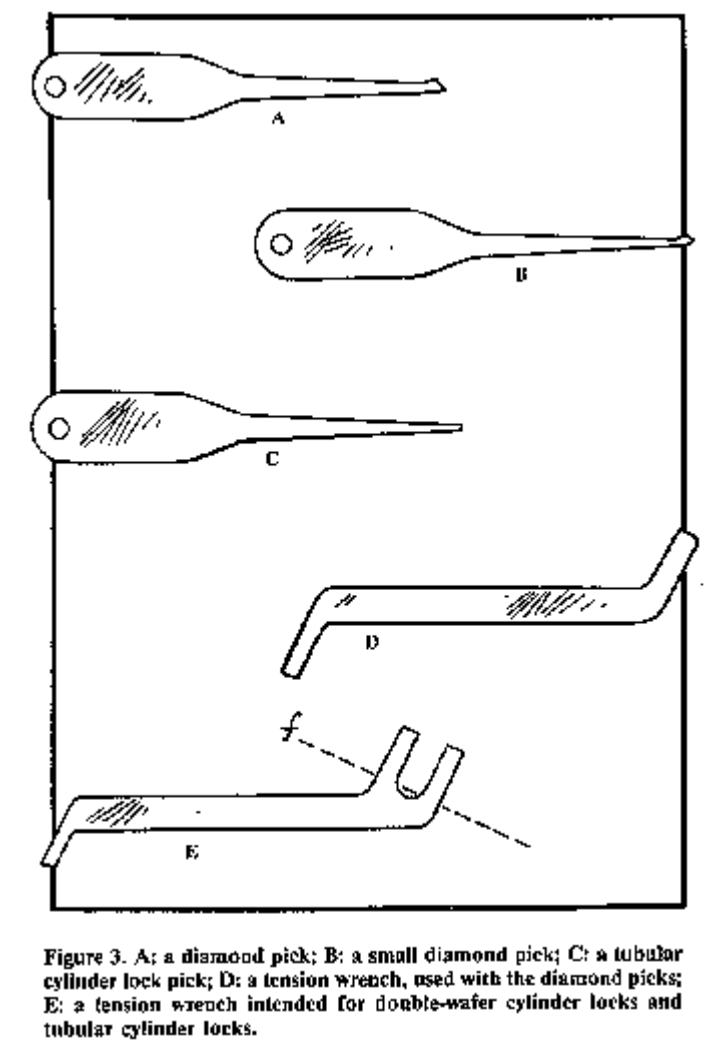

Figure 3. A: a diamond pick; B: a small diamond pick; C: a tubular cylinder lock pick; D: a tension wrench, used with the diamond picks; E: a tension wrench intended for double-wafer cylinder locks and tubular cylinder locks.

Among the more common tools used by professionals around the world is the rake pick. The rake pick is used to "rake" the tumblers into place by sliding it in and out across the tumblers. I seldom use the rake pick because it is not highly effective and I consider it a sloppy excuse for a lock pick. I've seen the rake pick work on some difficult locks, but you can rake with a diamond pick and get the same results. I prefer the diamond pick for most tumbler locks simply because it is easier to get in and out of locks-it slides across the tumblers with little or no trouble.

A ball pick is used for picking double-wafer cylinder locks, though I never carry one; I use a large diamond pick and reverse it when picking these locks. This means I have one less pick to carry and lose.

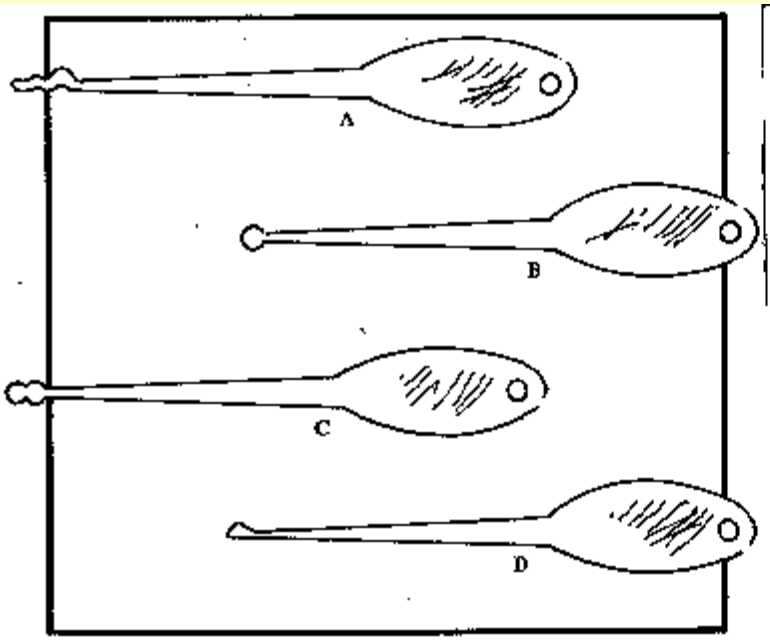

Figure 4. A: a rake pick; B: a ball pick; C: a double ball pick; D: a diamond pick.

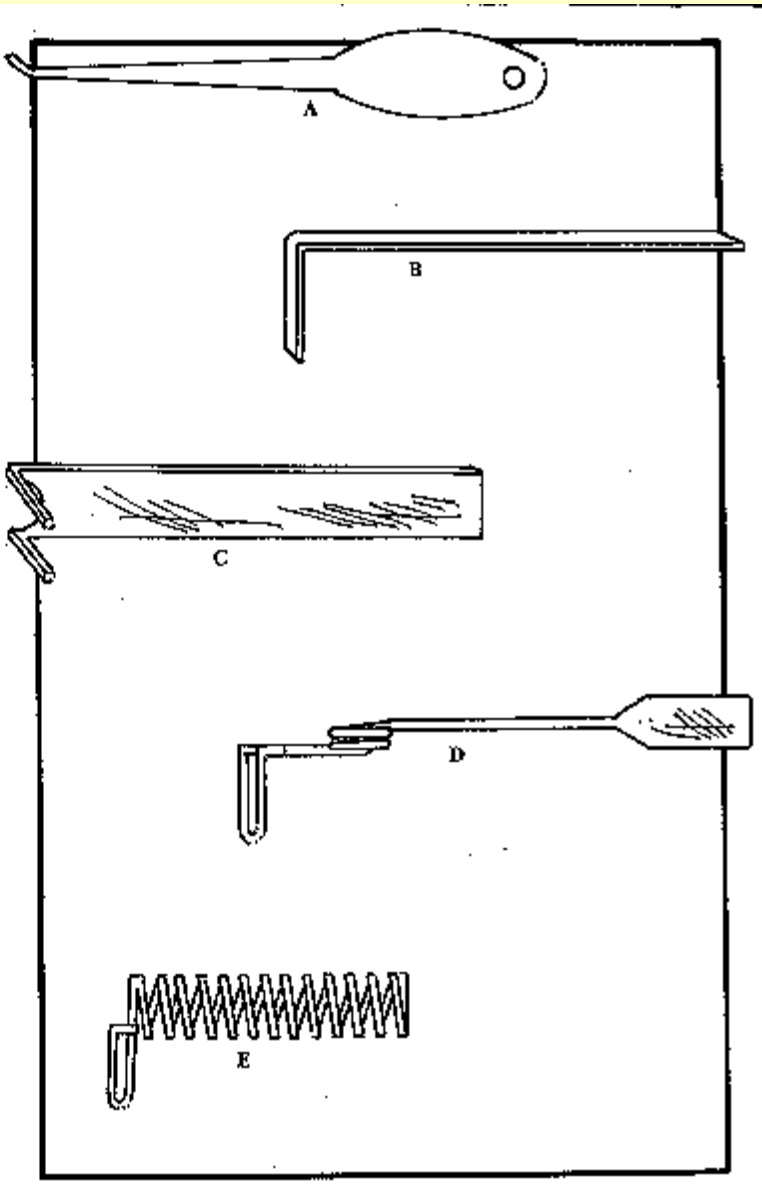

Figure 5. A: a hook pick; B: a pin and wafer lock tension wrench; C: a double-wafer tension wrench; D: a Feather Touch tension wrench; E: a homemade Feather Touch tension wrench.

A double-ball pick is used like a rake on double-wafer locks in conjunction with a tension wrench (two-pronged end).

A hook pick is used to open lever tumbler locks, though again, I use a diamond pick with a hooking action when possible. There are various sizes of hooks but they all have the same basic job-to catch the movable levers that unlock lever locks.

There are also various sizes of tension wrenches. They are usually made from spring steel. The standard tension wrench is used for pin and wafer locks. A special tension wrench is called a Feather Touch, and it is used for high- security mushroom and spool pin tumbler locks. Its delicate spring-loaded action allows the pick to bypass the tendencies of these pins to stick. A homemade version of the Feather Touch can be made from a medium-light duty steel spring.

As to getting lock picks for your own use, you cannot go down to your local hardware store and buy them. I could supply you with some sources or wholesalers, but I do believe it is illegal for them to sell to individuals. Your best bet would be to find a machine shop that will fabricate them for you. It would be less expensive and arouse less suspicion if you purchase a small grinder with a cut-off wheel and make your own. With a little practice, you can make a whole set in an afternoon. Use a copy of the illustrations in this book as templates and carefully cut them out with an X-ACTO knife. Cut down the middle of the lines. Acquire some stainless steel (many steak knives approach proper thickness).

With a glue stick, lightly coat one side of the paper template and apply it to the cleaned stainless surface, and allow it to dry. You'll need a can of black wrinkle finish spray paint. This kind of paint has a high carbon content and can stand high temperature of grinding. Spray the stainless (or knives) with the patterns glued on and dry in a warm oven or direct sunlight for one hour. Set aside for twenty-four more hours. Peel off the paper template and you are ready to cut and grind. Please use caution when cutting and grinding. The piece should be quenched every three seconds in cold water. Smooth up sharp edges with a small file or burnishing wheel.

Tools made from stainless steel will outlast the purchased ones. The tools purchased from most suppliers are made from spring steel and wear out after about 100 uses. The stainless steel ones, if properly made, should last over 2,000 uses.

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LOCK IDENTIFICATION

There are many types of locks, the most common being:

1. The pin tumbler lock. Used for house and garage doors, padlocks, mail boxes, and Ford automobiles.

2. The wafer tumbler lock. Used for garage and trailer doors, desks, padlocks, cabinets, most autos, window locks, and older vending machines.

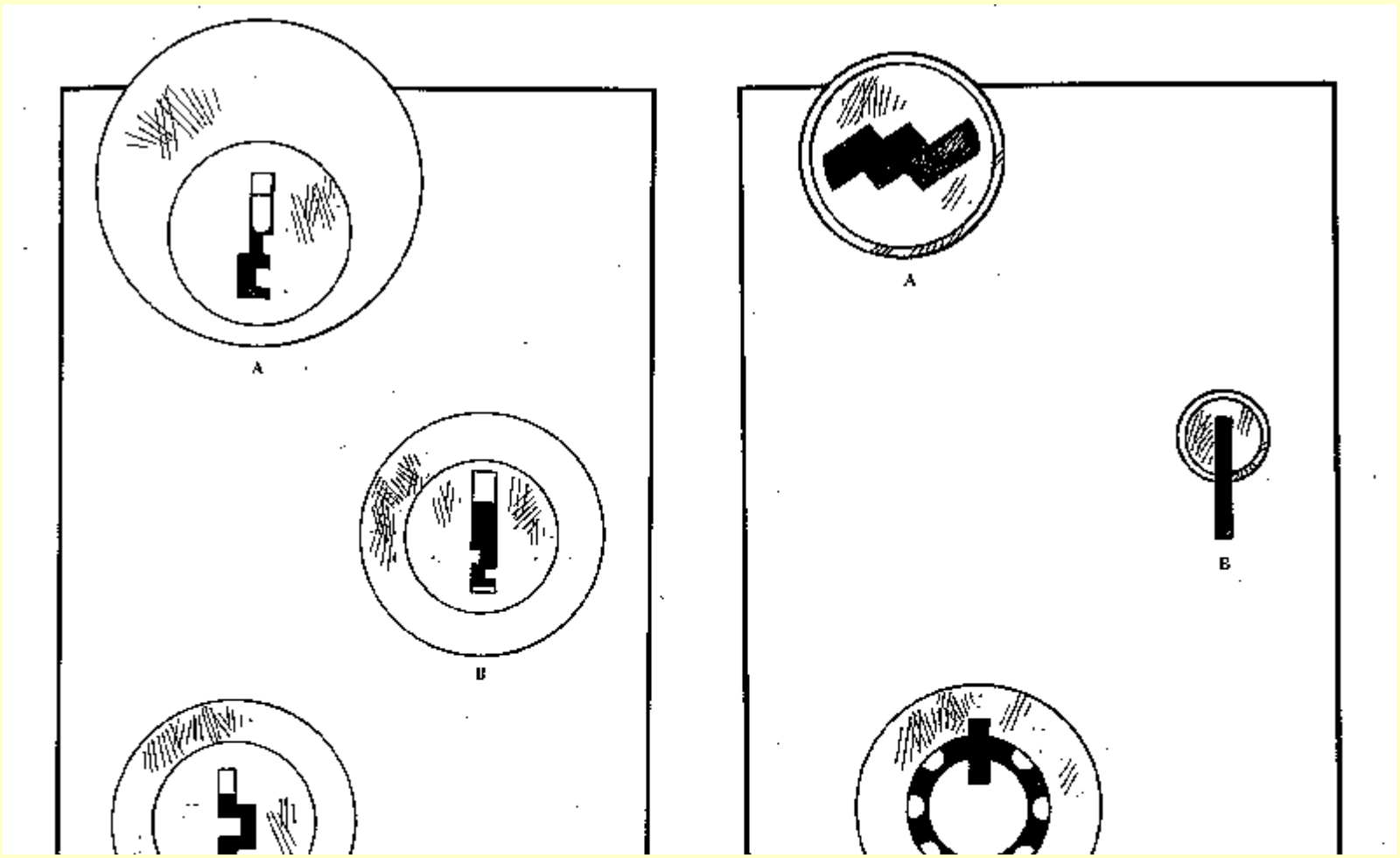
3. The double-wafer lock. Used for higher security wafer tumbler applications.

4. The warded locks. Used for light security padlocks and old-fashioned door locks.

5. Lever locks Used for light security and older padlocks, sophisticated safe-deposit boxes, some desks, jewelry boxes, and small cash boxes.

6. Tubular cylinder locks. Used for alarm control systems, newer vending machines, car-wash control boxes and wherever higher security problems might exist.

These locks are the more common locks used yet there are variations and combinations of these principal types that usually pick open in the manner that will be discussed. Some of them just require practice of the basic types, others luck, and most of the rest of them knowledge of how that particular lock works and is keyed. This comes from experience.



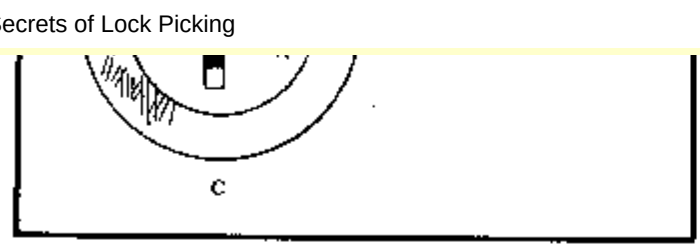


Figure 6. A: a pin tumbler lock; B: a wafer tumbler lock; C: a double-wafer tumbler lock.

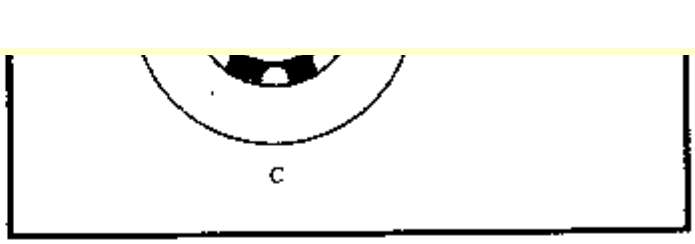


Figure 7. A: a warded lock; B: a lever lock; C: a tubular cylinder lock.

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PIN TUMBLER LOCKS

Pin tumbler locks offer the most security for their price. They have close machine tolerances and approximately 1,000,000 different key combinations for a five-pin lock. Considering the thousands of different companies making pin tumblers (different shaped keyways for each company or design line), the chances of someone having a key that will work in your front door lock are one in many billions.

Pin tumbler locks can easily be identified by peering down the keyway and locating the first round pin.

Sometimes you can see the pin's dividing point, where it breaks with the cylinder wall (shear point).

To successfully pick a pin tumbler lock, your sense of touch sould be honed so that both hands feel the tools. Once the hand holding the pick has located a slight relief in tension while picking a particular tumbler, the other hand holding the tension wrench will feel a relief or breaking point. Both hands should be involved with the sense of touch, the sensing of the inner workings of the lock.

We are now ready to begin the first lesson. First open your front door and check for a pin tumbler lock on it. It should have one on it. If there is one, leave the door open to decrease suspicion. Do not lock yourself out of your apartment or house by being overconfident; not only will you raise suspicion, but window glass is not cheap.

HOW TO PICK A TUMBLER LOCK

STEP ONE

Without using the tension wrench, slip the pick into the lock. The "hook" of the pick should be toward the tumblers (up in most cases, depending on whether or not the lock was mounted upside down-you can tell by looking down the keyway and locating the first pin with your pick). Try to feel the last tumbler of the lock. It should be 7/8 inches into the lock for a five-pin tumbler lock (most common pin tumbler lock used).

Make certain that you have no tension on the wrench when inserting the pick as this will encumber the frontal tumblers. When you feel the back tumbler, slowly raise it with a slight prying motion of the pick. Release it, but keep the pick in the lock on the rear tumbler.

Now insert the tension wrench, allowing room for the pick to manipulate all of the pins. It should be placed at the bottom of the cylinder if the lock was mounted upright, tumblers toward the top of the cylinder. Apply firm and yet gentle clockwise pressure to the tension wrench.

Slowly raise the back tumbler with a slight prying motion of the pick. A minute click will be felt and heard when it breaks. It will lose its springiness when this occurs, so do not go any further with it. Any further movement with the pick will cause binding by going past the pins' shear line. Continue an even pressure with the tension wrench.

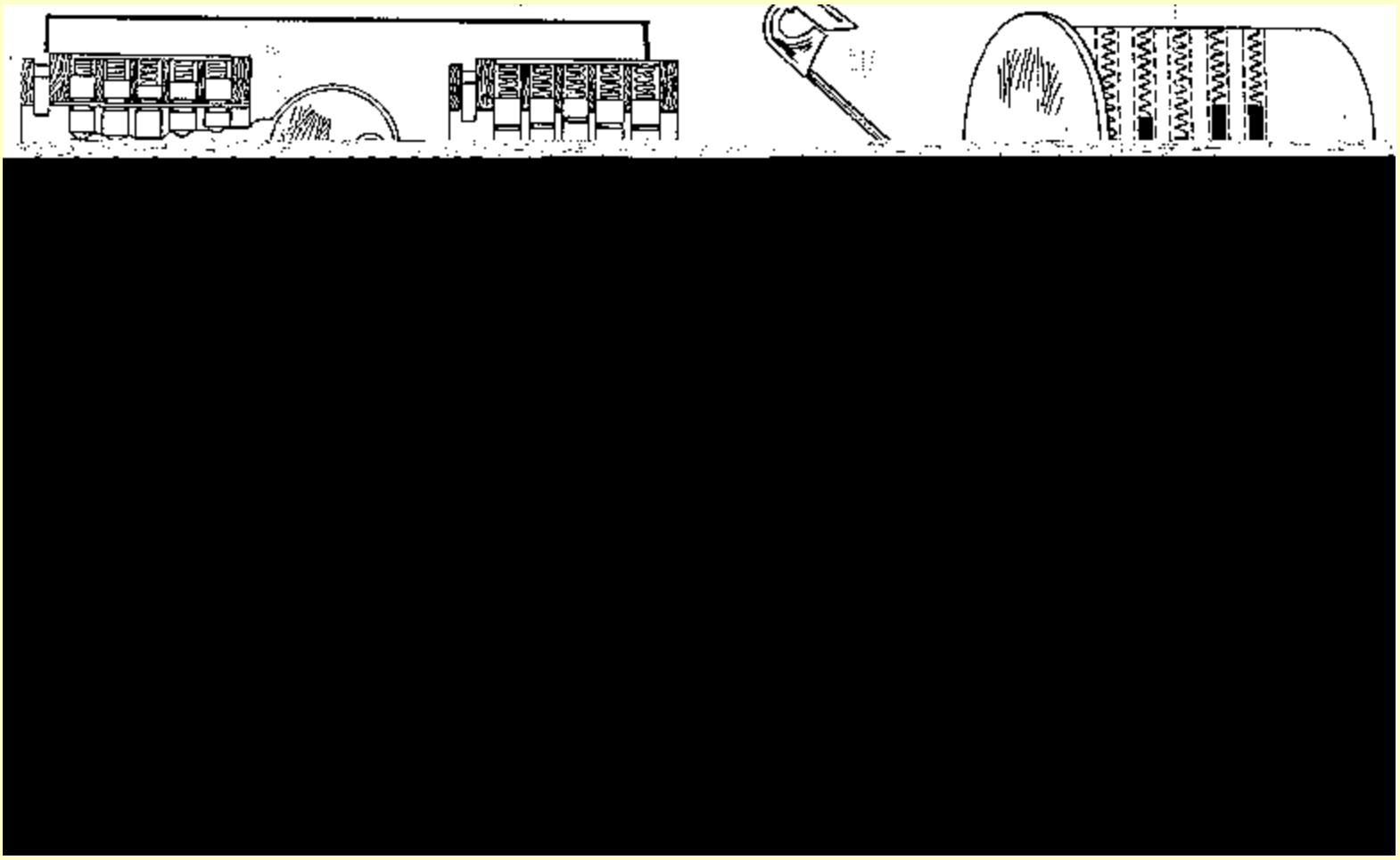
Keeping an even tension pressure, proceed to Step Two.

STEP TWO

The fourth tumbler should be easily felt since it is the next one in line. Raise it until it breaks, keeping the tension wrench steady. It too will give a sound and sensation when it breaks or aligns.

STEP THREE

The third or middle tumbler is next. Again, it too will click. Maintain a constant, even pressure on the wrench- about the same pressure that you would use to replace a cap on a catsup bottle. You may feel the "clicks" in your tension wrench as well as hear them.



STEPS FOUR AND FIVE

Continue on to the next tumbler out, working toward you. When it breaks, raise the last (front) tumbler to its braking point and the cylinder should be free to rotate and unlock the door. Sometimes you may have to play with the wrench to open the lock because you may have raised a tumbler too high, past its breaking point. If this is the case, very slowly and gradually release the tension wrench pressure and the overly extended tumbler will drop into its breaking point before the other tumblers have a chance to fall. The cylinder should pop open at that point. I have found that this technique is responsible for over 30 percent of my successes in opening all tumbler locks.

If the lock still refuses to open after all that treatment, release the tension wrench pressure, allowing all of the tumblers to drop and start over. You may have more than one tumbler too high and would be better off to repeat the picking process.

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WAFER TUMBLER LOCKS

Wafer tumbler locks make up over one-fourth of the locks in use in the world. Since they are generally easier to pick than most pin tumbler locks, you will be 75 percent master after fooling around with these mechanisms. That is why I wrote about pin tumbler locks first-they are more difficult and make up over one-half of the locks used today.

unnecessary wear on your picks not to mention wasting your time.

