THE SPOOK BOOK

A Strange and Dangerous Look at Forbidden Technology

Mick Tyner

hearing is said to span 20 Hz to 20,000 Hz. High fidelity recordings demand the widest response we can get. But for surveillance work, which consists almost entirely of intercepting the human voice, we seek to limit the response to the range of speech fundamentals and overtones, and to exclude bands that would interfere, such as wind-noise or 60-cycle hum.

Whatever the range of frequency response, we seek smoothness. Refer to the diagram. It shows two microphone response curves. The first is smooth, with little deviation from flat at most frequencies. The second shows a nasty "peak" at about 3 KHz. This causes a harsh, tinny sound that makes listening tiresome.

Second, how sensitive is the mic? In other word, for a given sound level, how much electrical output can we expect? In scenes where prized sounds may be mere whispers, or have traveled from afar, we seek the most sensitive mic that does not sacrifice other performance variables.

Third, what is its signal-to-noise ratio (abbreviated SIN)? Even the quietest of microphones introduce their own electrical noise, typically hiss-like. This emerges as a problem when the amplitude of the mic's own noise looms large relative to its input signal. This specification is usually expressed in "dB" or decibels. The SiN ratio tells the number of decibels louder than the mic's noise the input signal measures.

Some compact disc players quote a phenomenal SiN ratio of 90 dB. The appliance itself makes no noise audible to humans. Vinyl records, on the other hand, clock in at 50-60 dB. In quiet passages their hisses, clicks, and pops sound like "Rice Crispies" cereal, but a SIN figure of 50 dB is not bad when talking surveillance gear. Typical condenser mic cartridges claim SiN ratios of 38-42 dB, not that great. When added to the noise of high-gain preamplifiers, we cannot escape annoying hiss.

Note also that noise accumulates with each stage: mic noise, preamp noise, processor noise, amplifier noise, and tape recorder noise, particularly if we must use shoddy gear or dub the tape. This points up the advantages of digitizing an audio signal as early as possible, since we can process or dub infinite generations of digital data with no decline in SIN ratio when we return it to analog form. See section below on the ominous specter of digital sound processing.

Fourth, what is the mic's impedance? Impedance refers to net resistance to flow of alternating current, usually at a specified frequency, such as 1000 Hz.

Mics fall into one of two impedance categories, high and low. High impedance mics suffer a potential shortfall in that their high frequency response falls off rapidly in long runs of cable, a problem low impedance mics do not share.

Low impedance generally means anything from 50 to 600 ohms, high covers 5000 to more than 20,000 ohms. Most dynamic and condenser/electret mics are low-impedance devices, while crystal and ceramic mics are high-impedance. Some mics come with tiny transformers built into them such that impedance may be toggled high or low at the flip of a switch.

For spook work it is not so much the mic's absolute impedance as it is the need that we closely match it with interfacing machinery, or suffer a loss of signal or a decline in SiN ratio. Lousy function blamed on the electronics often traces to mismatch between amp and mic or other source.

If a mic and its interface do not match, use a transformer to match them. Take the example of the single-tube directional mic described below. Its mic is in fact a 3" speaker whose impedance measures about 8 ohms; but the input impedance of the amplifier rates about 1000 ohms. That explains the interposition of a transformer that matches the impedance of the mic to that of the amp. Without it, tests showed a sharp drop in performance. (If we chose a mic whose nominal impedance rated 1000 ohms we could dispense with the transformer.)

Fifth, how durable is the mic? How does it hold up under environmental changes of humidity, temperature, and shock? Dynamic and electret mics have proven sturdy and stable in most respects.

Sixth, how large or small is the mic? Refer to the mic photos, and note that hearing aids use mics smaller than the smallest we have shown here, a Panasonic WM-62A.

property of coherence. Stated another way, it's light of a single wavelength, marching in step, as it were. Sunlight and other sources of white light contain the entire visible spectrum, as passage through a prism will show.

The laser's special properties that suit it to bugging lie in its near-inconsequential divergence over vast distances; power, which enables use at those distances; and invisibility in the case of infrared and ultraviolet lasers.

We have seen that one bugging method calls for an audio signal to modulate the output of an infrared diode. These changes in intensity can be picked up at moderate distances, demodulated, and processed as desired.

But the IR bug is active in the sense that it demands a mic inside the target premises, or at least a limpet mic hugging the wall or window. The laser bug is deemed passive because all working components lie outside the target.

Laser light bounces off surfaces. A thin, highly reflective mirror modulated by the voices of targets would make the ideal reflector, but we find few such surfaces accessible to the deadly beam. Windows have been primary targets out of their reflectivity, thinness, and outside visibility.

We beam the laser at a window. Since the window vibrates as the pigeons inside speak, reflected laser light carries these modulations. We detect the reflected light with apparatus similar to that used for the IR bug, and demodulate the signal to extract the audio.

Angle of incidence can vary widely without degrading performance. The laser source could be mounted one location, the receiver at another, though finding the beam poses problems. Ideally, laser and receiver mount coaxially on a single unit, but this limits the angles from which we may shoot the target window to near-perpendicular in two planes.

Use of a visible laser at night carries risk if the target is familiar not with laser listeners, but with laser sights used on guns. He may spot that telltale red glow on the curtain and take you for a sniper. And who knows what breed of executive action that might prompt?

Experimenters would be advised to begin with visible, low-power lasers, always bearing in mind that even these can cause permanent eye damage. (Experimenting with lasers is a craft unto itself, with safety precautions for experimenter and bystanders, special goggles to buy, and the like. Master laser safety before trying the bug.)

The laser bug has been around long enough to have seen several sinister refinements. First, it's been found that window-glass is by no means the only surface that will suit the needs of the principle. Shiny objects inside the house can offer better reflectivity, and are less likely to be screened with white noise generators attached to them. Second, surfaces not ordinarily considered reflective have proven adequate for laser listening-walls, doors, and so forth. Third, we need not limit the technique to fixed structures such as houses or offices. Moving cars, reflective objects near marks engaged in conversation, and so forth have been targeted, though techniques involved lie beyond the financial reach of hobbyists. (Hint: For years, the military complained that the major roadblock to genuinely effective laser weapons lay with lack of an aiming system that would fix the beam in situations where both target and laser were moving. Airborne lasers have downed incoming Sidewinder missiles aimed at them. Breakthroughs in aiming high-power lasers could just as readily serve eavesdropping.) Fourth, in theory, the laser bug will work at frightening distances. One of the first experiments conducted with lasers bounced the beam off the moon. A range of several miles with Class IV (i.e., powerful) infrared lasers should surprise no one. We have to wonder whether this equipment nestles aboard our latest generation of spy satellites, to track conversations inside cars with a beam bounced off the roof. Digital audio processing has expanded the laser bug's potential by eliminating former noise obstacles.

To counter the laser bug, several firms market white-noise generators designed to stick on windows at risk. They modulate the window just as any sound would, only more strongly, making it difficult but not impossible to extract conversation.

company has been around, their reported experience, whether they offer follow-up or other help after the sale.

Kits with all parts, and most important, an etched and drilled printed circuit board, will save many headaches. Matching components on perfboard to a schematic diagram has brought on many a migraine.

KNOWLEDGE FOR SALE

These five profiles sample what's current in the knowledge market. We chose a combination of vendors whose emphases tend to complement one another:

PANAXIS

Offering plans and kits since 1975, Panaxis Productions, under the tutelage of Ernest Wilson (no relation to John) has grown into what is probably the most comprehensive offering reviewed here.

Like many in the information business, Mr. Wilson calls upon an extensive technical background dating back to the fifties, which includes work with ion accelerators, analog computers, digital telemetry, and broadcast engineering. He has held posts teaching electronics, but has devoted his efforts primarily to Panaxis for the past 10 years, as well as serving as a broadcasting consultant.

Panaxis sells plans and some kits related to amateur radio, CB radio, various aspects of television, including scrambling; computer software, and low-power to full-power FM broadcasting. Some of the more interesting plans/kits include active antennas, anti-bugging devices, infinity transmitters, various transmitters named in the catalog as "bugs" (plans only); a transmitter for tailing autos; ultrasonic jammer, non-digital voice scrambler/descrambler; various RF sniffers, parabolic mic, electronic voice disguiser, SCA decoder, notch filters to remove hash video signals, 75,000-volt electrical defense weapon, theremin (see the discussion of proximity sensors in the Alarm section); various audio compressors-gear close to the author's heart; and a host of other plans and treatises that span an incredibly broad spectrum. Prices rank among the most reasonable we have seen, from plans up to complete kits.

Panaxis' catalog spans 34 professionally typeset pages. Any reader with an interest in electronics in general or surveillance/countersurveillance in particular should order a free copy from: Panaxis, Box 130, Paradise, CA, 95697.

CONSUMERTRONICS

What's related here reflects Consumertronics' catalog in profile, as well as hands-on experience with two items we had the publisher buy for testing. We asked all vendors for a more detailed bio than appears in ads or literature, but former Lockheed engineer John J. Williams' reply suggested that he wasn't interested unless we had national media connections. Judging from Mr. Williams' material, he's at least as deep-fringe-oriented as this awful rag••••

Ah, well. To business. Consumertronics sells hard, meaty, usable data at upmarket prices, though not unreasonable beside prices of close-to-the-edge material sold elsewhere. We've detailed its marketing of the Pakistani "Brain" computer virus in the chapter on Security and threats thereto.

Consumertronics' current catalog includes treatises on computer phreaking, phone phreaking, cryptanalysis, encryption (Mr. Williams is among those who've posted a monetary reward for anyone who can break his cipher), magnetic fields, electrical weapons, various aspects of computer programming, and automatic teller machines. Appropriate material can be bought with or without diskettes of software discussed. In addition, he offers to research topics, no matter how outre', for a fee; and solicits consultants to pay $25 to sign up as part of his consultant database. That's right: You pay to be on his list. An offering that paid Consumertronics a commission based on fees consultants actually received as a result of referrals from the firm might attract more potential members, but that's hardly our affair.

We purchased two products: "Beyond van Eck Phreaking" ($20) and "Cryptanalysis Techniques" w/diskette ($25).

Slapping the circuit together correctly on a breadboard, like laying out PC boards, proves tougher than it looks. And if you make the wrong kind of wiring error, such as reversing the polarity of the power supply, you can kiss several expensive chips goodbye.

General rules: First, keep leads as short as possible, since this will closely mimic PC board layout. Second, use insulated jumpers (a wire-stripping tool is worth its weight in platinum). Third, always double check your work before applying power to the circuit. Fourth, if the circuit fails to work when power is applied, shut it down immediately. The same holds if a working circuit inexplicably quits on you. Feel the chip(s). Some types of wrong wiring kill the chip by overheating it. Realize that 99 percent of failures trace to your own wiring errors. Fifth, curb the tendency to move leads while the circuit is powered up. As one example of how this can kill a chip, many circuits use capacitors, units which store energy. Plucked out of one socket fully charged, then plunged into another, it may dump its load into a sensitive junction that lives no more. Work carefully, power down before altering a circuit. Note that, when experimenting with one half of a dual or "stereo" chip, killing one channel might not harm the other, leaving it in shape to carryon. Sixth, long leads make for unintended shorts. Watch this carefully. Finally, do not start with some complex function generator. Make something simple, a project to give you positive feedback in the form of success.

