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aramilitary survivors and others who have seriously contemplated their circumstances realize they need a powerful weapon to deal with armored police and/or military vehicles, including tanks and armored personnel carriers (APCs). Survivors also know that they might need a means by which to hold off a large number of hostile people.

To prepare for these and other survival scenarios, some have acquired superaccurate sniper rifles, homemade mortars, automatic weapons, exotic explosives, or Molotov cocktails. Unfortunately, these weapons aren’t effective against extensive firepower and/or military-type police hardware.

Most traditional defenses have
severe limitations. Sniper rifles, no matter how well handled, are totally ineffective against but toned-up armor. High explosives are dangerous usually illegal, and require considerable skill to deploy because they are perishable and must be stored for an indeterminate period of time against the day of need.

Many of the most highly desirable devices are also highly illegal. Legality—or the lack thereof—may not be the determining factor for hardcore paramilitarists, but under some circumstances, it could be a consideration. Certainly some sort of destructive-device or weapons ordinance prohibiting possession of flamethrowers could be dredged up in places such as California or New York. In most places, however, one can safely assume that the Bureau of Alcohol, Tobacco, and Firearms (BATF) boys won’t be looking for flamethrowers.

Military-grade flamethrowers can be legally built and operated by virtually anyone willing to invest the time and sweat. Unlike explosives requiring special training, flamethrowers can be used by anyone who can operate a garden hose and will take a few weekends to practice. For those willing to scrounge and improvise, the cost can be held to an extremely modest amount. So there is no reason for any survivor who might one day face otherwise overwhelming situations not to have a flamethrower. In inner-city locations, the owner of a flamethrower would almost certainly dominate his surroundings. Any survival bunker or retreat would be impregnable when defended by a determined owner with a good flamethrower and a
modest supply of easily acquired fuel.

Imagine a small army of police, armed to the teeth, pulling up in bulletproof cruisers. Confidently and arrogantly, they confront what they suppose is a hapless victim, trembling in his retreat. Crouching behind their vehicles, they deliver their ultimatum: surrender or be blasted to oblivion.

Using his homemade dragon, the survivor silently proceeds to slime his attackers, their cruisers, and the ground around them with unlit napalm. The defender doesn’t ignite the napalm in order to limit his own exposure to the extremely volatile chemical (it is hoped that none of the invaders were smoking as they were being sprayed). Outside, his opponents find that they are unable to wipe the slime from their clothing or skin.

As an added precaution—depending on the prevailing winds, the intensity of the threat, and the amount of fuel available—the survivor may lay down a napalm barrier between his position and the attackers. Jelled napalm, as delivered from the flamethrower, will remain in an extremely dangerous form for a period of days. In some cases, its volatility may remain a week or more. Rain will eventually wash the substance away, but certainly not immediately.

If they have a lick of sense, the opposition (despite their firepower and hardware) will recognize their extremely exposed position. They will likely deduce that the survivor could easily fire a flare into the napalm, instantaneously wiping out the whole war party. Switching on the burner and
giving them another shot of ignited material would settle the issue rather resolutely, destroying the armed force and most of their equipment.

This use of the flamethrower is strictly defensive, useful from set (and often hidden) positions. The flamethrower can be quite noisy, causing survivors to worry that its location (and theirs) might be revealed, but the machine can be muffled and made to run almost silently. For people who want more portability out of their weapons for defensive and offensive use while on the move, flamethrowers can easily and quickly be scaled down to allow additional mobility. Models described in this book, even the smaller portable models, have great range when used with heavily thickened fuel. The basic difference is that portable units will not deliver the large volume of conflagration that a larger semistationary model will. A good compromise would be to mount a medium-sized dragon on an all-terrain vehicle, providing firepower, mobility, and versatility.

With the element of surprise assured, one should not underestimate the effective deployment of this device from a well-chosen defensive position. The range of raw, unlit, thickened napalm, when thrown into a calm environment, will be 150 feet or more depending on one's position. If the wind is cooperating, the results could be quite dynamic. Theoretically, a defender could neutralize a hostile group at a distance of a couple of city blocks or more.

Once having coated the enemy and/or established a napalmed perimeter, one need do little more than sit back and wait for developments. It
may even be appropriate to detonate the napalm from another position should the attackers persist in their hostile behavior. If the authorities were to bring up an armored vehicle, the defenders might elect to fry it without further delay before the attackers understand what they face.

Unless one expects to defend against planes, helicopters, and/or mortars, a flamethrower offers the ultimate in retreat protection against ground attack. As an added bonus, flamethrowers are legal, relatively easy to build, reasonably inexpensive, and use common, inexpensive fuels.
Morning dew still covered the brown, crackly, alpine leaves when James Steamons rolled the flamethrower out of the shed and onto the back of his three-quarter-ton truck. The device itself was not particularly heavy or difficult, but the two fifty-five-gallon barrels of fuel were a different matter. Together, they weighted the pickup bed down snugly onto the overload springs. A gallon jug of "regular" for the dragon and a new bag of Sure-Jell rounded out the load.

Steamons, a private forester, headed his company truck through the gate and up the gravel road to a winding dirt trail through the mountains. He calculated that he had a minimum six-hour drive back into the high country.
where the tall trees grow, if all went well. However, as he well knew, events seldom go as planned for lumberjacks.

By 2:00 P.M. Steamons had wound his way up the dusty trail to the site of his company’s clear-cut. Months ago, company lumberjacks had cut the hemlock and fir, which are highly prized as building materials, leaving only stunted, inferior trees, which had been summarily mowed over and left to dry. It was now time to remove the trash and duff from the forest ground and put back the natural nutrients that would allow the next crop to start its cycle. Given his relatively young age (41) and the vigorous, fast-growing saplings they were about to replant, Steamons figured he might live to see the land’s fourth crop of trees.

Word of Steamons’ mission and his fire-breathing dragon had spread and attracted considerable attention throughout the region. On arrival at the fire site, Steamons found a veritable army of observers in their pickup trucks strung along the weed-choked trail. Their presence was to prove unfortunate at first for Steamons—and then very fortunate indeed. Since there were still several hours of daylight left, Steamons had enough time to reposition the rigs a mile or so back onto an old log landing. As it turned out, this was probably Steamons’ best decision of the day.

By 4:00 P.M. the mountain air had cooled enough for Steamons to start the slash fire. Seasoned lumberjacks who knew of the flamethrower by rumor hung on past their normal quitting time, anxious to see the dreaded beast in operation. Knowing all eyes were on him, Steamons nervously jumped into the
pickup bed. He dumped the recommended amount of Sure-Jell into the barrels of diesel fuel and gasoline and then cranked the Briggs & Stratton engine to life and circulated the fuel until it became thick and syrupy. His driver started moseying the truck down the old skid road in granny gear. Above him, the brushy clear-cut stretched about half a mile up a steeply sloping hill. U.S. Forest Service land bordered the intended burn area on both sides and at the top.

Steamons lit the propane pilot light, coaxing the sputtering sparks into a steady flame. Gingerly he tapped the trigger of the flamethrower. The dragon's engine raced ahead momentarily, answering its master's call to perform additional work.