Ford auto locks are relatively simple to pick. They have pin tumblers and you have to remember that the door locks turn counterclockwise. Most other auto locks turn clockwise. If you are not sure, remember this: If the tumblers will not catch at their breaking points, you are going in the wrong direction with the tension wrench.

Wafer locks are a cinch to pick if you have learned how to pick pin tumblers. Just remember that wafers are thinner than pins and there is less distance between them.

Generally you need less tension-wrench pressure with these locks, yet car locks can be quite stubborn and require a great deal of tension. Any heavily spring-loaded cylinder needs a substantial amount of tension.

As a rule, though, wafer locks need less play with the tension wrench than with pin tumbler locks. But if you find yourself having difficulty in opening these, you may try a little tension-wrench play. Usually they won't pop open like pin tumbler locks, they just slide open; you don't get the warning that a pin tumbler gives before it opens because there is less contact area on the wafer's edge than on a pin, so the sense of climax is reduced with these types of locks. Still, they open quite easily.

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DOUBLE WAFER LOCKS

Double-wafer locks are picked in the same way as single wafer locks, but there are two sides to the story. Not only do you have to align the top wafers, but you have ones in the bottom of the cylinder to align as well.

The Chicago Lock Company was the first to come up with this type of lock. It is a classic example of the race toward better security. Certain tension wrenches allow uninterrupted picking using ball picks. You can also use a standard tension wrench or small screwdriver and place it at the center of the keyway. To eliminate unnecessary baggage, use a diamond pick, reversing it to encounter both top and bottom wafers.

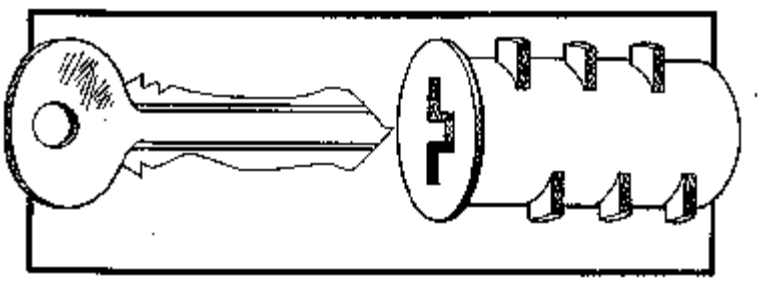

Figure 16. A double-wafer lock.

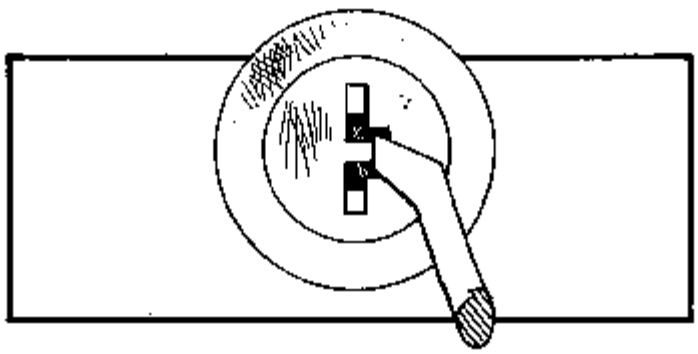

Figure 17. Inserting a tension wrench in a double-wafer lock.

The last tumbler in this type of lock is located less than one-half of an inch in. The picking procedure may have to be repeated more than one time-top wafers, then bottom wafers, top, bottom-back and forth. Yet these locks are easier to pick than most pin tumblers.

Locate the last wafer on the top side and move it to its breaking point. Do the same with the other top wafers. Keep the tension wrench firm, remove the pick, turn it upside down (if you are using a diamond or homemade pick), and reinsert it to work the bottom wafers. You may have to repeat this process a few times, but double-wafer locks can and will open with such treatment. Schlage has a doorknob lock that opens this way, but the last tumbler is about one and one-half inches in.

Double-wafer locks are easy to master if you have learned to pick pin and wafer tumbler locks. Since double- wafer locks are more compact, you have to compensate for the fact-slightly closer tolerances. These type of locks are used on old pop and

candy machines, gas caps, cabinets, etc.

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PIN AND WAFER TUMBLER PADLOCKS

Cylinder padlocks require a technique of holding them with the same hand with which you are using the tension wrench. This technique allows one to pick the padlock without going into contortions over a dangling padlock. Assuming that you are right-handed, hold the padlock in your left hand by gripping the body of the padlock with your thumb and forefinger. Insert the tension wrench at the bottom of the keyway and hold it in a clockwise turn with your ring and little finger, causing a slight binding pressure on the cylinder. Now your right hand is free to pick, and your left hand does the job of holding both the lock and tension wrench. The overhand method works well, too, but the thumb controls the tension wrench instead. Switch around to find which is most comfortable for you.

When tumbler padlocks pop open, it is quite a sensation because the shackle is spring-loaded and gives one quite a jolt. It's a feeling of accomplishment. You may need a little more tension on padlocks than on door locks because the cylinder cam has to operate a spring-loaded bolt. Overall, padlocks are the most fun to open. Practice using old or discarded padlocks that you have found. I've worn out hundreds of them.

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TUBULAR CYLINDER LOCKS

(Note: Diagrams of tubular lock were omitted due to the fact that picking them with conventional methods is a complete waste of time. There are picks available that are specifically designed to pick this kind of lock in a matter of seconds)

We will gradually proceed to more sophisticated locks from here. I would like to remind you that success is not based on personality. If one is arrogant about one's lockpicking skills, one could easily be made a fool of by a lock. And no matter how many times you bash a cylinder, you will still be locked out. The only thing you accomplish is attracting an audience-so be cool.

If at this point you have had much difficulty understanding the principles of pin and wafer locks, please restudy this book from the beginning. Read it several times so as to absorb it. The information that you now have has taken me almost two decades to gather, so please be mindful of that.

Now you are about to learn how to open the more dif- ficult locking mechanisms-some of the other 25 percent of the locks used today. You should feel confident with pin, wafer and double-wafer tumbler locks before you attempt rim cylinder locks.

Tubular cylinder locks stand out as the most generally accepted lock in all important industries using high-quality locks for protection of property, merchandise, and cash. They are recognized as giving the maximum amount of security for their price range.

Tubular cylinder locks are pin tumbler locks arranged on a circular plane. Unlike conventional pin tumbler locks, all of the pins are exposed to the eye. The central section of the lock rotates to operate the cam when all of the seven pins have reached their breaking points. When the pro- per key is entered into the lock, the tumblers are pressed into position so that the central section (plug) can be turned. This manual operation of inserting the key places the tumblers in position so that the lock can be operated and ensures that frost, dust, salt, or unfavorable climatic conditions will not affect the smooth operation of the lock.

The Chicago Ace lock is a product of the Chicago Lock Company of Chicago, Illinois. It is an effective security device and is used on vending machines, coin boxes, and burglar alarms. A larger, more complex version of it is used on bank doors and electronic teller machines. The key is of tubular shape with the cuts arranged in a circle around the key.

The pick used for this lock is the tubular cylinder pick, or you may use a straight pin or your homemade safety pin pick. The one-pronged end of the tension wrench is a little more specialized and is used for rim cylinder locks. It must be .062 inches square for best results. Any square steel stock is acceptable, as long as it fits snugly into the groove of the tubular cylinder plug.

This type of lock is a burglar's nightmare because it takes so long to pick. You have to pick it three or four times to accomplish the unlocking radius of 120 to 180 degrees. And the cylinder locks after each time you pick it-every one-seventh of a turn.

If you leave the lock only partly picked, the key will not be able to open it, so you must pick it back into the locked position after opening it-another three or four picking sessions. In all, to unlock and lock the cylinder, you have to pick it up to eight times-quite a chore if you don't have the right tools or time.

These locks almost always pick in the clockwise direction. Make certain that the tension wrench fits snugly into the groove on the cylinder. Very slowly push the first pin down until it clicks, maintaining a definite clockwise pressure on the tension wrench. Once the tumbler has broken, do not push any further and proceed to the next one, and so on. As you reach the last tumbler, the tension wrench will feel more slack and give way if the lock were properly picked.

There are special keyhole saws for these locks in which you drill out the tumblers and turn the cylinder. Also there is a special tool used by locksmiths to open rim cylinder locks.

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MUSHROOM AND SPOOL PIN TUMBLER LOCKS

High-security pin tumbler locks may contain specially made pins to make picking them more challenging. The pins are machined so as to make picking them quite difficult. When picking these locks, the pins give the impression that they have broken, when in fact they could be a long way from breaking. You can tell whether or not you are picking a pin tumbler lock that has these pins by the fact that the pins seem to align so easily with a louder than normal click. The cylinder seems eager to open but to no avail.

The picking procedure relies on a well-yielding tension wrench. The tension wrench has to be lightly spring-loaded so that the pins can bypass their false breaking points. You also have to "rake" (seesaw in and out) the pins with your pick. The feather-touch tension wrench is ideal for the job. Use light pressure with it, and it will let you in.

(Note: A feather-touch tension wrench is not necessarily required. A normal tension wrench will work fine with an extremely light tension on it. The weight of just your index finger alone should be enough in most cases.)

The mushroom and spool pins are used in locks for high-security purposes such as bank doors. The American Lock Company uses them in some of their padlocks.

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MAGNETIC LOCKS

Magnetic locks are fascinating. I almost hate to open them because I feel that I have breached their uniqueness. In reality, you do not pick them, but "confuse" them. They generally work on the principle that like magnetic polarities repel each other. The key is a set of small magnets arranged in a certain order to repel other magnets in the lock, thereby allowing the spring-loaded bolt or cam to open the lock.

By using a pulsating electromagnetic field, you can cause the magnets in the lock to vibrate violently at thirty vibrations per second, thereby allowing it to be opened by intermittent tugging of the bolt or turning of the door knob.

This method may also ruin the small magnets in the lock by changing their magnetic status or properties. So, if you have to perform an emergency break-in with these locks, do not relock the door. The card or key will not operate the lock.

The magnetic pick can be used on padlocks by stroking it across the place where the key is placed. It is also designed to fit into the doorknob and is used by stroking one pole in and out or by using the other pole the same way.

If you have had little or no training and experience building something like this, please have a friend who is familiar with basic electronics do it for you. Do not take the chance of electrocuting yourself. Make sure that the coil is also completely covered with electrician's tape after you have wound the 34 gauge wire. Also make sure that the steel core has at least three layers of tape over it. Do not leave the unit plugged in for more than two to three minutes at any one time as this may cause overheating which could cause it to burn out or start a fire. It is safe to use if constructed properly and not left plugged in unattended. Opening magnetic locks requires only 30 to 60 seconds anyway, so don't leave the unit plugged in for longer.

For magnetic padlocks, use a back-and-forth stroking action along the length of the keyway. For magnetic door locks, use a stroking in-and-out action in the slot of the knob alternating from one side (pole) of the pick to the other.

The "key" for a magnetic door lock is a metal or plastic card containing an array of magnetic domains or regions coded in a specific order to allow entry. The magnetic pick bypasses that.

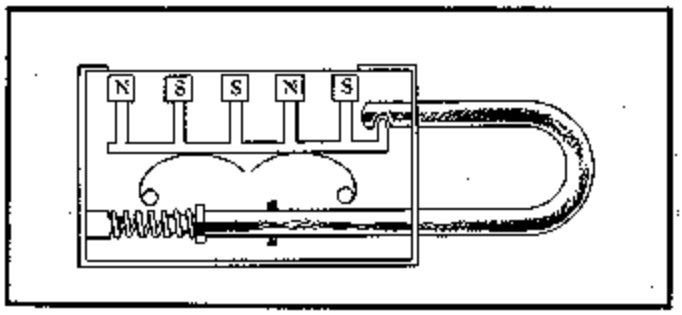

Figure 28. The inner mechanism of a magnetic lock is rather simple.

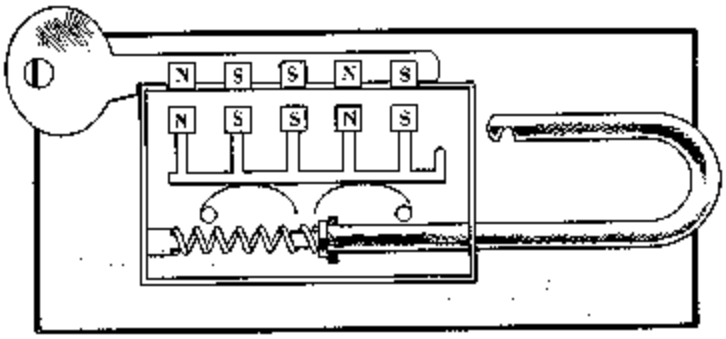

Figure 29. The magnetic key has the same sequence of magnets as the lock.

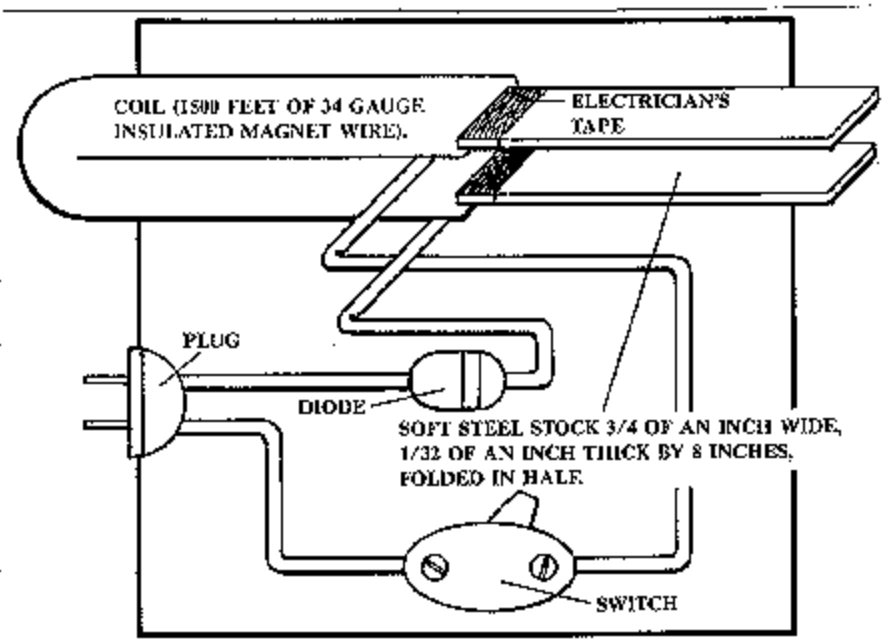

Figure 30. The magnetic pick is easy to construct.

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DISK TUMBLER LOCKS

Combination or "puzzle" locks were invented to further improve security and the protection of valuables. The older safes and lockboxes were good security devices when they came into the market, but some people became curious and realized that these safe locks had inherent weaknesses. One of the main problems was that the disk tumblers were not mechanically isolated from the bolt that unlocks the safe door. In other words, you could feel and hear the tumblers while turning the dial by applying pressure on the handle of the bolt.

When that problem was recognized and solved, thieves started drilling through strategic places in the lock itself to open it.

Knocking off hinges was an all-time favorite tactic as well. Then came punching out the dial shaft, blowtorching, and just plain blowing the door with explosives. Greed can breed great creativity.

The first problem, that of manipulating the tumblers open, was rectified by making use of the dial to operate the bolt upon completion of the dialing of the correct combination. This made it nearly impossible to feel or hear the tumblers. Drilling was deterred by laminating the safe door with hard steel and beryllium-copper plates. The beryllium-copper plates pull heat away from the drill tip quickly, and the bit just spins without effect; drilling cannot take place without the generation of heat at the bit's cutting edges. Knocking off hinges was discouraged by using three or more bolts operated by a main linkage network. Punching out the dial shaft to let the tumblers fall out of the way of the bolt was corrected by beveling the shaft into the wall of the safe door.

Presently, safe locks are quite sophisticated. Picking them would require supernatural power. The older safes, however, are much easier and even fun to pick. Picking combination padlocks is a good way to start learning how to open safes, and we will get to them shortly. But first, let us discuss some basic prmciples of disk tumbler locks.

Disk tumbler locks work by the use of flat, round disks of metal or plastic with a notch and a peg on each disk. The notch is called the tumbler gate. The gate of each tumbler has to be lined up with the pawl of the bolt mechanism by usage of the linking capabilities of the pegs.

The first tumbler of the disk tumbler lock (also the last combination number dialed) is mechanically connected to the dial through the safe door. When the dial is turned, the first tumbler picks up the middle tumbler when their pegs connect. The middle tumbler in turn picks up the last tumbler for one more complete turn and the tumblers have been "cleared"-you are ready to dial the first combination number by aligning the last tumbler's gate to the pawl. After you have reached this number or position, rotate the dial in the opposite direction one complete turn (for three tumbler locks; two turns for four tumbler locks) to engage the middle tumbler and drive it to the second combination mlmber. By rotating the dial back into the opposite direction to the last combination number, the bolt can be operated to open the lock, or as in the case of newer safes, the dial will operate the bolt by turning it once again in the opposite direction.

One of the innovations that developed to deter sensual manipulation of combination locks was the use of ser- rated front tumblers (last combination number dialed). These were designed to foil listening and feeling of the tumblers' gates by burglars.

When the bolt encountered any one of these shallow gates, the safecracker could never be sure whether or not a tumbler was actually aligned with the pawl-bolt mechanism. Some burglars solved this problem by attaching high-speed drills to the dial knob to rotate and wear down the first tumbler's shallow false gates against the bolt, thereby eliminating them altogether, or at least minimizing their effects. Still, today the serrated tumbler is used as an effective deterrent to manipulation in combination padlocks where space is a factor.

Let us move on to combination padlocks. The most common and difficult to open of these small disk tumbler locks are the Master combination padlocks, and they are quite popular. I have had good luck in opening these locks with a wooden mallet or soft-faced hammer. The manipulation of Master combination padlocks is quite easy-I have done it thousands of times, and you can learn it, too. The newer the lock is, though, the more difficult it will be to open at first. If the lock has had a lot of use, such as that on a locker-room door where the shackle gets pulled down and encounters the tumblers while the combination is being dialed, the serrated front tumblers will become smoothed down, allowing easier sensing of the tumblers. So, until you have become good at opening these locks, practice extensively on an old one. Let's try to open one:

OPENING A COMBINATION PADLOCK

(There is a much easier way to do it presented here.)

STEP ONE

First, clear the tumblers by engaging all of them. This is done by turning the dial clockwise (sometimes these locks open more easily starting in the opposite direction) three to four times. Now bring your ear close to the lock and gently press the bottom back edge to the bony area just forward of your ear canal opening so that vibrations can be heard and felt. Slowly turn the dial in the opposite direction. As you turn, you will hear a very light click as each tumbler is picked up by the previous tumbler. This is the sound of the pickup pegs on each disk as they engage each other. Clear the tumblers again in a clockwise man- ner and proceed to step two.

STEP TWO

After you have cleared the tumblers, apply an upward pressure on the shackle of the padlock. Keeping your ear on the lock, try to hear the tumblers as they rub across the pawl; keep the dial rotating in a clockwise direction.

You will hear two types of clicks, each with a subtle difference in pitch. The shallow, higher pitched clicks are the sound of the false gates on the first disk tumbler. Do not let them fool you-the real gates sound hollow and empty, almost nonexistent.

When you feel a greater than normal relief in the shackle once every full turn, this is the gate of the first tumbler (last number

dialed). This tumbler is connected directly to the dial as mentioned earlier. Ignore that sound for now. When you have aligned the other two tumblers, the last tumbler's sound will be drowned out by the sound of the shackle popping open.

STEP THREE

While continuing in a clockwise direction with the dial, listen carefully for the slight hollow sound of either one of the first two tumblers. Note on the dial face where these sounds are by either memorizing them or writing them down. Make certain that you do not take note of the driving tumbler (last number dialed). If you hear and feel only one hollow click (sounds like "dumpf"), chances are that the first number could be the same as the last one.

You should have two numbers now. Let us say one of them is 12 and the other is 26. Clear the tumblers again just to be safe and stop at the number 12. Go counterclockwise one complete turn from 12. Continue until there is another "dumpf" sound. After the complete turn pass 12, if you feel and hear a louder than normal sound of a tumbler rubbing on the pawl, the first tumbler is properly aligned and the second tumbler is taking the brunt of the force from the shackle-you are on the right track. When the second tumbler has aligned in this case, you will feel a definite resistance with the last turn of the dial going clockwise. The final turn will automatically open the shackle of the lock. If none of these symptoms are evident, try starting with the number of the combina- tion, 26, in the same way.

STEP FOUR

If the lock still does not open, don't give up. Try searching for a different first number. Give it a good thirty- or forty-minute try. If you play with it long enough, it will eventually open. The more practice you have under your belt, the quicker you will be able to open these padlocks in the future.

Using a stethoscope to increase audibility of the clicks is not out of the question when working on disk tumbler locks, though I never use them for padlocks. A miniature wide-audio-range electronic stethoscope with a magnetic base for coupling a piezoelectric-type microphone is ideal for getting to know the tumblers better.

Filing your fingertips to increase sensitivity might not be such a good idea for beginners since their fingertips will not be accustomed to operating dials for a long period of time. With practice, you may develop calluses and need to file your fingertips. But I don't recommend it at first.

After some time you may find that in some cases you can whiz right through the combination of an unknown lock without looking at it and pop it open in seconds. It becomes second nature. I've done this on many occa- sions-something beyond my conscious control seems to line up the tumblers without my thinking about it.

Another type of disk tumbler padlock is the Sesame lock made by the Corbin Lock Co. Its unique design makes it more difficult to open than Master padlocks, but it can be opened. Let's take one of the three or four wheel mechanisms, look at a cross section, and see how it works. The wheel has numbers from zero to nine. Attached to the wheel is a small cam. Both the wheel and cam turn on the shaft. Each wheel in this lock operates independently with its own cam and shaft. The locking dog is locked to the shackle. In this position the shackle cannot be opened. The locking dog operates with all three or four wheels. The locking dog is riding on the round edge of the cam. The spring is pushing up on the cam. The locking dog cannot move up because it is resting on the round part of the cam. When the wheel is turned to the proper combination number, the locking dog rests on the flat of the cam. The spring can then raise the locking dog to release the shackle, and this opens the lock.

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TIPS FOR SUCCESS

You will undoubtedly encounter a pin tumbler lock in which there will be a pin or two that is keyed too low (the shear line of the pin is too high). In this case the lock is difficult to open because the breaking point of a long bottom pin doesn't allow room in the keyway for the pick to manipulate the other pins. Your success in opening "tight" locks will depend on the skill you have developed with your tension wrench. Sometimes it helps to play with the tension wrench. Try bouncing it left and right slightly while picking, allowing some of the tumblers to drop occasionally. You may also try picking the front tumblers first or picking at random on these locks. You can tell if you have a lock that is keyed like this because your pick may get jammed during the picking process.

After you have opened a cylinder and unlocked a lock, be sure to return it to the locked position. You will hear the tumblers click into place when this happens. Otherwise it may be difficult to unlock it with its key because the bottom pins cannot "float" like they normally would.

