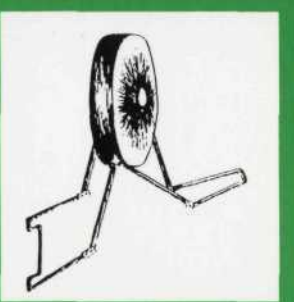
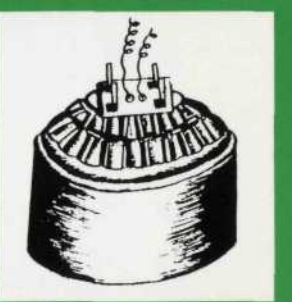
THE INVISIBLE ENEMY





BOOBYTRAPS IN VIETNAM

EDITED BY

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THE INVISIBLE ENEMY: Boobytraps in Vietnam

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Introduction

THE VIET CONG were recognized as masters in the deadly art of boobytrap construction and deployment. During the early years of the US involvement in Vietnam a high percentage of all American casualties came as a result of this type of warfare.

US Marines landed in force in South Vietnam during March 1965. During the first months of fighting approximately sixty-five to seventy-five percent of all Marine casualties were caused by mines and boobytraps. During 1968, 37.7 percent of all Marine casualties were caused by the accidental detonation of a mine or boobytrap.

In the final tally, enemy mines and boobytraps caused approximately seventy percent of the vehicle losses and twenty percent of the casualties in US forces.

ENEMY DOCTRINE

The Viet Cong employed "nuisance mining," that is, scattering mines throughout an area rather than in well-defined minefields, on a scale never before encountered by US forces. Mines and boobytraps were usually installed at night by trained personnel who had detailed knowledge of the terrain. Through ingenious techniques in mine warfare, the Viet Cong successfully substituted mines and boobytraps for artillery. Instead of conventional minefields covered by fire, the enemy hindered or prevented the use of supply roads and inhibited off-the-road operations by planting explosive devices in indiscriminate patterns. While he benefited directly by causing combat casualties, vehicle losses, and delays in tactical operations, equally important was the psychological effect. Just the knowledge that a mine or boobytrap could be placed anywhere slowed combat operations and forced allied troops to clear almost the entire Vietnam road net every day.

The Viet Cong employed mines and boobytraps to delay and disrupt the use of roads and paths and to cause the diversion of US forces to guard and clear those routes. In addition to the threat to military and lawful civilian

movement, American personnel and equipment employed in patrolling the roads and in detecting and removing mines and boobytraps were prime targets.

In contested areas where friendly offensive operations or patrol activities were conducted, the Viet Cong employed mines and boobytraps to inflict casualties, delay and channelize movement, damage or destroy equipment and as an outer perimeter defense around underground factory entrances.

ENEMY SOURCES OF SUPPLY

The Viet Cong used a very limited number of modern machine-produced mines. The majority of enemy mines were handmade by the Viet Cong using US duds, discarded ammunition and equipment, and materials thrown away by American forces as trash. Ninety percent of all the material in enemy mines and boobytraps were of US origin.

All dud ammunition was a source of supply for the Viet Cong. After air strikes and artillery and mortar missions, enemy salvage teams made sweeps to collect duds. Lighter ordnance was carried away to preparation areas; large bombs and projectiles were broken down and stripped on the spot. In some cases the larger

duds were rigged as boobytraps where they had fallen. This was especially true when the enemy felt the strike or fire mission was a preparation for an infantry attack.

However, defective ammunition was not the only source of enemy supply. Carelessly discarded ordnance of all sizes and in any quantity was collected by Viet Cong salvage teams. Mortar rounds, rockets, LAAWs, grenades, and small arms ammunition abandoned to lighten the load (or improperly secured and lost by fast-moving US troops) had value as the explosive element in boobytraps. Even a single M16 round ejected to clear a stoppage could be used by the Viet Cong.

Additionally, materials discarded as trash and improperly destroyed such as ration, ammunition, beer and soda cans, batteries, waterproof packaging materials, bandoliers, etc., provided the enemy with a valuable source of supply to support his boobytrap and mine warfare operations.

Mines and boobytraps employed by the Viet Cong against friendly personnel were limited in type and quantity only by the availability of materials and the imagination of the enemy. Anything that could be made to explode and

cause injury could be rigged as an anti-personnel mine or boobytrap.

VIET CONG MINE FACTORIES

Primitive Viet Cong mine factories were usually located in the areas they supplied. Great care was taken in the camouflage and dispersal of these facilities. Usually constructed underground, effort was made to disperse the workshops and storage throughout a series of tunnels. These limited destruction by working accidents or US fire and protected against discovery. By the end of 1970, four thousand-eight hundred tunnels had been discovered. Most of the discoveries were made during sweep operations by US forces. Tunnel complexes were also located through local informers and by means of dogs trained to find underground facilities. At one find, a complete workshop was discovered. Old hand-cranked drill presses, along with small forges, heated by charcoal, to melt scrap metal and sand molds were used to produce hand grenades.