Those who breadboard circuits soon find themselves hankering for test gear. In many cases it is all but impossible to trouble-shoot a circuit without a VOM at the least, often a digital multimeter and an oscilloscope.

Exercise great care when transferring circuits from breadboard to printed circuit board. For reasons the author hasn't been able to delineate fully, projects that blew your socks off on the breadboard either lose it on the PC board or don't work at all. We encountered vexing problems with the LM382, which, after days of reconfiguring the circuit, turned out to be a partially blown channel 1. The second channel of this dual device worked fine, meaning that we had accidentally damaged the bad channel through exactly the amateurish practices the reader should avoid. If the entire channel would die completely, it would betray itself quickly; but mere parts of an IC die, leaving the rest to carryon, after a fashion, so as to mislead the trouble-shooter.

SURFACE MOUNTED DEVICES

Surveillance devices described, sold, and made using conventional electrical components are in any practical sense small enough to accomplish their task without detection due to size. Yet we must take note of increasing availability to the hobbyist of electrically identical components a fraction the size of the common variety. They are known as surface mounted devices, and have been around since the 1960s. Consumer electronics which called them to our attention were the ever-shrinking line of Sony Walkmen, and the Cincinnati Microwave Passport[tm] radar detector. SMDs are now available to the hobbyist.

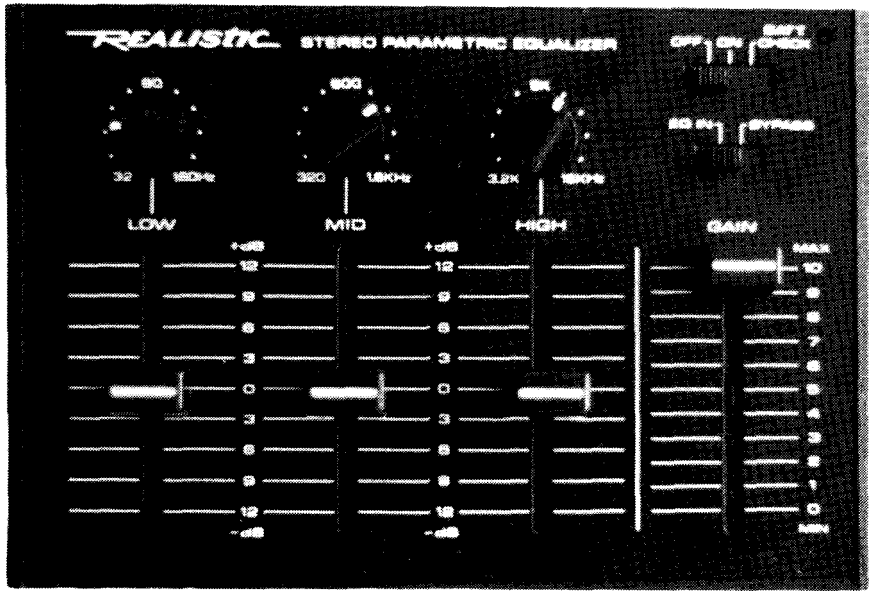
Their two vital properties are A) small size, B) soldering to the copper side of the circuit board, rather than having their leads pushed through holes for soldering on the other side (they have no leads). It is possible also to increase the density of components by printing circuits on both sides of the board and loading them with components.

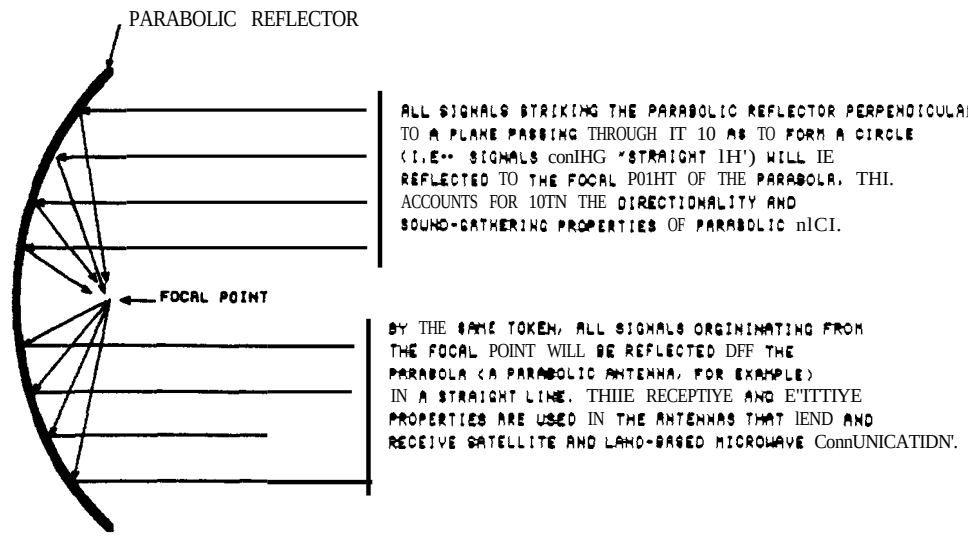
At this writing, you can purchase resistors, capacitors, variable resistors and caps, inductors, LEDs, and from some sources, ICs and transistors in surface-mount configuration. The electrical specs don't change.

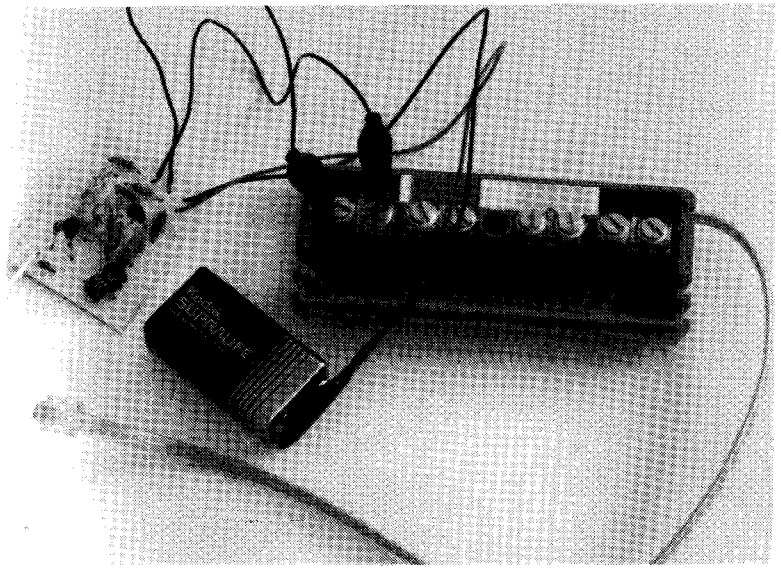
Board design, handling, and mounting change, though. You will absolutely need that magnifier, along with tweezers, micro-tipped soldering irons, some special desoldering gear•••and a great deal of patience. This can be like making a watch, the old mechanical kind, from scratch. The entire circuit board may fit behind a postage stamp.

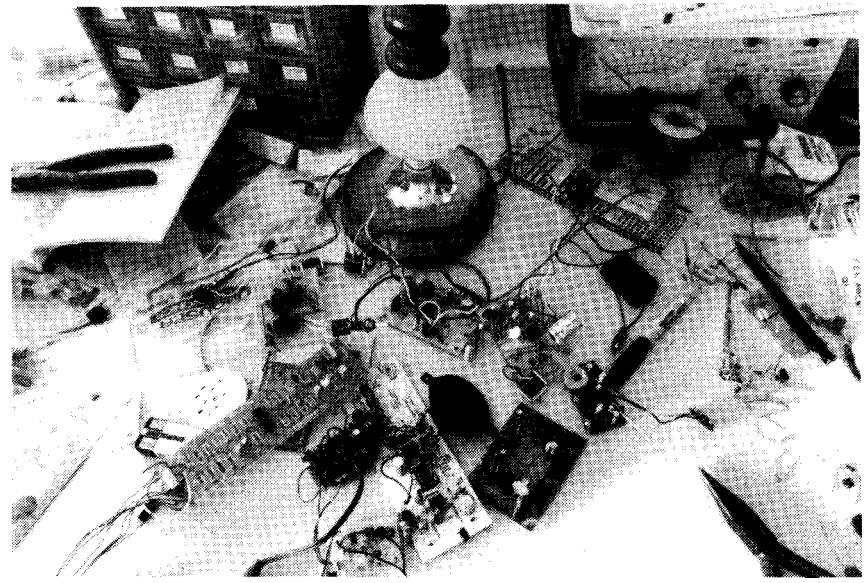
Aside from a certain novelty about them, their place in home-brew surveillance equipment has yet to define itself. Servicing is harder out of small size, as is substitution of components in experimental work.

Best to know that they are available, though, for that transmitter that has to lose about 75 percent of its bulk to escape detection.









TOP LEFT: Radio Shack semiparametric equalizer. TOP RIGHT: Illustration of certain principles of the parabolic surface. BOnOM LEFT: Experimental transmitter hooked up to modular phone block. Incidentally, in this configuration, it won't pick up a thing: both clips are on one terminal. Second clip should hook to adjacent terminal (green/red pair). BOnOM RIGHT: The wages of sin....

followed, he tested it outdoors with several types of directional mics. The amps that had offered high gain and too much of their own noise simply couldn't keep up with a unit that let the operative tailor all aspects of performance on the spot: adjustable gain, selectable compression, speech passband option (most always left in), limiter when needed, and a true parametric equalizer for tweaking to peak thrust.

If devoting a chapter to a product in development seems extravagant, it's merely indicative of the disparity in performance between other units we had bought or built prior to exposure to the awesome power of Ultra-Amp. It gave greatest gain, versatility, features, and utility under field conditions.

As this goes to press, Registry Distributing has not finalized Ultra-Amp's design, but is gearing up to sell it in either assembled or kit form (they haven't finalized that, either), with all parts, a professionally etched and drilled printed circuit board with solder mask (a coating between pads that prevents solder bridges), and enclosure. They may offer sealed headphones to retard feedback and mask ambient noise, and other goodies they asked us not to speculate about. For latest information on Ultra-Amp's availability, write: Registry Distributing, 1616 17th St, Suite 372, Denver, CO, 80202.

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AFTERTHOUGHTS ON ENGINEERING ULTRA-AMP

The bane of genuinely bad Math keeps most of us out of electronic engineering, at least engineering in the true sense of crafting a device on paper from knowledge of its behavior expressed in numbers-in essence calculating what should work before moving on to parts and boards. A professional engineer told the author that equations always come to life on the breadboard, a journeyman stage on the way to production, because what works in theory must prove itself in hardware.

What a twist that plug-it-in-and-see engineering leads inexorably back to that dread Math to solve problems in empiric design. Ultra-Amp proved a case in point. We had begun with a single-minded goal of incredible gain, achieved easily after a few false starts. But with that gain we met unanticipated problems knowledge of math would have alerted us to well in advance. For example, blocking: overload internal to the preamp that gave harsh, raspy sounds, produced by common room noises, such as footfalls or a refrigerator. With gain set high enough to capture whispers from behind a closed door we had to suffer blocking caused by louder ambient sounds.

A passband filter would not help here, since we could not place the filter in front of the preamp. Preamps excel at handling low-level, microphone-output signals-on the order of microvolts to a few millivolts. Some op amps used in active filters can handle low-level signals reasonably well, but filters aren't optimized for that task. They feel comfortable working with Illine-level" signals, on the order of 1 volt peak-to-peak (P-P). We needed to cut low frequencies at the input, using a passive component: a capacitor.