*A quick shot of napalm splashes onto brush and branches, creating a hot fireball.*
A fiery, red-black blast ricocheted off the bank fifty feet up the hill. Steamons' aim was far too short, and the flame threatened to scorch the paint off the pickup's right side. Wisely, he raised the next burst, spraying the flaming napalm down onto the tangle of brush. Even shooting uphill, the blaze reached a full 130 feet. The pyrotechnic display impressed the lumberjacks who had stayed for the show.

Using professionally thickened fuel oil and gas and with an uphill advantage, the range of this flamethrower is about 150 feet.

The dragon and his master crept slowly down the road, whetting the appetite of the fiercely burning flames with more gray slime from the weapon's tanks. The incendiary transformed the bone-dry logs into bright, leaping, anxious flames, as the hellish brimstone ate its way down into solid wood.
More conservative foresters might have let loose a single three- or four-second burst of liquid fire, allowing the conflagration to spread somewhat naturally up the hill. But Steamons was caught up in the heady aura of his peers’ approval, and, as he later told the company officials, he didn’t know if it would be safe to store half-empty barrels of napalm at the company warehouse.

Slowly the mobile furnace rolled along the road, spewing a steady stream of black and red flames. Intense, greasy smoke rose from the fire and darkened the sky above. By the time they reached the end of the clear-cut, the fuel barrels had been emptied and the mountainside roared with angry red and yellow flames. A solid sheet of

A truck-mounted flamethrower moves through forest slash area.
A commercial flamethrower lighting trash and old slash area from a logging operation.
flame engulfed the entire clear-cut, as though painted on by a giant hand. Wicked, black heat devils danced through the air, carrying soot and smoke high into the atmosphere.

Lumberjacks who watched the spectacle estimated that it took about ninety seconds for the fleet-footed flames to streak up the hill and reach the ridge line. Most agreed the fire moved far faster than a man could have run. Steamons expected the fire to die out at the ridge line. Instead it raced ahead, building its own firestorm and hurtling over the fire line on the left and right sides, as well as spreading laterally along the ridge. It had become a classic case of a controlled burn getting out of control. Soon Uncle Sam's standing timber was also in flames.

It didn't take a Phi Beta Kappa in forest management to realize that they had a full-blown, out-of-control forest fire on their hands. Without delay, Steamons dispatched the spectators, armed with chain saws and shovels, up the hill to start a fire line. On his truck two-way radio, he called the fire-protection district headquarters to request extra help.

By the cool of the night, the fire fighters had another sixty men on the line armed with Pulaskis and shovels. By 10:00 the next morning, Steamons reluctantly called in two converted P2V Neptunes to make borate drops on the raging inferno. For three days, he and other fire fighters remained on the mountain trying to contain the fire. To make matters worse for Steamons, he had to haul the dragon around in the back of his truck until he could finally get down off the mountain and
unload it. Everyone he met made it a point to eyeball the damn thing.

Pouring rain three weeks later suppressed the fire to a controlled state, but it continued to smoke and smolder under five feet of snow until spring torrents finally smothered it.

As Steamons' experience shows, the destructive power one can unleash with a flamethrower should not be underestimated. For the paramilitary survivor, flamethrowers have incredible potential, for protection and destruction.

Simply built with common off-the-shelf parts and some scavenged surplus components, a homemade flamethrower is neither difficult nor expensive. Just deadly.
History of Flamethrowers

Light rain misted over the sparse trees, bushes, and grass that remained after sixty days of heavy artillery bombardment. German troops commanded by the Duke of Württemberg were scheduled to charge out of their muddy, cesspool trenches at first light and take the Chateau de Hooge from the British. Two unsuccessful attempts and the unseasonably wet weather—which had turned the ground along the Menin Road three miles east of Ypres in Belgian Flanders into thin, runny, gruel-like mud—had dampened the Germans' optimism. Conditions on that gray, drizzly morning of July 30, 1915, left even poets and historians groping for words to describe the horror. Men were being choked by poison gas or
pounded to protoplasm at a collective rate of more than 11,000 per day. At one point, a British attack penetrated four miles along a nine-mile front, with only 18,000 killed or wounded, leading commentators to assert that the action was a good one, characterized by "acceptably light casualties."

Starting at 3:00 A.M. German artillery fire saturated British lines, commanded by the popular but stoically methodical British General, Sir Herbert Plumer. Rounds, including some newly developed flammable projectiles, fell at a steady rate of twenty or more per minute. As on their two previous attempts to capture the Hooge on July 21 and 24, the Germans also used copious numbers of gas rounds and large cylinders of compressed gas released from their positions into the light westerly wind. Deadly fumes wafted toward the British lines. At one point they generated a cloud of death five miles long and more than forty feet deep. A year earlier, this action would have decided the battle immediately, but that morning the British donned their newly issued rubberized ponchos, hoods, and breathing masks. Although crude, these devices had enabled British defenders during the past week to gun down German infantrymen as they followed the gas cloud into no-man's land.

Though the British were equipped for poison gas, they saw something new that day for which they were unprepared. Between fifty and one hundred "flame projectors," as they were called at the time, had arrived at the German lines the week before. As is so often the case, German commanders anxious to capitalize on any tiny advantage rushed the untried weapons into the hands of
untrained men who carried them to the front in an
indecisive manner. Similarly, the British rushed
into action with their tanks; the Americans with
their squad automatic weapons; the French with
their fighter planes.

The first flame projectors consisted of bulky
brass cylinders capable of carrying about six gal-
lons of fuel and a leather-gasketed pump that cre-
ted twenty-five to thirty pounds of pressure per
square inch (psi). The Germans lacked the ability
to thicken the fuel, so range was limited to about
forty yards under ideal conditions. The fuel was a
mixture of lamp oil and gasoline, with perhaps a
small percentage of pitch (contrary to British spec-
ulation that the fuel was a coal-tar product). It was
ignited by a crude oil-soaked cotton wick that
functioned as the pilot light for the sprayer nozzle.
As a result of the thin fuel and the relatively weak
pump pressures, ranges were such that the user
had to charge right up to the lip of the enemy’s
track before the device had the slightest effect. The
burning wick exposed the user to the enemy, and
shortly defenders knew what to guard against.

The flamethrowers had other flaws as well.
Simple tanks were fastened to a crude rack that
was in turn strapped to the user, creating weight
and balance problems for the soldier. Severely
limiting its usefulness was the fact that the user
could expect about five shots before emptying the
reservoirs. If the flaming wick didn’t attract fatal
fire, the hapless soldier found he had at best a
minute or two of combat effectiveness before running out of fuel.

In that regard, flamethrowers were not particu-
larly effective weapons, but their presence that day—along with napalm artillery rounds, which were mixed with high explosives and gas canister—and used for the first time in modern warfare—so surprised the British that they surrendered their forward positions (although the use of napalm was a major tactical leap, many of the details were unnoted or have been lost with time). Historical accounts noted that the British suffered about 2,000 killed, wounded, or captured that morning. The three-tiered organization by both armies precluded a victory by either side. An attacking force quickly overran its communications line before reaching the third system of trenches. Advancing troops sometimes were shelled by their own artillery; or, at best, they were forced to wait, while the enemy repaired the breach.