Plants were planted so they would grow around and on top of doors to the entrances of the tunnels. Dried leaves were sometimes changed every three days before they began to darken and were almost always gathered far

from the actual factory site. Tunnel entrances were concealed in villages under such places as cooking fires, animal pens, and latrines. The avenues of approach to the tunnel entrances were heavily mined and boobytrapped.

As important as concealment of the mine factory, was the mobility of its personnel and equipment. Even while the mine factory was being settled in one position, new positions were being prepared for rapid displacement. Rarely did a mine factory remain in one place any longer than a few weeks. There was no distinct pattern of movement. Factories were known to return to previous positions even after that position had been discovered and destroyed by US forces.

NVA (North Vietnamese Army) trained engineers provided the skilled nucleus for the enemy mine factories, but supervision and labor were primarily Viet Cong.

The typical output of a local Viet Cong mine factory was about 135 mines and explosive devices per month.

ENEMY TACTICS

As the Americans improved in their ability to detect mines, the enemy countered with new twists such as increased use of boobytraps at-

tached to a basic mine to create casualties among mine-clearing personnel; larger mines buried deeper with reduced activation pressure; and pressure electric detonators with offset devices to explode mines under vehicles. Command-detonating mines were normally used in densely populated sections. The heaviest mining was along lines of communications near fixed installations.

The enemy made every effort to avoid repeating practices which, when analyzed, could indicate a pattern. Therefore, the VC/NVA doctrine stressed *where* to use mines, not how.

A few of the kinds of places where enemy anti-tank and anti-vehicular mines could be found were road junctions and the areas in the vicinity of the road near the junction, with all the mines set to detonate simultaneously. Bridges and the approaches five to fifteen meters from the bridges. Old wheel and tread tracks in the road, with care taken to duplicate the track after mine emplacement. Underneath roads, tunneling in from the shoulders. Potholes in the road. Areas recently cleared by Free World military forces. The enemy replaced the mines that have been taken out.

ANTI-PERSONNEL MINES AND BOOBYTRAPS

Enemy tactics in emplacing anti-personnel mines and boobytraps differed from those used in anti-tank and anti-vehicular mining only by where they put them. Locations most commonly used by the VC/NVA to place anti-personnel mines and boobytraps were: narrow passages, paddy dikes, trail junctions, hedgerows and tree lines, tunnels and caves, fence lines and gates, tree branches overhanging trails, likely command post sites, high ground and ridgelines, shady areas, stream fords, wells and natural watering points on streams and rivers, and likely helicopter landing zones.

Any place where US troops frequently walked, took cover, rested, or drew water was a likely location for enemy anti-personnel mines and boobytraps.

Counter-Measures

In response to the massive use of mines and boobytraps by the Viet Cong, a concentrated effort in strategic and tactical planning, research and analysis, and material development was focused on counter-measures for these devices. Extensive study of Viet Cong and North Vietnamese mining operations, techniques, and ordnance were conducted by several branches of the US Armed forces. In addition, a materiel exploitation program evolved.

The Combined Material Exploitation Center was charged with collecting and exploiting captured material of all types including mines and boobytraps. This entailed examination, identification, analysis, evaluation of the items and distribution of the information obtained.

The characteristics, capabilities, and limitations of the enemy materiel were determined, so that adequate counter-measures could be devised. The Mobility Section of this organization evaluated and analyzed mines and boobytraps.

When captured or otherwise obtained, items of interest were tagged and sent to the center for full-scale examination. Quick-reaction or "go" teams were airlifted to objective areas to conduct on-site examinations of captured material determined to be of immediate tactical importance. When evacuation was impossible, either because of the tactical situation or the size of the item, all important data were recorded and, along with photographs or sketches, were forwarded to the center for analysis and examination.

The mining problem was divided into three major categories: road mining, off-road anti-vehicular mining, and anti-personnel mining. Most US mine casualties occurred during road clearing operations. Heavy losses coupled with the need to clear many kilometers of road every day put a strain on the engineer and combat troop effort. Off-road mines caused more damage to armored vehicles than road mining did. Little used trails and tracks, open fields,

jungles, and even avenues that were difficult for vehicles to use were mined. The anti-personnel mines and boobytraps were ingeniously rigged devices, set in unusual locations to trap the individual soldier. From an extensive analysis of the techniques used by the enemy in each of the four corps tactical zones, a map was drawn showing the areas where mining activity was heavy and qualifying each area by indicating the most common type of mine there.

In the III Corps Tactical Zone, the Viet Cong seemed to adjust their mining pattern according to US tactical operations, rather than following a preconceived plan. During periods when US forces activity was high, there was a substantial increase in the Viet Cong mining efforts. In this particular zone, intelligence sources learned that the mining and setting of boobytraps was largely the work of Viet Cong local forces rather than larger Viet Cong or NVA units.