Speaker crossovers use capacitors to pass high frequencies and block low frequencies. We can calculate the point at which signals pass or block based on a knowledge of the impedance and capacitance involved. In Ultra's case, we began with the manufacturer's recommended 1 uF input cap for flat response-far too much bass-and went to progressively lower values. We found that a polypropylene cap of 0.01-0.0022 uF cut bass response acceptably. Note that slope here rates only 6 dB/octave, such that we had to start rolling off response several octaves above the problem region, at the cost of some speech-band signal. But since we had a plethora of gain to start with, this proved no hindrance.

It turns out that chip-makers have designed their preamps to allow a modest degree of frequency-shaping. Though we cannot achieve the spectacular roll-off rates of active filters, in many cases we can adjust the high and low frequency response at the input to reduce system noise and eliminate other bugs, such as blocking. At first glance, Application Note 64 on the LM381 looks like a nightmare out of some college math text. On closer inspection we find: A) that those grim equations tell exactly what value of components will alter gain and frequency response, and B) that the average financial calculator makes duck-quiche out of solving them. Equations hide the power built into a chip. Math unleashes it. It hands us the quickest solution to what would otherwise prove a problemito.

It goes without saying that impounding film in your car's glove box on a hot day kills it as dead as Raid kills bugs. And if you left the camera in there too, kiss its microelectronics goodbye.

Though you can safely load most films in ordinary room light, it pays to play safe by doing so under the darkest conditions feasible. All film cartridges leak light to some extent. The briefer the exposure the less likely you are to lose prints.

Once exposed, get the film developed as soon as possible. In addition to yielding best results, this practice minimizes the odds of a loss or theft. For genuinely important film, bypass the drugstore for a custom photo shop: Nobody assumes liability for loss except as to replace the film. Your pix may be gone forever. Some mass photo labs have become notorious for losing customers' film. (And if the subject-matter is delicate, either go to a reliable custom processor out of town, or front for your own darkroom....)

AUTOWINDERS

The trend today leans toward built-in autowinders in most mid-to-upper-level 35 mm cameras, with continuous shooting modes that range from 1 to 5 frames a second. Outboard autowinders are available for most older models, at modest prices.

For surveillance work they are worth their weight in Haagen-Dazs. That quick flip of the thumb to advance the film and cock the shutter usually takes the subject out of the viewfinder and may wreck the focus if you are using a cat.

EXTENDED FILM MAGAZINES

Those who have dabbled in surveillance photography find it axiomatic that the incriminating shot escaped while they were reloading film. Thirty-five mm film cartridges sold in most camera shops hold 36 frames, tops; yet pros know that there are available magazines that will hold 100 frames or more. Be aware of the existence of these larger magazines for situations that call for a prolonged and unpredictable series of sequential shots.

FILTERS

Amateur-going-on-serious photographers discover that their photos bear a washed-out look compared with profession pix, or that pictures taken with outdoor film under indoor lighting affect an unnatural orange cast.

The solution to these and a host of other problems lies with filters-transmissive plates screwed onto the front of the lens. For long telephoto work, especially with the requisite high-speed film, the most needed filter will be the UV/haze, which filters ultraviolet light. The human eye cannot see ultraviolet spectra, but these rays tan/burn sunbathers. They happen also to expose film, even though we cannot sense the wreckage as it happens. This leads to a fogged image. A UV filter remedies this and offers a plus in that "haze"-the longer the distance the greater the atmospheric haze-magnified by telephoto lenses, contains much ultraviolet, reduced through use of this filter. (When using B&W film and shooting from extremely long range, the ultimate haze-killer is a red filter.)

The UV/haze filter is almost a must for several reasons. Some high-speed films show higher-than-average sensitivity to ultraviolet light. Second, long distances bring atmospheric haze in as a problem to be reckoned with. Finally, UV/haze filters protect expensive lenses from spatters and dirt that would otherwise shorten the lenses' lives. Some hold that a UV filter should be bought with every lens and left in place more or less permanently. Better that you should clean a cheap filter than a $600 multicoated lens.

As an instructive exercise, take your 35 mm camera and some 400 speed color print film, and get a UV/haze filter (about $10 for a generic brand, unless you want to shell out more than $50 for a Nikon). Set up a tripod and take pictures under a variety of outdoor settings, and indoors with flash, both with and without filter. Use a long telephoto lens for outdoor work if you have one. Even with computerized commercial processing which tends to compensate for some glare, you will notice a distinct heightened clarity of the filtered product. As a freebie, these filters do not reduce the amount of visible light transmitted, as most other filters do. That means no slowing of the shutter speed in fast-moving gigs.

TRY AGAIN USING A DIFFERENT PICK

Once you have worked up to 5 pins, using only the lifter, have gained proficiency and confidence, you may experiment with other picks in your set. Try the diamond and compare its feel to that of the lifter. Try the rake/snake or the circle. You may find that different picks work better with different locks. Ideally, repeat the mounted-cylinder exercise pin by pin with each new pick. Try the two basic types of tension wrenches (thin and thick, for different size keyways).

Try other methods of applying tension. Some authors recommend using a rubber band, one end attached to a thumb-tack stuck in the door, the other hooked on the end of the wrench, to maintain fairly constant tension. Others advocate attaching small weights to the end of the wrench. A closet lock-student since 1977, the author has never had to resort to these techniques, though some highly qualified people commend them.

COMMON MISTAKES BEGINNERS MAKE

First, different locks demand different technique, certainly. But for the bulk of non-resistant locks encountered in condominiums, office buildings, and lock boxes, these rules work well:

Use proper grip. Hold the handle firmly, and move the entire pick up or down, as needed, rather than attempting to pivot the pick. When working a single, rear pin with a lifter, pivoting may be the only way to avoid upsetting the pins in front of it. But as a rule, the best technique keeps the long axis of the pick parallel to the bore of the lock. This demands a firm grip that quickly cuts your flesh if the pick lacks a rounded or padded handle.

Second, do not let the pick twist. This is easier with thicker picks than with thin ones, but you will probably find the thin picks more effective because they fit into cramped keyways. Twisting side to side defeats the lifting action, and, if you happen to be raking, galls the metal. So, not only must you tense the muscles to hold the pick rigid in a horizontal plane, you must not let it rotate while you lift the pins.

Third, early successes, especially with rakes on the 5-pin "beginner" locks in bench testing, will tend to condition you to lifting the pins all the way. As long as it works, fine. But you will meet locks whose shear-points hit with only slight lifting. That means that pushing them higher will only frustrate you. The lock used on the filing cabinet shown in the photo, a simple 4-pin or wafer, was of that type. It finally yielded when the lock student altered his approach to lifting just a little, rather than all the way.

Fourth, beginners become frustrated easily. Their reaction is A) to sweat, B) to tense up, and C) to bend the tension wrench into a bow from which it never springs back. Getting tense, making jerky movements-experience shows that these never succeed. Patience does. If things aren't working, change your approach systematically: pick the center pins, then the rear, then the front, or some combination other than the obvious back-to-front. Alter tension. If using a rake, note that it's likely to have different actions upside down, so turn it over. Persistence pays off, as does adaptability. You lose nothing by altering your approach.

Fifth, change the tension wrench. Most small sets give you a thick wrench and a thin one. For some locks, the thick wrench won't let the pick maneuver. For others, the thin will be too small to apply any force at all. If one doesn't seem to work, try the other.

The photos are posed, obviously, but the woman who belongs to the hands picked each lock she attacked. If she can do it, so can you. The locks to the alarm box (4-pin), a desk drawer (ditto), the office back door (5 pins, but they practically pick themselves) and the mailbox (another 4-pin) are yours for the taking, even with suboptimum tools, should you accidentally lock yourself out. (As a proper solution to that, secrete spare keys where you can get them quickly in case of a lockout.)

BUT WHICH WAY DOES IT PICK?

Those who have taken on locks know that they prove impossible to pick in one direction, often the "unlock" direction, yet open fairly smoothly in the other, or "lock" direction. That means that, unless you know which way the brand picks to open, you should give both directions a good go before slipping the bumper-jack into the doorway.

PADLOCKS

As a rule, if you plan to defeat a padlock, and do it quickly, get a pair of bolt-cutters that will fit the size of the hasp. Sure, picking, rapping, springing and so on may impress us with their finesse; but finesse is very different from results. And bolt-cutters can do double-duty if you have to fade through a chain-link fence after the caper••••

CHOOSING AND USING LOCKS

Locks provide at best an illusion of security. They symbolize territorial barriers whose strength or flimsiness is defined by the determination of those who keep them and those who would break them. Criminals' determination, more likely recklessness, has risen, while locks have lagged.

First of all, match the lock to the door, and vice versa; and match both to the security level of what's behind the door. A seven-pin tumbler that would prove a bitch to drill and a nightmare to pick will remain untouched when the felon jams a car bumper-jack in the doorway and pries the jamb away from the lock.

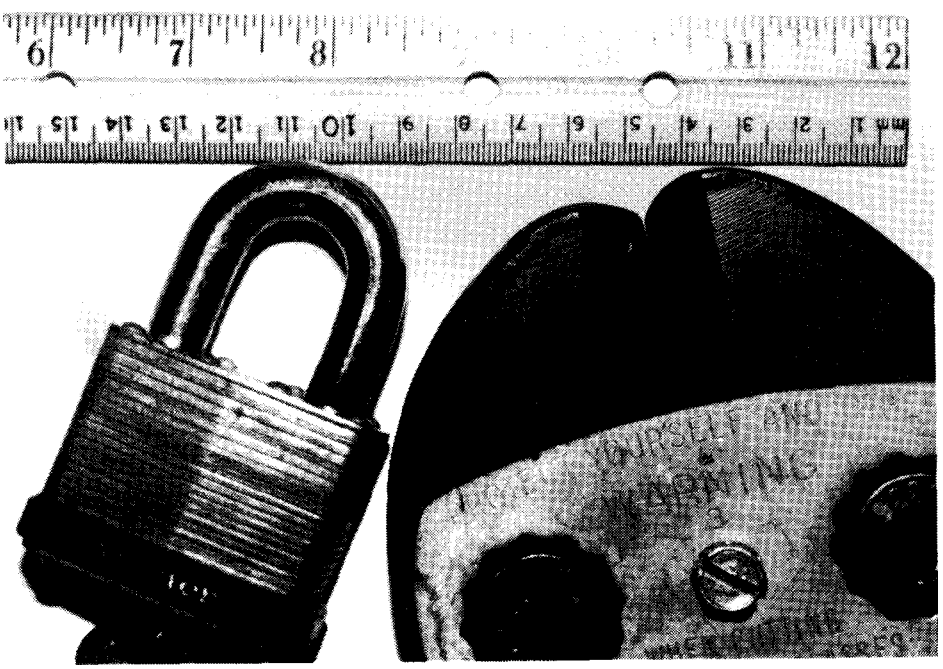
Next, make unobserved access difficult. The discount stores have been flooded with passive infrared devices hooked up to a pair of sockets for floodlights that bathe a prowler in glory (the burglar will shoot out the lights with a BB gun before the B&E...).

The critical elements of premises security provide for diffiCUlty of access, either through too much effort to get in in relation to the worth of the booty, or too great a risk of capture.