Although the first use of flamethrowers was historically indecisive, the event was briefly noted by several writers. More than seventy-five years later, most historians know the event at the Hooge occurred but have no idea exactly when and under what conditions. The fact that flamethrowers are an offensive weapon, valuable only in a set-piece urban war, seems to have been overlooked by military commentators. Virtually no additional mention of flamethrowers can be found until well into World War II. Russian soldiers used them in Finland without averting the disaster that Finland was to become. Against the U.S.S.R. in Europe, the Germans designed more effective flamethrowers for urban use. They also used them to flush French, British, Czech, and Belgian troops out of their bunkers. British defenders installed vast networks
of flamethrowers along their channel coasts to thwart Nazi invasions.

Given the experiences in Europe and the perceived need in the South Pacific, U.S. tacticians reasoned that man-carried flamethrowers would be ideal to clear Japanese bunkers. But they soon realized it was not possible to project unthickened gasoline, motor oil, or coal oil any appreciable distance. Late in 1942, the U.S. Chemical Warfare Service contracted with the Standard Oil Development Company for materials that could be mixed in the field with common petroleum products to produce napalm. Standard Oil was able to quickly produce a material that:

"...throws a cohesive rod of fire with such accuracy that it can be directed into a two-inch bunker slit sixty yards away. The jet, traveling at nearly two miles a minute, does not billow out but strikes its target as a solid glowing stream, then splatters and sticks to any object, blazing with terrific heat that destroys guns and all life within a pillbox."

The thickening agents developed by Standard Oil were simply mixtures of aluminum and soap, but they were treated as closely guarded military secrets. Military planners were not about to compromise what they thought was a significant military breakthrough with loose talk.

As a result, the Americans developed the model M1-A1 flamethrower. Some of these models are still seen in Third World arsenals around the
world. The M1-A1 had two separate fuel cells containing about four gallons of napalm when fully charged. Use of two smaller fuel tanks rather than one big one gave the user a lower, lighter, more balanced profile. To these two tanks, developers mounted a third smaller tank containing massively compressed air to provide propulsion. In theory the compressed air propellant lasted as long as the contents of the fuel tanks without diminished performance. (At one time, it was thought that napalm had to be propelled with inert nitrogen gas, which further limited the use of flamethrowers. Most modern models are designed to use regular compressed air.)

Special electrically fired blank flash cartridges ignited the napalm. At best, the M1-A1 flamethrower could produce seven one-second blasts. On Munda airfield in the South Pacific, U.S. Marines destroyed sixty-seven Japanese bunkers using flamethrowers. Most of these bunkers had already withstood protracted shelling, including direct hits from fighter bombers. By rolling in smoke grenades and deploying smoke pots upwind of the bunker, marine “hot foot” units, as they were called, could get close enough to splash napalm through the cracks in the bunkers, killing or routing the occupants.

Meanwhile, on the European front, the British developed a forty-one-ton, armored, self-propelled flamethrower they dubbed the “crocodile.” Reportedly, the crocodile had an accurate range of 450 feet. The Allies deployed a few in Europe against fixed positions, and U.S. forces made limited use of them in the South Pacific.
Somewhat improved U.S. flamethrowers saw action again in Korea and Vietnam. As a tool for burning villages and flushing out tunnels, they filled a valuable niche for U.S. servicemen. However, by the end of the Vietnam War, the handwriting was on the wall. Small, easily portable white phosphorous and magnesium grenades were proving to be superior to the inconvenience of the flamethrower’s clunky tanks, racks, and hose.

Today, the U.S. military’s inventory of flamethrowers is decreasing. Flamethrowers are an ideal urban weapon, but few military planners envision a war fought in cities and towns. Contingency plans call for bypassing cities or blowing them off the face of the Earth. At the battalion level, the armorer may have one or two among his stores, but the military relies primarily on modern explosives. Only rarely do soldiers receive training on the use of flamethrowers.

Obsolete U.S. military models that one may encounter around the world include the M2-A1-7 or the ABC-M9-7. Both are basically three-tank, four-gallon models, lit by electrically fired ignition cartridges. Both weigh about twenty-one kilos, or forty-six pounds. U.S. training manuals often showed users deploying their dragons from behind an obstacle, while the tanks were set to the side. (Undoubtedly, this is the position preferred by survivors.) The M9-E1-7 is the only model considered to be current in the U.S. armed forces today. Basically, this model is much like its predecessors. Filled, it weighs about forty-six pounds; maximum range with properly thickened fuel is forty-five to fifty meters. All models have three tanks, cartridge
ignition, and a pack rack for soldiers. Useful life of the fuel in combat is from five to seven seconds.

Soviet flamethrowers employ a somewhat different mode of operation. The LPO-50 is the flamethrower currently in use among Warsaw Pact armies. The LPO-50 consists of a three-tank unit with manifold. Each tank contains an electrically

M2A1-7 PORTABLE FLAMETHROWER (U.S.)
fired pressurizing cartridge that, when fired, provides the propellant necessary to project the napalm from the gun. Individual tanks contain about one gallon of fuel, enough for a single two- to three-second burst. Effective operating distance is said to be about forty meters. A second and third burst are accomplished by moving a selection lever on the gun. The Soviet flamethrower weighs about forty-six pounds. Three electrically fired ignition cartridges provide traditional lighting.
In a purely military situation, the flamethrower operator may not wish to risk having his position revealed by the pilot light flame. Soldiers are also not usually in the position of wanting to coat their opponents with napalm before giving them the option of retreating, fleeing, or surrendering. In a paramilitary context, however, a propane pilot light can be simpler and does offer the flexibility of igniting the napalm later.

Most experts agree that either the Italians or the
Brazilians, depending on one's point of view, currently manufacture the world's most advanced flamethrower. Both are capable of seventy meter (215 feet) ranges. The LC-T1-M1 Brazilian model has three tanks and weighs thirty-five kilos fully
charged. Its outstanding feature is an electronic ignition system powered by eight standard 1.5-volt dry cells. Reportedly, a fresh set of batteries will light one thousand shots before going dead. On the average, users expect five to seven seconds of actual operation before the fuel is expended.

The model T-148/A Italian flamethrower also has an electronic ignition, and its manufacturer claims it will function satisfactorily under water! This may be of value on rainy or snowy days. The Italian model’s advanced tank design gives it the
same basic fuel load as most other models, but with a total weight (filled) of only twenty-five and one-half kilograms—as opposed to most other models weighing in at around thirty-five kilos.

Problems inherent in the military application of flamethrowers—availability of proper chemicals, a ready source of fuel, and difficult-to-maintain compressing equipment—are either alleviated by civilian models or not as serious to survivors who have better access to chemicals and fuel and aren’t as mobile as an army on the move. Civilian paramilitary models use smaller engines and pumps instead of high-pressure tanks and are generally simpler and more effective than the rugged, more reliable three-tank military models. Lighter civilian models can use thicker napalm, which allows greater throwing distance. Most important, the civilian unit can be deployed and field-served without large amounts of sophisticated support equipment. Those who are not satisfied with the pilot-light ignition standard on civilian models and who are electronically adept may wish to design and construct a sparking system for their home-built dragons.