Counter-measures were those actions, both tactical and non-tactical, that could be taken by units or individuals which reduced the mine and boobytrap threat. Counter-measures decreased the enemy's ability to place mines and boobytraps or limited their effectiveness if they were placed.

NON-TACTICAL COUNTER-MEASURES

The most effective way to counter the Viet Cong's mine and boobytrap threat was to destroy his threat at its source; i.e., the elimination of the VC/NVA mine and boobytrap factories and the sources of supply for these factories.

Every effort was made to locate existing enemy mine and boobytrap factories, which many were located in tunnel complexes, and to determine likely locations for future factory sites. Hoi Chanhs (Viet Cong defectors), POW's and captured documents were carefully processed because, with skillful handling, they provided vital information on factory location sites.

Once found, Tunnel Rat teams, armed only with a flashlight, knife, and handgun would clear and explore tunnels. The burning-type tear gas grenades, known as CS grenades, along with HC smoke grenades, were also used in conjunction with the M106 Riot Control Agent Dispenser, dubbed Mity Mite, a portable blower, to clear tunnels of the enemy. This system was capable of forcing the enemy out of unsophisticated tunnel complexes, as well as helping to locate hidden entrances and air vents. The Mity Mite system could not drive

personnel from the more complex, multilevel tunnel systems, many of which contained air-locks. Existing factories and future locations were then made unusable.

After tunnels were cleared and searched, they were destroyed to prevent their further use by the enemy. Methods developed to keep the tunnels from being used again included placing riot control agents in the tunnel, sealing the entrance with explosives, using demolitions to destroy the tunnels, pumping acetyline into the tunnel using blowers and igniting the gas by explosives, and using construction equipment to crush the tunnels.

However, bulk CS was widely used in tunnel denial operations, in which bags of CS were exploded throughout the tunnels. In some cases the tear gas remained effective for five to six months if the tunnel was sealed.

More important than neutralizing the enemy's mine and boobytrap factories, was the denial to the enemy of the source of supply with which he operated these factories; i.e., unexploded US ordnance, discarded equipment and improperly destroyed trash. The fact that US ordnance and salvageable trash fell into Viet Cong hands could be traced to several factors.

UNEXPLODED ORDNANCE

The first factor and an important source of unexploded ordnance for the Viet Cong was provided by the free world military force's employment of air, artillery and naval gunfire support. Some ordnance items failed to detonate, became a "dud" and provided a potential mine or boobytrap. All American personnel who employed fire support were instructed to consider this fact in the employment of supporting arms, and to be careful not to call for fires in excess of what was required to accomplish the mission.

ABANDONED MUNITIONS

The second factor, another important source of explosive material supply for the enemy's mine and boobytrap operations, were abandoned or lost munitions. Examples of this problem which assisted the Viet Cong in their efforts were:

Overstockage. A unit overstocked ammunition and then was required to move on short notice with only a basic load. The remaining ammunition was left on the abandoned position and recovered by the enemy.

Inadequate ammunition handling procedures. A unit attempted to turn in excess am-

munition to an ASP (ammunition supply point) and was refused due to inefficient disposal procedures.

Abuse of Ammunition. A unit discarded ammunition considered unserviceable because of dirt, tarnish, mud or other avoidable conditions or minor imperfections.

Loss in Transit. A helicopter sling broke on an ammunition resupply mission and all or portion of the load was scattered across the countryside.

IMPROPERLY DESTROYED TRASH

The last factor, but far from least important to the Viet Cong's mine and boobytrap program, was his source of supply from friendly trash. All items considered unusable by free world forces should have been completely destroyed or properly disposed of, but many weren't.

Discarded C-ration/soda cans were commonly used in a type of boobytrap that was constructed with a M26 grenade. The safety pin from the grenade was removed and the grenade was put in the can. When the can was disturbed, the grenade slipped out, the spoon popped and the grenade detonated.

VIP PROGRAM

The VIP (Volunteer Informant Program) proved to be an effective counter-measure to the enemy's mine and boobytrap efforts. This program rewarded Vietnamese individuals with cash who turned in dud and abandoned munitions, or reported the location of mines or boobytraps.

This program significantly decreased the Viet Cong capacity to employ US ordnance against free world forces. During one period, 188 of 259 payments in the III MAF area were made to children who turned in explosive suitable for the manufacture of boobytraps. In 1968 alone, 103,521 pieces of ordnance that could have been used as mines and boobytraps were located.

TACTICAL COUNTER-MEASURES

Tactical counter-measures employed by US troop were very effective in reducing the Viet Cong's capability of emplacing mines and boobytraps when such counter-measures were aggressively planned and executed. Unit commanders had several tactical measures at their disposal, including the employment of sophisticated electronic devices.