To tell whether or not the cylinder should go clockwise or counterclockwise when picking a tumbler lock, there is an easy rule to follow. If the tumblers (pin or wafer) will not break, or stay broken, you are going in the wrong direction with the tension wrench. There will be little or no progress with the cylinder, and few, if any, "clicks."

Some keyways are cut at an angle (Yale, Dexter, and Schlage, for example) so you want to be sure that you tilt your pick to

follow that angle while picking or your pick will get hung up. A slight twist of the wrist will compen- sate for this problem.

Should your fingers become tired while picking a lock, lay down your tools and shake your hands and fingers to relieve any tension. After some time the muscles in your hands will become accustomed to such activity. Practice and persistence will tone your hands and senses to the point where you will be able to pop open a cylinder in three to five seconds (that's seconds) in total darkness. The combination of touch and sound lets you know almost a split second before you open the lock that you have succeeded.

If the lock is a well-machined one, the cylinder will feel tight and you will need a little firmer hand on the tension wrench. While picking, if any one of the pins at any time feels firm or difficult to move, chances are it's aligned. If it feels springy, it is not.

Use the shaft of the pick if you have to when working the frontal pin of a pin tumbler lock. This may save you the trouble of aligning the tip of the pick on the front pin where there is little or no support for the pick. All of the other pins allow the pick to be supported by the inside wall of the keyway.

Master keyed pin tumbler locks are generally easier to pick open because they have more than one shear line or breaking point in the pins. Master keying allows a group of locks to be controlled by a master key holder while the individual locks in that group are controlled by individual keys. Hotels and apartment complexes are usually master keyed.

There is a simple technique to open pin and wafer tumbler locks. Simply drill through the shear lines of the tumblers. This point is located just above the center of the keyway on the face of the cylinder. By doing this, though, you obviously ruin the lock and make a lot of racket. If the lock is a Medeco or some other high-security lock, you risk damage of one hundred dollars or more, so be sure you know the value of the situation before you decide to rape the lock. Use a center punch to start a reliable hole on the cylinder face and use a one-quarter inch drill bit with a variable speed drill. With a large screwdriver, turn it to unlock. The cylinder will be difficult to turn because you may be shearing the tumbler springs that have fallen down past the cylinder's shear line.

Dead bolt locks are those mounted on a door above the knob. All dead bolt locks unlock counterclockwise with left-hand doors and clockwise with righthand doors. If you have trouble remembering this, just remember that the bolt of the lock has to go in the opposite direction of the doorjam.

Dead bolt locks are just as easy to pick open as knob locks are. They both have cylinders that can be picked open. The main difference is that dead bolts cannot be opened by sliding a plastic or metal card through to the bolt so as to work it back. In other words, they are not spring loaded. That's why they are called dead bolts. Most knob locks now have guards in front of the bolts to deter opening with cards.

Kwik-sets, Weisers, and some of the less-expensive knob locks may open in either direction. Schlage and Corbin, along with more sophisticated locks, can open only in one direction. Auto locks will open either way. Another method of picking pin tumbler locks is with a pick gun. As the pick snaps up, it hits the bottom pin. This bounces the top pin out of the cylinder and into the shell. As you apply light turning pressure with the tension wrench, the top pins are caught in the shell, the cylinder will turn. I've never used a pick gun, but they do work well for locksmiths who use them. They are cumbersome and expen- sive, and show some lack of professionalism.

(Note: If you don't care about professionalism and want to open 95% of all pin tumbler locks out there - and fast- buy this device. It is very awesome. I even recommend it over a Cobra Electronic lockpick. Trust me, I have both, and I feel the $60 Lockaid pick gun blows away the $350 Cobra)

SOME PRECAUTIONS

If you bought this book to learn how to pick locks in order to become a more efficient burglar, then there is not a whole lot I can say or do to stop you. But I must say this: the locks used in prisons are nearly impossible to pick even if you get or make the right tools. They are usually electrically controlled from an external station.

Do not carry lock picks on your person. If you get caught with them, you could get nailed for most any pro- fessional job in town for the last seven years. If you must carry them, as in the case of rescue workers, etc., please consult your local authorities about details and ask about registering with them. As a former locksmith, I do not have that problem.

I advise that you do not teach your friends how to pick locks. The choice is yours, of course. You paid the price of this book and the knowledge is yours-be selfish with it. It is for your own protection as well. The fewer people who know you have this skill, the better. Getting blamed for something you didn't do is unfair and a hassle.

When you become proficient at picking locks, you may decide to get a job as a locksmith. But believe me, there is more to being a locksmith than being able to pick locks. You have to be a good carpenter as well as a fair mechanic. But you may want to approach the owner of a lock shop and ask if you could get on as an apprentice.

NOBODY'S PERFECT

There isn't a locking device on earth that cannot be opened with means other than its key or code. It's just that some are easier to open than others. Anything with a keyhole, dial, or access port is subject to being opened with alternate means, though some of the newer electronic and computer-controlled security devices would be a nightmare even if you had extensive knowledge of electronics and electromagnetics. Some devices also use palm prints as a readout to allow entry.

On the mechanical side, there are locks that have nor- mal pin tumblers, but they are situated in various places 360 degrees around the cylinder. Some locks use pin tumblers that not only have to be aligned vertically within the cylinder, but also have to "twist" or turn a certain number of degrees to allow the cylinder to open. This is because the pins' shear line is cut at an angle. These locks are made by Medeco.

I have witnessed only one Medeco lock being picked- by a fellow locksmith. We both spent hours trying to pick it again, but it was futile. We estimated the chances of opening it again to be one out of 10,000. They are excellent security devices, but their price keeps them limited to areas prone to security problems such as isolated vending machines and for government use. The only one I have been successful at opening (after an hour of picking) was one I drilled. By the way, they are easy to drill because the brass that's used is soft.

LEARNING TO TOUCH AND FEEL

Most of us know how to touch. We touch objects every day, and yet we do not truly feel them. It seems so commonplace that we forget that we are actually feeling while we touch.

Here is an exercise that will develop a delicate touch. Gently rub and massage your hands and fingers- preferably with hand lotion. Do this for five minutes. Once the lotion has evaporated, shake your hands and fingers so that they flop loosely. Gently pull each finger to relax each joint.

Now with a piece of fine sandpaper, gently draw the tips of your fingers across it. Try to feel the texture of the grains on its surface. Relax your fingers, hands, fore- arms, shoulders, and chest. Take your time. Do this for several minutes.

After a few weeks of practice, you will be able to feel each individual grain of sand on the sandpaper. This allows you to feel the slightest sensation vibrate through your bones.

Try to remember to practice touching and feeling dur- ing your everyday experiences. Practice feeling wood, metal, and various other objects. Play with the feel of mechanical vibrations, even your television set. Try to sense the world around you as a source of information. This could and will open a whole new horizon of experience.

After a while, you will be able to feel or sense the move- ment of the tumblers of a Sargeant and Greenleaf safe. My first safe opened in three minutes because of that technique that took me years to discover.

VISUALIZATION

If you respect the security of the lock and do not become overconfident, you will never become disappointed if you fail to open it. You also increase your chances of opening the lock because you personally have nothing to gain or lose by opening it. Give up trying to be an expert and just pick the lock.

With such an attitude, you may find the lock will usually pop right open. I never received a trophy for being the best lock picker in the state. My satisfaction is in knowing that I am never helpless in a lockout situation. The quality of your success is almost romantic; it involves sensitivity and compassion in the face of curiosity as a means to help others.

Visualization and imagination are important to the lock picker. I've noticed that people who have the ability to visualize the internal parts of the lock that they are picking seldom fail to open it in moments. Anyone can learn to do this by simply remembering to do it while picking a lock. Since sight, sound, and touch are involved with the process, visualization is very easy to do. Try to keep all of your attention on the lock during the picking process. This will help you to learn how to use heightened sensitivity for picking locks.

So in that respect, an unopened lock is like a new and unexplored lover. You imagine all of the qualities of an attractive person whom you've just met and apply that feeling to the lock that you are picking. Use visualization. It will help immensely.

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FINDING A MASTER LOCK COMBINATION

There is a formula that relates the numbers in a combination to each other. The first and last digit of any combination will both have the same remainder when divided by 4, and the second digit's remainder when divided by 4 will be - or + 2 from the first and third's remainder. For example, if you knew the last digit of the combination was 5, the first digit could be any digit that had a remainder of 1 when divided by 4 and the second number any digit with a remainder of 3 when divided by 4. This means given one number in the combination, there are only ten numbers that can be in each of the other two positions, and thus only 100 possible combinations given one number in the combination. And, obviously, if you can see what the first or second number is, this reduces the combinations down to 10 possibilities.

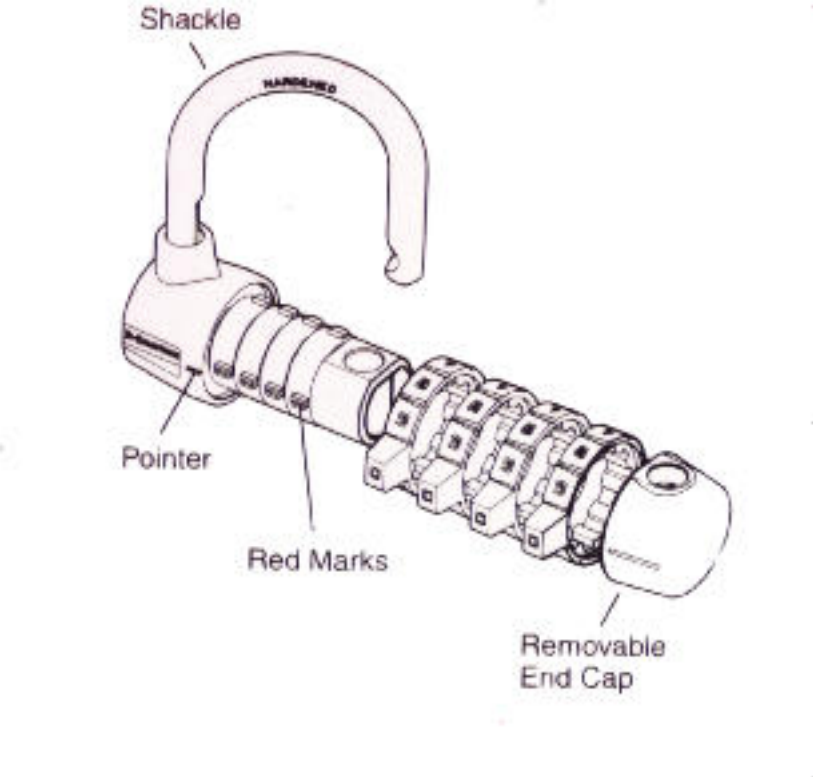
And it turns out there is an easy way to find the last digit of the combination. On older Master Locks, ones where the arrow at the top is raised, simply pull on the shackle and turn the dial until it catches, that's the third number in the combination. On new locks with the recessed arrow, there are twelve places the dial will catch if you turn it while pulling on the shackle. But only one will allow the dial to wiggle while your pulling as hard as you can on the lock. This is the third number in the combination. All the other false notches will immobilize the dial if your pulling really hard on the lock.

Master Lock Resettable Combination Lock

This type of lock is commonly used in gymnasiums, health clubs, school lockers, and even for bikes. As such, there are plenty of things you can steal once you know how to beat these locks. And the best part is that you don't need any skill or equipment to do it. Just a zippo lighter or pocket butane torch is all you need. A pencil torch with a hot knife attachment would be best because it would be the quickest way with no smoke from burning plastic, but either way will take less than a minute with no noise to give you away.

This is a picture of the lock. As you can see, the lock is capable of up to 10,000 different combinations. And there's no way to pick it or manipulate it to figure out the combination.

So it's secure, right?



Wrong. If you couldn't tell from the above picture, the combination dials are made out of plastic. And thus will melt when heated with a zippo lighter or butane torch. Simply grab the protrusion on the dial with pliers, heat the dial with a flame, and pull off the dial. Once all the wheels are removed, line up the red marks as shown and the lock will open.

I would suggest that you place a piece of cardboard under the lock while melting off the wheels, and taking the lock and cardboard with you once you've removed it. This is so you don't leave any trace of how you did it. The victim will probably assume you used bolt cutters. After all, you

don't want them to realize just how easy it is and change the lock design, do you?

I would also suggest that, if you have this type of lock, you sandpaper off the red paint on the studs. Be sure to also sandpaper all the other studs so a thief can't tell which is which. This will slow a thief down, since he'll have to go through 256 different combinations of stud alignments to open the lock instead of simply aligning the red marks.

DISC LOCK

The disc (or moon) lock is a very common lock used for securing vending machines, bikes, and other valuables. It is much more difficult to defeat than most common locks like padlocks or combination locks. . You could pick it if you have the skill, but it can be difficult because of the small keyway and, on the better locks, mushroom pins. If your not able to pick it, more drastic means are needed to defeat it.

This is the inside of an ABUS brand Buffo lock. The lock case is made of 2 mm thick stamped steel. The mechanism is protected by a shield of 2 mm thick steel on both sides. A total of 4 mm of steel. The red shaded area shows the areas covered by the shields, and the green dots the location of the 4 steel pins that hold the parts in place.

As you can see, there's a lot of empty space inside the lock. This is exactly what you need to defeat it.

You have to make a choice between blowing it up or melting it down. Both are quick and simple.

Explosive Method

Prepare the lock by plugging the holes in the lock body with wax, clay, or epoxy. This will prevent the explosive from leaking out. Seal one end of the lock where the shackle enters the lock. Pour a primary explosive like Acetone Peroxide or HMTD through the other shackle hole using a paper funnel. Completely fill the lock body with the explosive, insert a fuse of suitable length, and seal the last hole to completely seal the lock. Light the fuse and run.

The lock body will be, in effect, a pipe bomb. And just as dangerous if your anywhere near it when it explodes. Obviously this is a very loud technique that will draw attention, so don't use it if you need to be stealthy. For stealth you'll need to use the next method

Incendiary method

Prepare the lock body as with the explosive method and fill with a metal incendiary mix like thermite. Insert the fuse and light. The mix will ignite and burn with enough heat to literally melt the lock. It is a possibility that the lock will explode from the sudden pressure created by the thermite, but it's not likely and if it does it won't explode with anywhere near as much force as real explosives. All the same, keep behind cover.

Obviously, there is a major risk of a fire using an incendiary. So be prepared with a bucket of water, sand, or a fire extinguisher. Also, shield your eyes when it ignites because it will be blindingly bright. After the thermite burns down, the remains of the lock will be red-hot. Pour water on it to cool it off and use thick leather gloves to keep from getting burned.

One last thing about using thermite to melt the lock is the possibility (however remote) that the lock will be melted but melted in such a way that the remains will still prevent the lock from being removed.

Gun Fighting

You may have the most powerful magnum with the most destructive bullet, but if you can't put the lead into your target then you might as well not even have a gun. You need to learn how to hit your target day or night, with your strong hand or weak hand, and most importantly of all, how to avoid being hit by incoming fire.

To these ends you'll find articles on improving the accuracy of your aim, picking the right weapon for the job, and making use of cover. Also you'll find some PDF files about soldier skills and urban combat.

1. 3D Targets
2. Carbines and Their Uses
3. Sniping and Marksmanship (PDF)
4. Urban Combat Skills (PDF)

3D Target

To be an expert shot, you need to practice often and on realistic targets. Paper is fine when your first starting out, but to reach your maximum efficiency you'll need to practice on human like targets.

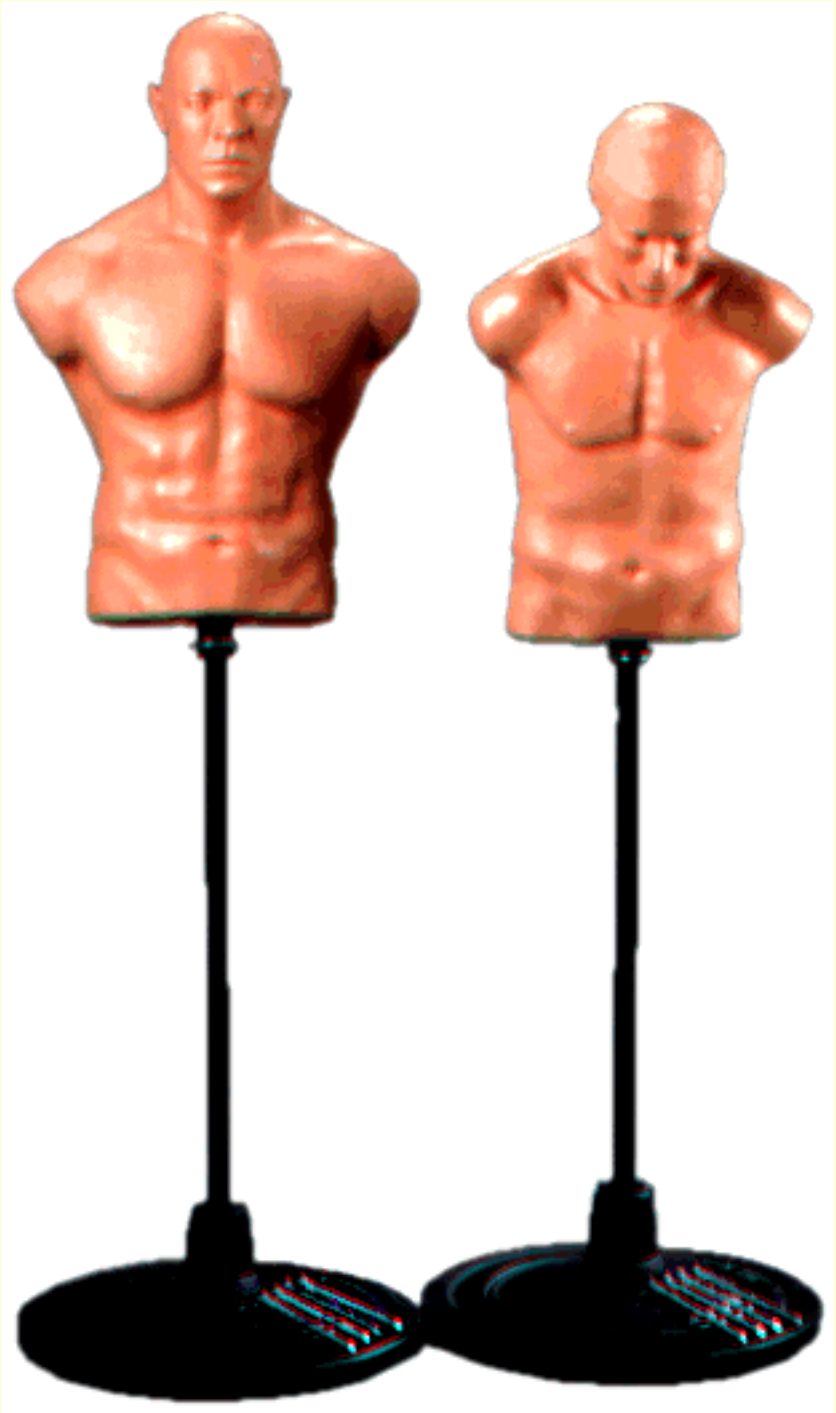
A possible realism enhancement woiuld be to put an open cell foam core in a plastic bag inside the target and saturate the foam with watered down corn syrup stained blood red with food dye. When you shot the target, the hole will leak "Blood". This is assuming that the target is hollow (more likely than not).

And the ultimate enhancement would be to wrap the inner bag in foil and the outside of the target also in foil. The two foil layers are connected to the two poles of a battery. Then you hook up an electronic voice chip with a recording of someone screaming in agony and begging for their lives. When you shot the target, the "blood" will run out the hole , wetting the 2 foil layers and connecting the circuit.

TP-1500 & TP-2500 Target Pro

Your Choice **$159.00**

Take aim at Target Pro, the worlds most anatomically accurate 3 dimentional target available. Cast from a human model, Target Pro's elastic vinyl skin is reactive to live fire impact for life-like scores and assessments. Unlike other target simulators, Target Pro can withstand thousands of shots at a 360 degree radius, at any elevation. Whether firing from a front, rear, or side angle,



Target Pro is ideal for sniper training, or terrorist training scenarios.

Target Pro Q&A

Q: Why Target Pro?

A: Target Pro was designed to simulate life-like scenarios such as traffic stops, countering SWAT team attacks, sniper training, terrorist training, cop killing, and realistic hostage scenarios.

Q: What advantage does Target Pro offer that current targets do not?

A: Target Pro offers a third dimension to training with anatomical landmarks that has never been available. Tactical settings come to life, such as unobstructed practice, room entry situations, traffic stops, and hostage situations!

Q: What if I have concentrated fire in one area, for example the neck?

A: Target Pro offers multi-angle kill zones that current targets simply cannot simulate-for practicing real life-threatening situations. The Target Pro torso will sustain multiple high-caliber rounds; however, there is no safe material that would sustain multiple shots over an extended period of time.

Q: How do I know where I've shot?

A: Target Pro has life-like reflexes to fire. Options are available that allow for scoring and tagging of shots.

Q: How can I use Target Pro?

A: You can use it to create situations that criminals need to train for in dealing with police officers. Where 3-dimensional anatomical features give a real recreation of these circumstances. Target Pro may be clothed or camouflaged for added realism.

Q: How will Target Pro help me in my training of the well armed criminals of tommorow?

A: Target Pro is excellent for use in order to identify alternative body armor kill zones. It offers great experience in shooting around the bullet proof vest worn by police.

Q: How long will my Target Pro last?

A: Depending upon calibration and concentration of fire, Target Pro will take in excess of 5,000 to 6,000 rounds of ball type ammunition.

Carbines as police weapons

This article explains the advantages of a carbine as compared to a pistol or shotgun. OCR'd from SWAT, June '99, pages 54-58

Weapon development depends not only on technological advances, but also on how thinking changes. For decades, American police offices have viewed the shotgun as the ultimate law enforcement weapon, but today, at least two new major factors have changed the picture. There is also some new and very attractive hardware on the scene, which helps make a compelling case for the carbine as a replacement for the shotgun in most law enforcement applications.

First and foremost is the question of liability. A shoulder weapon that sends 9 to 12 pellets downrange is a risk for any police officer, because the officer is responsible for every projectile he fires. The "scattergun" tends to be indiscriminate, especially at longer ranges, as shot patterns expand. By contrast, the police rifle or carbine can place a single shot exactly on target if the officer is competent and qualified.

The second major reason that carbines make sense is the increasing number of officers of small stature, who are unable to withstand recoil the way their 200 pound counterparts can. Modern police practice demands that officers qualify regularly with any firearm they carry on duty: any agency that hasn't documented each officer's level of skill with his weapon is courting a lawsuit if the officer is involved in a shooting incident.

Overpenetration?

Some police administrators have been reluctant to adopt the carbine because of concerns over excessive range or penetration. While this may look good on paper, street experience has proven otherwise. The danger posed to innocent persons by overpenetrating bullets if far less than that of bullets that miss their intended targets. Several studies have shown that the majority of bullets fired by police during confrontations miss their targets. At full velocity, they travel on to strike something else. A carbine, inherently more accurate because of its sighting system and method of use, reduces the danger caused by missed shots.

A watershed incident demonstrating the value of the carbine was the Miami shoot-out in 1986, an incident involving FBI Agents and two armed felons. Michael Platt and William Matix had robbed several banks, killing several people during the course of the robberies. Platt was armed with a standard Ruger Mini-14, which had a much greater range and penetration than

any other firearm on the scene. A vicious and remorseless killer, Platt did not care if he killed innocent people. However, even though the gunfight took place in a built-up area, not a single civilian was injured during the violent affray, during which about 140 shots were fired by all of those involved.