MICROTRACES

Letting yourself into your own home, office, or mailbox via picking, because you lost the key, will not prompt an all-out manhunt and mobilization of the FBI crime lab. But those who would break into genuinely secure premises with picks should be aware that A) microscopic bits of pick-metal will be left in the lock, B) microscopic bits of lock- and pin-metal will be left on the picks and the operative's fingers (and in his nostrils and hair, and on his skin and under his fingernails; in the fabric of clothing worn during the crime). The compositions of these alloys can be determined with utter certainty, and bits of lock metal under your fingernails or on a set of picks found in your possession is awfully wicked evidence to tie you to a felony....

The same principle applies to carpet-fibers adherent to the soles of your shoes, particles of dirt indigenous to your driveway found on the floor of the target room, and a wealth of semi-invisible traces science can gather, analyze, and tag to a person or place: pollen, hair, blood, saliva-even your kiester-print lifted off a toilet seat.



Scramble Facts
Phone 1-718-343-0130. A new recorded message every Friday, except June, July, and August (every other Friday; message at end of August, 1988 stated at that Scramble Facts needed more callers to keep going), 24 hours a day, free, with some commercial slant, as seen from this partial transcript recorded 5/31/88:

> Get ready for another monthly code change on the first of june. The new 26-data is being transmitted now. Those with self-sustaining units such as Testron's PROTEC test devices are advised to park your VideoCipher on a non-pay-per-view service when not in use. Be sure to leave both the VideoCipher and receiver turned on all the time. This is necessary to capture the new monthly code data.
>
> Have you seen the new videotape from Blank Box Newsletter, A Pirate's View, Volume III? This 2-hour production divulges the newest information and products related to VideoCipher descrambling. Watch as they use the latest techniques and learn how easy it really is. See Testron's PROTEC test devices, the Wizard, Doomsday, and Parasite technology. You will probably come to the same conclusion we have after watching this outstanding tape: The only totally self-sustaining device is the one designed and manufactured by Testron. By the way, we noticed that the ribbon connector was damaged and repaired on this device. Blank Box should have asked Testron for a replacement. It did make this otherwise perfect device look sloppy. The tape selling (sic) for only $30. Mastercard, Visa, and COD orders are accepted. Call Blank Box Newsletter to order. Mention Scramble Facts and they will deduct $5. Also request a complimentary copy of Blank Box. They can be reached at: 501-321-1845. Call Testron at: 516-358-9414.
>
> Technical tips: Here are two problems associated with the power supply inside the VideoCipher. First, verify the VC board is working properly by testing it in a known working unit. A loud hum, and/or dark bar on the screen, is a common indicator of a power supply failure. Check the 12-volt regulator, IC904. It may be shortened (sic) or defective. Also suspect capacitor C931, a 25-volt 3300 microfarad cap. If the VC light flashes once and then refuses to stay on, then suspect the minus 5-volt regulator, IC906, or the minus 12-volt regulator, IC905. The capacitor C933 will most likely also be defective. C933 is rated at 25 volts, 3300 microfarads. If your board was working prior to the installation of a socket at U30, and is not working properly now, let's validate the reset line circuit associated with U29, an RCA 3406. Place a logic probe or scope on pin 13 of U30. A digital signal should be present. Now short pins 2 and 3 together on U29. This should stop the activity seen on pin 13 of U30. If this activity has not stopped, then U29 is probably defective.

This message, taped in a grim interlude of sheer boredom at 4:52 AM, was recited by an energetic-sounding woman who spoke fluent Brooklynese punctuated with bits of broken English.

Note that descrambling has its own jargon, much of it common to the electronics trade, that you must master to understand what Scramble Facts is talking about. "U," "IC," "microfarad," "picofarad," "cap," "pin," and so forth are common electronic terms. U20 is referred to most often when dealing with the VC, since that's where the action is.

Excerpt of Scramble Facts 3 June 1988:

> Scramble Facts, 3 june, 1988, updated every Friday at 5 PM eastern, updated every other week during june and july, your free service covering the latest news on the TYRO industry, each program devoted to: news and views, technical tips, and new product information. Please tell your friends about Scramble Facts, and call in every week. Each call counts. Thanks.
>
> The monthly code changes started on the first of june, and is 26A5 for 018 units; and 26C4 for 010 units. It is quite possible that a mid-month code-change will occur in june. This is part of G/I's ECM: electronic countermeasures program to disable Keyboard Wizard-type devices. A new 27 code is being transmitted now. Once again, we advise all VideoCipher owners to keep their VC and receiver on all the time. When you are not watching TV, park your dish on a scrambled service, but not a pay-per-view transponder. The same advice applies to IRD owners.
>
> G/I is designing a new scrambling system to be known as "Newcipher." The new system is expected to contain two scrambling systems. One would be compatible with existing VideoCiphers, and the other

* * *

BE CAREFUL WHOM YOU CALL

-because date, time, duration, and both numbers become immortal data that remains on-line forever. The phone company had the ability to record this information as early as the fifties. It installed the equipment in the sixties, according to one source, but denied its existence to the government, which wanted to tap into the resource to gather evidence on organized-crime bosses. Any company that says No to Uncle has got to have the flush to back it up against Uncle's favorite means of harassment, a permanent state of IRS auditure.

Look over your telephone bill, the one that lists all numbers with dates and times. Machines make child's play out of matching names with those numbers. Is one company a purveyor of information about jamming police radar detectors? Is one an, ah, escort service? What will the opposing counsel insinuate from your having called them? (The opposing counsel keeps on a leash a private investigator who has "contacts" in the phone company. If the opposing counsel is the DA, his investigators are the police, and the likelihood of a mole in the phone company quadruples.)

Dialing some numbers may trigger automatic monitoring, place your name on a mail-intercept list, say, if you accidentally dial the NORAD mainframe, or if your computer committed the same blunder.

If James Bamford's estimate of the design and prowess of the NSA is to be believed, they have the ability to monitor all telephone communications in this country. Furthermore, they can detect a certain voiceprint and have it taped automatically, even screened for words and phrases, and very soon, automatically transcribed and edited, and translated into English or some other tongue.

Remember that the phone company, in whatever now-disbanded guise, has the power to monitor all calls, even local ones, as to time, number calling, number called, time spent on the line. They do not have to list this on your monthly statement, but in a civil or criminal action they can pull it and show that somebody called these numbers. It goes for pay phones, too. The old axiom that you cannot be too careful was never more apropos now that universal surveillance has become interwoven with the cloth of our society.

A NON-DIGITAL VOICE-SCRAMBLER

Both completed commercial units and schematics for do-it-yourselfers exist. This details a device featured in the January, 1988 issue of Radio-Electronics magazine, which kindly granted permission to reprint the schematic and PC board template. The advanced hobbyist can decipher component layout from the schematic. Others would do well to order the quoted issue from Gernsback Publications (see Chapter 9). The photo shows the author's nearly completed model. He bought the board from WaveLink Laboratories (Box 199, Trumbull, CT, 06611; $11), highly recommended, but better write to see whether it's still available.

The 555 timer chip here is the new MOS version which drinks far less power than its bipolar predecessor. The other chips are standard logic devices and a dual op amp, along with the common LM386 audio amp IC, all available at Radio Shack. Use proper care in handling static-sensitive chips.

This device chops, splits, and folds the audio input; reverses those functions when descrambling. You must build a pair for simultaneous operations. The 50K pot is a 20-turn device that tunes it, and allows variation in signal over a wide range.

Determined foes will descramble this breed of signal with ease. If you plan to face no determined foes, the device offers acceptable security.

MAILING LISTS

What are these mailing lists everyone talks about? Who keeps them, sells them, uses them?

Many companies. Consult Literary Marketplace to find them. Most public libraries keep a copy in the reference room. Get names and addresses, write for their listing. Some companies specialize in subpopulations, such as lawyers, doctors, or accountants. Others boast that all the customer need do is supply the

automatic. The wheelgunner must open the cylinder, eject cases, fit new rounds in, held in an ungainly contraption known as a speed-loader, then close the cylinder (loading one-at-a-time from ammo spilled from a pouch went out shortly before Jim Morrison died in a Paris bathtub). Here a revolver loses precious seconds in a complex maneuver whose mastery eats up practice time with less return than we get from an automatic.

RELIABILITY

It can be extremely dangerous to trust your life to an autoloading pistol as it comes out of the box. Many, and the .45 auto tops the list, jam frequently when new and need to be broken in by firing a few hundred rounds. Revolvers enjoy a better reputation in that regard, but lose to the big auto in other spheres.

Those who elect to use the auto should satisfy themselves that it will not jam in the crunch. Generally, if it will shoot two hundred rounds in a row without a jam, it is considered reliable enough to carry. There is also something to be said for learning to clear various types of jams••••

STOPPING POWER

What is it that we ask of the service pistol? In two words, stopping power. The ability of a pistol bullet to incapacitate a determined aggressor with a single, centrally placed hit defines its stopping power. It is almost painful to broach this topic, beaten to death as it was in the 1970s, for fear of boring the reader or stirring controversy on a SUbject long closed by silent assent. The point still surfaces in gun magazines, like a weighted corpse all would rather see hug the bottom. Those who read gun mags for more than a year understand that it bats stale air, fi lis space on the page.

Two equally ardent schools vie for primacy. The first believe in the superior stopping power of large-caliber bullets (.40 or greater). Their advocates use heavy-caliber weapons. Those who believe the .36 caliber series adequate (9 mm, .38 Special, .357 Magnum, and even the meek .380 auto) carry those weapons. Mute testament, perhaps, that some Latin American countries have outlawed civilian possession of the **.45....**

Handguns illustrate the laws of physics. One law says that for every action there must be an equal and opposite reaction. This explains the phenomenon of recoil: Guns "kick" when fired. The heavier the bullet and the faster it travels-the product of speed and mass is known as momentum-the heavier the recoil. This demands consideration, since the degree to which we can control a pistol depends upon the amount of recoil it generates. Without control, "the most powerful handgun in the world" becomes a noisy, dangerous, useless piece of machinery.

It turns out that the power-window where recoil is manageable, yet the bullet's momentum meets its task, is a small one. This puts power at a premium in pistolS, compared with the surplus of it the rifle disposes.

To summarize-and this paraphrases Jeff Cooper's party line, Cooper being widely regarded as the father of modern pistolcraft-sidearms are deemed defensive units. Their purpose is to halt an aggressor with one center torso hit. Observation from actual shootouts suggests that the standard military .45 caliber load will do this close to 90 percent of the time. Numbers for the .38s make it to the 50-percent mark. (Newer, less imposing data argues against such a decisive advantage for the .45 and, coincidentally, keeps the controversy alive. It will be interesting to see if this heresy withstands the test of time.)

Despite evidence favoring the .45, which, at the moment, is the only duty-ready heavy-caliber sidearm available, it does not enjoy universal acceptance. (Colt's new 10 mm auto shoots .40 caliber ammo. It yet lacks a track record to define its role among sidearms.) Thirty-eight special and 9 mm weapons each rule droves of advocates. Part of this devotion in the face of compelling evidence lies with tradition. Cops have always carried .38s of one sort or another; tradition is reluctant to cede its center to reason. Our military has begun a sulking surrender to the notion that we should drop the .45 in favor of the 9 mm as our standard pistol cartridge simply because the rest of the world and our NATO allies use it.