GSR (ground surveillance RADAR) were crew serviced RADARS that could penetrate smoke, haze, fog, light rain and light foliage to detect and accurately locate moving personnel or vehicles for rapid engagement. They were used to monitor avenues of approach, bridges, road junctions, barriers and obstacles to detect and report enemy breaching attempts. Monitor possible rear and forward area drop or landing zones. Search enemy-held terrain and areas between friendly and enemy forces to detect movement. When detected, enemy forces could be engaged by ground forces, air raids, and mortar and artillery fire. The maximum range of the ANVPPS-4 radar was 1.5 kilometer, while the AN/PPS-5 had a range of five kilometers.

Remote Sensors collected real-time combat information, intelligence and target acquisition data. Sensors were placed in areas of expected enemy activity and monitored by teams located with US forces in forward areas. Movement of enemy forces within the sensor detection radius was detected and indications transmitted to the monitoring team. This data was then analyzed by the team and the resulting information reported. Sensors monitored roads, trails, road junctions, bridges, possible assembly areas, drop and landing zones.

The movement of personnel or vehicles within the detection radius of the sensor sent vibrations through the ground to the sensor. These vibrations were sensed and a signal was transmitted to the monitoring device. Seismic sensors detected personnel movement up to twenty-five meters and vehicle movement up to eighty meters from the sensing element.

Acoustic sensors worked on the principle of microphone and had detection capabilities similar to that of the human ear. Acoustic sensors were used with seismic sensors and activated only after receiving a specific number of seismic activations within a specific period.

Magnetic sensors operated by detecting disturbances in the earth's magnetic field created by movement of iron-based metal near the sensor.

Electromagnetic sensors radiated a continuous radio frequency (RF) signal that set up an active field around the sensor. Movement of objects within the field affected the emitting antenna's signal properties. When these changes were sensed, the sensor transmitted an activation signal. Electromagnetic sensors were used in marshy areas, waterways, depressions, and gullies where seismic sensors were ineffective.

Sensors were either hand placed or air dropped by helicopters.

Maintaining a constant physical presence throughout the TAOR (Tactical area of responsibility), that included outposting of key roads, was the most effective tactical countermeasure. It was, however, sometimes difficult to achieve because of the number of troops required to ensure good coverage.

Conducting aggressive patrolling kept the Viet Cong off balance. These included Long Range Patrols (LRP); they were needed in Vietnam because of the difficult terrain and the elusiveness of the enemy. LRP units were formed based on the success of the 5th Special Forces Group's Project Delta. These LRP teams monitored trails and suspected river crossing sites. Taking prisoners of war was an additional mission of these patrols. The POW's were than interrogated to find mine and boobytrap factory locations.

Reconnaissance patrols were often conducted by units ten or fifteen minutes after a mine sweep to surprise the enemy who would lay mines behind the team.

One of the most effective counter-measure was the employment of scout-sniper teams. Sniper teams consisted for the most part of two

men; a sniper and a spotter. The sniper was armed with an accurized M14 rifle with a sniper scope mounted. The most successful use of the sniper was with ambush patrols. Snipers would either accompany a platoon on an ambush or, when provided with a security element of five to eight men, established their own ambush-sniper position. They were situated in many cases near known or suspected rice caches or tunnel entrances. Using such tactics, the sniper picked the time and place to engage the enemy, thereby maintaining the initiative.

In addition, sniper teams were sometimes left behind to engage Viet Cong who were following a moving unit. The team established positions that would allow long-range observation over the route that the unit had traveled. This technique was effective because the sniper could engage targets as far away as 900 meters and because the Viet Cong tended to be lax about their cover at extreme ranges. Thus, the Viet Cong presented excellent targets.

Snipers also could operate at night with the help of "pink light," an infrared searchlight that illuminated an area for a person looking through an infrared scope or by using a starlight scope. The starlight scope intensified the available light, from the moon and stars, rather

than emitting a light source of its own. In situations where no natural light was available for the Starlight scope, artificial illumination from searchlights, flares, and other light sources were used. These scopes allowed the sniper to operate anytime of day or night, especially considering that the Viet Cong placed most of their mines and boobytraps during the night. The stay-behind sniper teams consisted of two snipers, a radio operator, and three men for security.

Small unit cordon and search operations in coordination with Vietnamese units and police gathered intelligence and Viet Cong suspects. Troops would surround and seal-off a village. Then teams of intelligence officers and Vietnamese police would search the village, house by house, for Viet Cong suspects. Each team was composed of six Police Field Force members with scout dogs. They were trained to search for hidden documents, weapons, and other items that were stored in caches by the Viet Cong. All members of a household were searched and identifications checked.

A screening center was established at a central location within the village where suspects were questioned and checked against photographs of known Viet Cong suspects.

Suspects detained were taken to police headquarters for further questioning. While the search was being conducted, civic action, such as medical treatment to the sick or giving treats to the children, was performed.

H&I (harassment and interdiction) fires over roads or over specific areas discouraged the enemy from emplacing mines and boobytraps. The fires used mechanical, time-fuzed projectiles set to burst approximately thirty feet off the ground at ranges of one hundred to one thousand meters. Light and medium artillery (105mm and 155mm) and also eight-inch howitzers were used.