For the foreseeable future, flamethrowers will be with at least some elements of the world’s armies. And, as was true in the case of the marines at Munda, flamethrowers may provide exactly the deterrent for civilians wanting to protect their urban safe havens.
CHAPTER TWO

Construction of a Flamethrower

Builders of flamethrowers should keep several basic guidelines in mind throughout the process of construction and use. Chief among these is the fact that flamethrowers—especially the smaller, portable, expedient models—can be very dangerous. Larger commercial models (as recommended and described in this chapter) include a number of design features that make them relatively safe to own and operate. Amateur assemblers should keep these safety features in mind as they alter or modify their own weapons to accommodate surplus or scrounged components.

GIs who are assigned to flamethrower duty do not consider it particularly desirable or even rational.
Handling one is intrinsically dirty, disagreeable, and dangerous. They consider flamethrowers to be weapons of last resort, useful when nothing else is at hand to do the job.

Makers who want a flamethrower for commercial applications—including starting fires, disinfecting buildings, destroying trash and refuse, or just cleaning up—should in all cases choose the more durable, conservative model. Those who want an inexpensive version principally to use in an emergency to defend their retreat could opt for a simpler design.

Flamethrowers, when viewed as a collection of their parts, are extremely simple. They consist of the following components:

1. Pump needed to propel the thickened petroleum. This pump adds cost and weight to the package but gives the machine greater utility over many military models, making it more valuable to survivors.

2. An engine, pressure tank, or other device used to power the pump. Military models use heavy, cumbersome pressure tanks. Expedient or commercial models work best with a small two-cycle engine. Miniaturization of these power plants in recent years has made it possible to develop even smaller flamethrowers.

3. Spray nozzle or gun that disperses the napalm, allowing the user to propel the napalm out onto the target. For safety and accuracy, the gun must include a forward hand grip.
4. Lighting mechanism used to flame the napalm after it leaves the hand-held gun.

5. High-pressure hoses necessary to transport the thickened hydrocarbons from tank to pump to gun.

6. Pressure valve to allow the pump to recirculate the napalm back into the storage tank when the pump pressure is not relieved by pulling the gun trigger. Some builders may want to include a pressure gauge so that they can know precisely what the system is doing.

7. Napalm fuel storage tank. To a major extent, this component is the limiting factor of any flamethrower design. Ideally, the tank should be as large as possible to provide as many shots as possible. However, weight and maneuverability considerations preclude anything much greater than 10 or 12 gallons on a backpack design or 135 gallons when mounted on a small truck or all-terrain vehicle. Using longer delivery hoses, the truck-mounted design—which at first seems cumbersome and basically immobile—can be of great tactical value.

8. Clutch or engine/pump coupling. This connection can be very complex. In some cases, the engine will run slowly enough under load to allow a direct link. However, for safety reasons, the user may demand an electric clutch that engages only when the gun trigger is pulled. In still other cases, the builder will find that he must purchase an expensive speed-reduction unit.
COMPONENT PARTS OF FLAMETHROWER

Using the above component list, the builder should start with the mortar and pump. Large commercial units employ a standard eleven-horsepower Briggs & Stratton electric-start gas engine. Models 221400, 252400, or 254400 are all accept-
able. Tecumseh model 912210B at 12 horsepower is also an excellent choice for heavier, truck-mounted commercial units.

These larger engines don’t have to be electric start. Yet on many commercial applications, users often enjoy the simplicity of punching a button to start the power plant. Scroungers can use a four-cycle engine from an unused riding mower, generator, farm implement, paint sprayer, compressor pump, or other available power plant.

Those wanting a smaller portable unit may elect to use a 3.5 horsepower, two-cycle engine, such as a Tecumseh model 800110, available new from Grainger’s Supply. These are pull-start, direct-drive engines that are eminently suitable

Portable flamethrowers may use smaller, lighter engines directly coupled to the pump.
for smaller flamethrowers.

Since these new engines purchased from farm and ranch supply houses and/or wholesale hardware dealers can be quite expensive, survivors may elect to use a small surplus chain-saw or go-cart engine. Although many pump manufacturers claim that a unit as small as one-half horsepower will run their pumps at or near full capacity, survivors must still exercise caution so that the marriage between engine and pump is a good one. Scrounged power plants must possess sufficient remaining life to operate the intended pump moving heavy, viscous napalm.

Chain-saw engines having a 3.1 cubic inch displacement theoretically have about 3.4 horsepower. Larger, more desirable 4.9 cubic inch displacement models will have in the neighborhood of 6 horsepower, which is sufficient zip to adequately power most pumps and to get the napalm out to where it can do some beneficial work. Three-and-one-half horsepower will work, but the spray-gun orifice must be reduced so that sufficient pressure can be developed, which limits the amount of material that can be delivered. As a general rule, the unit should be run on pressures from 90 pounds per square inch (psi) to a maximum of 125 psi. Beyond this point, delivery performance is not increased.

My own supersafe model uses a Continental Belton Co. model B0201 pump with brass gears. This pump, available from many automotive supply houses, is virtually product specific for napalm. The survivor can also choose from a host of other suitable pumps. Grainger lists a number
of cast-iron or aluminum rotary gear pumps that will handle viscous No. 2 through No. 6 fuel oil. Most farm supply houses also have lighter aluminum-bodied gear pumps designed to handle chemicals and petroleum products. Specialty engineering supply houses, such as McMaster-Carr, stock extremely light plastic epoxy or bronze body pumps with impellers that are specifically designed to move petroleum products. Some of these pumps are designed to operate using engines as small as one horsepower or less.

Anyone with sufficient funds can buy a suitable new pump. Those whose resources limit their acquisitions to scrounging may spend a bit more time looking for a pump that will reliably handle heavy petroleum-based material without dissolving or detonating the entire apparatus.

Connecting the pump to the engine is probably the trickiest procedure involved in assembling the various parts of a flamethrower. Tried and true safer commercial models use an Everco A8433 electrically engaged clutch. These clutches are cumbersome, heavy, and expensive. If purchased, successful operation requires that these units have a wet-cell battery wired in as a permanent fixture. An A8433 clutch can be scrounged from an old Ford automobile air conditioner system. They are used in conjunction with a microswitch wired into the gun trigger so that the hoses carrying the volatile napalm are not under constant pressure. Pulling the trigger kicks in the clutch, putting the engine under load as the pump pushes the snotty napalm down the hose.
Eleven-horsepower gas engine (left) powers pulley/clutch assembly (center). The electric clutch is taken from a Ford automobile air conditioning system. Pump on far right is a bronze gear-type, designed to handle thick petroleum products.

Electric microswitch to machine clutch (arrow) and propane bottle are mounted on the gun barrel extension. Pulling the trigger engages the microswitch, which activates the clutch, thus propelling the napalm.
Backpack Flamethrower and Component Parts
On smaller, more expedient models the maker may elect to run the hoses under constant pressure. All hoses must be the high-pressure type, double fastened at all connections. Makers should also install a good pressure-release valve that will allow excess napalm to be recycled back into the storage tank. This recycling process prevents the user from having to mix the napalm in a separate container and then empty it back into the flamethrower tank.