Another factor, a rather fanciful idea, has it that use of "expanding bullets," i.e., bullets intended to deform or upset or blow up on impact, will compensate for smaller caliber. That logic has proven faulty because

The design is a solid metal with a semi-pointed tip, weighing only a fraction of the 158 grains or so for the typical .357 magnum round. The slug reaches velocities in the vicinity of 2000 fps from a handgun barrel. At that speed, it burns through the front thickness of armor.

But lightweight projectiles shed their speed quickly. This design clearly presents less of a threat than ordinary rounds at longer ranges.

The round, like others specifically designed to defeat armor, is highly specialized, with restricted access.

SPENT-URANIUM HANDGUN AMMO?

We have found uses for uranium which has sacrificed its radioactivity on the alter of nuclear power. Known as spent or depleted uranium, it loses none of its incredible density, greater than lead, and adds the property of pyrophoria. This refers to the fact that, like plutonium, it will burst into flame on exposure to air. The heat released lends spark to its penetration power.

This material found a home in saboted 30 mm and 20 mm cannon rounds used as antitank/antimissile weapons. The 30 mm projectile, traveling at several thousand feet per second, could defeat all known tank armor, at least until recently. (And when it makes it to the boiler room, it sprays burning, highly toxic molten metal around the interior with explosive and incendiary effect. Amazing how insecure one can feel behind a foot-thickness of armor••••) An otherwise identical projectile of lead would splatter on the armor like high-velocity Haagen-Dazs.

The Phalanx antimissile defense system fires 20 mm rounds. This same fearsome setup was not activated in the USS Stark tragedy in the Persian Gulf. The weapon tracks sea-skimming missiles inbound to ships and sprays its 20 mm spent uranium bullets at an incredibly fast rate. A single strike from such a round could destroy the missile, render it inexplosive through damage to the detonator, or splash it in the ocean.

This makes for compelling speculation as to what kind of performance we might expect from a .45 or .357 Magnum bullet made of spent uranium. Sadly, speculate is all we can do. The determined experimenter may get his hands on tungsten or less exotic alloys nearly as hard, but will not come by spent uranium or the inert-atmosphere chamber necessary to keep it from igniting out of spite.

EXPLOSIVE BULLETS

Ads appeared in Soldier of Fortune in 1978 for Velet exploding bullets. Those ads have faded, and so, presumably, has the product. Some states have banned explosive bullets along with AP rounds. The diagram follows one that appeared in a Velet ad.

Its purpose is obscure, since the whole rationale of exploding projectiles is to deliver the explosive to the target and let the explosion, more than the kinetic energy of the projectile, do the damage; or, with anti-aircraft rounds, let the explosive blast the projectile into shards of flak, to be sucked into a jet intake and devastate the turbine. We do not reach the point at which the power of the explosive exceeds that of the the bullet's kinetic energy until projectile diameter passes an inch.

The design is reminiscent of exploding pellets 13-year-olds used to make back in '65. Scrape the coating off match-heads-the strike-anywhere variety gave best results-and pack it into a pellet for a Benjamin pellet rifle (or any brand that will fire hollow-based pellets). Load the pellet open-end forward and fire at a hard surface, such as brick. It lets go with a satisfying report, like a loud cap pistol. The thrill wears off after about three shots. Hard to believe that deranged experimenter would go on to get his bachelor's degree with honors. Our world has shown little use for star students but will pay to read about mindless trivia, such as exploding pellets••••

RUSSIAN AFGHANISTAN-TYPE

Now, what manner of bullet might we expect the Soviet Army, the same force fond of leaving explosive dolls and other crippling toys around to maim Afghan children, to shoot from its rifles? Strictly Geneva Convention ammo, right?

DUPONT
ESTABLISHED 1802
E. I. DU PONT DE NEMOURS AND COMPANY
INCORPORATED
WILMINGTON, DELAWARE 19898

EXTERNAL AFFAIRS DEPARTMENT

October 21, 1988

Suzanne [redacted]
Research Assistant
Trentland Press
[redacted]

Dear Suzanne:

I am sorry it has taken us so long to respond to your inquiry on PTFE coated bullets: your letter was sent to several departments before it reached me. In a place of this size, it's sometimes difficult to know who is the appropriate person to handle a given situation.

In response to your question, our pOlicy is still the same: we do not knowingly sell "Teflon" PTFE to makers of armor-piercing bullets. We have made it a practice to strongly reject orders for our product that will be used in such bullets.

Your letter indicated that there are still PTFE-coated bullets around, and I can suggest a few reasons for that. Du Pont discovered PTFE and markets it under the trade name "Teflon". Hoechst, lel, Daikin and Ausimont also make the material, and while I don't believe they supply the makers of armor-piercing bullets, I can't answer for them on the issue. At any rate, there's often no way for any of us to control where our products go. Our customers don't always tell us what they use the product for, and information they give us may not always be true.

We believe our products contribute significantly to our society's quality of life, and we are highly opposed to our product being used in a way that detracts from that contribution. I'd be happy to answer any more questions you have, and would appreciate knowing about what you publish. Please keep my card for future reference.

Best Wishes,

Janet E. Smith

Janet E. Smith

One of the better places would be the front door, if you anticipate shots fired through it.

It can be plastered over, drilled, painted, and wallpapered. Dealers for the stuff in large sheets are usually found in cities of more than 200,000 population, and you may have to order custom sizes or thicknesses.

What about sheets of Kevlar? They will serve; but make a cost comparison, and ask, if a vest of about two sq ft costs $200, what will a 32 sq ft panel cost? And what about handling? Limp Kevlar would have to be supported at key points, unlike a sheet of polycarbonate, which could simply be propped up, or secreted in slots prudently made during construction of the house or mobile home.

* * *

TEAR GAS

Any decade ushered in by Klute cannot help but consider itself chic. The seventies were a trendy time for personal tear-gas weapons. The rise of feminism brought with it the need for a portable weapon women could use to thwart muggers and rapists; or, just on a whim, teach cheeky and self-satisfied chauvinists a lesson. Due to the leftist pull of feminism, guns and other fascist (i.e., effective) weapons did not qualify. So hand-held gassers filled the need by fashion and default. What an irony that the police types who gave Mace[tm] its first surge saw it go on to become the darling of liberals. Political extremes oppose possession of all weapons by anyone but Big Brother•••and themselves, of course, since they aim to step up to the top **spot....**

Two compounds are commonly available as "tear gas." The first is called CN, which stands for chloracetophenone. One brand of spray dissolves it in the propellant that squirts it out of the canister. Its maker maintains that the propellant dissolves fat on the skin of the assailant, and through that means exposes nerve endings to the CN, which makes it more likely to hurt.

The second type, the varsity of tear gasses, is known as CS (or orthochlorobenzal-malononitrile). When riot-control cops get serious they turn to CS.

Both types cause intense burning of exposed skin, ten times worse on mucous membranes and a thousand times worse in the eyes. If inhaled they induce coughing and a sense of constricted breathing. The literature indicates CS to be more pitiless than CN.

One gun mag reported a test of CN tear gas. An experienced combat handgunner let himself be maced straight in the face, then drew his weapon and fired controlled burst, hitting a standard combat target. A surprise splash of CN might give you time to flee a casual mauler in an open space, but this non-lethal defense will not stop the determined adversary. And think if he had tried to duck the burst, wore glasses.

Streetwise punks can duck or cover their eyes in a flash. Most of them laugh when the imminent victim brandishes a gas canister, since they recognize it as a non-threat that gives the user a deadly false sense of security.

Other types of gasses are available to highly placed powers. One is known as sternutator gas. It induces such severe nausea and vomiting that victims feel as if they want to die. Mean stuff. Better stock up now to gas your brokerage after the next crash. One rumor making the rounds in Frisco in the wake of Watergate had it that the security team at Democratic National Headquarters planned to plant sternutator gas in quick-release canisters to catch, and presumably punish on the spot, the second wave of buggers that would take Liddy's place. We put no stock in rumor••••

* * *

PERSONAL LASER WEAPONS?

You can buy kits to make lasers in the shape of ray-pistols right off the set of Forbidden Planet. What end they serve is not clear. Their laser light might conceivably cause momentary blurred vision if it accidentally shown straight in the eye of a felon, but not much else.

Second, not without endangering yourself or bystanders. The rocket weapons discussed shortly could strike targets over a mile distant under some conditions. That mandates fireproof testing grounds so far from innocents that there will be no chance of harming anyone save the rocketeer, whose actions silently condemn him to travel at his risk.

Third, about the only components usable off-the-shelf for serious weapons work are the engines. These offer reliability, consistency, and a great deal of safety, compared with making one's own engines from scratch. (Not that there isn't something to say for making one's own engines. The level of extra-pyrotechnic interest in this aspect of rocketry has burgeoned of late due to R&D and marketing of tools and instructions from Impulse Reactions and Teleflite). Still, rocket weapons fairly demand quality control which may lie beyond the reach of all but the most dedicated and well heeled researcher.

Paper body tubes, balsa fins and nose-cones might serve well for scale testing in research, but any terrorist or paramilitary unit that came under fire from such flimsy weapons would laugh them off, then turn the infrared scanner to discover your launch site and dispatch you with a single bullet fired from a night-scope-equipped sniper rifle. No, it would not do to tease a serious foe with kiddie weapons.

What do we see in serious, unguided military rockets, exemplified by the U.S. Army's LAW (light antitank weapon) and the USSR's RPG-7? A very special time-thrust curve: These rockets have burned out by the time they exit the launch tube, about a foot of travel in the case of the RPG-7, whose warhead sticks out the front of the launcher. Only its engine nestles in the firing tube. Their burn-times measure a fraction of a second. The military learned early that rockets which continued to ride a tail of flame after they quit the launcher had a grisly way of cooking the unprotected firer's face. Our Stinger shoulder-fired guided missile sports a two-stage motor. The first burns a fraction of a second, enough to clear the rocket from the launcher, then a sustainer engine ignites. In essence, rocket-propelled grenades accelerate to the speed of a slow bullet without generating recoil.

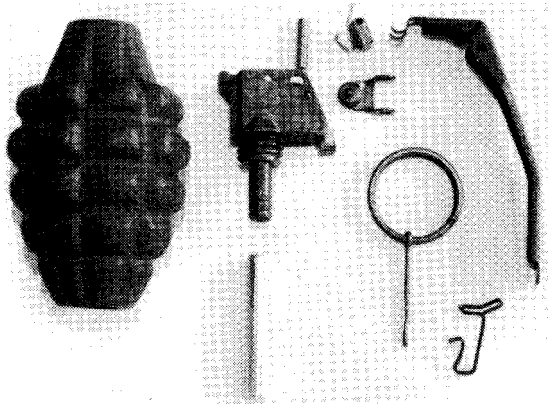
Britain's Starstreak missile exemplifies the third generation of portable antiaircraft weapons, this two-stage device tipped with three independent, maneuverable, explosive darts.