Another technique that was also used was the artillery ambush. The ambush involved the emplacing of a homemade trip flare device with the tripwire running across the road or trail. An artillery unit was laid on this grid and fired on the flare signal. Two flares of different colors were used to determine the direction of travel of the target, so that appropriate fire could be placed at either side of the location.

Small stay-behind patrols were employed as effective counter-measure. These teams were usually dropped off unnoticed from units passing near a road. At other times, both a unit and a stay-behind team would be airlifted into a

landing zone together. The unit was subsequently withdrawn, leaving the team as a stay-behind patrol. While on patrol, some units would leave a small team behind at the unit's overnight position. This team would pick-off the enemy who came to scavenge the position for useful items.

Another technique was to boobytrap the trash left by a unit. In one incident, a unit that knew it was being followed by a small group of Viet Cong, boobytrapped the trash it left behind. A pressure-release fuzed mine was placed beneath a case of C-rations that was buried where the unit had camped overnight. Twenty to thirty minutes after departing, a small team returned to the area and found the bodies of several VC killed by the mine.

Paving or oiling dirt roads prevented the Viet Cong from easily concealing mines as they would have to dig a hole through the pavement or disturb the oiled dirt. A good example was heavily mined Route 1 in Quang Ngai Province. Although culverts were still destroyed by the enemy, there were no mining incidents after the road was paved.

Tanks were used to discourage the laying of mines. In December 1966 an armor unit was assigned to secure the route from Tay Ninh to

Tri Tam, where small groups of Viet Cong had been successfully mining the road. The battalion commander chose to use the "thunder run" technique to offset this enemy action. During the hours of darkness, a tank company or platoon "ran the road" two or three times at irregular intervals. It fired canisters and .50 caliber and 7.62mm machine guns at likely enemy locations on both sides of the road. After three nights, mining incidents stopped, and the first Chieu Hoi rallier surrendered. He attributed his action to the thunder runs. This technique was used by most of the tank units in Vietnam.

Using the native ability of the Kit Carson Scouts, coupled with their knowledge of the area of operations and Viet Cong activities, proved highly useful in locating devices. During October 1968, Kit Carson Scouts found 229 mines and boobytraps in the III MAF area. Kit Carson Scouts were former Viet Cong who had deserted to the American side.

Removing all vegetation from the sides of roads and around base camps eliminated enemy cover and concealment. The equipment that filled the need for a rapid, efficient land clearing device was the Rome K/G Clearing Blade—better known as the Rome plow. It con-

sisted of a tractor attachment with a blade that "stung" and "sliced" large trees. A sharp projection on the left side of the blade split the trees, while the cutting edge sheared them off at ground level. Bulldozers equipped with this blade would clear both sides of a road from one hundred to two hundred meters.

Herbicides, although they were in the center of much controversy, were also used for land clearing. For small areas such as base camp perimeters and possible ambush sites, helicopters or ground-based equipment were used.

The two agents most commonly used in Vietnam were Blue and Orange, so named for the color markings on the containers in which the herbicides were shipped. Orange was a mixture of two relatively common herbicides and was classified as a systemic herbicide. As such it was absorbed into the plant from the point of application. Once inside the plant's system, Agent Orange interfered with the growth processes, such as photosynthesis, and eventually killed the plant if the dose was adequate.

Blue was a desiccant, contact herbicide that damaged plant tissue at the point where it was applied. Desiccants are drying agents that cause leaves to drop off but will not necessarily

kill the plant itself. In Vietnam, on the average, new foliage grew back within thirty to ninety days after applying Agent Blue. Captured Viet Cong admitted that in many instances, their units avoided defoliated areas and would not camp in them. They feared detection by air.

Specially trained scout dogs were used to detect the scent left by the individual emplacing a mine or boobytrap. This scent was detectable one to four days after emplacement. Since boobytraps were generally placed shortly after initiation of friendly operations, the chance of discovery by dogs was good.

A scout dog team consisted of one dog and one handler, trained to work together and inseparable for operational purposes. Scout dogs were German shepherds and normally worked on a leash.

A trained dog used his vision to detect tripwires and unnatural elements, and his hearing to detect sound waves created by tripwire vibration. Many dogs detected a tripwire when it touched the body hair of their forelegs or chest. Most dogs were agile enough to back away before the device was tripped.

Of 119 dogs killed in South Vietnam between January 1967 and June 1969, only seven were killed by boobytraps.

Helicopter units experimented with a variety of lighting systems to deny the enemy freedom of movement at night. The earliest systems were known as the Helicopter Illumination System (Lightning Bug-Firefly) and were characterized by a fixed bank of C-123 landing lights mounted in a gunship. The crew would find and hold the target with the lights while other gunships engaged the enemy. In the Mekong Delta an OV-1C Mohawk was often used as part of the team, locating targets by an infrared device and vectoring the light ship onto the target. A series of refinement were made which included developing a focusing arrangement for the illumination system, testing various searchlights, and using the night observation device as a passive means of detection.