Most gear-type pumps require about 2,000 revolutions per minute (rpm) to perform satisfactorily at full pressure, with something approaching full delivery potential. New commercial engines run wide open at about 3,600 rpm. This would suggest

Eleven-horsepower, four-cycle engine powers the pump, which is connected through the electric clutch. The motor is belted to slow it from 3,600 revolutions per minute (rpm) to 1,800 rpm. The battery (shown in upper left) partially supplies the power to activate the clutch and start the engine.
that a direct-drive system avoiding heavy pulleys and belts would not be feasible. However, in actual practice most pumps will accommodate higher rpm, while smaller engines under load seldom run at a full 3,600 rpm. It all depends on the engine and the pump. Builders will find that they must field engineer their specific pumps and engines to achieve the best results. Theoretically, engines running at 3,600 rpm that are geared or belted back 50 percent to 1,800 rpm have twice the torque and would be expected to perform more suitably. In actual practice, this is not always true. Some surplus chain-saw engines run faster than 3,600 rpm and absolutely must be geared back to be effective.

Before I set up a belt and pulley system or purchased an expensive reduction coupling, I would try a simple collar, hooking up pump and motor face-to-face. This simple, cheap approach is preferable unless the survivor's needs require the safer, more conservative model, necessitating the use of an electrically engaged clutch.

Once the pump and engine are matched, the unit must be bolted to a small aluminum-angle carrying rack. I use four 1-1/2-inch aluminum angles. Since most survivors cannot weld aluminum angle, the pieces must be cut to size, drilled, and then bolted together. Aluminum angle is ideal because of its weight, ease of handling, and non-sparking nature.

As a general rule, pumps used for flamethrowers will be engineered with one-half-inch pipe intake and output ports. Securely thread a two-inch black pipe nipple into the output port. Onto this nipple, securely thread a common black one-
half tee. All pipe fittings must be in excellent condition. Into one side of the tee, thread either a preset or adjustable relief valve. Set the relief valve at 100 pounds of pressure or use a preset version of that strength. Past experience indicates that 100 psi is about maximum for a flamethrower. At 125 psi we start to lose distance and efficiency, while below 90 psi performance drops dramatically. As the engine builds pressure in the system, the valve will open, allowing the napalm to cycle through the tank. Commercial models are constructed with permanent ball valves built into the system that, when opened or closed, allow the material to be cycled to the tank, the gun, or in some cases an external tank, such as those used on helicopters.

Throughout the system you should use high-pressure spray hose designed for agricultural use, including petroleum products. Design working pressure should be 600 psi or more. This hose is commonly available at full-service farm or automotive supply houses. Suppliers will press on appropriate fittings to the specification of the builder. It is possible to obtain three-eighths-inch inside diameter hose for use over one-fourth-inch pipe fitting or three-fourths-inch pipe over one-half-inch nipples, but these require double hose clamps and are not as secure as pressed factory fittings.

Use the largest inside diameter hose available. Do not settle for anything less than one-fourth-inch. On larger models, the three-fourths-inch hose is expensive to buy and cumbersome to use, but on smaller, expedient models where hose lengths are limited, this price/utility problem seems minimal. Three-fourths-inch hose delivers more napalm and
Construction of a Flamethrower

fits tightly over a one-half-inch pipe nipple, making it the hose of choice if the builder can work it out.

Storage tanks don’t pose as severe a problem as one might initially think. My large commercial unit uses a 135-gallon tank made from welded aluminum sheet. Other units use 55-gallon surplus poly barrels with movable hoses. For one small portable unit, we scrounged a 12-gallon poly tank from an orchard sprayer. Since the tanks aren’t pressurized, they must meet only one specific criterion: they must be nonsparking.

This flamethrower has a 135-gallon aluminum tank with gun and hose attached for transport. The motor and pump are located to the right, under the sheet aluminum shield.

Poly and fiberglass tanks are especially easy to work with since most come with secure caps and can be easily fitted with suction (on the bottom) and discharge (in the top side) fittings using epoxy and/or fiberglass kits. Even common tap-and-die fittings can be placed on a poly tank as long as the
tank will not be subjected to destructive pressures.

From the second T-outlet on the pump, run an appropriate length of pressure hose to the gun. The outlet tee on the pump now has one hose running to the back of the tank through the relief valve and another to the gun. Commercial semistationary models are generally built with fifty-foot gun hoses so that the user can walk around. On backpack models, four feet of discharge hose may be adequate, but a longer hose of up to twenty-five feet is more practical so that the user can set the unit

Flamethrower gun is attached to a truck-mounted commercial motor, pump, and tank by a twenty-five-foot high-pressure hose.
Construction of a Flamethrower

...down, pull the starting cord to ignite the engine and then crawl around relatively unencumbered with the flamethrower gun. When connecting suction hoses from the bottom of the tank to the pump intake, inspect carefully to make certain that all connections are secure.

Finding and assembling a high-pressure gun is the last task facing the determined paramilitarist. Once this is done, the user can be reasonably confident that he can defend his retreat against heavy-duty hardware.

Most full-service farm supply stores will carry a number of high-pressure spray guns. Ask for a model that will handle highly viscous petroleum products. The gun should accept an eighteen- to twenty-four-inch barrel extension. The nozzle should be capable of handling at least two and one-half gallons per minute at 500 psi. These pressure and volume requirements may seem excessive, but they do allow for some margin of error when handling fairly dangerous materials.

If possible, use a gun with a drop-forged brass body with positive nondrip trigger action. The gun must accept a twenty-four-inch barrel extension. Using a flamethrower without an extra-long barrel to keep the discharge away from the user is foolish and dangerous. The barrel extension also provides a place to mount a forward hand grip for the user to hold onto, as well as a mounting plane for the pilot-light assembly. The forward hand grip should be mounted at a comfortable place on the barrel using U-bolts of hose clamps.
The propane gas bottle supplies the ignition to the pilot light. The trigger has a built-in electric switch that connects to a surplus automotive electric clutch. The forward grip on the gun is necessary for safety.

Setting up one’s hoses to adequately and safely attach to the gun, as well as fitting the unit with appropriate nozzles, can become an expensive, time-consuming exercise. To find the correct nozzles for a specific gun, the only method seems to be trial and error.

Every high-pressure gun maker seems to have his own set of nozzles and nozzle codes. At times, I have had to call the distributor or facto-
ry to get appropriate numbers, which causes long and exasperating delays.

Commercial models that have a battery as an integral part of the assembly are drilled and tapped so that a microswitch can be placed in the trigger mechanism of the gun (suitable switches are available from Radio Shack or other electronics stores). Pulling the trigger also engages the electric clutch between the pump and engine. Electric lines from the battery to the clutch must be run up the hose, adding marginally to the total weight. Pressing the switch results in a momentary pause as the system builds enough pressure.

The spray gun on this model features an electrically activated microswitch to engage the engine pump.
to expel napalm over its design distance.