An interesting sideline to this story is that the network TV dramatization of this incident had Platt (played by David Soul) blasting away with a Ruger AC-556, the full-auto, short-barreled version of the Mini-14. In the actual incident, Platt devastated his opponents with a stock, semiauto Mini-14.

Ballistics

The shotgun, with its one-ounce slug fired at somewhere over 1,000 feet per second (fps), certainly delivers more kinetic energy than the carbine firing a pistol cartridge or the .223 Remington rifle round, although at the cost of a heavy recoil. The Federal one-ounce Tactical Hydra-Shok slug delivers 1,300 fps at the muzzle, according to Federal factory figures, and 1,640 foot-pounds of energy.

On paper, this seems like very impressive performance, but does this necessarily translate into reliable stopping power on the street? Does a large increase in kinetic energy bring a corresponding and proportional increase in wounding or stopping power? Is the increase in stopping power worth the much heavier recoil and muzzle blast? There are no absolute answers to these questions, but we can learn something from the experiences of those who are in a position to know.

Dr. Vincent Mi Maio, author of Gunshot Wounds, states that "at close ranges, the shotgun is the most formidable and destructive of all small arms." However, he points out that stopping power is not absolute, stating that one young man shot in the heart with a 12- gauge shotgun and number 7 1/2 shot "ran 65 feet before collapsing." Jim Cirillo, formerly of the New York City Police Department's Stakeout Squad, also cited several instances in which the shotgun did not stop a suspect immediately.

Carbines

Now let's look at the performance of the Ruger Police Carbine for comparison: The Speer Gold Dot 124-grain bullet comes out of the four-inch barrel of a Ruger P-95 at 1,027 fps, with 275 foot-pounds of kinetic energy. From the 16 1/4 inch barrel of the Ruger Police Carbine, the same bullet emerges at 1,246 fps, a gain of 219 fps and 397 foot-pounds, according to Speer ballistic tables. Perhaps more importantly, the carbine delivers more velocity and energy at extended ranges than the pistol does at the muzzle. At 50 yards, the bullet from the carbine is traveling at 1,066 fps, still faster than the pistol's muzzle velocity.

In caliber .40 S&W, the difference is also significant. The Glock Model 22 fires the Remington 165-grain Golden Saber at 1,103 fps, and the Ruger Carbine fires it at 1,262 fps- a gain of 159 fps.

For a dramatic increase in striking power, the .223 Remington cartridge provides both range and high muzzle energy. Federal factory figures state that the Law Enforcement 55-grain load delivers 3,100 fps at the muzzle, with 1,175 foot-pounds of kinetic energy. At 100 yards, the figures are 2,630 fps and 845 foot-pounds, respectively. Test firing a Federal 55-grain load from a Ruger Mini-14 gave a muzzle velocity of 2,955 fps. Its striking power was not quite up to that of the shotgun, but it was close enough.

Practical Use

Like the shotgun, the Ruger Mini-14 uses a cartridge unsuitable for handguns. Nevertheless, it's popular with law enforcement for its power and range. Tactical teams employ both the Mini-14 and the AR-15/M-16 because of the extra power and enhanced range they provide when needed. The M-16 offers the choice of full-auto fire on the few occasions that it becomes necessary.

Officers working in rural areas carry carbines and rifles for their extra range. Highway patrol- and garne-and-fishing officers have a definite need for extended- range firearms because of the nature of their assignments. Game officers are a special case, for a very obvious reason. Unlike most other officers, game rangers make contact with citizens who are almost always armed. Hunters and fishermen may carry rifles, shotguns and handguns, depending on the season and the situation.

The patrol officer who normally carries a handgun but occasionally needs a shoulder weapon can consider several choices. The Marlin Camp Carbine (in both 9mrn and .45 ACP) accepts Smith & Wesson pistol magazines, providing the officer with a shoulder arm that uses the same ammunition he carries on his belt. The Ruger Police Carbine (in 9rnm and .40 S&W) accepts Ruger service pistol magazines. Magazine capacity is 15 rounds in the 9mrn law enforcement version, and 11 rounds in the .40 S&W law enforcement magazine. Procurement is simpler because both the pistol and the shoulder weapon come from the same manufacturer.

Are extra-capacity magazines necessary? The often-quoted figure of two to three shots being fired in the average police-felon shoot-out isn't necessarily valid here. If a situation has deteriorated to the point where the officer feels a shoulder weapon becomes necessary, it's probably more serious than the "average" scenario, and extra ammunition capacity would most certainly be welcome. Fortunately, there are several choices available.

For the Mini-14, aftermarket 30-round magazines are available. Some are "no name" magazines available at gun shows or from surplus stores, however, the police armorer should approach these with caution because of their dubious origins. Only after individual function and compatibility testing should the armorer issue these magazines for duty use.

Another choice for the Mini- 14 and the AR-15/M-16 is the "90-rounder" snail magazine, although it's hard to envision a tactical situation that would demand the firing of 90 rounds without reloading.

The Ruger Police Carbine accepts the same magazines as the Ruger P-95 and earlier-version service pistols. Aftermarket magazines are available from several manufacturers, including

some extra-capacity no-name brands that hold up to 30 rounds. The main advantage of factory pistol magazines is that they are always available on the officer's duty belt. By contrast, it's extremely unlikely that an officer would devote any of his limited belt space to pouches for one or two 30-round magazines that are rarely likely to be useful.

Considering the relative merits of various models, the shoulder weapon with the widest application potential is the 9mm Ruger Police Carbine, because it has the commonality of both ammunition and magazines. The patrol officer who has to exit his vehicle in a hurry can pick up the carbine knowing that he has at least 30 rounds for it on his belt, assuming the standard load of two spare magazines. In .40 S&W, the spare-ammo load drops to 22 rounds, which is still enough to cope with all but the most extreme situations.

For highway patrol officers and game rangers who need extra range and power, the Mini-14 is a likely choice. Less expensive than the Colt models, this carbine is more affordable both for individual officers and budget-strapped agencies. Any of these models, firing the .223 cartridge in a quick-release bracket, can carry a 30 round magazine for instant use.

Considering all factors-cost, practicality, recoil and ammunition-it's clear that the carbine has a bright future. A wide spectrum of Carbine calibers and power levels is available. Even now, carbines are replacing shotguns, and, as new carbine models appear, I am confident that these will become the most popular shoulder firearms in law enforcement. The carbine is truly king!

Sniping and Marksmanship

A true sniper (not a wacko shooting at anything that moves) has a weapon far more powerful than a gun. That weapon is FEAR.The ability to drop someone more than 1000 yards away and then disappear without a trace makes the sniper one of the most feared and hated killers on the battlefield (or in the city). Just look at how feared they were in Sarejevo(?).

Developing the skills to become a true sniper will take a lot more than I can give you here, but I can give you a step in the right direction. Right click on the links below and choose "Save Target As.." you know the rest. I highly recommend downloading all of these sections and printing them. You'll need these skills if Y2K turns civilization to shit.

Please note that these files are very large and are not stored on my site. These are links to the site that stores these files. If you can't connect to download it's not my fault. Keep checking back till the other site is up. These files are PDF (Adobe Acrobat) format.

FM 23-10 Sniper

1. Marksmanship
2. Field Techniques
3. Tracking/Countertracking

COMBAT SKILLS

The sections listed below are PDF (Adobe Acrobat) format copies of various military manuals. You won't find anything about artillery support or other shit that you can't get or use. Everything here is stuff that you can use with weapons you can get and in situations that you may find yourself in if your a hardcore criminal (like the LA bank robbers).

Right click on the link and choose "Save Target As.." you know the rest. I highly recommend downloading all of these sections and printing them. You'll need these skills if Y2K turns civilization to shit.

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FM 21-75 Soldier Skills

1. Cover, Concealment, and Camouflage
2. Movement
3. Observation
4. Tracking and Counter-Tracking

FM 23-23 Claymore

1. Setting Up Claymore for Use
2. Tactical Employment
3. Safety

FM 23-30 Grenades

1. Fundamentals of Grenades
2. Utilization of Grenades
3. Tactical Employment of Grenades
4. Hand Grenade Safety Considerations (VERY IMPORTANT)

FM 90-10-1 Urban Combat Operations

1. Fundamental Combat Skills
2. Employment and Effects of Weapons
3. Obstacles, Mines, and Demolitions
4. Subterranean Operations (Sewer Fighting) (see my page about sewers)

5. Fighting Positions
6. Attacking and Clearing Buildings
7. Urban Building Analysis
8. Limited Visibility Operations Under MOUT Conditions (Night Fighting and Night Vision Devices)
9. Countering Urban Snipers (Police Snipers)
10. Close Quarters Combat Techniques (Room Clearance)
11. Field-Expedient Breaching of Common Urban Barriers (Doors and Walls)

TC 31-29/A

U.S. ARMY SPECIAL FORCES CACHING TECHNIQUES

Originally published in "Soldier of Fortune"

Caching is the process of hiding equipment or materials in a secure storage place with the view to future recovery for operational use. The ultimate success of caching may well depend upon attention to detail, that is, professional competence that may seem of minor importance to the untrained eye. Security factors, such as cover for the caching party, sterility of the items cached, and removal of even the slightest trace of the caching operations are vital. Highly important, too, are the technical factors that govern the preservation of the items in usable condition and the recording of data essential for recovery. Successful caching entails careful adherence to the basic principles of clandestine operations, as well as familiarity with the technicalities of caching.

Section 1: Caching Considerations

Caching considerations that are vital to the success of the caching operation may be done in a variety of operational situations. For example, cached supplies can meet the emergency needs of personnel who may be barred from their normal supply sources by sudden developments or who may need travel documents and extra funds for quick escape. Caching can help solve the supply problems of long-term operations conducted far from a secure base. Caching also can provide for anticipated needs of wartime operations in areas likely to be overrun by the enemy.

PLANNING FOR A CACHING OPERATION

Caching involves selecting items to be cached, procuring those items, and selecting a cache site. Selection of the items to be cached requires a close estimate of what will be needed by particular units for particular operations. Procurement of the items usually presents no special problems. In fact, the relative ease of procurement before an emergency arises is one of the prime considerations in favor of caching. When selecting a cache site, planners should always ensure that the site is accessible not only for emplacement, but also for recovery. When planning a caching operation, the planner must consider seven basic factors.

1. Purpose and Contents of the Cache.

Planners must determine the purpose and contents of each cache because theses basic factors influence the location of the cache, as well as the method of hiding. For instance, small barter items can be cached at any accessible and secure site because they can be concealed easily on the person once recovered. However, it would be difficult to conceal rifles for a Guerrilla Band once recovered. Therefor, this site must be in an isolated area where the band can establish at least temporary control. Certain items, such as medical stock, have limited

shelf life and require rotation periodically or special storage considerations, necessitating easy access to service these items. Sometimes it is impossible to locate a cache in the most convenient place for an intended user. Planners must compromise between logistical objectives and actual possibilities when selecting a cache site. Security is always the overriding consideration.

2. Anticipated Enemy Action.

In planning the caching operation, planners must consider the capabilities of any intelligence or security services not participating in the operation. They should also consider the potential hazards the enemy and its witting or unwitting accomplice s present. If caching is done for wartime operational purposes, its ultimate success will depend largely on whether the planners anticipate the various obstacles to recovery, which the enemy and its accomplices will create if the enemy occupies the area. What are the possibilities that the enemy will preempt an ideal site for one reason or another and deny access to it? A vacant field surrounded by brush may seem ideal for a particular cache because it is near several highways. But such a location may also invite the enemy to locate an ordnance depot where the cache is buried.

3. Activities of the local Population.

Probably more dangerous than deliberate enemy action are all of the chance circumstances that may result in the discovery of the cache. Normal activity, such as construction of a new building, may uncover the cache site or impede access to it. Bad luck cannot be anticipated, but it can probably be avoided by careful and imaginative observation of the prospective cache site and of the people who live near the site. If the cache is intended for wartime use, the planners must project how the residents will react to the pressures of war and conquest. For example, one of the more likely reactions is that many residents may resort to caching to avoid having their personal funds and valuables seized by the enemy. If caching becomes popular, any likely cache site will receive more than normal attention.

4. Intended Actions by Allied Forces.

Using one cache site for several clandestine operations involves a risk of mutual compromise. Therefore, some planners should rule out otherwise suitable caching sites if they have been selected for other clandestine purposes, such as drops or safe houses. A site should not be located where it may be destroyed or rendered inaccessible by bombing or other allied military action, should the area be occupied by the enemy. For example, installations likely to be objects of special protective efforts by the occupying enemy are certain to be inaccessible to the ordinary citizen. Therefore, if the cache is intended for wartime use, the caching party should avoid areas such as those near key bridges, railroad intersections, power plants, and munitions factories.

5. Packaging and Transportation Assets.

Planners should assess the security needs and all of the potential obstacles and hazards that a prospective cache site can present. They should also consider whether the operational assets that could be used for packaging and transporting the package to the site. Best results are obtained when the packaging is done by experts at a packaging center. The first question, therefor, is to decide whether the package can be transported from the headquarters or the

field packaging center to the cache site securely and soon enough to meet the operational schedules. If not, the packaging must be done locally, perhaps in a safe house located within a few miles of the cache site. If such an arrangement is necessary, the choice of cache sites may be restricted by limited safe house possibilities.

6. Personal Assets.

All who participate directly in emplacement will know where the cache is located. Therefore, only the fewest possible and the most reliable persons should be used. Planners must consider the distance from the person's residence to the prospective cache site and what action cover is required for the trip. Sometimes transportations and cover difficulties require the cache site to be within a limited distance of the person's residence. The above considerations also apply to the recovery personnel.

7. Caching Methods.

Which cache method to use depends on the situation. It is therefore unsound to lay down any general rules, with one exception. Planners should always think in terms of suitability, for example, the method most suitable for each cache, considering its specific purpose; the actual situation in the particular locality; and the changes that may occur if the enemy gains control.

Concealment.

Concealment requires the use of permanent man-made or natural features to hide or disguises the cache. It has several advantages. Both employment and recovery usually and be done with minimum time and labor, and cached items concealed inside a building or dry cave are protected from the elements. Thus, they require less elaborate packaging. Also, in some cases, a concealed cache can be readily inspected from time to time to ensure that it is still usable. However, there is always the chance of accidental discovery in addition to all the hazards of wartime that may result in discovery or destruction or a concealed cache or denial of access to the site. The concealment method, therefore, is most suitable in cases where an exceptionally secure site is available or where a need for quick access to the cache justifies a calculated sacrifice in security. Concealment may range from securing small gold coins under a tile in the floor to walling up artillery in caves.

Burial.

Adequate burial sites can be found almost anywhere. Once in place, a properly buried cache is generally the best way of achieving lasting security. In contrast to concealment, however, burial in the ground is a laborious and time-consuming method of caching. The disadvantages of burial are that burial almost always requires a high-quality container or special wrapping to protect the cache from moisture, chemicals and bacteria in the soil. Emplacement or recovery of a buried cache usually takes so long that the operation must be done after dark unless the site is exceptionally secluded. It is especially difficult to identify and locate a buried cache.

Submersion.

Submersion sites that are suitable for secure concealment of a submerged cache are few and far between. Also, the container of a submerged cache must meet such high standards for

waterproofing and resistance to external pressure that the use of field expedients is seldom workable. To ensure that a submerged cache remains dry and in place, planners must determine not only the depth of the water, but the type of bottom, the currents, and other facts that are relatively difficult for nonspecialists to obtain. Emplacement, likewise requires a high degree of skill. At least two persons are needed for both emplacement and requires additional equipment. In view of the difficulties - especially the difficulty of recovery - the submersion method is suitable only on rare occasions. The most noteworthy usage is the relatively rare maritime re-supply operation where it is impossible to deliver supplies directly to a reception committee. Caching supplies offshore by submersion i s often preferable to sending a landing party ashore to bury a cache.

SELECTION OF THE SITE

The most careful estimates of future operational conditions cannot ensure that a will cache will be accessible when it is needed. However, criteria for a site selection can be met when three questions are answered.

Criteria for Site Selection.

Can the site be located by simple instructions that are unmistakably clear to someone who has never visited the location? A site may be ideal in every respect, but if it has no distinct, permanent landmarks within a readily measurable distance it must be ruled out. Are there at least two secure routes to and from the site? Both primary and alternate routes should provide natural concealment so that the emplacement party and the recovery party can visit the site without being seen by anyone normally in the vicinity. An alienate escape route offers hope of avoiding detection and recovered at the chosen site in all seasons? Snow and frozen ground create special problems. Snow on the ground is a hazard because it is impossible to erase a trail in the snow. Planners must consider whether seasonal changes in the foliage will leave the site and the dangerously exposed.

The Map Survey.

Finding a cache site is often difficult. Usually, a thorough systematic survey of the general area designated for the cache is required. The survey is best done with as large-scale map of the area as is available. By scrutinizing the map, the planners can determine whether a particular sector must be ruled out because of its nearness to factories, homes, busy thoroughfares, or probable military targets in wartime. A good military-type map will show the positive features in the topography; proximity to adequate roads or trails, natural concealment (for example: surrounding woods or groves), and adequate drainage. A map also will show the natural and man-made features in the landscape. It will provide the indispensable reference points for locating a cache site: confluences of streams, dams and waterfalls, road junctures and distance markers, villages, bridges, churches, and cemeteries.

The Personal Reconnaissance.

A map survey normally should show the location of several promising sites within the general area designated for the cache. To select and pinpoint the best site, however, a well-qualified observer must examine each site firsthand. If possible, whoever examines the site should carry

adequate maps, a compass, a drawing pad or board for making sketch maps or tracings, and a metallic measuring line. (A wire knotted at regular intervals is adequate for measuring. Twine or cloth measuring tapes should not be used because stretching or shrinking will make them inaccurate if they get wet.) The observer should also carry a probe rod for probing prospective burial sites, if the rod can be carried securely. Since the observer seldom completes a field survey without being noticed by local residents, his action cover is of great importance. His cover must offer a natural explanation for his exploratory activity in the area. Ordinarily, this means that an observer who is not a known resident of the area can pose as a tourist or a newcomer with some reason for visiting the area. However, his action cover must be developed over an extended period before he undertakes the actual reconnaissance. If the observer is a known resident of the area, he cannot suddenly take up hunting, fishing, or wildlife photography without arousing interest and perhaps suspicion. But he must build up a reputation for being a devotee of his sport or hobby.

Reference Points.

When the observer finds a suitable cache site, he prepares simple and unmistakable instructions for locating the reference points. These instructions must identify the general area (the names of general recognizable places, from the country down to the nearest village) and an immediate reference point. Any durable landmark that is identified by its title or simple description can be immediate reference point (for example, the only Roman Catholic church in a certain village or the only bridge on a named road between two villages). The instructions must also include a final reference point (FRP), which must meet four requirements:

(1) It must be identifiable, including at least one feature that can be used as a precise reference point.

(2) It must be an object that will remain fixed as long as the cache may be used.

(3) It must be near enough to the cache to pinpoint the exact location of the cache by precise linear measurements from the FRP to the cache.

(4) It should be related to the immediate reference point by a simple route description, which proceeds from the immediate reference point to the FRP.

Since the route description should be reduced to the minimum essential, the ideal solution for locating the cache is to combine the immediate reference point and the FRP into one landmark readily identifiable, but sufficiently secluded. The following objects, when available, are sometimes ideal reference points: small, unfrequented bridges, and dams, boundary markers, kilometer markers and culverts along unfrequented roads, a geodetic survey marker, battle monuments, and wayside shrines. When such reference points are not available at an otherwise suitable cache site, natural or man-made objects may serve as FRP's: distinct rocks, posts for power or telephone lines, intersections in stone fences or hedgerows, and gravestones in isolated cemeteries.

Pinpointing Techniques.

Recovery instructions must identify the exact location of the cache. These instructions must describe the point where the cache is placed in terms that relate in to the FRP. When the

concealment method is used, the cache ordinarily is placed inside the FRP, so it is pinpointed by a precise description of the FRP. A submerged cache usually is pinpointed by describing exactly how the moorings are attached to the FRP. With a buried cache, any of the following techniques may be used.

Placing the cache directly beside the FRP. The simples method is to place the cache directly beside the FRP. Then pinpointing is reduced to specifying the precise reference point of the FRP. Sighting the cache by projection, This method may be used if the FRP has one flat side long enough to permit precise sighting by projecting a line along the side of the object. The burial party places the cache a measured distance along the sighted line. This method may also be used if two precise FRP's are available, by projecting a line sighed between the two objects. In either case, the instructions for finding the cache must state the approximate direction of the cache from the FRP. Since small errors in sighting are magnified as the sighted line is extended, the cache should be placed as close to the FRP as other factors permit. Ordinarily this method becomes unreliable if the sighted line is extended beyond 50 meters.

Placing the cache at the intersection of measured lines.

If two FRP's are available within several paces, the cache can be one line projected from each of the FRP's. If this method is used, state the approximate direction of the cache from each FRP . To ensure accuracy, neither of the projected lines (from the FRP's to the point of emplacement) should be more than twice as long as the base line (between the two FRP's). If this proportion is maintained, the only limitation upon the length of the projected lines is the length of the measuring line that the recovery party is expected to carry. The recovery party should carry two measuring lines when this method is used. Sighting the cache by compass azimuth. If the above methods of sighting are not feasible, one measured line may be projected by taking a compass azimuth from the FRP to the point where the cache is placed. To avoid confusion, use an azimuth to a cardinal point of the compass (north, east, south, or west). Since compass sightings are likely to be inaccurate, a cache that is pinpointed by this method should not be placed more than 10 meters from the FRP.

Measuring Distances.

The observer should express all measured distances in a linear system that the recovery party is sure to understand - ordinarily the standard system for the country where the cache is located. He should use whole numbers (6 meters, not 6.3 or 6.5, etc.) to keep his instructions as brief and as simple as possible. To get an exact location for the cache in whole numbers, take sightings and measurements first. If the surface of the ground between the points to be measured is uneven, the linear distance should be measured on a direct line from point to point, rather than by following the contour of the ground. This method requires a measuring line long enough to reach the full distance from point to point and enough to be pulled taut without breaking.

Marking Techniques.

The emplacement operation can be simplified and critical time saved if the point where the cache is to be buried is marked during the reconnaissance. If a night burial is planned, the point of emplacement may have to be marked during a daylight reconnaissance. This method should

be used whenever operational conditions permit. The marker must be an object that is easily recognizable but that is meaningless to an unwitting observer. For example, a small rock or a branch with its butt placed at the point selected for the emplacement may be used.

During a personal reconnaissance, the observer must not only pinpoint the cache site, but also gather all the incidental information required for planning the emplacement operation. It is especially important to determine the best route to the site and at least one alternate route, the security hazards along these routes, and any information that can be used to overcome the hazards. Since this information is also essential to the recovery operation, it must be compiled after emplacement and included in the final cache report. Therefore, the observer should be thoroughly familiar with the Twelve-Point Cache Report before he starts a personal reconnaissance. This report is a checklist for the observer to record as much information as possible. Points 6 through 11 are particularly important. The personal reconnaissance also provides an excellent opportunity for a preliminary estimate of the time required for getting to the site.