When the Cobra was introduced into Vietnam, the UH-ID/H Nighthawk was developed in the field. The basic components of the Nighthawk were an Xenon searchlight, a coaxially mounted night observation device, and an 7.62mm minigun system. The searchlight provided both white light and infrared, while the minigun system mounted in the cargo compartment allowed the Nighthawk to engage the target or provide suppressive fire.

Normal use involved a Nighthawk and one or two AH-1G gunships working either an area or specific targets already pinpointed through other methods. The Nighthawk would fly at fifty knots five-hundred feet above the terrain with the gunships to the rear at about 1,500 feet. When the light ship detected a target with infrared light, it could either turn on the white light or open fire with the minigun, with the accompanying gunships then firing into the minigun's tracer pattern. Nighthawks were employed to a limited extent in checking out radar sightings, in sensor activity, and in mechanical ambushes.

The effectiveness of these aircraft, even when operating at night, was limited, because the noise of the aircraft warned the enemy of its approach and gave them time to hide.

When all the tactical elements were used together results were positive. One Army unit in the III Corps Tactical Zone made a detailed study of the enemy road mining patterns. The analysis showed that fifty percent of such activity in the area of operations was concentrated in four sectors of road having a total length of about 4.5 kilometers. Once the problem areas were isolated, sensor fields were installed and ambush patrol activity was in-

creased. Artillery concentrations were plotted, night aircraft equipped with infrared lights were put on alert, and night observation devices were positioned so that the unit could respond to sensor activations and patrol sightings. After only one month the results were conclusive. The four road sectors, which had previously experienced fifty-six mining incidents per month, had only fifteen incidents during the test month. One sector went from fifteen to one.

INDIVIDUAL COUNTER-MEASURES

Individual counter-measures were those measures each and every US soldier could take to diminish the effectiveness of a mine or boobytrap device that had been placed, and was found or was accidentally detonated. This could be accomplished through physical protective measures, detection and destruction measures, avoidance of explosive devices, and through application of immediate action when an explosive device had been accidentally detonated.

PHYSICAL PROTECTIVE COUNTER-MEASURES

The individual soldier could have taken these steps to reduce the effectiveness of enemy mines:

Wearing body armor and helmet.

Sandbagging vehicle flooring. When possible, a heavy rubber mat was placed over the sandbags to help reduce secondary fragments such as shrapnel, sand, stones and pieces of sandbag.

Kits were developed for armored personnel carriers to provide supplemental armor for the hull bottom and to relocate and strengthen the fuel line. One armored personnel carrier on which the armor kit was installed hit a twenty-pound mine with no casualties among the men on board.

Keeping arms and legs inside vehicles to achieve maximum protection from the sandbags. In many cases, particularly in dense foliage, the troops did better to remain mounted and assault the objective as the carriers detonated anti-personnel mines and boobytraps.

Maintaining proper distance from other personnel. An analysis of mine and boobytrap detonations revealed that most often multiple casualties had occurred. This indicated that the soldiers were bunching up and not keeping the fifteen meter interval.

Not picking up or touching what appeared to be attractive "souvenirs". The VC/NVA

preyed upon the natural curiosity of US soldiers and their desire to take home a souvenir. That "souvenir" was most likely a boobytrap.

DETECTION COUNTER-MEASURES

Detection of most boobytraps was usually by visual inspection. The best mine and boobytrap detector was an alert and observant individual. Each soldier knew the areas in which boobytraps and mines were normally found and was alerted for things that "just don't look right."

Examples were mud smears, mud balls, dung, or a board on the road. Apparent road repair, new fill or paving patches, ditching or culvert work. Wires leading away from the side of the road.

Tripwires across the trails; along shoulders of roads at likely ambush sites; across vegetation; at fords, ditches and across rice paddy dikes.

Terrain features that did not appear natural. Cut vegetation dried and changed color; rain washed away covering material and caused an explosive device to sink leaving a surface depression; a covered device may have appeared as a mound. Suspicious items in trees, branches, or bushes.

Markings used by VC/NVA to indicate the location of a mine or boobytrap.

Probing. Suspicious spots were carefully probed with a probe or bayonet.

Mine detectors. Mine detectors were designed to assist the individual soldier in a detailed, deliberate sweep of a specific area, usually a road. Particular attention was given to the time factors of the individual sweeping situation, since overhasty opening of a road meant an ineffective sweep and quite possibly destruction or injury to vehicular traffic and personnel. The average sweep rate varied from almost nothing to about 5 mph depending, of course, on the proficiency of the team and number of contacts encountered.

Various hand-held infrared detectors and others for use in helicopters and vehicles were developed and tried. Experiments were conducted to induce current in mine detonator wiring using radio frequencies. These experiments, however, were unsuccessful and were terminated.

In using detectors, certain considerations were kept in mind.

Graveled roads made it difficult for the detector to discriminate between real and false targets.