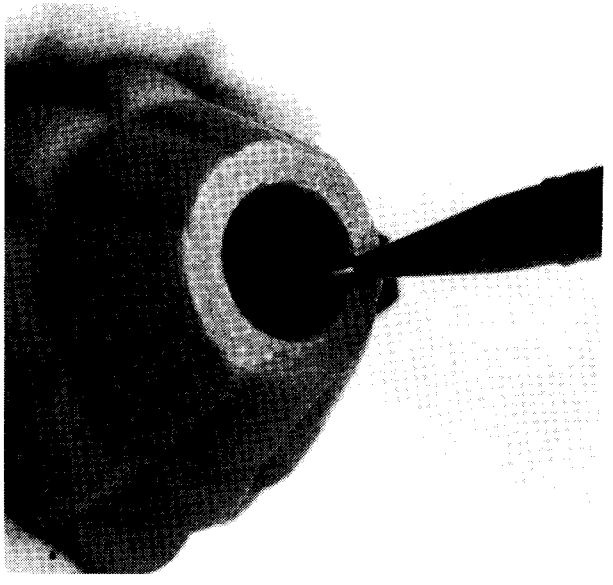
Return to this matter of time-thrust curves. No ex-model rocketeer can forget those wonderful illustrations provided in Estes Industries catalogs, back in the sixties, of two basic curves. The first type gave a medium initial surge of thrust followed by sustained thrust at lower level. That type would not suit the portable rocket weapon due to backblast and the laws of physics. The physics involved in predicting the behavior of a projectile that continues to accelerate after being fired horizontally rather than vertically is extremely complex. An unguided rocket fired essentially parallel to the ground begins to drop as soon as it leaves the launcher, no matter that it may be accelerating. Effective unguided rocket weapons toss their loads upward slightly, such that aiming is much akin to aiming a very slow, heavy bullet.

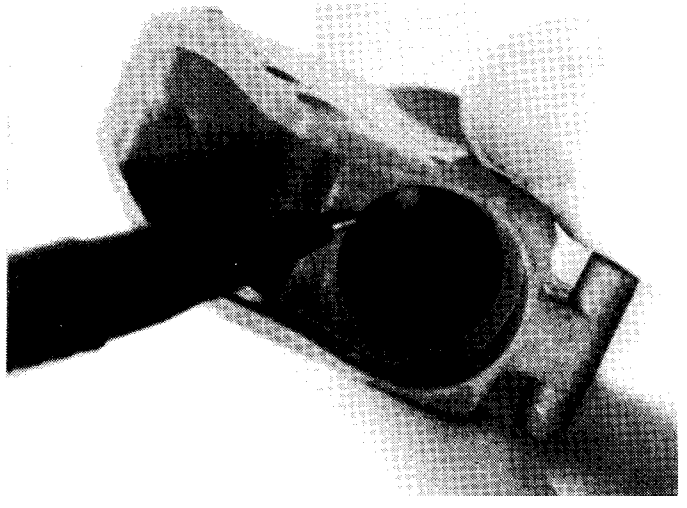
Thus, as we shop the pre-fab engine stock for raw material, we seek a short, sharp thrust, like that shown in the diagram. Eventually, we will resort to the most powerful engine of this type available, but we could well use smaller engines with similar burn-time for feasibility testing before working up to engines that cost five bucks apiece. At this writing, you can get 3 A-class T-series engines for less than a buck apiece by mailorder. They're dandy for scale testing. Black-powder-based F-100-class engines will loft serious warheads, particularly in clusters of 3, but go for five bucks each.

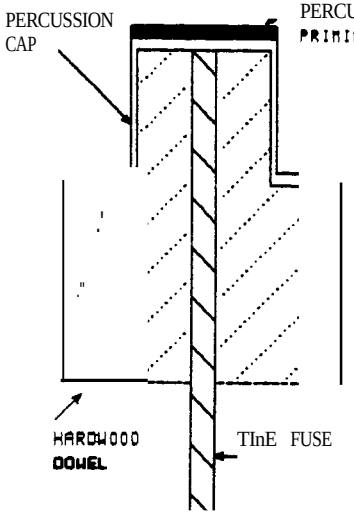
This type of engine bears a bigger nozzle coupled with a center burning grain. The propellant, most always simple black powder compressed into a hard grain in a hydraulic press, burns in a split second along its large surface area. Before Estes Industries changed to the metric system to designate its engines, the fabled B3 series reigned as king of the thrust peaks: about 9 pounds in a total burn time of 0.35 seconds. Launching a small rocket loaded with a B3-5 (5 seconds of smoke before the parachute deployed) felt like a 110-decibel sneeze, during which the rocket somehow vanished from the launch pad and its smoke trail materialized at 2000 feet....

If memory serves, Centuri Engineering, a now-defunct company formerly based in the desert southwest, sold engines with a 25-lb peak thrust, center burning grain type, circa 1968, an engine in the F-class. Total impulse delivered by an engine doubles with each successive letter. For example, a C engine delivers four times the impulse (thrust times time) than an A engine. An F engine is 16 times as powerful as a B engine. This is adequate to the needs of weaponry.

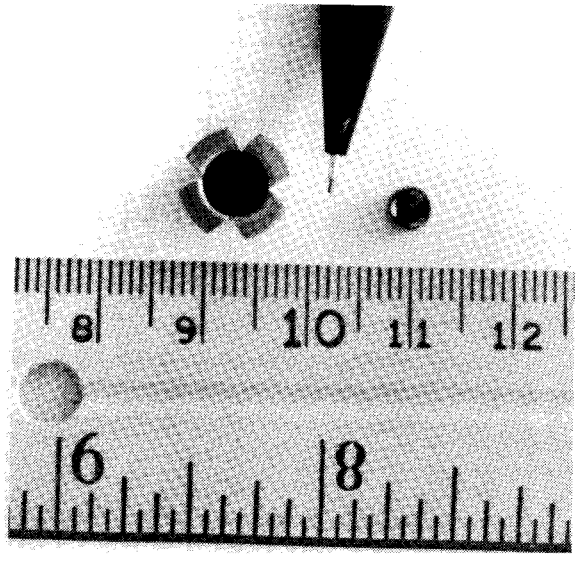


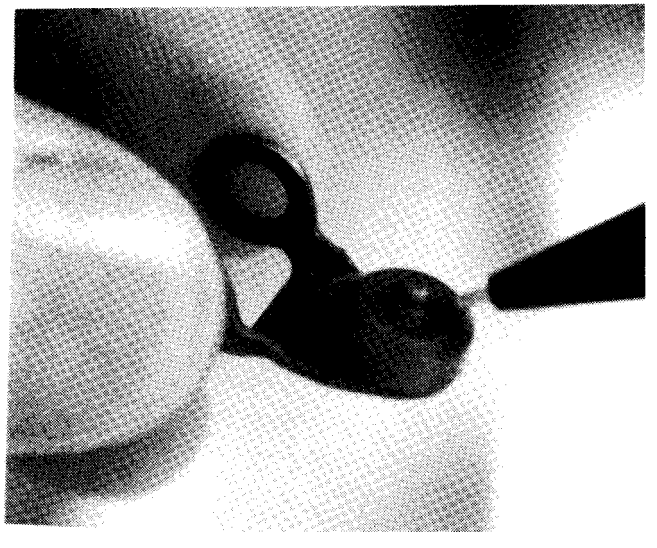






PERCUSSION IGNITION ASSEMBLY
GLUE INTO WELL AT TOP OF GRENADE





REACTIVATION OF PRACTICE GRENADE. TOP LEFT: Disassembled unit. TOP CENTER: Note absence of provision for sealing hole in bottom. Licensed experimenter must use his own ingenuity here. TOP RIGHT: Empty well for percussion primer. BOn'OM LEFT: One possible configuration for mounting percussion cap and fuse. Fixture made from hardwood dowel. BOTTOM CENTER: Left is percussion cap, right is large pistol primer. Only the cap is suited for this task out of its size and lack of deafening report as it triggers. BOTTOM RIGHT: Close-up of striker pin. (continued next page)

their handling and loading properties we must observe carefully. To no one's surprise, powders capable of detonation are considered more powerful, and for that reason command greater respect.

Some compositions require no confinement to detonate in the truest sense. Silver fulminate painted on tiny toothpicks stuck in the ends of "exploding cigars," once sold as practical jokes, produces an extremely crisp, surprisingly loud report. Or take cracker balls, no longer sold, perhaps with good reason, since they looked so much like candy that the kids would sometimes gobble them, oblivious to their phosphorous or arsenic content. These too produced quite a sharp report for their size, and represented true detonation. (For readers too young to recall them, cracker balls were colored pellets about 3/8" diameter, made from tissue paper enclosing gravel and a friction-sensitive explosive mix that detonated when thrown against a hard object or stepped on. They're still sold, if you don't mind a trip to the Orient to get them.)

A badly made skyrocket, one with cracks in its propellant grain for example, will sometimes let fly with an impressive boom about ten feet off the launch pad. (Ex-model rocketeers: Didn't you once bore a hole into the center of the black powder propellant to achieve a sharper thrust curve? The engine blew up shortly after launch, destroying your rocket, yet you recovered the strong engine casing intact. Most agree that black powder cannot detonate under practical conditions. Another example of the Type I Explosion.)

EXPLOSIVES: THE WORD ACCORDING TO BATF

The author's first run-in with the Bureau of Alcohol, Tobacco, and Firearms, aka BATF, and the then-new explosives laws spawned by the infamous Gun Control Act of 1968, amended in later years, occurred in 1971. He had become involved in the pyro hobby scene, and had latched onto a source of special fireworks, the kind shot at public displays. It was near Christmas, so he decided to order a small ($125) selection of 3" aerial shells to liven up the New Year's Holiday for his family and friends, and fired off an order to a vendor.

Instead of shipping the fireworks, they sent him a polite letter asking to see his Federal Explosives Permit.

Explosives? What in the Devil's name had these innocent fireworks to do with explosives?

It took a visit to the nearest BATF office, but he found out quickly that the new law had placed display fireworks in the same league with low explosives, of which black powder is the prototype. At the time, the BATF agents (who, in truth and fairness, proved to be OK guys who went out of their way to help that bumbling 19-year-old comply with the law) allowed that anything that held more than 5 pounds of black powder was considered a low explosive, subject to laws governing purchase, transport, storage, and usage of same. That 5-pound limit later climbed to 50 pounds under pressure from the gun lobby, but special fireworks of whatever size or weight remained low explosives, or "Explosives - B." (Dynamite and C4, for example, are high explosives or "Explosives - A," while common fireworks sold to the pUblic in some states qualify as "Explosives - C." These A-B-C categories originate with the Department of Transportation.)

Up until the time special fireworks became explosives by decree of law, BATF agents had had a pretty clear notion of explosives and their classification. Explosives were homogeneous materials used in blasting and munitions. High explosives were any materials that a No.8 blasting cap would detonate when unconfined (that's a big blasting cap), while low explosives were materials, such as black powder, that could be caused to "deflagrate" when confined. Exemptions included matches, components of small arms, and small fuse.

But where in this formerly simple scheme did fireworks fit? BATF finally acknowledged their singular niche in its publication ATF P 5400.7 (11/82) by noting (that) "Their manufacture and distribution require the manipulation of explosive materials in a manner that is utterly unique in the explosives industry."

That innocent admission automatically tied fireworks to the explosives industry, a point many would challenge. Nobody gives up turf voluntarily, and BATF is as big-brotherish as they come.

So what does it all mean for those who wish to pursue pyrotechnics as a hobby? You must attempt to comply with a nebulous law as interpreted by BATF. Careful reading of its booklets shows that gray zones exist still; that apparent internal inconsistencies are symptomatic of BATF's essential ignorance of the many and varied aspects of recreational pyrotechnics. A Democratically controlled Congress made the law discretionary to a point that passeth all understanding.

in the bag, such that your work surface and work room should be prepared to handle stray fuel; and, as always, you should wear a respirator when working with finely divided matter. Adding 1/2 percent by weight of Cab-O-Sil to the fuel at this stage will not hurt.