Before installing the pilot light, be absolutely sure the machine will operate reliably without leaks or spills. Extra care taken in the assembling and mounting of the pilot light will eliminate or minimize problems that might otherwise arise. One trick to remember in mounting the pilot light is to position the flame at least four inches away from the discharge port on the gun. This almost always entails using a piece of copper pipe to extend the flame to its correct position. Use a common propane cylinder fitted with an extra-long nozzle assembly. Hose-clamp the proper cylinder in a balanced, easy-to-use position back on the gun-extension pipe. Keep the tank at least twelve inches to the rear of the dis-

A completed flamethrower gun is mounted on the rack of the fuel tank. Note the angle of the pilot-light tube at the end of the gun barrel extension.
charge nozzle. Run the piece of copper extension from the cylinder regulator up past the end of the gun. Aim the flame downward at a twenty-degree angle through the stream of napalm.

Turn the cylinder on and adjust the flame so that it is bright and vigorous. Users will discover that it takes several four-hundred-gram cylinders to keep their dragons running for any length of time. Gas consumption can be cut by turning the flame down so that it is barely visible when not actually in use. However, the wise user will plan for rapid depletion of his LP gas supply and have extra canisters available.

After confirming that the engine and pump are properly matched, the next step is to mix the napalm and do a trial run. Successfully mixing napalm is much more difficult than one might expect, especially when the proper commercial chemicals are unavailable. (Since the quality of the fuel is the principal determinant of the flamethrower's effectiveness, the next chapter is on fuel-mixing procedures.)

By whatever means, make certain that you have thoroughly tested the pump and engine as a napalm slimer before even thinking about turning on the burner. Check for leaks or spills anywhere on the device. If any fittings show signs of leaking, do not economize on parts. Remove the defective parts and start anew. As an added precaution, I would recommend setting backpack flamethrowers on the ground before deploying, unless an emergency dictates otherwise.

Prices may vary a bit from place to place, but when assembling a dragon, the following budget
should be close, although perhaps a bit on the high side:

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
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<tbody>
<tr>
<td>12-HP electric-start gas engine</td>
<td>$400</td>
</tr>
<tr>
<td>High-pressure bronze gear pump</td>
<td>100</td>
</tr>
<tr>
<td>Gun fitted with electric pressure switch</td>
<td>100</td>
</tr>
<tr>
<td>Electric clutch assembly</td>
<td>150</td>
</tr>
<tr>
<td>Industrial grade hose (50 feet)</td>
<td>65</td>
</tr>
<tr>
<td>Surplus poly tank (55 gallon)</td>
<td>25</td>
</tr>
<tr>
<td>Aluminum frame material</td>
<td>15</td>
</tr>
<tr>
<td>Battery</td>
<td>50</td>
</tr>
<tr>
<td>Fittings and wire</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$930</strong></td>
</tr>
</tbody>
</table>

Add another $20 if a new pack frame for a man-portable unit is needed. Total price would still be well under $1,000, a small price to pay for something that would easily take out an armored car.

People who enjoy puttering around with devices of this sort can usually pick up all of the essential components at greatly reduced prices. Using a surplus chain-saw engine and farm chemical pump will usually keep the price under $500. At one time, I even found an adequate gun among some old farm supplies that was fitted with a barrel extension, pressure switch, and new nozzle for use on a portable unit. The only used components you should avoid are high-pressure hoses and pressure-relief valves.

Although novice builders generally *overestimate* the amount of money needed to make a flamethrower, they generally *underestimate* the amount of time needed to scrounge and construct their first unit. Assuming one has access to a well-
supplied agriculture or auto-supply store (and a lot of cash), a good estimate is about one solid week the first time through, using all new parts.
CHAPTER THREE

Manufacturing Napalm

It seems like a thousand years ago, but I can vividly recall as a kid crouching next to a three-gallon lard can half-filled with gasoline that I was heating on a small camp stove. I was trying to make napalm following instructions from an old World War II Office of Strategic Services (OSS) operations manual. The incident occurred so long ago that most of the details are blurred. For instance, I don't remember exactly why I was trying to make napalm. I do remember that I had no practical use for it; we didn't own a flamethrower, and I had no idea how to construct one. One thing is very clear to me, however. Even though I was operating upwind of a steady breeze, I remember my sixth sense...
kept telling me this was really a very dangerous
dumb thing to do.

Every time I put the can on the fire, the gaso-
lene started boiling furiously. Carefully and
meticulously, I shaved microscopically thin sliv-
ers from a bar of 99-percent pure Ivory soap into
the boiling gasoline. Eventually, most of the gaso-
lene boiled away, leaving a brown, varnishlike
sludge in the bottom of the can. The soap never
did jell the gasoline, leading me to the conclusion
that there really was no such animal as an expe-
dient napalm formula. As a result, I abandoned
this project until much later in life when I dis-
covered good, reliable commercial napalm chem-
icals.

Commercial users maintain that producing a
good batch of napalm is tougher than building the
flamethrower. The task of getting the napalm right
would be virtually impossible were it not for the
new, improved chemical formulations. However,
variations in temperature and humidity still pre-
clude the procedure from ever being cut and
dried. To make matters worse, in addition to
being sensitive to weather conditions, the formula
is always peculiar to each individual flamethrow-
er, as well as being subject to the availability of
various chemicals.

For a number of years I used military-grade
petroleum gel chemicals purchased from surplus
stores, which were usually quite cheap.
Invariably they came in battered five-gallon pails
containing twenty pounds of cream-colored
chemical. The pails were rugged, durable con-
tainers that were in and of themselves worth the
forty cents per pound I usually paid for the chemical inside. The chemical was called alumagel and it came in two distinct varieties: M-2 for use in warm weather (defined as temperatures above 60 degrees Fahrenheit) and M-4 for cold-weather use. I carried both M-2 and M-4 to the field for testing, and it was usually a toss-up as to which formula would perform best on a given day. As a general rule, it always took considerably more chemical of either type to achieve the desired performance when temperatures were at the lower end of the range.

Assuming alumagel is still sold in a surplus store near you, I recommend the following percent-

Most surplus napalm chemicals have disappeared by now. Occasionally a can of M-2 or M-4 alumagel may be found in old army surplus stores or commercial forestry supply stores. These two cans of M-4 incendiary oil and thickener were packed in 1969 (right) and 1964 (left).
ages as a starting point:

<table>
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<tbody>
<tr>
<td>55</td>
<td>10.00</td>
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<tr>
<td>40</td>
<td>6.75</td>
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<tr>
<td>30</td>
<td>5.00</td>
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<tr>
<td>25</td>
<td>4.50</td>
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<tr>
<td>20</td>
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<td>2.50</td>
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<tr>
<td>10</td>
<td>1.70</td>
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<tr>
<td>5</td>
<td>.81</td>
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M-2 (warm-weather alumagel) is for use when temperatures exceed 60°F. When the temperature falls below 60 degrees F, flamethrower operators must switch from M-2 to M-4 alumagel. Use the following ratios as starting points for a cold weather M-4 mix. (All ratios are approximations that must be adjusted for local conditions.)

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<tr>
<td>55</td>
<td>6.70</td>
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<td>15</td>
<td>1.75</td>
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<td>10</td>
<td>1.20</td>
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<tr>
<td>5</td>
<td>.60</td>
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Generally, five to fifteen minutes of mixing time will be required to whip up a batch of gel. Using the above ratios, begin with a small amount of fuel
to try the formula. Sift the alumagel through a screen to break up any lumps that may have formed because of high humidity or long storage. *Caution: you must sift all of the recommended amount of alumagel into the fuel on the initial pour.* Adding extra alumagel powder later to correct a runny formula causes uneven distribution of the powder in the fuel, producing napalm that is too thick, ropy, and lumpy to be usable.