The Alternate Site

As a general rule, planners should select an alternate site in case unforeseen difficulties prevent use of the best site. Unless the primary site is in a completely deserted area, there is always some danger that the emplacement party will find it occupied as they approach, or that the party will be observed as they near the site. The alternate site should be far enough away to be screened from view from the primary site, but near enough so that the party can reach it without making a second trip.

The Concealment Site

A site that looks ideal for concealment may be revealed to the enemy for that very reason. Such a site may be equally attractive to a native of an occupied country to hide his valuables. The only real key to the ideal concealment site is careful ca sing of the area combined with great familiarity with local residents and their customs. The following is a list of likely concealment sites:

- Natural caves and caverns, and abandoned mines and quarries.
- Walls (hidden behind loose bricks or stones or hidden a plastered surface).
- Abandoned buildings.
- Infrequently used structures (stadiums and other recreational facilities, and railroad facilities on spur lines).
- Memorial edifices (mausoleums, crypts, monuments).
- Public buildings (museums, churches, libraries).
- Ruins of historical interest.
- Culverts.
- Sewers.
- Cable conduits.

The concealment site must be equally accessible to the person emplacing and the person

recovering. However, visits by both persons to certain interior sites may be incompatible with the cover. For instance, a site in a house owned by a relative of the emplacer may be unsuitable because there is no adequate excuse for the recovery person to enter the house if he has no connection with the owner.

The site must remain accessible as long as the cache is needed. If access to a building depends upon a personal relationship with the owner, the death of the owner or the sale of the property might render it inaccessible. Persons involved in the operation should not be compromised if the cache is discovered on the site. Even if a cache is completely sterile, as every cache should be, the mere fact that it has been placed in a particular site may compromise certain persons. If the cache were discovered by the police, they might suspect the emplacer because it was found in his relative's house. The site must not be located where potentially hostile persons frequently visit. For instance, a site in a museum is not secure if police guards or curious visitors frequently enter the museum.

To preserve the cache material, the emplacer must ensure the site is physically secure for the preservation of the cached material. For example, most buildings involve a risk that the cache may be destroyed or damaged by fire, especially in wartime. The emplacer should consider all risks and weigh them against the advantages of an interior site. A custodian may serve to ease access to a building or to guard a cache. However, the use of such a person is inadvisable, as a custodian poses an additional security risk. He may use the contents of the cache for personal profit or reveal its location.

The Burial Site

In selecting a burial site, consider the following factors along with the basic considerations of suitability and accessibility:

Drainage

This includes the elevation of the site and the type of soil. The importance of good drainage makes a site on high ground preferable unless other factors rule it out. Moisture is one of the greatest natural threats to the contents of a cache. Swam p muck is the most difficult soil to work in. If the site is near a stream or river, ensure that the cache is well above the all-year-high-water mark so that it will not be uncovered if the soil is washed away.

Ground Cover

The types of vegetation at the site will influence the choice. Roots of deciduous tress make digging very difficult. Coniferous trees have less extensive root systems. Also, the presence of coniferous trees usually means that the site is well drained. Does the vegetation show paths or other indications that the site is frequented too much for secure caching? Can the ground cover be easily restored to its normal appearance when burial is completed? Tall grass reveals that it has been trampled, while an overlay of leaves and humus can be replaced easily and will effectively conceal a freshly refilled hole.

Natural Concealment

The vegetation or the surrounding terrain should offer natural concealment for the burial and

recovery parties working at the site. Planners should carefully consider seasonal variations in the foliage.

Types of Soil

Sandy loam is ideal because it is easy to dig and drains well. Clay soil should be avoided because it becomes quite sticky in wet weather and in dry weather it may become so hard that it is almost impossible to dig.

Snowfall and Freezing

If the cache must be buried or recovered in winter, data on the normal snowfall, the depth to which the ground freezes in winter, and the usual dates of freezing and thawing will influence the choice of the site. Frozen ground impedes digging and requires additional time for burial and recovery. Snow on the ground is especially hazardous for the burial operation. It is practically impossible to restore the snow over the burial site to its normal appearance unless there is more snowfall or a b risk wind. Also, it is very difficult to ensure that no traces of the operation are left after the snow has melted.

Rocks and Other Subsurface Obstructions

Large obstructions that might prevent use of a particular site can be located to some extent before digging by probing with a rod or stake at the exact spot selected for the cache.

The Submersion Site

To be suitable for a submerged cache, a body of water must have certain characteristics. The presence of these characteristics can be determined only by a thorough survey of the site. Their importance will be understood after familiarization with the technicalities of submersion as discussed in Section 3, Emplacement. Submersion usually requires a boat, first for reconnoitering, then for emplacement. Thus, the accessibility problems involved in submersion usually narrow down to the availability of a boat and the action cover for using it. If there is no fishing or pleasure boating at the site the cover for this peculiar type boating may be a real problem. In tropical areas the course of streams or rivers is frequently changed by seasonal rainfall and can cause many problems. Keep this fact in mind when choosing the site and when selecting reference points.

Recovery

Since the method for recovering a cache is generally similar to that for emplacing (Section 3) a cache, it need not be described in full. However, several important considerations should be stressed in training for a recovery operation.

Practical Exercises

Anyone who is expected to serve as a recovery person should have the experience of actually recovering dummy caches, if field exercises can be arranged securely. It is especially desirable for the recovery person to be able to master the pinpointing techniques. Mastery is best attained by practice in selecting points of emplacement and in drafting, as well as in following instructions.

Equipment

Although the equipment used in recovery is generally the same as that used in emplacement, it is important to include any additional items that may be required in recovery in the cache report. A probe rod may not be essential for emplacement, but it is necessary to have some object roughly the same size as the cache container to fill the cavity left in the ground by removal of a buried cache. Some sort of container of wrapping material may be needed to conceal the recovered cache while it is being carried from the cache site to a safe house. Recovery of a submerged cache may require grappling lines and hooks, especially if it is heavy.

Sketch of the site

If possible, the observer should provide the recovery person with sketches of the cache site and the route to the cache site. If the recovery person must rely exclusively on verbal instructions, as in the case when communications are limited to radio telephone (RT) messages, he should draw a sketch of the site before starting on the recovery operation. He should use all the data in the verbal instructions to make the sketch as realistic as possible. Drawing a sketch will help to clarify any misunderstanding of the instructions. Also, a sketch can be followed more easily than verbal instructions. It may also be helpful for the recovery person to draw a sketch of the route from the immediate reference point to the site. But he should not carry this sketch on him because if he were apprehended the sketch might direct the enemy to the cache.

Preliminary Reconnaissance

Checking the instructions for locating the cache may be advisable, especially when the recovery operation must be performed under stringent enemy controls or when there is no extra time for searching. Careful analysis of the best available map can minimize reconnoitering activity in the vicinity of the cache and thus reduce the danger of arousing suspicion. If recovery must be done at night, the recovery person should find the cache by daylight and place an unnoticeable marker directly over it .

Probe Rod

The recovery person can avoid digging at the wrong spot by using a probe rod before starting to dig. He should push and turn the probe rod into the ground by hand, so that it will not puncture the cache's container. Never pound the probe rod with a hammer.

Procedure for Digging and Refilling the Hole

The recovery procedure is the same as for the burial, except for two points. First, never use a pick for digging the hole because it might puncture the container and damage the cached items. Second, it may be necessary to fill the hole with other objects in addition to soil after the cache is removed. Sometimes it is possible to fill the hole with rocks, sticks, or other readily available objects at the site. If no such objects are found during the preliminary reconnaissance, the recovery person should carry to the site an object roughly the same size as the cache container. Sterilization of the Site

As with emplacement, the recovery operation must be preformed in such a way that no traces of the operation are left. Although sterilization is not as important for recovery as for emplacement, it should be done as thoroughly as time permits. Evidence that a cache has been recovered might alert the enemy to clandestine activity in the area and provoke countermeasures.

Section 2.

Packaging

Packaging usually involves packing the items to be cached, as well as the additional processing in protecting these items from adverse storage conditions. Proper packaging is important because inadequate packaging very likely will render the items unusable. Since special equipment and skilled technicians are needed for best results, packaging should be done at headquarters or a field packaging center whenever possible. However, to familiarize operational personnel with the fundamentals of packaging, so that they can improvise field expedients for emergency use, thus section discusses determining factors, steps in packaging, wrapping materials, and criteria for the container. Determining factors.

The first rule of packaging is that all processing is tailored to fit the specific requirements of each cache.

The method of packaging, as well as the size, shape, and weight of the package is determined by the items to be cached, by the method of caching, and, especially, by the way the cache is recovered and used. For instance, if circumstances require one man to recover the cache by himself, the container should be no larger than a small suitcase, and the total weight of container and contents no more than 30 pounds. Of course, these limits must be exceeded with some equipment, but the need for larger packages should be weighed against the difficulties and risks in handling them. Even if more than one person is available for recovery, the material should be divided whenever possible into separate packages of a size and weight readily portable by one man.

Another very important factor in packaging concerns adverse storage conditions. Any or all of the following conditions may be present: moisture, external pressure, freezing temperatures, and the bacteria and corrosive chemicals found in some soil and water. Animal life may present a hazard; insects and rodents may attack the package. If the cache is concealed in a exterior site, larger animals also may threaten it. Whether the packaging is adequate usually depends upon how carefully the conditions at the site were analyzed in designing the cache. Thus, the method of caching (burial, concealment, or submersion) should be determined before the packaging is done.

It is equally important to consider how long the cache is to be used. Since one seldom knows when a cache will be needed, a sound rule is to design the packaging to withstand adverse storage conditions for at least as long as the normal shelf life of the contents to be cached.

STEPS IN PACKAGING

The exact procedure for packaging depends upon the specific requirements for the cache and upon the packaging equipment available. There are Nine Steps that are almost always necessary in packaging.

Inspecting

The items to be cached must be inspected immediately before packaging to ensure they are complete, in serviceable condition, and free of all corrosive or contaminative substances.

Cleaning

All corrodible items must be cleaned thoroughly immediately before the final preservative coating is applied. All foreign matter, including any preservative applied before the item was shipped to the field, should be removed completely. Throughout the packaging operation, all contents of the cache should be handled with rubber or freshly cleaned cotton cloves. Special handling is important because even minute particles of human sweat will corrode metallic equipment. Also, any fingerprints on the contents of the cache may enable the enemy to identify those who did the packaging.

Drying

When cleaning is completed, every trace of moisture must be removed from all corrodible items. Methods of drying include: wiping with a highly absorbent cloth, heating or applying desiccant. Usually heating is best, unless the item can be damaged by heat. To dry by heating, the item to be cached should be placed in an oven for at least 3 hours at a temperature of about 110'F. An oven can be improvised from a large metal can or drum. In humid climates, it is especially important to dry the oven thoroughly before using it by preheating it to at least 212'F. Then, insert the equipment to be cached as soon as the over cools down to about 110'F. If a desiccant is used, it should not touch any metallic surface. Silica gel is a satisfactory desiccant, and it is commonly available.

Coating With a Preservative

Apply a light coat of oil to weapons, tools, and other items with unpainted metallic surfaces. A coat of paint may suffice for other metal items.

Wrapping

When drying and coating are completed, wrap the items to be cached in a suitable material (see paragraph below on Wrapping Materials.) The wrapping should be as nearly waterproof as possible. Each item should be wrapped separately, so that one perforation in the wrapping will not expose all items in the cache. The wrapping should fit tightly to each item to eliminate air pockets, and all folds should be sealed with a waterproof substance.

Packing

Several simple rules must be observed when packing items in the container. All moisture must be removed from the interior of the container by heating or applying desiccant. A long-lasting

desiccant should be packed inside the container to absorb any residual moisture. If silica gel is used, the required amount can be calculated by using the ratio of 15 kilograms of silica gel to 1 cubic meter of storage space within the container. (This figure is based on two assumptions: the container is completely moisture proof and the contents are slightly moist when inserted.)

Therefore, the ratio allows an ample margin for incomplete drying and can be reduced if the drying process is known to be highly effective. Air pockets should be eliminated as much as possible by tight packing. Thoroughly dried padding should be used liberally to fill air pockets and to protect the contents from shock. Clothing and other items, which will be useful to the recovery party, should be used for padding if possible. Items made of different metals should never touch, since continued contact may cause corrosion through electrolytic action.

Enclosing Instructions for Use of Cached Equipment

Written instructions and diagrams should be included if they facilitate assembly or use of the cached items. Instructions must be written in a language that recovery personnel can understand. The wording should be as simple as possible and unmistakably clear. Diagrams should be self- explanatory since the eventual user may not be able to comprehend written instructions because of language barriers.

Sealing & Testing Seals by Submersion

When packing is completed, the lid of the container must be sealed to make it watertight. Testing can be done by entirely submerging the container in water and watching for escaping air bubbles. Hot water should be used if possible because hot water will bring out leaks that would not be revealed by a cold water test.

WRAPPING MATERIALS

The most important requirement for wrapping material is that it be moisture proof. Also, it should be self-sealing or adhesive to a sealing material; it should be pliable enough to fit closely, with tight folds; and it should be tough enough to resist tearing and puncturing. Pliability and toughness may be combined by using two wrappings: an inner one that is thin and pliable and an outer one of heavier material. A tough outer wrapping is essential unless the container and the padding are adequate to prevent items from scraping together inside the cache. Five wrapping materials are recommended for field expedients because they often can be obtained locally and used effectively be unskilled personnel.

Aluminum Foil

For use as an inner wrapping. aluminum foil is the best of the widely available materials. It is moisture proof as long as it does not become perforated and provided the folds are adequately sealed. The drawbacks to its use for caching are that the thin foils perforate easily, while the heavy ones (over 2 mils thick) tend to admit moisture through the folds. The heavy-duty grade of aluminum foil generally sold for kitchen use is adequate when used with an outer wrapping. Scrim-backed foil, which is heat-sealable, is widely used commercially to package articles for shipment or storage. Portable heat- sealers that are easy to use are available commercially. Or, sealing can be done with a standard household iron.

Moisture-Resistant Papers

Several brands of commercial wrapping papers are resistant to water and grease. They do not provide lasting protection against moisture when used alone, but they are effective as an inner wrapping to prevent rubber, wax and similar substances from s ticking to the items in the cache.

Rubber Repair Gum

This is a self-sealing compound generally used for repairing tires; it makes an excellent outer wrapping. Standard commercial brands come in several thicknesses; 2 mils is the most satisfactory for caching. A watertight seal is produced easily by placing two rubber surfaces together and applying pressure manually. The seal should be at least 1/2 inch wide. Since rubber repair gum has a tendency to adhere to items, an inner wrapping of non- adhesive material must be used with it, and the backing should be left on the rubber material to keep it from sticking to other items in the cache.

Grade C Barrier Material

This is a cloth impregnated with mircrocrystalline wax that is used extensively when packing for storage of for overseas shipment. Thus, it is generally available, and it has the additional advantage of being self- sealing. Although it is not as effective as rubber repair gum, it may be used as an outer wrapping over aluminum foil to prevent perforation of the foil. Used without an inner wrapping, three layers of grade C barrier material may keep the contents dry for as long as three months, but it is highly vulnerable to insects and rodents. Also, the wax wrapping has a low melting point and will adhere to many items, so it should not be used without an inner wrapping except in emergencies.

Wax Coating

If no wrapping material is available, an outer coating of microcrystralline wax, paraffin or a similar waxy substance can be used to protect the contents against moisture. It will not provide protection against insects and rodents. The package should be hot-dipped in the waxy substance, or the wax can heated to molten form and applied with a brush.

THE CONTAINER

The outer container serves to protect the contents from shock, moisture and other natural hazards to which the cache may be exposed to.

Criteria for the Container

The ideal container should be:

- Completely watertight and airtight after sealing.
- Noiseless when handled and its handles should not rattle against the body of the container
- Resistant to shock and abrasion.
- Able to withstand crushing pressure.

- Lightweight in construction.
- Able to withstand rodents, insects, and bacteria.
- Equipped with a sealing device that can be closed and reopened easily and repeatedly.
- Capable of withstanding highly acidic or alkaline soil or water.

The Standard Stainless Steel Container

The standard stainless steel container comes in several sizes. Since the stainless steel container is more satisfactory than any that could be improvised in the field, it should be used whenever possible. Ideally, it should be packed at headquarter s or at a field packaging center. If the items to be cached must be obtained locally, it is still advisable to use the stainless steel container because its high resistance to moisture eliminates the need for an outer wrapping. Packers should, however, use a single wrapping even with the stainless steel container to protect the contents from any residual moisture that may be present in the container when it is sealed.

The Field Expedient Container

Obviously the ideal container cannot be improvised in the field, but the standard military and commercial containers discussed below can meet caching requirements if they are adapted with care and resourcefulness. First, a container must be sufficiently sturdy to remain unpunctured and retain its shape through whatever rough handling or crushing pressure it may encounter. (Even a slight warping may cause a joint around the lid to leak.) Second, if the lid is not already watertight and airtight , packers can make it so by improvising a sealing device. The most common type of sealing device includes a rubber-composition gasket or lining and a sharp metal rim that is pressed against common sealing device is a threaded lid. Its effectiveness can be increased by applying heavy grease to the threads. (Metallic solder should not be used for sealing because it corrodes metal surfaces when exposed to moisture.) Whenever any non-stainless metal container is used, it is important to apply several coats of high-quality paint to all exterior surfaces.

Instrument Containers.

Ordinarily, aircraft and other precision instruments are shipped in steel containers with a waterproof sealing device. The standard instrument containers range from 1/2 gallon to 10 gallon sizes. If one of suitable size can be found, only minimum modifications may be needed, In the most common type of instrument container, the only weak point is the nut and bolt that tightens the locking band around the lid. These should be replaced with a stainless steel nut and bolt .

Ammunition Boxes.

Several types and sizes of steel ammunition boxes that have a rubber-gasket closing device are satisfactory for buries caches. An advantage of using ammunition boxes as a cache container, is that they are usually available at a military depot.

Steel Drums.

A caching container of suitable size may be found among the commercially used steel drums for shipping oil, grease, nails, soap, and other products. The most common types, however, lack an adequate sealing device, so a waterproof material should be used around the lid. Fully removable head drums with lock-ring closures generally give a satisfactory seal.

Glass Jars.

The advantage of using glass is that it is waterproof and does not allow chemicals, bacteria and insects to pass through it. Although glass is highly vulnerable to shock, glass jars of a sturdy quality can withstand the crushing pressure normally encountered in caching. However, none of the available glass container have an adequate sealing device for the joint around the lid. The standard commercial canning jar with a spring clamp and a rubber washer is watertight, but the metal clamp is vulnerable to corrosion. Therefore, a glass jar with a spring clamp and a rubber washer is an adequate expedient for short-term caching of small items, but it should not be relied upon to resist moisture for more than a year.

Paint Cans.

Standard cans with reusable lids require a waterproof adhesive around the lids. It is especially important to apply several coats of paint to the exterior of standard commercial cans because the metal in these cans is not as heavy as that in metal drums. Even when the exterior is thoroughly painted, paint cans probably will not resist moisture for more than a few months.

Section 3.

Methods of Emplacement

Since burial is the most frequently used method of emplacement, this section describes first the complete procedure for burial, followed by a discussion of emplacement procedures peculiar to submersion and concealment. The last area discussed is the preparation of the cache report-a vital part of a caching operation.

BURIAL

When planners have designed a cache and selected the items for caching, they must carefully work out every step of the burial operation in advance. Horizontal and Vertical Caches

Ordinarily, the hole for a buried cache is vertical (the hole is dug straight down from the surface). Sometimes a horizontal cache, with the hole dug into the side of a steep hill or bank, provides a workable solution when a suitable site on level or slightly sloping ground is not available. A horizontal cache may provide better drainage in areas of heavy rainfall, but is more likely to be exposed by soil erosion and more difficult to refill and restore to normal appearance.

Dimensions of the Hole

The exact dimensions of the hole, either vertical or horizontal, depend on the size and shape of the cache container. As a general rule, ensures that the hole is large enough for the container to be inserted easily. The horizontal dimensions of the hole should be about 30 centimeters

longer and wider than the container. Most importantly, it should be deep enough to permit covering the container with soil to about 45 centimeters. This figure is recommended for normal usage because a more shallow burial risks exposure of the cache through soil erosion or inadvertent uncovering by normal indigenous activity. A deeper hole makes probing for recovery more difficult and unnecessarily prolongs the time required for burial and recovery.

Excavation Shoring

If there is a risk that the surrounding soil will cave in during excavation, boards or bags filled with subsoil may be used to shore the sides of the hole. Permanent shoring may be needed to protect an improvised container from pressure or shock.

Equipment

The following items of equipment may be helpful or indispensable in burying a cache, depending upon the conditions at the site:

- Measuring instruments (a wire or metal tape and compass) for pinpointing the site.
- Paper and pencil for recording the measurements.
- A probe rod for locating rocks, large roots, or other obstacles in the subsoil.
- Two ground sheets on which to place sod and loose soil. An article of clothing may be used for small excavation if nothing else is available.
- Sacks (sandbags, flour sacks) for holding subsoil.
- A spade or pickax, if the ground is too hard for spading.
- A hatchet for cutting roots.
- A crowbar for prying rocks.
- A flashlight or lamp if burial is to be done at night.

The Burial Party

Aside from locating, digging, and refilling the hole, the most important factors in this part of the emplacement operation may be expressed with one word: Personnel. Since it is almost impossible to prevent every member of the burial party from knowing the location of the cache, each member is a prime security problem as long as the cache remains intact. Thus, planners must keep the burial party as small as possible and select each member with utmost care. Once selected, each member must have adequate cover to explain his absence from home or work during the operation, his trip to and from the site, and his possession of whatever equipment cannot be concealed on the way.

Transportation for the burial party may be a problem, depending on the number of persons, how far they must go, and what equipment they must take. When planners have worked out all details of the operation, they must brief every member of the burial party on exactly what he is to do from start to finish.

The Operational Schedule

The final step in planning the emplacement operation is to make a schedule to set the date, time, and place for every step of the operation that requires advance coordination. The

schedule will depend mainly on the circumstances, but to be practical it must include a realistic estimate of how long it will take to complete the burial. Here generalizations are worthless, and the only sure guide is actual experience under similar conditions. Planners should consider three things with respect to scheduling. A careful burial job probably will take longer than most novices will expect. Therefore, if circumstances require a tight schedule, a dry run or test exercise before taking the package to the site may be advisable.

Unless the site is exceptionally well concealed or isolated, night burial will be required to avoid detection. Because of the difficulties of working in the dark, a nighttime practice exercise is especially advisable. The schedule should permit waiting for advantageous weather conditions. The difficulties of snow have already been mentioned. Rainy weather increases the problems of digging and complicates the cover story. If the burial is to be done at night, a moonless or a heavy overcast night is desirable.

Site Approach

Regardless of how effective the cover of actions during the trip to the cache site, the immediate approach must be completely unobserved to avoid detection of the burial. To reduce the risk of the party being observed, planners must carefully select the point where the burial party disappears, perhaps by turning off a road into woods. They should as carefully select the reappearance point. In addition, the return trip should be by a different route. The burial party should strictly observe the rule for concealed movement. The party should proceed cautiously and silently along a route that makes the best use of natural concealment. Concealed movement requires foresight, with special attention to using natural concealment while reconnoitering the route and to preventing rattles when preparing the package and contents.