Flash compositions that use more than oxidizer and aluminum demand another stage in mixing: blend the aluminum with other fuel elements before mixing it with oxidizer. This can be done by passing the ingredients repeatedly through a 24 or 40 mesh sieve, with exemplary results, but inevitably produces clouds of finely divided aluminum that could explode from a static spark. An alternative method is to mix aluminum and sulfur by placing them in a gallon plastic freezer bag and rolling them between the fingers until a homogeneous mix results.

At this point, we have oxidizer and fuel or fuel-mixture. We must combine the two. Here things get nervous, because the combination produces an explosive that we must handle and store.

Older texts casually recommend passing the whole works through a sieve. The Japanese used screens made of hair, with the caution not to "force" the mixture. The Americans merely warned the operator not to scratch a metal screen with the fingernails, since this could detonate the mix. As far as this text is concerned, do not blend flash powder by passing it through a sieve of any kind, even though that method produces genuinely thorough mixing.

One technique the author used years ago without accident was to place oxidizer and fuel on a large sheet of paper and roll the two poWders back and forth using a smooth metal or rubber spatula, carefully avoiding friction with the paper, until a uniformly dark appearance is achieved. Another technique calls for pouring oxidizer and fuel in one of those gallon plastic freezer bags, then gently rolling the mix to uniformity with gloved hands (right••••). Seriously, that second method could be used for bright aluminum/perchlorate compositions with little relative risk. It would not suit dark or Black German aluminum.

As we have mentioned previously, and illustrated in a grim incident, the particle size of the aluminum determines what mass of powder constitutes an explosive when unconfined. With a mix of sulfur, bright aluminum, and potassium perchlorate, this mass probably rates 200-300 grams, extrapolating from what other sources have quoted. With ordinary dark pyro aluminum, a hundred grams of this formula should be considered tops. Black German Pyro comp occupies its own ruinous class. Consider it explosive, unconfined, in any quantity. Consider potassium chlorate mixed with any fuel explosive whether confined or not.

FUSE

Unless you intend to fire them using electrical squibs, you will need fuse in order to construct tube salutes. Of the several types that could be had, only that known as plastic-coated safety fuse will suit, in addition to being about the only thing you can get nowadays••••

This refers broadly to "green" and "red" fuses, used for decades in the manufacture of domestic fireworks, and, to a lesser extent, in the blasting industry. One sees this same green fuse poking out the center of silver salutes, or out of cherry bombs like some evil stem. The author has never seen true 1/8" fuse offered for sale to amateurs, though it can still be found on "M-80 Smoke" and such, limp remnants of finer days. Purists sometimes buy those sorry smoke pots to salvage the fuse, just to maintain a sense of spiritual righteousness in salutes they use it to concoct.

The fuse you are most likely to find sold via mail measures 3/32" diameter, carries a green plastic coat, and a single-fiber stranded core. Other than lacking the charm of the larger fuse, it serves well for its purpose, the delay and sure transfer of fire.

Green fuse-all coated fuse the author has tested, in fact-burns underwater, a point of dubious benefit to hobbyists except when that little demon inside makes us tape a rock to a salute and toss it in the creek, a depraved act good for a startling WHOOMPH!, with appropriate distress on the water surface, strangely reminiscent of a midget depth charge.

Examine a length of coated fuse. It resists breaking except to a full pull. It burns reliably underwater. In

So why say anything at all? Well, the author has been involved with their manufacture, in small quantities and NEVER for sale, and for that reason knows a bit about them. (And all that took place well *over* fifteen years ago. There is no longer any physical evidence from those easy days, and the statute of limitations has long since expired. That means the author can speak frankly.)

Second, the author still has all his fingers and unimpaired sight and hearing because he practiced safety obsessively. He wishes to convey this safety-minded approach to those who may have gathered crude details for making cherry bombs from other texts, or to those who purchase contraband and are at risk because of safety defects already detailed.

Again, read this the way you read a tale of mayhem in some action novel, purely for vicarious gratification. DO NOT MAKE ANY OF THE DEVICES DISCUSSED HERE.

There is much more to pyrotechnics than ground-boomers. Explosive sound occupies a legitimate place in fireworks. Indeed, it is hard to imagine a professional fireworks display without the flash-KaBOOOM M! of aerial salutes. But explosive sound is like punctuation in a paragraph: indispensable, yet meaningless without words to pace.

What about whistles, fountains, roman candles, rockets, star-shells, set-pieces, and wheels? We could tell all this and more, but it would be a repetition of what's in Weingart and Lancaster. Much of what we have offered here is not found in the major fireworks texts, has interest and positive safety value for pyro dilettantes and casual readers.

BRAZILIAN SALUTES AND THE CULT OF MACHISMO

-because one look at them, one audition of their fierce, chlorate-based detonation, and you bloody well know it takes balls to make them. Here is the method, but don't do it:

Take a stout paper tube about 3/4" outside diameter, 1/2" inside diameter, 2" to 3" long. The interior of one end paint with a 1/8"-thick train of priming about 3/4" long. Make sure the priming comes fully to the end. Let it dry. Believe it or not, that's the fuse. Plug the fuse end with a crude, sticky mix of glue and sawdust about 1/2" thick. Use a dowel to pack it tightly. The priming must remain exposed for the salute to take fire. Then fill the casing thus prepared with flash powder and seal the other end with the same sawdust/glue mix. This blend of simplicity and economy is reminiscent of Oriental devices; yet the unquestionably violent chlorate-based composition would give *even* the Japanese pause.

Brazilian salutes usually fire from mortars or roman-candle-like units. Two or three of them are stacked vertically in relatively spacious launch tubes. This lets the flame of the lifting charge reach the priming and ignite it. A second later, tubes high in the air, it fires the flash mix, which tests in 1973 showed to be a pure evil blend of aluminum, sulfur, and potassium chlorate. Few pyrotechnic comps are deadlier.

THE ORIENTAL METHOD

The good news is that these salutes use a comparatively insensitive mix of potassium perchlorate, sulfur, and bright aluminum, in a weight ratio of about 2:1:1, respectively, this data from samples analyzed in 1972. The bad news is that making them requires prolonged handling of the device well into the stage at which, should it accidentally detonate, loss of fingers or hands would probably result.

The only pre-manufactured part of the Oriental salute is the fuse, and here the thick time fuse is used in aerial reports, while conventional green fuse can be substituted with good results for ground salutes as long as care is taken to protect it until it reaches the center ignition point, lest its side spit light the flash powder prematurely.

Refer to the photo set. These devices look like small pears. Construction shows us why. It begins with a length of fuse, the length determining the time for ignition. For ground-based devices, it should protrude at least two inches outside the salute to allow time to get away safely.

A pinch of black powder of FFFg grain is placed in the center of a 3/4" square of tissue paper (use the fabled

back in that grim summer of Watergate, and less prone to bring out sour sweat from worry over premature detonation.

WHAT NOT TO DO

Consider any casing that throws off hard fragments taboo. That includes all metals, PVC pipe, glass and ceramics, and anything with clumps of the professional pyro adhesive described previously (a thin film of it won't hurt).

In addition to their deadly fragments, these casings predispose to premature detonation. For example, with metal pipe you have to screw on the end caps. Friction created at the threads can set off the bomb in your hand. PVC pipe is prone to accumulate enough static electricity to ignite many aluminum-based mixes.

MIX YOUR OWN FLASH POWDER?

As an alternative to mixing flash powder from raw chemicals, use the powder contained in commercially available flash crackers (firecrackers, flashlight crackers). You do not have to buy strange chemicals that move your name and address to the top of a surveillance list and get your phone tapped. Plus, it eliminates the mixing process, one of the riskiest parts of manufacture.

In 1969 the author use a pair of nippers to halve firecrackers and remove their precious powder. Each could hold the then-legal maximum of 2 grains-about 120 milligrams. He loaded the powder from a dozen, roughly 1.4 grams of powder, which filled an M-80 casing less than half full, into each bomb. The source-firecrackers happened to be Black Cat Brand, which, as the package states clearly, "Black Cat Is The Best You Can Get," or at least it was when a firecracker could hold more than the 50 milligrams of powder it's held to in these thin times, a token charge that has trouble bursting a flashcracker case. This powder burns with disarming sluggishness out in the open; yet these salutes gave more bang for their size than any the author made in his entire depraved career as a pyro, which fizzled well over 15 years ago. Friends used to comment that it was embarrassing to shoot these salutes, even though we had skulked out into the woods and presumably were the only ones to hear their devastating reports. They exploded so fiercely that, thrown on a highway, they left a splotch as if the red paper case had been laminated to the pavement. No home-brew mix ever equaled that grim feat. The photograph shows the top of an empty gallon paint can found in an illegal trash dump deep in the woods some years ago. When discovered, the can was intact and closed. A single Black-Cat-derived M-80 was placed on the top, then detonated. It punctured the top, venting enough pressure into the can to blow off the lid and send it careening into the woods. Such was the power of these fearsome salutes.

Using premixed powder has its risks. Since you do no mixing, you do not know what the powder contains. You can see that it contains aluminum, or at least some powdered metal. But what you do not know may be the most crucial piece of safety-related information about a tube salute: Does the powder contain potassium chlorate?

If so, and if you carelessly let an acid-based glue drip on it before sealing, you are setting yourself up for a spontaneous detonation. The reason is that potassium chlorate mixed with a fuel ignites spontaneously in the presence of acids. Never mind the obscure chemistry of it; it happens (in fact, a test for the presence of chlorate is to take a small sample of powder, put it on a brick, then, with appropriate safety precautions, touch it with a glass rod which has been dipped in concentrated sulfuric acid; chlorate-containing mixtures will ignite). So, anyone who actually made tube salutes with unknown flash powder, and we do not recommend the making of tube salutes, puts himself and bystanders at risk. Act responsibly.

When salvaging flash powder from firecrackers, carefully extract the fuse before halving the cracker, about midway between the ends. Then take the halves and turn them mouth-down and roll them back and forth between your thumb and forefinger. The powder will pour out.

That approach made more sense years ago because crackers held more powder than they do today. Assuming a potent formula to begin with, almost certainly one containing the dread chlorate oxidizer, you could in theory buy flashcrackers in bulk and remove their powder. At less than 50 milligrams apiece, it will take 25-30 per salute; fewer, if you can get by with a less robust report. If Black Cat has not changed its formula, nothing the author has seen can touch it in terms of raw power.

PENNSYLVANIA
Retains copies of requests for info for 3 years, and will reveal to the subject that he has been asked about; however, source stated over the phone that such records were not computerized, were stored and would have to be dug up manually, such that it might be possible to miss the fact that a request was fulfilled.

TENNESSEE
Does not keep records"•••in a manner in which they could be located. These records are kept only for auditing purposes."

VERMONT
Does not maintain copies of requests for info.

VIRGINIA
Retains all requests for driver's records for 3 years and will disclose date and to whom furnished upon written request from the subject asked about.

WISCONSIN
"Varies-call if you want details."

Replies from the follOWing states did not address the question of keeping records of requests: CA, DE, GA, MA, MI, SC, SD, TX, UT. The rest of the states didn't answer the letter, printed on the publisher's expensive bond stationery••••

* * *

CREDIT, ALTERNATIVE ID, AND RELATED MATTERS
Let's skip the waltz and get straight to the tango.