Metallic debris, such as can tops, small arms ammunition cases, and metal fragments from artillery rounds fired over roads at night to discourage mine laying, made it difficult for the detector to discriminate between real and false targets. One method that combated this difficulty was to use the same minesweep team every day on the same stretch of road. The men became so familiar with the road that they were able to spot minor changes in the surface or the surrounding area. The majority of mines found were detected visually and destroyed with explosives in place.

The tendency for the Viet Cong to bury mines deeper than designed detection depths, and to deliberately plant metallic debris in the road, called for additional caution in the use of detectors.

Operator fatigue. Consideration was given to the fatigue experienced by operators after twenty minutes of wearing detector earphones. This condition could be delayed from one or two hours by wearing earphones over the helmet so that two to four inches existed between ear and phone. This also permitted the operator to hear a verbal alert for an ambush.

Use of the Buddy System. This system was not only useful in training inexperienced sol-

diers, but also provided an extra margin of safety to the individuals who employed it. Two soldiers working together, in the same area, had the advantage of increased detection capability, mutual reassurance, and shared knowledge.

DESTRUCTION COUNTER-MEASURES

Once detected, mines and boobytraps were marked or destroyed in place by the discovering person or unit to prevent accidental detonation by a following unit or individual.

Mines and boobytraps were not moved unless absolutely necessary and then only by qualified EOD (explosive ordnance disposal) or engineer personnel. Many boobytraps were themselves boobytrapped, and if disturbed would detonate the associated device.

Explosive devices were usually destroyed by engineers. If engineers were not available, then devices would be destroyed by selected qualified personnel within each unit.

Mines and boobytraps were destroyed or neutralized by use of grappling hooks, demolitions, and artillery fires. The LVTE linecharge and the LVTE with plow-shaped mine excavator were used in areas of high mine density.

The ENSURE 202 Tank-Mounted Expendable Mine Roller was tried in Vietnam as a mine-detonating device. Designed to exert high ground pressure without crushing roads and bridges, it was attached to a medium tank. Like the many rollers used in Vietnam and earlier, the problem was to survive the mine it detonated. Apparently in many instances it did not.

AVOIDANCE COUNTER-MEASURES

Strict application of training and careful planning of movements through danger areas enabled unit commanders and individuals to reduce casualties by simply avoiding the explosive devices. Some suggested means for avoiding mines and boobytraps were:

Staying off trails, footpaths, cart tracks, or other likely routes of travel as much as possible. Varying routes used to villages and key terrain features. Using the same route twice was an invitation to the enemy to employ boobytraps. Keeping the VC/NVA guessing as to which route would be used next.

Moving where local inhabitants moved. These people knew the location of most mines and boobytraps and would avoid these areas. In villages, staying near the villagers and

watching which buildings they used. Using local Vietnamese as guides whenever possible. Having sufficient money on hand to pay for information on mine and boobytrap locations.

Avoiding patterns and constantly changing direction of movement. Checking times of departure and return of patrols to ensure, for example, that all daylight patrols didn't return before supper and all nighttime patrols departed after supper. Avoiding the repeated use of the same bivouac areas.

Maintaining intervals of fifteen meters between men and one hundred meters between men and tracked vehicles. In view of the fact that the effective casualty radius of the M26 grenade is fifteen meters, and that two or more casualties were suffered for each boobytrap grenade accidently detonated, the maintenance of proper interval was most important.

Moving slowly. Rapid movement generated carelessness. A unit should have been allowed sufficient time to move to its objective.

At times the enemy would show themselves only when they wanted to be seen. So when US troops pursued the enemy, they had to be especially alert for deliberately placed boobytraps on the axis of advance.

Artillery and mortar fires near and into the area of operations did not only discourage boobytrap emplacement, but also would neutralize devices by sympathetic detonation, overturning and burying placed mines, and rupturing tripwires. Employment of these fires besides road, before and during a road sweep, discouraged command detonation of road mines.

A lightweight stick (bamboo) or a slender steel rod was helpful if used to feel for tripwires.

Marking detected mines and boobytraps so those following would avoid them.

Helicopters could and were used to extract a unit that found itself in a heavily boobytrapped area. EOD personnel with detectors were flown in to sweep a path from the helicopter to the trapped individuals. This path was marked with tape to enable the soldier to reach the helicopter safely.

At times, the flanks of a road were boobytrapped out to 250 meters as an obstacle to road sweep security teams. Tanks, preceding the infantry, could detonate these boobytraps. When situation permitted, tanks moving off and parallel to the road sweeps also reduced tank road mining incidents. Random selection of tank travel between road and adjacent ter-

rain kept the NVA guessing as to the actual route the tank would take.

When on roads, staying in the well-used portion and off shoulders. Following the tracks of the vehicle ahead. If there was no vehicle ahead, staying out of the ruts. Avoiding holes, depressions, and objects lying on the road.

A boobytrap that was easily detected were sometimes used as a ruse resulting in detonation of other explosive devices placed nearby.