Security Measures at the Site

The burial party must maintain maximum vigilance at the caches site, since detection can be disastrous. The time spent at the site is the most critical. At least one lookout should be on guard constantly. If one man must do the burial by himself, he should pause frequently to look and listen. The burial party should use flashlight or lanterns as little as possible, and should take special care to mask the glare. Planning should include emergency actions in case the burial party is interrupted. The party should be so thoroughly briefed that it will respond instantly to any sign of danger. Planner should also consider the various escape routes and whether the party will attempt to retain the package or conceal it along the escape route .

Steps in Digging and Refilling

Although procedures will vary slightly with the design of the cache, persons involved in caching operations must never overlook certain basic steps. The whole procedure is designed to restore the site to normal as far as possible.

Site Sterilization

When the hole is refilled, make a special effort to ensure that the site is left sterile-restored to normal in every way, with no clues left to indicate burial or the burial party's visit to the vicinity. Since sterilization is most important for the security of the operation, the schedule should allow ample time to complete these final steps in an unhurried, thorough manner. Dispose of any

excess soil far enough away from the site to avoid attracting attention to the site. Flushing the excess soil into a stream is the ideal solution. Check all tools and equipment against a checklist to ensure that nothing is left behind. This should include all personnel items that may drop from pockets. To keep this risk to a minimum, members of the burial party should carry nothing on their persons except the essentials for doing the job and covering their actions.

Make a final inspection of the site for any traces of the burial. Because this step is more difficult on a dark night, use of a carefully prepared checklist is essential. With a night burial, returning to the site in the daytime to inspect it for telltale evidence may be advisable, if this can be done safely.

SUBMERSION

Emplacing a submerged cache always involves two basic steps: weighting the container to keep it from floating to the surface and mooring it keep it in place.

Container Weighting and Mooring

Ordinarily, container weights rest on the bottom of the lake or river and function as anchors, and the mooring connect the anchors to the container. The moorings must also serve a second function, that is to provide a handle for pulling the cache to the surface when it is recovered. If the moorings are not accessible for recovery, another line must extend from the cache to a fixed, accessible object in the water or on shore.

There are four types of moorings:

(1) Spider Web Mooring.

The container is attached to several mooring cables that radiate to anchors placed around it to form a web. The container must be buoyant so that it lifts the cables for enough off the bottom to be readily secured by grappling. The site must be located exactly at the time of emplacement by visual sightings to fixed landmarks in the water, or along the shore, using several FRP's to establish a point where two sighted lines intersect. For recovery, the site is located by taking sightings on the reference points, when a mooring cable is engaged by dragging the bottom of diving. This method of mooring is most difficult for recovery. It can be used only where the bottom is smooth and firm enough for dragging, or where the water is not too deep, cold, or murky for diving.

(2) Line-to-Shore Mooring.

A line in run from the weighted container to an immovable object along the shore. The section of the line that extends from the shore to the shore must be buried in the ground or otherwise well concealed.

(3) Buoy Mooring.

A line is run from the weighted container to a buoy or other fixed, floating marker, and fastened well below the waterline. This method is secure only as long as the buoy is left in place. Buoys are generally inspected and repainted every six months or so. The inspection schedule should

be determined before a buoy is used.

(4) Structural Mooring.

A line for retrieving the weighted container is run to a bridge pier or other solid structure in the water. This line must be fastened well below the low-water mark.

Essential Data for Submersion

Whatever method of mooring is used, planners must carefully consider certain data before designing a submerged cache. The cache very likely will be lost if any of the following critical factors are overlooked:

Buoyancy.

Many containers are buoyant even when filled, so the container must be weighted sufficiently to submerge it and keep it in place. If the contents do not provide enough weight, emplacers must make up the balance by attaching a weight to the container. The approximate weight needed to attain zero buoyancy is shown in Appendix. This figure applies to several sizes of stainless steel containers. The weighting required for any container can be calculated theoretically if the displacement of the container and the gross weight of the container plus its contents are known. This calculation may be useful for designing an anchor, but is should not be relied upon for actual emplacement.

To avoid hurried improvisation during emplacement, emplacers should always test the buoyancy in advance by actually submerging the weighted container. This test determines only that a submerged cache will not float to the surface.

Additional weighting may be required to keep it from drifting along the bottom. As a general rule, the additional weight should be a least one-tenth of the gross weight required to make the container sink; more weight is advisable if strong currents are present.

Submersion depth.

Planners must first determine the depth which the container is to be submerged to calculate the water pressure that the container must withstand. The greater the depth, the greater the danger that the container will be crushed by water pressure. For instance, the standard stainless steel burial container will buckle at a depth of approximately 4.3 meters. The difficulty of waterproofing also increases with depth. Thus, the container should not be submerged any deeper than necessary to avoid detection. As a general rule, 2.2 meters is the maximum advisable depth for caching. If seasonal or tidal variations in the water level require deeper submersion, the container should be tested by actual submersion to the maximum depth it must withstand.

Depth of the Water.

Emplacers must measure accurately the depth of the water where at the point where the cache is to be placed. The will be the submersion depth if the cache is designed so that the container rests on the bottom of the lake or river. The container may be suspended some distance above

the bottom, but the depth of the water must be known to determine the length of moorings connecting the containers to the anchors.

High-and-Low-Water Marks.

Any tidal or seasonal changes in the depth of the water should be estimated as accurately as possible. Emplacers must consider the low-water mark to ensure that low water will not leave cache exposed. The high-water point also should be considered to ensure that the increased depth will crush the container or prevent recovery.

Type of Bottom.

Emplacers should probe as thoroughly as possible the bed of the lake or river in the vicinity of the cache. If the bottom is soft and silty, the cache may sink into the muck, become covered with sediment, or drift out of place. If the bottom is rocky or covered with debris, the mooring may become snagged. Any of these conditions may make recovery very difficult.

Water Motion.

Emplacers should consider tides, currents, and waves because any water motion will put additional strain on the moorings of the cache. Moorings must be strong enough to withstand the greatest possible strain. If the water motion tends to rock the cache, emplacers must take special care to prevent the moorings from rubbing and fraying.

Clearness of the Water.

When deciding how deep to submerge the cache, emplacers must first determine how far the cache can be seen through the water. If the water is clear, the cache may need to be camouflaged by painting the container to match the bottom. (Always paint shiny metallic fixtures a dull color.) Very murk water makes recovery by divers more difficult.

Water Temperature.

Planners must consider seasonal changes in the temperature of the water. Recovery may be impossible in the winter if the water freezes. The dates when the lake or river usually freezes and thaws should be determined as accurately as possible.

Salt Water.

Since seawater is much more corrosive than fresh water, tidal estuaries and lagoons should not be used for caching. The only exception is the maritime re-supply operation, where equipment may be submerged temporarily along the seacoast until it can be recovered by a shore party.

CONCEALMENT

There are many different ways to conceal a cache in natural or ready-made hiding places. For instance, if a caching party were hiding weapons and ammunition in a cave, relying entirely on natural concealment, the emplacement operation would be reduced to simply locating the site. No tools would be needed except paper, pencil and a flashlight. On the other hand, if the party were sealing a packet of jewels in a brick wall, a skilled mason would be needed, his kit of

tools, and a supply of mortar expertly mixed to match the original brick wall.

When planning for concealment, planners must know the local residents and their customs. During the actual emplacement, the caching party must ensure the operation is not observed. The final sterilization of the site is especially important, since a concealment site is usually open to frequent observation.

CACHING COMMUNICATIONS EQUIPMENT

As a general rule, all equipment for a particular purpose (demolitions, survival) should be included in one container. Some equipment, however, is so sensitive from a security standpoint that it should be packed in several containers and cached in different locations to minimize the danger of discovery by the enemy. This is particularly true of communications equipment, since under some circumstances anyone who acquires a whole RT set with a signal plan and cryptographic material would be able to play the set back. An especially dangerous type of penetration would result.

In the face of this danger, the signal plan and the cryptographic material must never be placed in the same container. Ideally a communications kit should be distributed among three containers and cached in different locations. If three containers are used , the distribution may be as follows:

- Container #1: The RT set, including the crystals.
- Container #2: The signal plan and operational supplies for the RT operator, such as currency, barter and small arms.
- Container #3: The cryptographic material.

When several containers are used for one set of equipment, they must be placed far enough apart so that if one is discovered, the others will not be detected in the immediate vicinity. On the other hand, they should be located close enough together so that they can be recovered conveniently in one operation. The distance between containers will depend on the particular situation, but ordinarily they should be at least 10 meters apart. One final reference point ordinarily is used for a multiple cache. The caching party should be careful to avoid placing multiple caches in a repeated pattern. Discovery of one multiple cache would give the opposition a guide for probing others placed in a similar pattern.

CACHING MEDICAL EQUIPMENT

A feasibility study must be performed to determine the need for the caching of medical supplies. The purpose of caches is to store excess medical supplies, to maintain mobility, and deny access to the enemy. Also caching large stockpiles of medical supplies allows prepositioning vital supplies in anticipation of future planned operations.

THE CACHE REPORT

The final step, which is vital in every emplacement operation, is the preparation of a cache report. This report records the essential data for recovery. The cache report must provide all of the information that someone unfamiliar with the locality needs to find his way to the site,

recover the cache, and return safely. The report format follows.

THE TWELVE-POINT CACHE REPORT

1. Type of Cache
2. Method of Caching
3. Contents
4. Description of Containers
5. General Area
6. Immediate Area
7. Cache Location
8. Emplacement Details
9. Operational Data and Remarks
10. Dates of Emplacement and Duration of the Cache
11. Sketches and Diagrams
12. Radio Message for Recovery

Content

The most important parts of the cache report must include instructions for finding and recovering the cache. it should also include any other information that will ease planning the recover operation. Since the details will depend upon the situation and the particular needs of each organization, the exact format of the report cannot be prescribed. The Twelve-Point cache Report is intended merely to point out the minimum essential data. Whatever format is used, the importance of attention to detail cannot be overemphasized. A careless error or omission in the cache report may prevent recovery of the cache when it is needed.

Procedure

The observer should collect as much data as possible during the personal reconnaissance to assist in selecting a site and planning emplacement and recovery operations. Drafting the cache report before emplacement is also advisable. Following these procedures will reveal the omissions. Then the missing data can be obtained at the site. If this procedure is followed, the preparation of the final cache report will be reduced to an after-action check. This check ensures that the cache actually was placed precisely where planned and that all other descriptive details are accurate. Although this ideal may seldom be realized, two procedures always should be followed:

*The caching party should complete the final cache report as soon as possible after emplacement, as details are fresh in mind.

*Someone who has not visited the site should check the instructions by using them to lead the party to the site. When such a person is available, they should visit the site shortly after emplacement, provided he can do so securely. If the cache has been embraced at night, a visit to the site in daylight may also provide an opportunity to check on the sterilization of the site.

APPENDIX

Weights Needed to Submerge Containers

Container Dimensions (inches)	7x9x8 1/2	7x9x16 1/2	7x9x40	7x9x45	7x9750
Empty Container Weight (pounds)	5	8	16	17.5	19
Approx. weight that must be added to empty container weight to attain zero buoyancy (pounds)	15	31	77	88	97

STASHES

A stash is different than a cache, in that a stash is intended for temporary, short term, storage of something with the ability of immediate access, while a cache is intended for permanent, long term storage, where access may take a few hours.

Stashes are often used for drugs or weapons. Whether transporting or keeping handy for sales, stashes are intended to evade detection in a search while still being handy enough for immediate access.

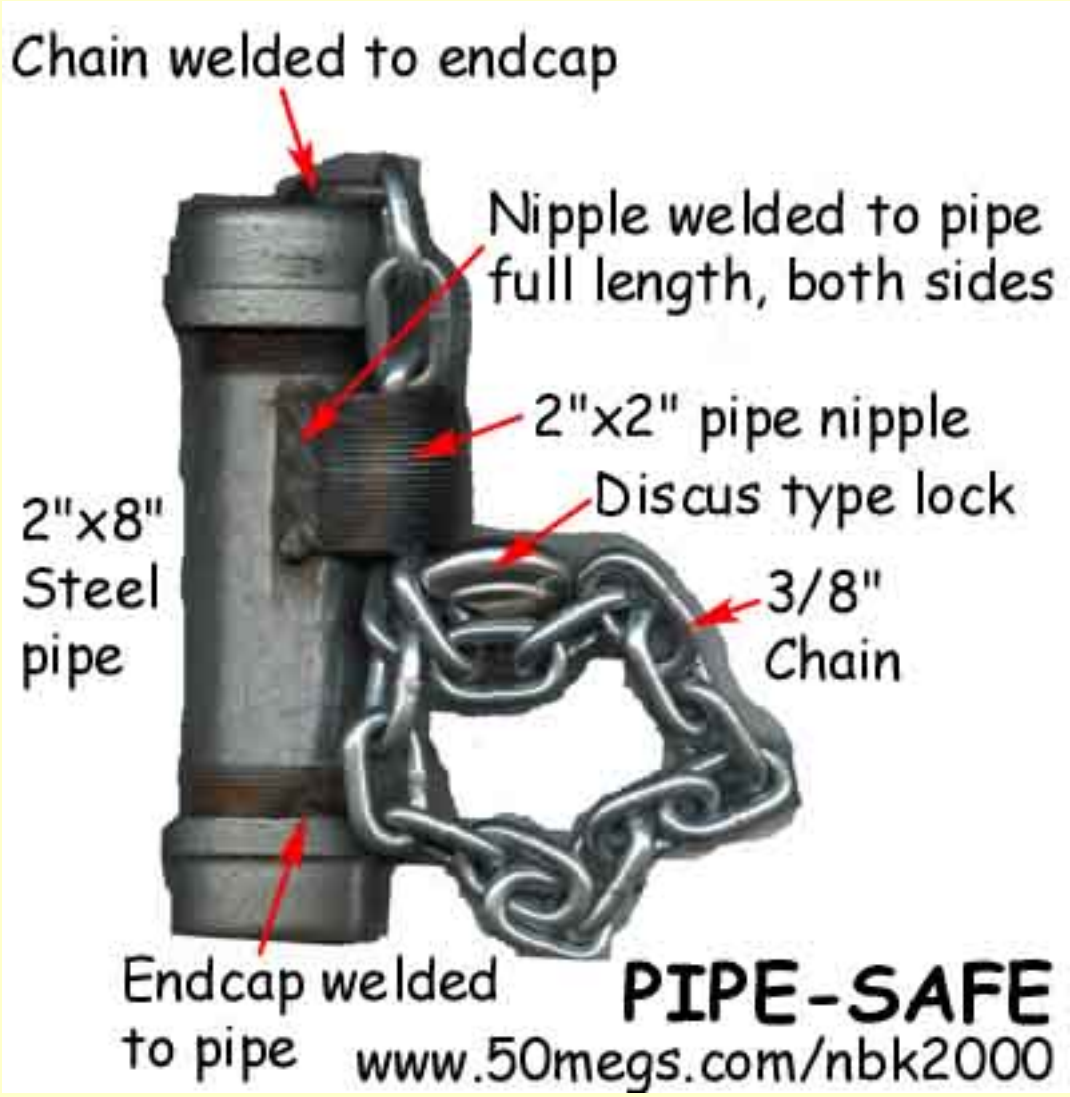
- Pipe Safe
- DEA Stash and Hideout Book

PIPE SAFE

I came up with the idea for this after an associate of mine had $3,000 stolen from his girlfriends place by a couple of fags who where visiting her at the time. He eventually recovered $2,000 after he "taxed" them, but he still lost $1,000. And all because the bitch didn't take care to watch the money every second.

Well after this I thought "How could you keep someone from taking off with your money (or dope) if your not around to watch it every second?". A safe would work, but it's way too big to drag around with you, and a lock box is too wimpy to take any abuse. Then I thought a pipe bomb is strong and cheap so why not adapt that? So I did. It took a few designs to come up with this one.

My safe cost me $20 (not including the lock) and is stronger than anything else you could buy for that much. Hell, it's stronger than a home safe that costs $200, although it won't hold as much obviously. But it will hold at least 200 bills or a half pound of dope (not weed). You could make it smaller or larger depending on your needs. When locking it up I recommend locking it around a gas, water, or electrical pipe. Preferably something they can't turn off and would kill themselves trying to cut.



The picture shows the finished product and the major elements of it's construction.

The first step in building the safe is preparing the pipe and caps. Take the pipe nipple and cut out a 1/3 section out of it. The edges of the cut need to be straight so that when the nipple is placed against the side of the pipe, both edges are flush against it. This ensures a strong joining of the 2 elements.

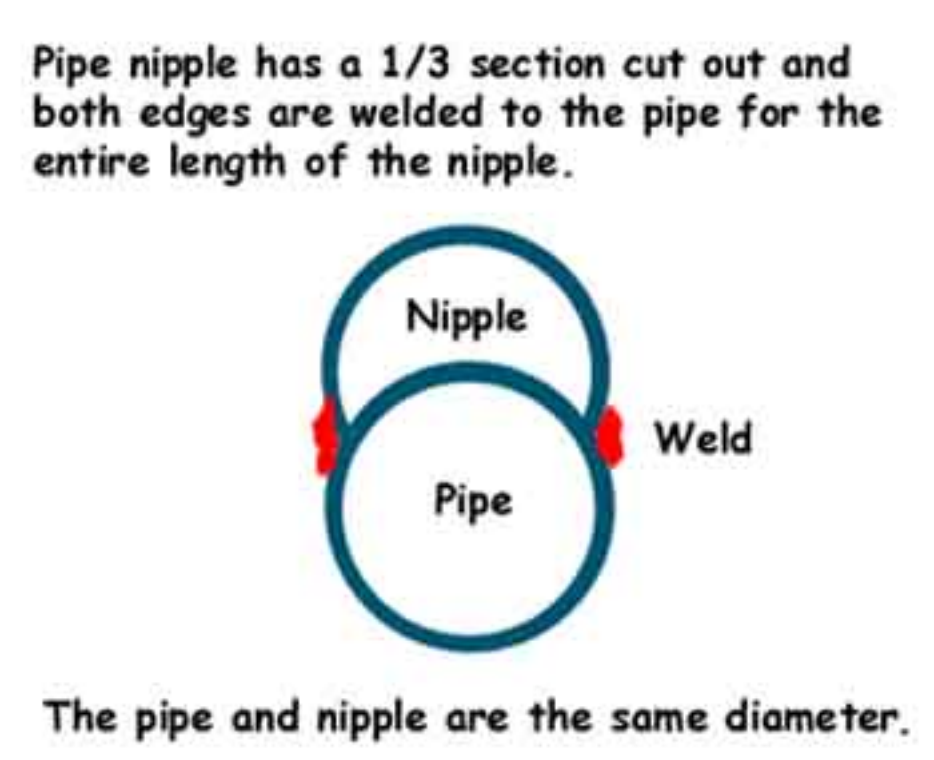
Don't weld the nipple on yet. You next need to screw on the end cap that your going to be permanently welding onto the pipe. You could weld it all the way around, but that's not necessary. A couple of good spot welds will work fine. If you want to you could use epoxy and coat the entire thread of the cap with it before screwing it on, but welds are stronger.

Now screw on the cap that you'll need to seal up the safe. Screw it on hand tight. It should take 3 or 4 turns to get it all the way on. Once it's on all the way make a mark on the cap and pipe that are aligned, anywhere on the pipe is fine. You'll be needing this later on.

Now take the cap and, using either a file or grinder, remove the galvanized coating where your going to weld the chain onto the cap. Center this area with the mark on the cap. Next, grind the chain to remove the coating on it and to flatten it on one side. This is to ensure a strong weld. Weld the chain onto the cap. Make sure you use an adequate length of chain. 3 feet is fine.

Now take the cap with the attached chain and screw it back onto the pipe. Center the chain on the mark on the pipe and place the nipple over chain. You'll need to adjust the position of the nipple so that a chain link will be in a position where you can place a lock through it and the chain won't be able to be turned enough to remove the pipe cap. See the picture to get an idea of this.

Once you've found the right spot for the nipple, mark it. Then, using the file or grinder, remove the galvanizing on the pipe where the edges of the nipple will be. Then weld it on. Be sure the cap is off before you do this.



Once it's cooled off, screw on the cap, pass the chain through the nipple, wrap it around a solid object, and lock the chain to itself passing the lock shackle through the link closest to the nipple. Your now securely locked up.

DEA Stash and Hideout Handbook

The DEA Stash and Hideout Handbook was obtained via covert means from the U.S. Drug Enforcement Administration. This information has been classified "Top Secret -- Eyes Only" for DEA officers, and is information the DEA uses.

This is the actual list used in seminars conducted to train narcotics officers in search and seizure of drugs and contraband items. These seminars instruct many military, state, local, and foreign narcotics officers. The places listed here are not checked in every search, nor are these the only places searched.

Now you have the information that will help you either find someone else's stash or put your own where no one, not even many highly trained law-enforcement officers, will be able to find it!

We've all wondered from time to time, "Where would be a good, safe place to put my extra cash, my trusty firearm, or a valuable painting where no one will ever find it but me?" Wonder no longer. This list, used wisely, will put that valuable item beyond the reach of any save yourself. The purpose of this list is to provide an insight into the mind of the searcher and to show the futility of hiding contraband under the socks in your dresser drawer.

You know that putting cash in a vase on the dining room table or under the mattress of your bed is just plain crazy, and that hiding it under your pillow is not very wise either -- but where is a good place?

Consider the locations in your house that would most likely elude searching officers, K-9s, or criminals. From abandoned plumbing, under-floor drains, and within tea bags to above acoustical tiles, behind wall and ceiling light fixtures, and inside shower nozzle heads.

Your car, motorcycle, and even your own body contain hundreds of unlikely hiding places, from the tiny spaces in jewelry, to the somewhat larger and much more private bodily cavities.

Although all these places are known to law enforcement agencies, many of them would serve quite well in most police searches. There are several trick stash containers on the market today, such as phony soft drink cans. This type of thing can prove very useful, and will fool all but the most determined of police.