Those whose dragons will mix the napalm by running it through the system can expect a far superior product of much smoother consistency than that which results from stirring it in a tank with a paddle. Too much alumagel sifted into the base fuel creates a final product that is beyond the capabilities of the dragon's motor and pump. Should this happen, wait ten minutes to be sure it has completed the jelling process and then mix in two to three additional gallons of gasoline—assuming that this is a twenty-five to fifty-five gallon starting batch. If the test batch is five gallons or less, one-half gallon of additional gasoline should thin the batch sufficiently to run through the machine. Always use gasoline to thin, never diesel fuel, even if the mixture was originally thought to be low on fuel oil.

If the gel will be carried around for several hours before using, make the mixture slightly thinner than usual. It should set up adequately after a few hours, especially in rising temperatures. Remember to circulate it through the system occasionally to produce a more stable end product.

Almost any petroleum product can be jelled. Pure gasoline will jell into a mixture similar in
After the mixture sets, it resembles apple butter in color and consistency (above). As the mixture approaches the correct state, lumps will appear and the fuel will cling to a stick like heavy syrup (below).
Manufacturing Napalm

Colo and consistency to apple butter, and it loses some of its intense volatility. Jelled gasoline burns more like lighter fuel, only with greater endurance and body. The end product should have the same thickness and stickiness as Karo syrup, with a few floating soft lumps that look much like whipped margarine.

The best starting fuels usually combine gasoline and fuel oil. Gasoline provides volatility, while the fuel oil adds the staying power necessary to eat through body panels and plaster walls and to set vehicle engines on fire. A heavier mixture will propel farther and will splash and ricochet, causing more mayhem. My preferred formula for small portable flamethrowers is about fifty/fifty gas and diesel. Your experiments may show that a mixture of 60 percent oil and 40 percent gasoline works better on a given day. Because alumagel is extremely sensitive to atmospheric conditions, it is difficult to predict ahead of time which formula will work best.

Larger commercial units often perform best by reversing the ratios to 60 percent oil and 40 percent gasoline. Surplus JP-4 (jet fuel) is often available from aircraft fuel-tank maintenance. It makes excellent flamethrower fuel. Napalm made from JP-4 will often remain in good condition for two to three weeks. At about two weeks, napalm made from regular fuel oil and gasoline usually starts separating into a thin, watery solution or congealing into a heavy gluelike substance. Neither is usable. To test your formula’s shelf life, set aside five or ten gallons for a few weeks and see what happens.
In my opinion, expedient methods of making napalm have not improved since my failed childhood experiment. I strongly recommend that you use only commercial or military surplus chemicals when preparing napalm, especially if the situation is a serious paramilitary one. Some readers may develop a workable, expedient method of jelling petroleum, but at this point, I doubt it.

Military-surplus alumagel performs adequately for its intended purpose, but because it is so sensitive to temperature and moisture fluctuations, I now use a material called Sure-Fire (available from Simplex Manufacturing Co., 13340 N.E. Whitaker Way, Portland, Oregon 97230; 503-257-3511). Sure-Fire works well under most moisture conditions and in temperatures ranging from 32 to 70 degrees F. Warming or cooling the fuel does not seem to affect Sure-Fire, nor does it seem to matter which fuel or fuel mixture is used. Sure-Fire is slightly sensitive to excessive humidity, but tightly sealing the bag between use greatly minimizes the moisture problem.

As do all “miracle” products, Sure-Fire has a downside. While alumagel costs between forty cents and one dollar per pound, Sure-Fire costs a minimum of four dollars per pound. As an added disincentive (in case this didn’t make up your mind), Sure-Fire is almost always sold in fifty-pound bags. Western Helicopters (Box 369, Newburg, Oregon 97132; 503-538-9469) will occasionally ship smaller quantities. Contact them directly to find out about selection, price, quantity, and shipping instructions. Both Western Helicopters and Simplex are basically farm and
Sure-Fire chemical additive is the best and most expensive commercial napalm fuel additive available in the United States.

logger supply houses so inquiring about Sure-Fire will not generate concern or hostility, provided the inquirer maintains the posture of having an agricultural or forestry use for the material.

Sure-Fire is used in far smaller quantities than alumagel, mitigating its cost per pound somewhat. One-twentieth of a pound (at a cost of about twenty cents) will usually jell one gallon of regular gasoline and oil mixture in about twenty-three minutes. If the temperature drops below 30 degrees F, it may take two-thirds of a pound per gallon to do the job in the same time.
Adding a relatively small amount of Sure-Fire to the tank of a truck-mounted flamethrower produces napalm in about twenty-five minutes.

Plan to use three pounds of Sure-Fire in thirty gallons of fuel to jell the mixture in twenty minutes at 50 degrees F. As with other products of this nature, Sure-Fire must be sifted gently into the fuel to avoid caking, roping, and lumping. Using the flamethrower’s pump to circulate this mixture is the preferred method of mixing, assuming one’s dragon has this internal ability. Note that with all
Manufacturing Napalm

chemicals of this nature, these figures are to be used only as starting points. Intelligent users will experiment to find suitable mixtures that perform well in their weapons. Owners are looking for a formula that will give them the longest propulsion, hottest burn, and most sustained jell.

The pump on the flamethrower is set to circulate the solution for a superior mix. All of the chemical additive must be dumped evenly into the fuel at the beginning, before jelling begins. After the initial mixing, the fuel and additive must be agitated until a good thick gel results.

Experienced fire fighters wear Nomex pants and shirts when working around flamethrowers. It may not be necessary to wear this special flame-resistant clothing, but it is imperative that users
never wear synthetic clothing—including nylon, rayon, or polyester of any sort—when using a dragon. When subjected to high heat, synthetics melt to one’s skin, subjecting it to ugly, painful burns that would not result from natural fabrics.

When trying the flamethrower for the first few times, be especially cautious that errant breezes do not send the napalm arcing back onto you. It is always best to throw the napalm with the wind, but this may not be possible, especially from a defensive position. In the case of an upwind attack, try to operate from an uphill position. After some trial runs, it may even be necessary to install a different, more appropriate orifice in the gun.

Mixing suitable napalm, even with a superior product such as Sure-Fire, is more an art than a science. Determined survivors who elect to use flamethrowers must decide ahead to invest enough money and time to do the job properly.
At this time, private ownership of flamethrowers is not restricted or controlled except possibly in some isolated local cases. This means there are a number of commercial models available to those who prefer to buy rather than build their flamethrower and who have enough money to do so. Generally, these ready-built models were designed for burning forest slash, constructing back fires to fight major fires, destroying trash and refuse, torching buildings, controlling weeds, and other common work-related tasks. Flamethrowers are most commonly found where fire-fighting supplies are found. So finding a source of fire-fighting equipment makes sense for the survivor or paramilitarist. Catalogs
listing napalm chemicals, fire-resistant suits, spray guns, nozzles, and other fire-fighting equipment may be filed away in the local library or fire station. It may take a while to root them out, but for many people the time is well spent.