1. Perfectly innocent men and women have legitimate need for alternative ID.

2. The only paper worth getting is genuine paper. Phony paper burns with felonious smoke.

3. In many states possession of alternative ID is not a crime. In some states it is.

4. None can deny that some use alternative ID for crime, but the same holds for use of guns, cars, and common tools for crime.

As a rule, American citizens can call themselves anything they wish, and change the name at will, so long as foul deeds or intent to commit them don't taint the scene. You can live under an alias if you wish. The alias, this name other than your given name, becomes your legal name after a period in some jurisdictions.

Which holds fine in principle; but few interest/power groups will let you interface with them under a name other than the one by which they have come to know you. Banks, credit institutions, vehicle registries, police, and the tax folks don't care what you call yourself, so long as you fly straight and ante up, come payout time. They have taken a dim view of alternative names since some persons have used them to escape valid burdens. If that name fails to tally with records you have created under a different name, they will want to know why; or, worse, will refuse to interface with you, in effect locking you out of the system.

And you do need to be part of the system, no matter what name you choose. To own and operate a car, insure it, marry, parent, run a business, sue someone (or, more likely, be sUed)-all this becomes awkward or impossible without a name that resonates in the downtown files.

Though America requires no national identity cards in the internal-passport sense the Soviet Union or France do, identity cards by any other name are a fact of life just to stay out of jail. If the Authorities stop you on

Just as the officer has a legitimate interest in knowing whether a speeder or bad driver has outstanding warrants or a history of DUI, so civilians maintain rightful interest in the officer's past behavior.

Stop and look at the concept of Special Privileges and the reasoning behind it. We empower select members of society with rights and authority denied the rest, ostensibly to serve the common good. In the case of police, we have given them power to arrest, to carry firearms, to have their commands obeyed under penalty of incarceration (disobeying a police officer). As a given, courts take the word of a police officer over that of the unsworn citizen if it comes to a trial.

It just makes sense to subject those with this terrible and discretionary leeway to tighter surveillance as the price of expanded powers. True, they already undergo semi-probing background checks just to get their jobs; but these checks and the results are conducted and held largely in-house. Better to get some of it out where all can see it.

J. Edgar Hoover's stint at the helm of the FBI left us with a grim legacy of illegal government snooping unequaled in modern times. And it became common knowledge that intelligence units of many police departments bugged premises and phone lines without authorization. But who's to say it isn't still going on? Get lists of the agents, make their personnel files public knowledge. It's a reasonable price for special privileges.

Re-reading those artless words evokes a dreadful sense of naivete. A unified "people's database" could snag on regional, factional, racial, economic, and political differences. Each social stratum must have its own idea of what a non-governmental database should be and how it should be used. Cooperation vital to an effective setup might not materialize. Pipe dreams••••

* * *

DESKTOP PUBLISHING AND ITS IMPLICATIONS FOR FALSE DOCUMENTS

Personal computers can design fake birth certificates that, if printed on a phototypesetter, will fool anyone because a photocopy would look as if it had been minted from the real thing. The same design fed through a laser printer easily betrays itself as phony because of the low resolution of current lasers, about 300 dots per inch.

But times change. Rumors of 650 dpi laser printers for consumers are circulating already. We expect the evolution of printing technology to shave the gap between laser printers and true phototypesetters, with their 3000 dpi resolution. They should be available to anyone with a computer soon. What an irony that the coming flood of fake documents will undermine the Authorities' faith in paper, edging us further toward a completely digitized society and negating a newfound power to produce genuine-looking papers.

* * *

L1PSTICK•••AND OTHER TRACES

Fingerprints and tire tracks are macrotraces: visible to the naked eye, and so obvious that all but the most amateurish felon obscures them or avoids leaving them. But forensic science has identified a wealth of trails that are not obvious when they get left. These microtraces and the fresh generation of of lab apparatus that detects them have opened up a world of new and reliable sources of evidence.

Forensic science's power to identify even microscopic traces of material or flesh and match it with samples gathered later amazes no one so much as those who have gone to the big house because they overlooked that flaw in their plans. Recently, forensics began talking about extracting the DNA (deoxyribonucleic acid) from a tiny piece of skin to match it with that of the perpetrator as surely as a fingerprint. That means that, if they found the spot from which a sniper cooled his target, they would also be able to recover microscopic

unit would ring for 15 seconds to half an hour, depending on its configuration, then return to duty. If, however, the door had been propped ajar, or some other point in the loop left broken, the unit would shut itself off, leaving the premises defenseless.

Hardly surprising that an effective tactic calls for the burglar to trip the alarm intentionally, and in a few seconds cut an inconspicuous wire or shim a door open such that, though the unit will draw attention, its automatic cutoff will silence the alarm permanently since the alarm loop remains broken. The baddies return a few hours later to gut the premises at their leisure. (Cops know this ruse, and tend to keep an eye on premises whose alarm tripped earlier in the evening.)

UL-qualified units must contain a loop to guard against this attack. That loop remains armed whatever the status of the main loop, and will again sound the claxon should the baddies return. Of course, the backup loop must have its own independent sensor, usually a "trap" inside the building.

A third UL measure, one genuinely handy in light of known tactics to defeat combination switches, demands that entering the code, turning the key, or shorting the proper contacts will not silence the alarm once it has been tripped. It will do so with most non-UL units. That means that to defeat a UL unit, the alarm cannot be tripped even momentarily, or it rings until programmed to shut off, or until the owner or alarm company arrives.

Be careful hooking up the backup battery. Install it polarity reversed and kiss the panel goodbye. The author bought two $300 control panels in 1984, identical save that one was UL-approved, the other not. Only the approved unit bore an orange warning sticker that told of of deadly results of reversed polarity. (The author would have bought but one unit, but he had destroyed one by accidentally reversing the polarity, which was not marked all that clearly on the backup battery••••) Given the stiff prices of alarm control units, and the simplicity of incorporating protective circuitry into them, one has to wonder why it had not been done. Who knows•••maybe some companies do a fair business replacing burned-out boxes•••certainly not the maker of the author's prize panels••••

COST

Buying from an alarm company, even by mailorder, usually means a near-fatal price markup. Twenty dollars worth of electronics, and not very sophisticated stuff at that, becomes the $299 Deluxe Special when mounted in a $2 metal box. Sensors, wire, installation, and so forth cost extra, and bear the curse of that same awful markup.

What a pleasant surprise that you can buy units of equal performance at the local Radio Shack for half the cost. Radio Shack, at least in the opinion of some, has earned no renown for rock-bottom prices, which makes its prices on alarm gear–the equal of "professional" models in most respects-surprising and attractive. Comparison shopping is a must for amateur installers.

Before McGee Radio decided to change its image and its inventory, it carried the Cal-Rad line of products, among which some genuine alarm bargains could be found. We haven't been able to run down a discount Cal-Rad dealer. Perhaps McGee will rethink its marketing. strategy.

WINDOW STICKERS

"Warning! These premises protected by electronic intrusion system!"

Now, everybody, criminals most of all, knows that some stickers are fakes. Experienced burglars know genuine stickers from phony, and real outdoor switches from bogus.

In general, window stickers will deter the unmotivated amateur, at least send him to the house next door, rather than call your bluff. Stickers and hard evidence of an alarm, such as a genuine outdoor disarm switch or obvious glass-break sensors could prove more effective in combination with warning stickers.

18. LIST BELOW THE INFORMATION REQUIRED FOR EACH INDIVIDUAL OWNER, (sole owners must include themselves), PARTNER, AND OTHER RESPONSIBLE PERSONS (see Instruction 7) IN THE APPLICANT BUSINESS. IF A FEMALE, LIST GIVEN NAMES AND MAIDEN, IF MARRIED, e.g., "MARY ALICE (SMITH) JONES," NOT "MRS. JOHN JONES." (If additional space is needed, use a separate sheet.)

FULL NAME	POSITION AND SOCIAL SECURITY NO.	HOME ADDRESS (Include ZIP Code)	PLACE OF BIRTH	DATE OF BIRTH

19. HAS APPLICANT OR ANY PERSON L1STEO ABOVE: (If "Y..," place an (*) by the name and .how city and State at right.)	YES	NO
A. HELO A FEOERAL FIREARMS LICENSE		
B. BEEN OENIEO A FEOERAL FIREARMS LiCENSE		
C. BEEN AN OFFICER IN A CORPORATION HOLDING A FEOERAL FIREARMS LICENSE		
D. BEEN AN EMPLOYEE RESPONSIBLE FOR FIREARMS ACTIVITIES OF A FEDERAL FIREARMS LICENSEE		

CITY

STATE

GIVE FULL DETAILS ON SEPARATE SHEET FOR ALL "Yes" ANSWERS IN ITEMS 20 & 21.		YES	NO
20. is APPLICANT OR ANY PERSON NAMED IN ITEM 18 ABOVE:	A. CHARGED BY INFORMATION OR UNDER INDICTMENT IN ANY COURT FOR A CRIME PUNISHABLE BY IMPRISONMENT FOR A TERM EXCEEDING ONE YEAR'		
	B. A FUGITIVE FROM JUSTICE		
	C. AN ALIEN WHO is ILLEGALLY OR UNLAWFULLY IN THE UNITED STATES		
	D. UNDER 21 YEARS OF AGE		
	E. AN UNLAWFUL USER OF OR ADDICTED TO MARIJUANA OR ANY DEPRESSANT, STIMULANT OR NARCOTIC DRUG		
21. HAS APPLICANT OR ANY PERSON NAMED IN ITEM 18 EVER:	A. BEEN CONVICTED IN ANY COURT OF A CRIME PUNISHABLE BY IMPRiSONMENT FOR A TERM EXCEEDING ONE YEAR'		
	B. BEEN DISCHARGEO FROM THE ARMEO FORCES UNDER DISHONORABLE CONDITIONS		
	C. BEEN ADJUDICATEO AS A MENTAL DEFECTIVE OR BEEN COMMITIED TO ANY MENTAL INSTITUTION		
	D. RENOUNCED HIS CITIZENSHIP HAVING BEEN A CITIZEN OF THE UNITED STATES		

22. CERTIFICATION: Under the penalties imposed by 18 U.S.C. 924, I declare that I have examined this application and the documents submitted in support thereof, and to the best of my knowledge and belief, they are true, correct and complete.

SIGN HERE ▶ | TITLE | DATE

FOR ATF USE

23. APPLICATION IS	REASONS FOR TERMINATED OR DISAPPROVED APPLICATION
0 APPROVED 0 DISAPPROVED*	
0 TERMINATED*	
*L1CENSE FEE WILL BE REFUNDED BY THE BUREAU OF ALCOHOL, TOBACCO AND FIREARMS	
SIGNATURE OF REGIONAL DIRECTOR (COMPLIANCE)	250 DATE

1 Information _ A formal accusation of crime made by a prosecuting attorney, as distinguished from an indictment presented by a grand jury.

*The actual sentence given by the judge does not malter - a "yes" answer is necessary if the judge could have given a sentence of more than one year. Also, a "yes" answer is required even if a conviction has been discharged. set aside, or dismissed pursuant to an expungement or rehabilitation statute. However. a crime punishable by imprisonment for a term exceeding 1 year does Dot include a conviction which has been set aSide under the Federal Youth Correction Act.