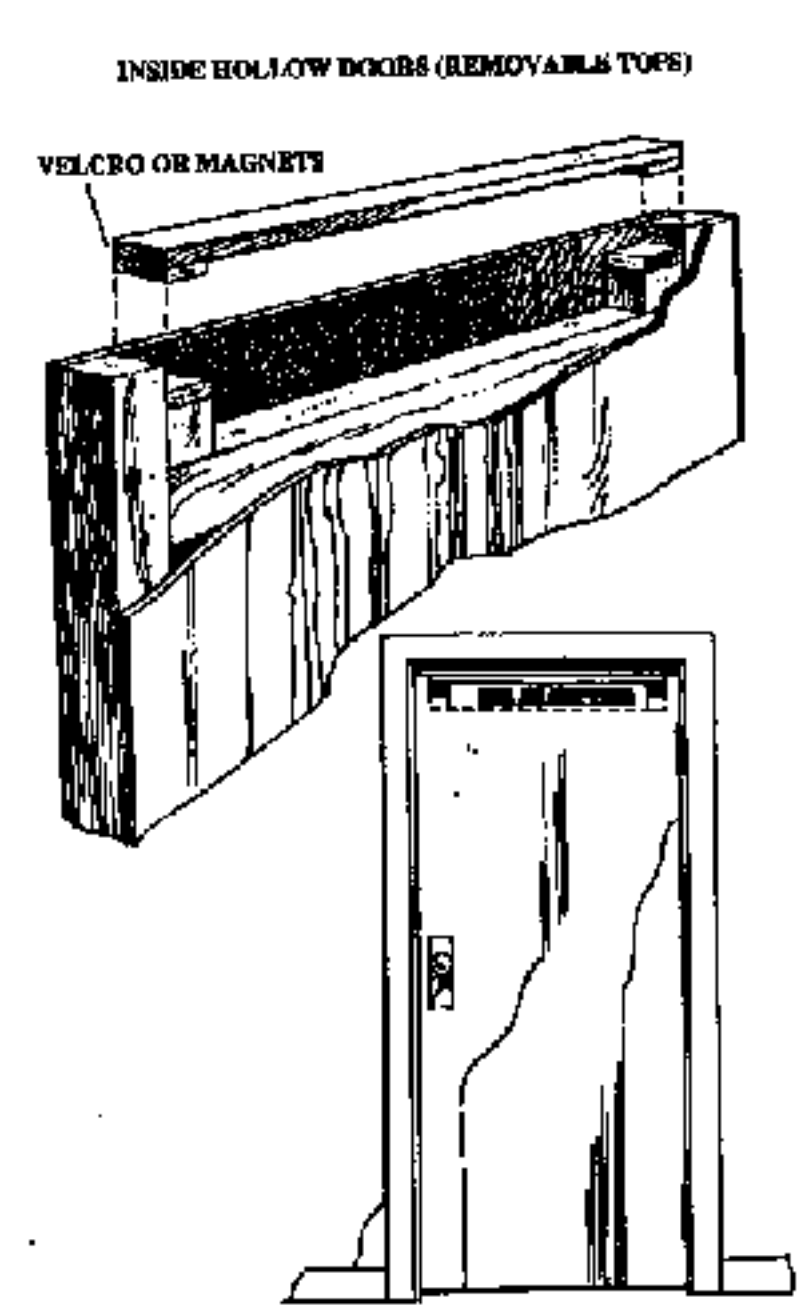
But don't try to get these hide-outs past U.S. Customs officials -- they've seen them all!

DRUG CONCEALMENT IN THE HOME

Under or in the mailbox

In flower pots and window boxes

Inside hollow doors (removable tops)



Inside door chimes and door bell

Behind plumbing inspection doors

In doorknobs

Under or in dog collars

Hanging out windows

In rolled-up window shades

On or under window ledge next door

On top of window, door sills, moldings

In fire and water hoses

In or on cellar beams

Taped to movable clothesline

Behind exterior brick near window

Inside fuse boxes

In conduit from fuse box

Inside fire alarm bell

In dog houses

In rain gutters and drain spouts

Inside abandoned plumbing

In attic insulation

Inside or under furnace

In hollowed-out tree

Within fuel of oil heaters

Under lip ring of plastic trash cans

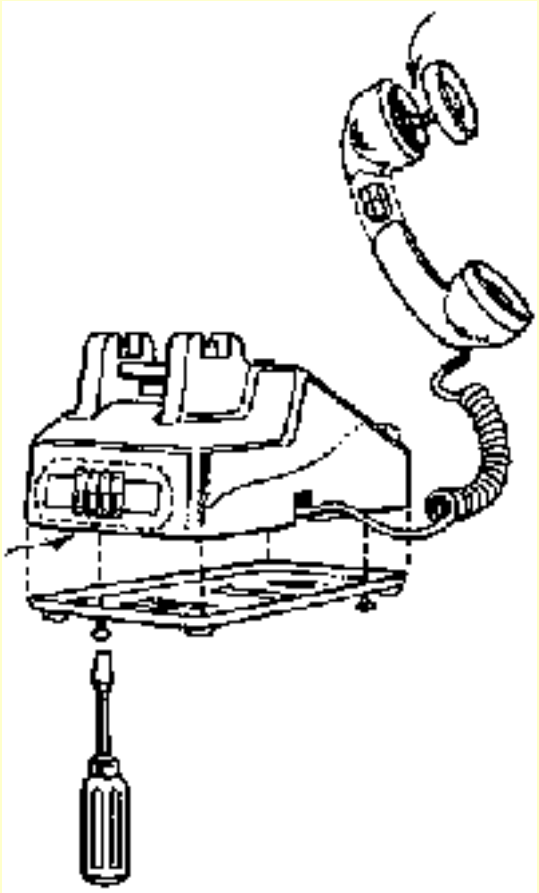
Under tile steps of backyard

Under fence post tops

Inside rabbit hutch

In pay telephone coin return

In telephone base and handle



Behind wall phones

Under telephone name plate

In clothesline pipe

Refrigerator:

- Inside fruit containers
- In eggs
- Inside mayonnaise
- Under food
- Taped under door
- Inside motor compartment
- LSD on food items

Inside garbage disposal unit

Behind electric baseboard heaters

Inside string mop

Under ironing board cover

On bottom of dog food bag

Bottom half of double boiler

In ironing board legs

Under toaster tray

Inside plastic rolling pin

Inside knife handles

In clock

In hot-air ducts

In stove pipes

In garbage bags

In bromo seltzer, cough syrup, prescription drug bottles

In baked bread, cookies, brownies, and candy bars

Built inside room dividers

Behind kick plates of sink cabinets

In stove insulation, exhausts, and drip pans

Within tea bags

Above acoustic tile ceilings

Inside tinfoil tube

Inside paper towel tube

In salt and pepper shakers

In waxed-paper dispensers

In spice jars

In all kitchen canisters and containers

In hollowed fruits and vegetables

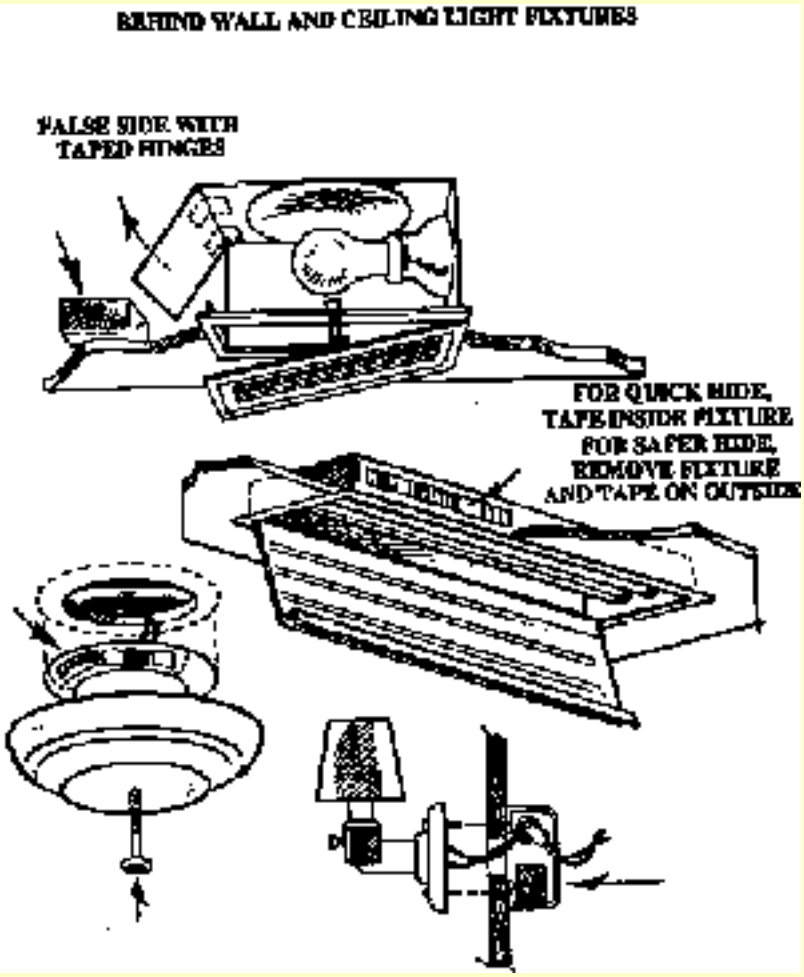
In or on chandelier

Within agitator of clothes washer

On, behind, or above Venetian blinds

In fluorescent light tubes

Behind wall and ceiling light fixtures



Inside light housing

Behind light switches

Behind light switches

Inside or behind electric sockets

In removable air-conditioning registers

In range hood and filter

Inside deep well fryers

Behind baseboards

Inside flashlights

Inside douche bags

Within sanitary napkins and in box

In razor blade dispenser

In hollowed-out flashlight batteries

Inside talcum powder, cold cream, and Vaseline containers

In electric toothbrush holder

In toothpaste tubes

In clothes hamper

Hung behind curtains

Inside false ceilings and chimneys

In or behind sink traps

In bases of lamps

Under washbowl, sink, or tub

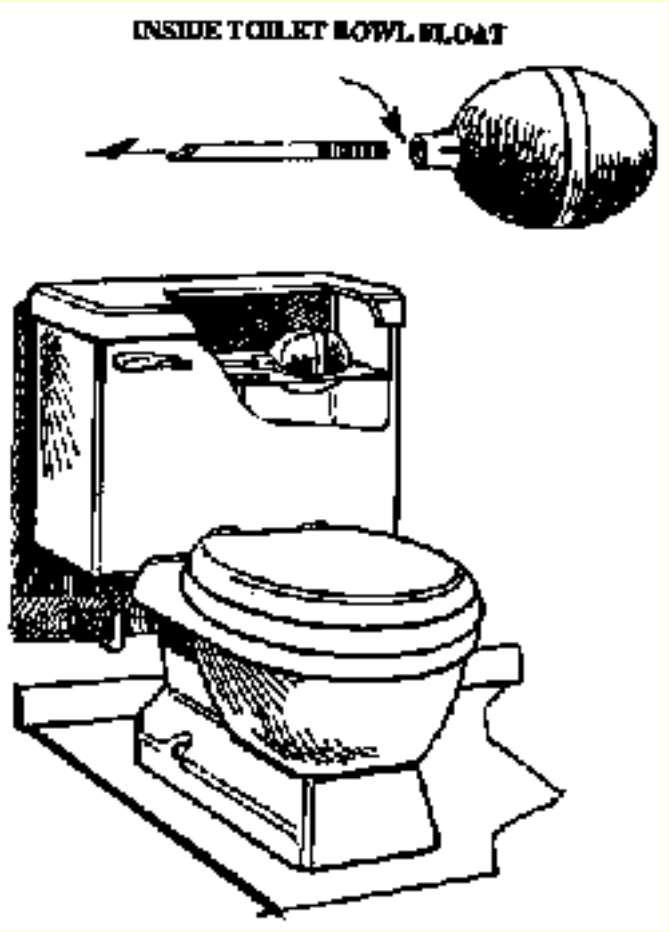
At bottom of pet litter box

Inside hollow curtain rods, shower curtain rods, and within closet rods

Under false bottom on radiator covers

Inside toilet tanks

Inside toilet bowl float



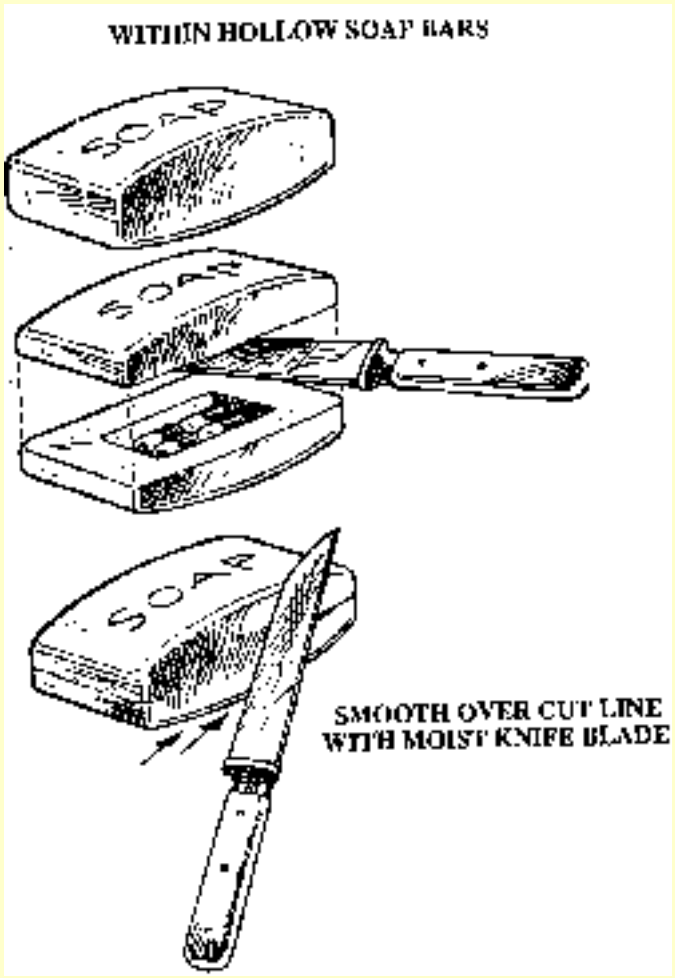
Taped to top of toilet bowl

Within false aerosol cans

In Band-aids and Band-Aid boxes

Inside stick deodorant containers

Within hollow soap bars



Under panel or parquet floors

Inside toilet paper roll

In clothes-pin bag

Inside hollow handle of toilet bowl brush

In after shave, cologne, or cosmetic bottles

Behind and inside medicine cabinets

Inside shaving brush handles

In hair dryer

In shower nozzle head

In razor blade disposal box

In or behind legs of old-style bath tub

Closet clothing:

- In waistbands
- in pens
- In sleeves
- In hat bands
- In shoes
- In gloves

Behind picture frames, posters, and mirrors

In mattresses and box spring frames

Inside pillows

Under carpets

In seams of field cots and hollow cap of cot legs

Inside hassocks

Inside and under wigs

Behind walls

In hollow bedposts

In furniture upholstery

In golf bags

In toys, stuffed animals, and games

Inside child's bank

Taped in dresser and behind drawers

Inside concealed magnet boxes

Inside zippered cushions

Inside pipe rack stand

In false-bottomed baby carriage and cribs

In footlockers

In hem of drapes and curtains

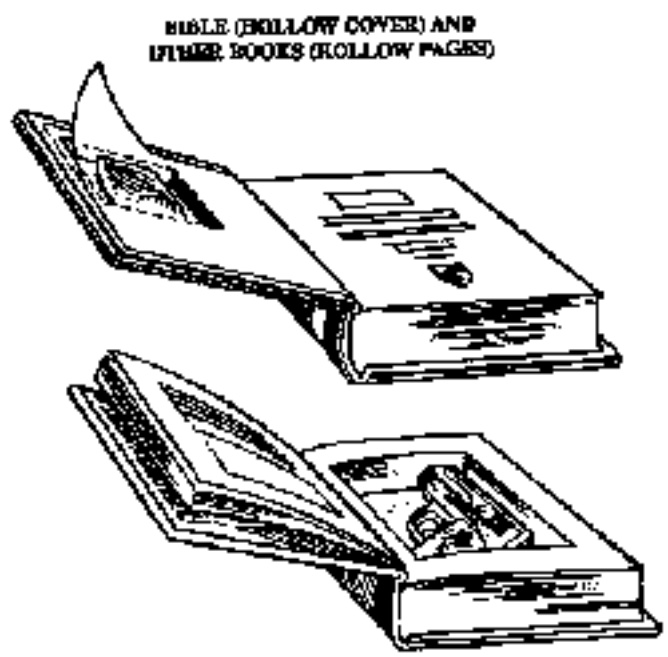
In hidden drawers in tables

Inside letters

In dolls

In art kits

Bible (hollow cover) and other books (hollow pages)



Inside jewelry boxes

Mixed with tobacco

Taped to hat or shoe boxes

LSD on or in blotter

Inside tube and barrel of air rifle

In bird cage

In typewriters and typewriter covers

Inside hollow chess players and boards

Inside hollow canes and umbrellas

In fireplace ash clean-out bin

In drops on graph paper

Inside base of rabbit antenna

Inside TV set

Inside TV antenna

Inside altered picture tube or other components

Within hollowed-out pad of paper

In surf boards, skis and other sports equipment

Inside Christmas tree decorations

Inside handle of vacuum cleaners

Inside and behind vacuum cleaner bag

In tool box

In shoe polish container and equipment

In 35 mm film cans

Inside cameras

In record albums

In fish tanks

Inside patch trap of antique rifle

Inside rifle cartridges and shotgun shells

Behind rifle butt plates

Inside carpenter's toolbox

Inside candlestick holders

Inside ceramic and clay figurines

Inside rolled-up newspaper

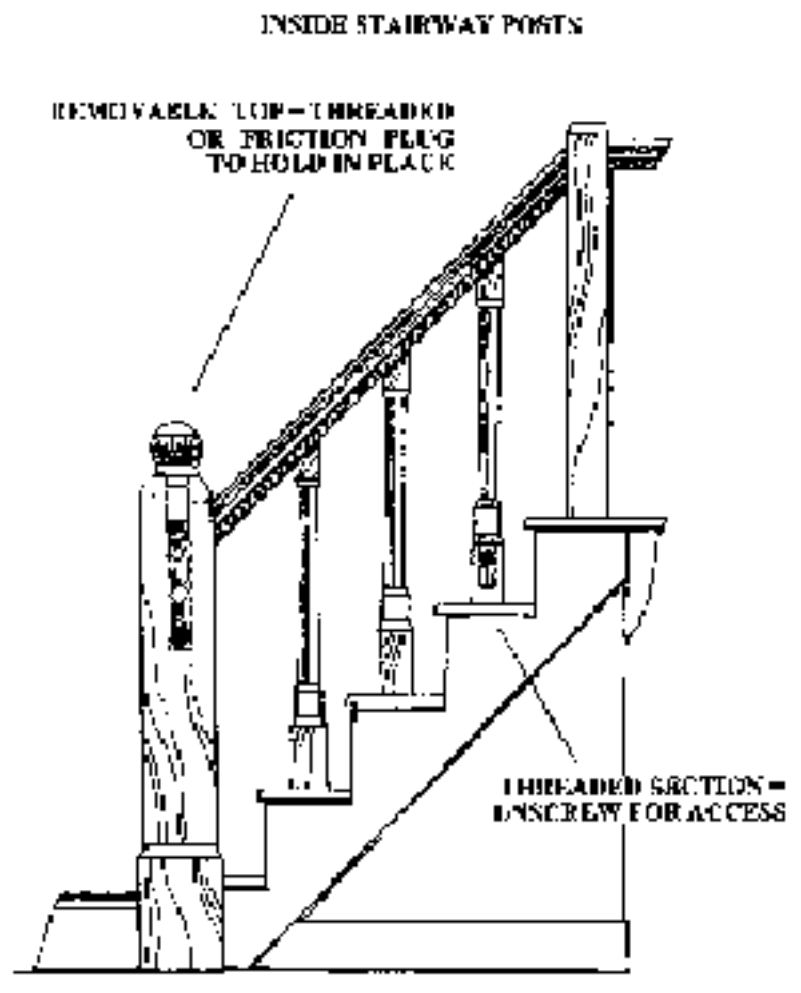
Inside trophies

In test tubes

Inside crucifix

Inside sealed and opened cigarette packages

Inside stairway posts

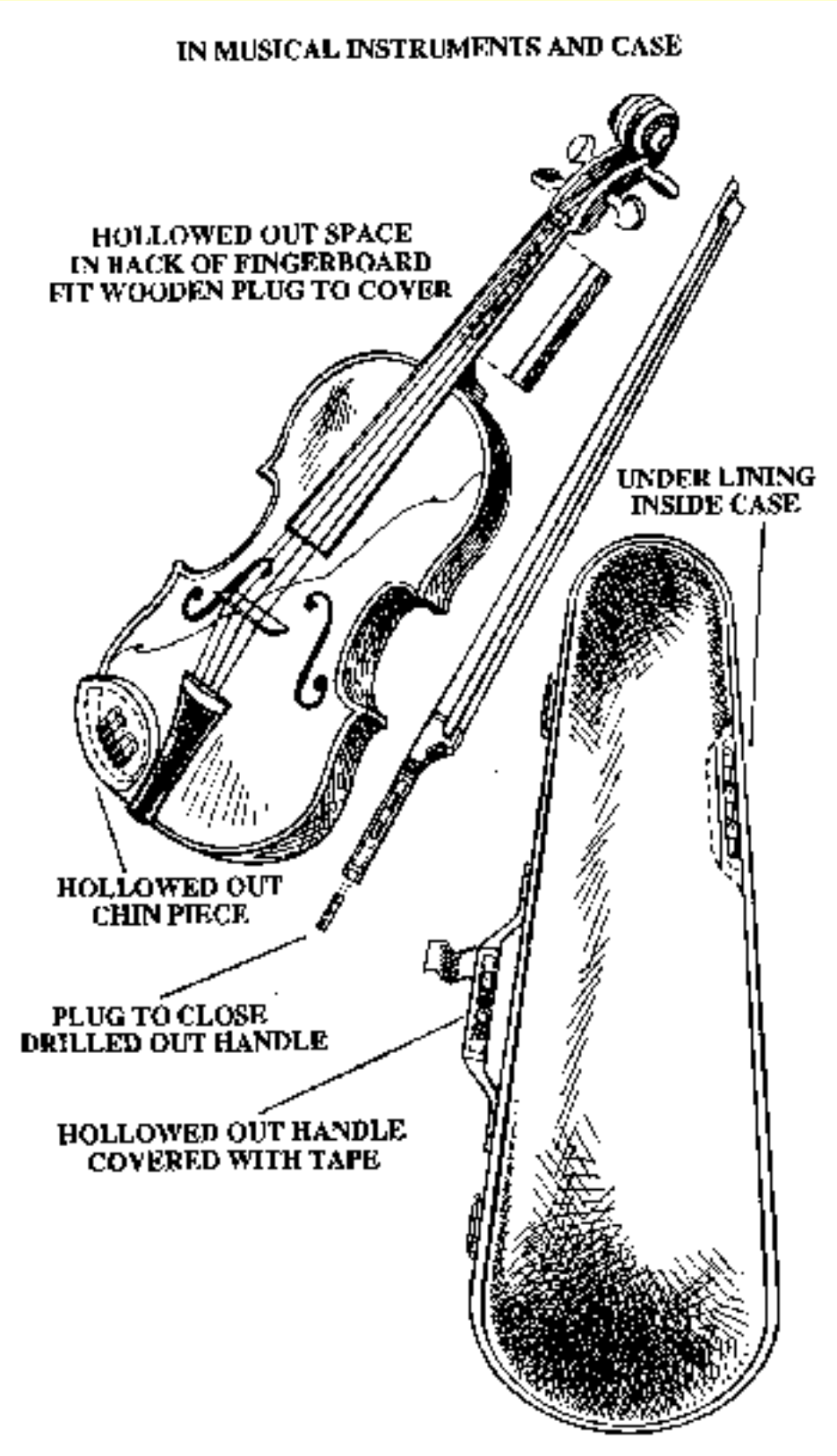


Inside transistor radio

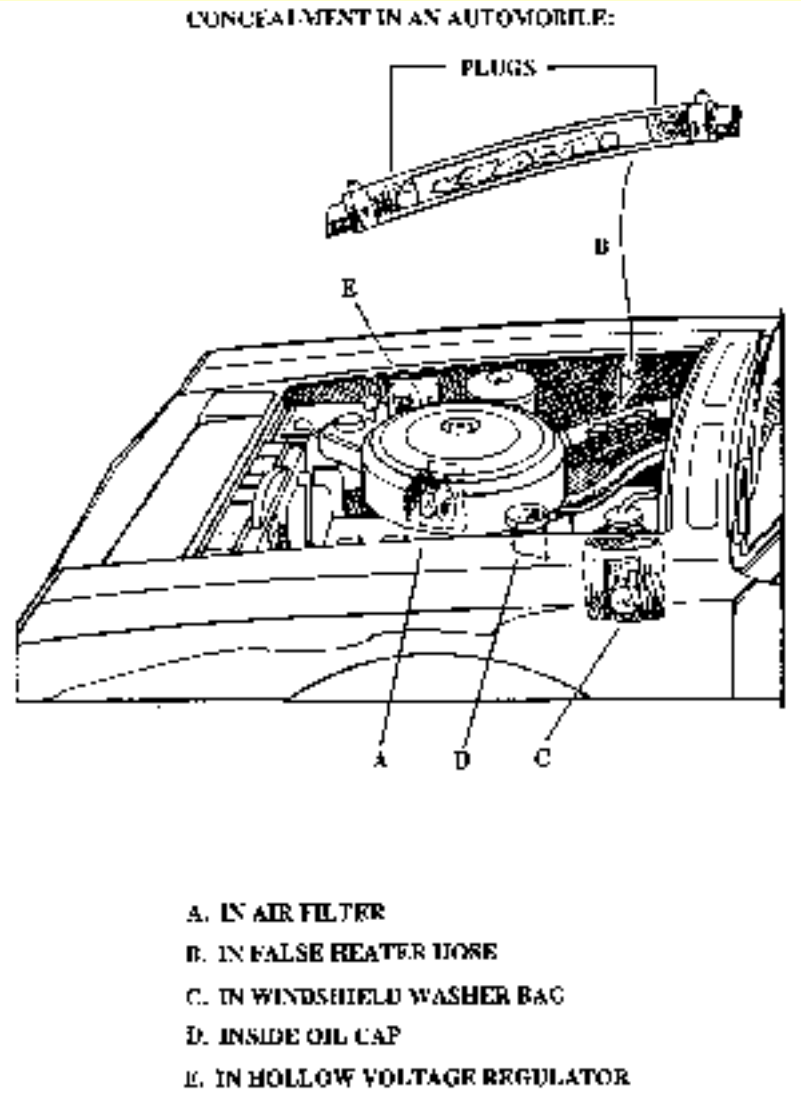
Inside speakers

Inside other stereo components

In musical instruments and cases



CONCEALMENT IN AN AUTOMOBILE



Inside horn

In air filter

In false heater hose

In heater

In false battery

In oil filter

In windshield washer bag

In carburetor

Inside oil cap

In false dual muffler

In hollow voltage regulator

On top of gas tank (suspended or concealed in compartment)