*International Reforestation Supplies, Inc.,* (Box 5547, Eugene, Oregon 97405, 800-321-1037) will send you an excellent full-color catalog on request that shows their complete line of products and equipment. They sell good-quality, flame-resistant shirts and pants, as well as unique poly tanks designed to fit the user's contours. The tank comes with a hand pump, but it could easily be fitted with a portable motor and pump. These tanks would be ideal for portable dragons were it not for their relatively small size of 5.2 gallons.

*The Mallory Company* (1814 Baker Way, Kelso, WA 98626, 800-426-6830) carries the best line of flamethrower hoses, assuming amateur builders cannot find what they need closer to home. Their 400-page illustrated catalog is one of the most comprehensive in the industry. They feature a small motor-driven backpack sprayer that can either be modified into a portable flamethrower or serve as the model for a custom-built dragon with larger tank capacity. It costs about $600, making it prohibitively expensive for all but the most impossibly inept mechanics.

*McMaster-Carr* (with locations in New Jersey 201-329-3200, Chicago 312-833-0300, and Los Angeles 213-945-2811) is a good source for survivors who want to build their own flamethrowers from components. *McMaster-Carr* catalogs are well over 2,000 pages, so the company is under stand-
ably reluctant to send them out to those who order infrequently or in small lots. You should call one of their regional sales offices to see if you can talk them out of a catalog. Even if you have to pay for the catalog, it is worth it because McMaster-Carr stocks an incredible number of different hardware items, all of the finest quality but often also very expensive.

*Grainger's* (5959 W. Howard Street, Chicago, IL 60648, 312-647-8900) has a much smaller inventory than McMaster-Carr, but builders can save bucks by ordering larger, more expensive components from Grainger's catalog. Grainger's, which has warehouses in almost every state, has a stated corporate policy of selling only to industrial and wholesale customers. They do sell to farmers and ranchers, however, which allows many survivors to qualify.

*Sears*, in its farm and ranch catalog, features two pumps that might be used on a flamethrower, although I have not tried either model. They also show at least two direct-drive pump and engine packages that I would at least consider. Pick up this catalog at any local outlet.

*Forestry Suppliers, Inc.* (800-647-5368) has several commercial flamethrowers for sale. The ones shown in their catalog are probably too small for tactical paramilitary operations but are of interest because of the gasoline-soaked ring they use as an ignition system. This alternative might be the answer for those who don't want to fool around with a propane pilot light on their flamethrowers. Forestry Suppliers is also an excellent outfit from which to purchase heavy leather fire-resistant
gloves to wear while using the gun, in case these gloves are unavailable from a local welding supply shop. In addition, they carry a complete line of smaller gasoline-engine-powered sprayers. Or, perhaps more importantly, they also carry all of the many parts required to build one from scratch, including hoses, engines, and guns. Building a small, yet suitable backpack flamethrower using their parts assembled in a modified fashion would be quite easy, although fairly expensive.

For protection from the napalm and the flame, the operator wears heavy leather gloves and flame-resistant coveralls. When around any kind of fire, never wear anything made of synthetic materials, which melt onto the skin.

*Western Helicopters* (Box 369, Newburg, OR 97132) and *Simplex* (13340 N.E. Whitaker Way, Portland, OR 97230) will custom-build flamethrowers from scratch. Product-liability considerations force them to virtually insist on building larger truck- or tractor-mounted units with all available safety features. Especially determined
survivors may decide to mount one of their units on an all-terrain vehicle. A weapon like that deployed in a manner taking full advantage of the terrain would be extremely difficult for the authorities to counter. I have never asked either supplier about building a smaller backpack model, but I suspect that the buyer would face a difficult selling job to get them to agree.

These are all of the mail-order dealers I have used when assembling flamethrowers. As usual, I would greatly appreciate hearing from readers who come up with new sources of supplies and parts for their dragons. If you know of names of other mail-order suppliers, please send them to me in care of Paladin Press (P.O. Box 1307, Boulder, CO 80306). Of course, one should not overlook obvious local suppliers, including farm and ranch outlets, when trying to locate supplies and equipment.
No doubt, defenders in places such as Rangoon, Beirut, and Beijing would have taken the time and expense to construct personal flamethrowers had they known what lay ahead and had they the opportunity and supplies to do so. Today, this would be an impossible task for them. Other more critical matters demand their time, and the necessary parts, equipment, and chemicals simply are not available. Even if they had the dragon, finding an adequate supply of fuel would be a problem in most of today’s hot spots.

Here in the United States, we are still extremely fortunate that anyone can purchase—for a relatively modest amount of money—all the necessary off-the-shelf parts from a farm or auto
Flamethrowers are the ultimate urban survival weapon: they're cheap, legal, easily built and maintained, and they stop any kind of ground attack.
Conclusion

supply shop, catalog store, and/or scrounge to obtain used parts from a junkyard to assemble a good, workable flamethrower. The chemicals are readily available, legal, and can be kept for long periods when properly sealed and stored. Fuel is plentiful and moderately priced (especially when compared with prices in other countries). Urban warriors have never had it so easy. At a cost of between $400 and $1,000, they can put together a machine that will effectively checkmate a million-dollar tank or other piece of military hardware. And they don’t have the headaches associated with high explosives, which are dangerous, illegal, perishable, and hard to find.

In a more peaceful context, flamethrowers are practical and fun to play with. Used sparingly and professionally, the fuel will last a long time. I spent one whole day singeing weed-choked ditch banks and did not consume more than thirty gallons of fuel. Shooting trap or skeet would have cost that much. And think of the damage one can do! On the other hand, flamethrowers can be extremely dangerous. But so is having a battle tank rumble across one’s property.

Some survivors may decide not to build a dragon immediately. They might hold fast, content in the knowledge that if the flag does go up, they know what to do. The flamethrowers described in this book are easy to build, operate, and maintain. Flamethrowers will remain the weapon of choice for those who are forced to survive in urban situations.
What do you have in your arsenal that would hold off armored vehicles or a small army of heavily armed, hostile people? Sniper rifles, automatic weapons, mortars, and improvised explosives all have their uses for survivors, but stopping tanks is not among them. What you need is a flamethrower. One whiff of the dragon's napalm-scented breath will put attackers at your mercy.

Flamethrowers are available commercially, but they are expensive and designed for civilian applications, such as building fire lines or controlling weeds. *Breath of the Dragon* will show you how to build your own, using easy-to-follow, nontechnical instructions and common, legal components, many of which you can pick up used at little or no cost. You'll save money and have a weapon designed to meet your special needs. You can choose between a backpack model or one mounted on a vehicle, or you can customize your pump, engine, spray gun, lighting mechanism, and tanks. Ragnar also includes a simple formula that takes the guesswork out of manufacturing napalm.

Flamethrowers are legal; easy to build, maintain, and operate; and use fuel that is cheap and plentiful. Plus, they give you the edge over most urban combat weapons you're likely to encounter. So if you think you may need more stopping power than your conventional weapons can deliver, invest a small amount of money and time and learn how to gather the components, assemble and operate the flamethrower, and use napalm to set perimeter defenses. Make your safe haven really safe. A complete source guide is included.