In 35 mm film cans

Under rocker panels

Tied to axle

Underside of fender

In tail pipe

In insulation under hood

Under chrome

Behind Volkswagen battery box

Inside trunk lids

Inside tubing on roof racks

Inside tubing on surfboard or ski rack

Under tire air valve caps

Taped behind bumper

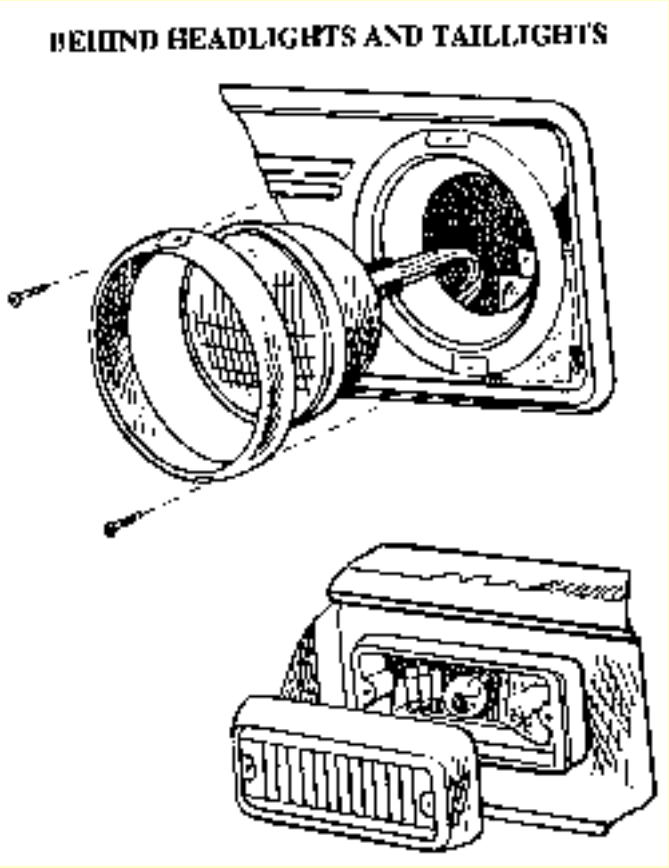
In antenna base

Taped to rolled-down window

Behind license plates

Attached to frame of car

Behind headlights and taillights



Within hub caps

In picnic jug in trunk

In double roof of surplus police cars

Within spare tire and tire well

In convertible top

In trunk

In fuse box

Under false bottom of trunk beds

In cigarette lighter

Under floorboards

Under front seatUnder back seat

Within vents (air and heater)

In glove compartment -- top of compartment or trap

Within door

Behind radio speaker grill

In shift knob

In steering column

In dome light

In and under ashtrays

Inside key case

In service station travel kits

Under brake and gas pedals

In or behind sun visors

Under carpet

Behind or within false radio

Inside a hide-a-key container

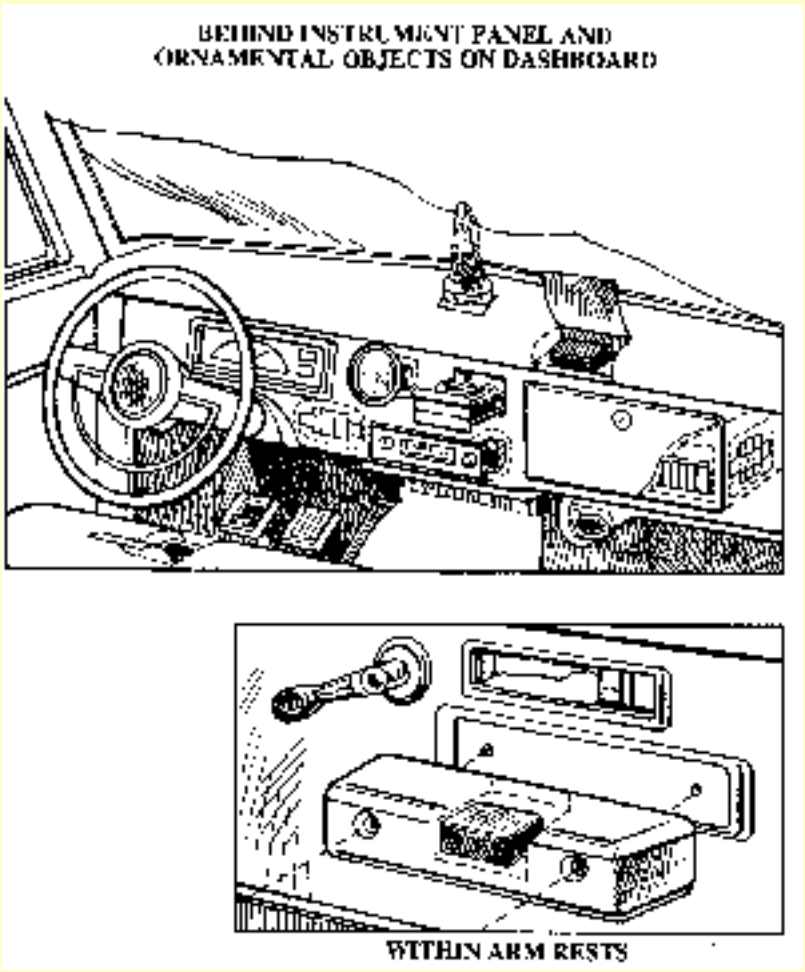
Pill vials

Under floor mats

Within upholstery

Behind instrumental panel

Under ornamental objects on dashboard



Within compartments under floor of older VWs and Jeeps

Inside floor consoles

Inside dash knobs

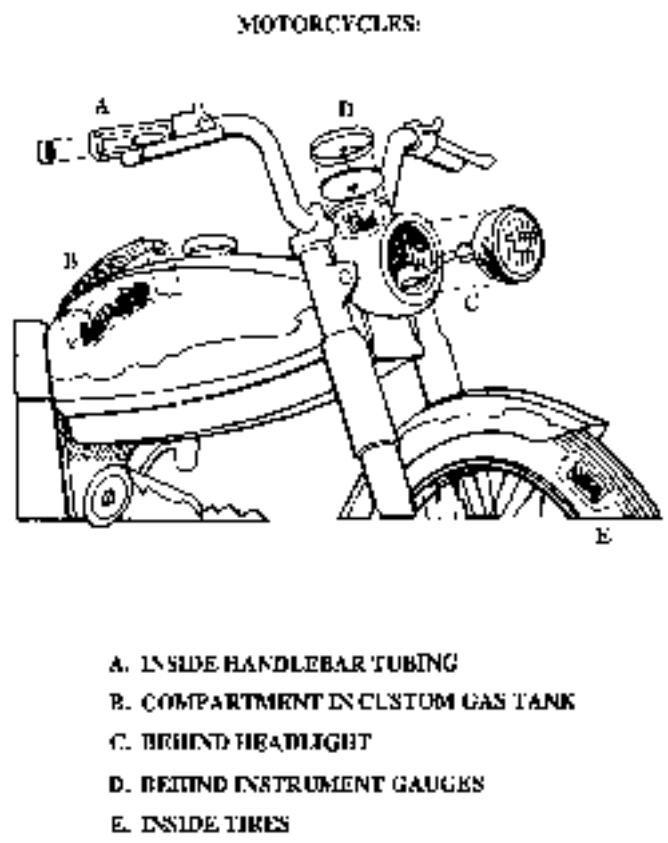
Within arm rests

Inside flashlight

Inside toolbox

Inside light sockets

CONCEALMENT ON A MOTORCYCLE



Behind taillights

Under seats

Inside handlebar tubing

Inside battery box

In toolbox

Rolled up inside sleeping bag or other carried items

Concealed compartment in custom gas tank

Inside lining of motorcycle helmet

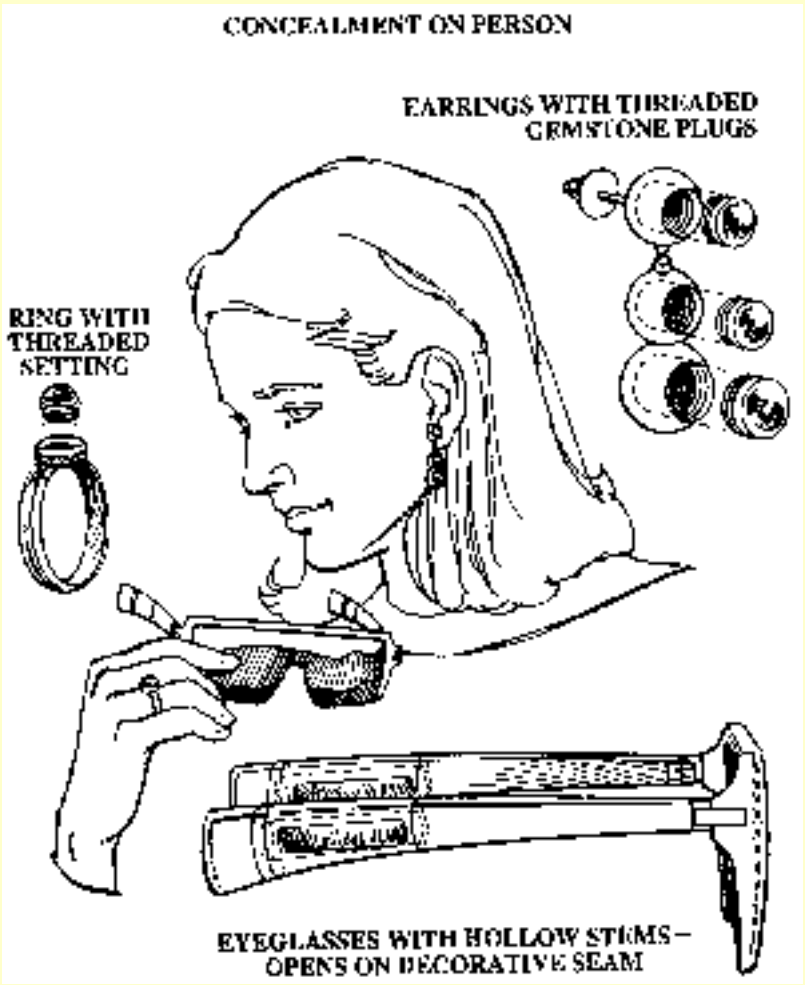
In concealed pockets in padded clothing

Behind headlight

Behind instrument gauges

Inside tires

CONCEALMENT ON THE PERSON



Inside false caps on teeth

Swallowed with string tied to teeth

Under false teeth

Loose in mouth

Behind or in ears

In glass eyes

In nose

Taped under breasts

In brassiere

Under Band-aids and bandages

Within rectum

Within vagina

Between cheeks of buttocks

Under foreskin of penis

Inside feces bag

In false leg, arm, foot, etc.

In or behind womens' hair barrettes

Under processed hair, hair buns, or wigs

In hearing aids mounted on eyeglasses or within ears

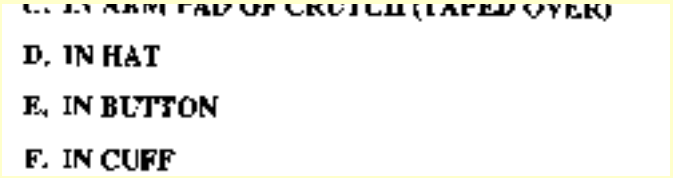
In earrings

In rings

Inside neck and wrist lockets, bracelets, and charms

Inside ID bracelets

In plaster or plastic casts



Under hat bands

In hats

Under military cap insignia

Under lapel and shoulder patches

Behind campaign ribbons and uniform brass

Hashish in love beads

In fountain pens

In money belts, slit or zippered

In tie pins, clasps, and cuff links

In lining of clothing

Within false buttons

Under lapels of jacket and coats

Inside back of watch

In pockets

In eyeglass case

In corsets

In tie knot of tie and handkerchiefs

Jockstraps

Wallet

In hollow belt buckles

Inside fly flap of trousers

Pinned to shorts

In swimming trunks

In male or female girdle

Inside cuffs and waistbands

In socks and shoes

In baby's diapers

In lipstick tube

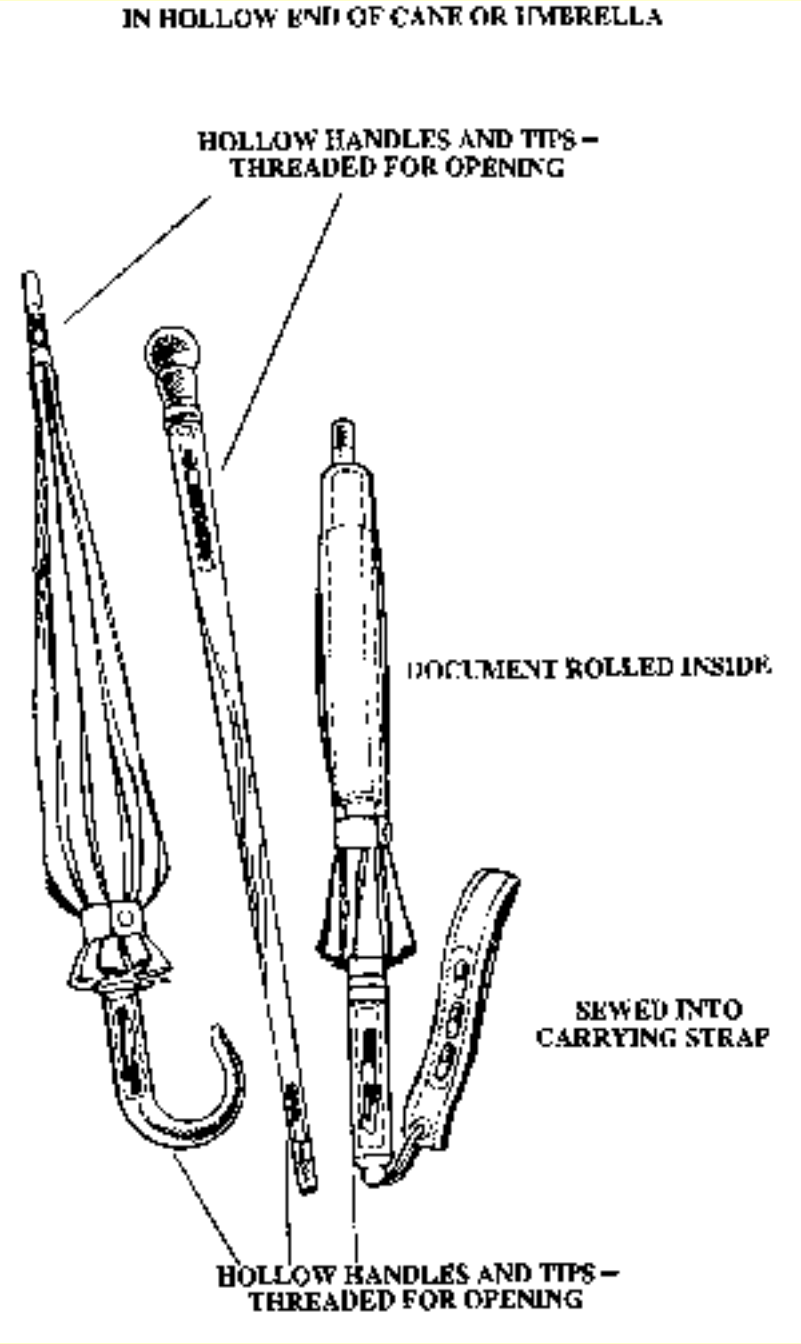
In tobacco tins and pouches

In cigarette package

In cigarette lighters

Inside hollowed-out crutches

In hollow end of cane or umbrella



Inside feces bag

In Thermos jug cavity or lining

In canteens

In addressed envelopes

Within liners of luggage

KNOW YOUR RIGHTS

How to Deal with the Police

It is important to remember that the reason the police are dealing with you may end up being explained to a judge or jury in a courtroom. Police officers are trained to write down what people say and to repeat what they have heard later from their notes and reports. Most people do not write down what goes on between them and the police and they are at a disadvantage when it comes time to recall who said what several months or even years later.

So how do you deal with the officer who comes up to you on the street and says "Hold on, I want to talk with you?" Your first response might be, "How can I help you?" or it might be "What do you want?" The first example sets a better tone with the officer and lets her know that you are willing to talk, at least at first. The second example is more hostile and will be taken as a challenge to the officer's authority. The first response might very well lead the officer to say, "We're investigating a burglary that just happened down the street and want to know if you saw anything." The second response may make the officer say, "Turn around and put your hands on the wall," followed by a pat down search where the officer searches your clothing for weapons which may be used to harm her or others. That will be followed by, "What's your name and lets see some identification?" How you respond will often determine what happens next.

The basic rules after your first contact with an officer depend on what you might have done (which you know about) and what the officer thinks you have done (which you may not know about). If you get the sense that the officer wants to talk with you because he thinks you might be involved in criminal activity, then it is important to remember that the officer does not have to warn you of your constitutional rights unless she arrests you and intends to ask you questions.

The famous *Miranda* warnings go like this, **"You have the right to remain silent and not say anything which might incriminate yourself. Anything you say can and will be used against you in a court of law. You can stop answering questions I ask you at anytime. You have the right to have a lawyer with you when you go to court or during questioning. If you cannot afford a lawyer, one will be appointed for you."**

Officers do not have to give these warnings unless you have been arrested and they intend to ask you questions. This means that anything you might say or write, before you are arrested, can be used against you in court. Many people have received lengthy prison terms because of what they said or wrote before their arrest. Many people have talked with police and admitted to criminal activity while on the street and paid the price for their ignorance of the law with a long stay in prison.

The advice contained in the warnings applies to all police-citizen contacts. If approached by an officer, you do not have to answer any questions she may ask you, even if you are not arrested. You are perfectly within your rights to say to the officer who asks to speak with you, "Officer, I do not want speak with you. Good bye." At this point you should be free to leave the officer's

presence. The officer may not like this and may challenge you with words like, "If you have nothing to hide, why won't you speak to me?" Just like the first question, you do not have to answer this one either.

If you refuse to answer the officer's questions, she might take the next step by saying, "You will have to stay here and answer my questions" or "You're not leaving until I find out what I want." If the officer restrains you by words or actions, such as putting you in a squad car or in handcuffs, then she must give you the *Miranda* warnings, if she intends to ask you questions. If she just wants you to sweat, she may not give you the warnings at all and just take you to the station, just to show you who is the boss.

If you are not free to leave, you have been arrested, whether or not you are taken to a police station. If the police have arrested you, that means that they have enough information to believe that you are at least a suspect in criminal activity. Under these circumstances, you should follow the advice of the warnings and refuse to tell the officers anything unless you are provided with a lawyer. After telling the officer your name and date of birth, you should say, "I will not answer any more questions until I have a lawyer present." This may mean that you will spend a little bit longer time in jail until you can call a lawyer, but it will be worth the wait. You will not be able to successfully talk your way out of police custody, once you are arrested, without a lawyer's help.

Sometimes the police arrest people on suspicion, hoping that they will confess or make a statement which can be used against the person. Often, the police will tell the arrested person that cooperation with them is best and it will go better for them if they cooperate by talking. Remember, talking and writing are the same and you do not have to sign a written statement before it can be used against you.

Officers may promise shorter sentences and other deals for statements or confessions. The police cannot legally make deals with people they arrest. The only person who can make a deal that can be enforced is the prosecutor, and he should not talk with you without a lawyer present who represents you.

It is legal for the police to lie to you about what they know or suspect or what other people have said about you. The police might try these or other tricks to get you to talk. Police often do not tape record or videotape interviews with those they arrest. If you talk with them, it will be your word against the officer's word about what you said. You should refuse to talk without a lawyer present to represent you, no matter what the police say. A weekend spent in jail waiting for a lawyer is better than a lengthy prison sentence spent because you talked to the police without a lawyer to help you. Trying to talk your way out of the police station by telling the police what they want to hear or by telling a lie will always do much more harm than good to your case.

The only exception to this rule is if you are arrested for drunk driving. Then, you will need to figure out if you want to take a breath or chemical test, as required by law. If you refuse to take such a test, after being arrested for drunk driving, your driver's license can be revoked for a year or more for refusing to take the test.

If you have been arrested for just drunk driving, it may be advisable to take the test. If you were involved in an accident where people were killed or seriously injured, it may be advisable not to take the test and suffer the revocation rather than give the police evidence of your possible intoxication. In either event, the police do not have to let you speak with a lawyer before taking the test. If you tell them that you will not take the test without a lawyer present, they will treat your comment as a refusal and so will the court.

Remember, in most situations you are under no obligation to talk with the police. If you are arrested, then you should immediately ask to have a lawyer present and you should not say anything to the police until a lawyer who represents you is present.