IMMEDIATE ACTION TAKEN IF AN EXPLOSIVE DEVICE WAS TRIPPED

It was recognized that little reaction time existed once the detonation chain started. The maximum delay for the M26 and foreign grenades ranged from four to nine seconds. If the delay element had been modified, the minimum fuze delay could have been less than 1.5 seconds. However, since the time available couldn't be predicted, certain immediate action assisted in reducing casualties and the degree of personal injury.

IMMEDIATE ACTION DRILL

First: Being alert for the "pop" of the exploding cap, the tug of the tripwire, or the warning of another individual.

Second: Sounding a warning so that others could take cover.
Third: Dropping to the ground immediately.

The immediate action drill was designed as an instinctive reaction based on minimum fuze delay. Further instructions included:

Not attempting to out run the explosion. The 800 fragments of the M26 grenade had an initial velocity of over 5000 feet per second. During the available delay, however brief, an individual could best remove himself from the cone of the explosion by dropping to the ground.

Presenting the smallest target to the force of the explosion by pointing the feet in the direction of the charge. All those nearby should have dropped to the ground when the warning was sounded.

Not immediately rushing to the aid of individuals wounded by mines or boobytraps. Frequently there was a second boobytrap near the first. The man nearest each casualty would carefully clear his way to the wounded individual and render first aid.

Conducting a brief but careful search for other explosive devices in the immediate vicinity before moving on.

If a device was tripped and did not explode, following the same immediate action drill and then blowing it in place.

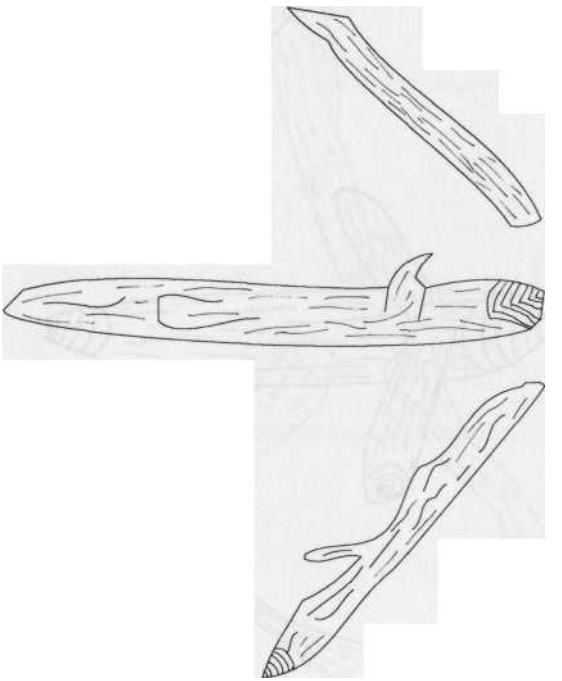
Viet Cong Mine Indicators

IF THE ENEMY placed mines or boobytraps in the vicinity of villages or in areas where he moved or expected to move, he often indicated the location or direction of the explosive devices in some manner. The VC/NVA may not have always followed the examples in this publication in absolute detail, but as a general rule, the indicators were usually found in regular patterns such as sticks and stones in a line or sticks placed on or in the ground. This regularity of pattern was the danger signal. Any arrangement of sticks and stones which appeared unnatural indicated a strong pos-

sibility of the presence of mines and boobytraps. The illustrations which follow are examples of marking patterns indicating the presence of mines and boobytraps which were encountered in South Vietnam.

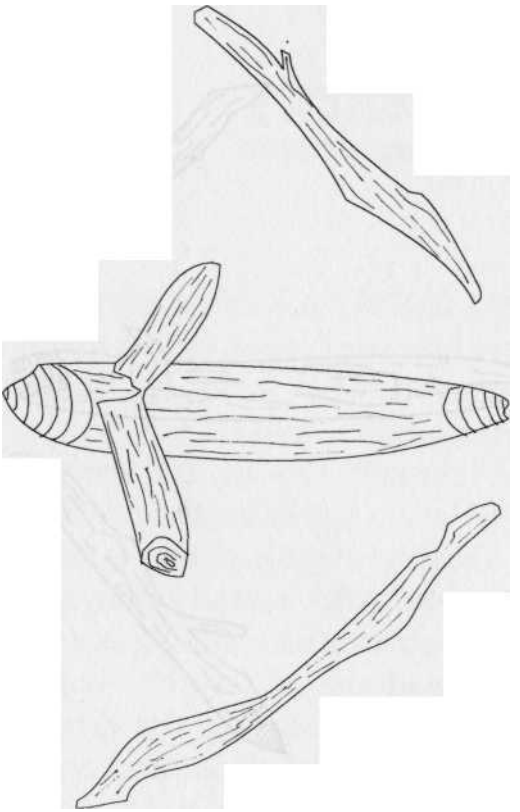
ARROW MARKERS

Three sticks were placed on the trail in the form of an arrowhead. The important thing to remember was that the point of the arrow did not always point in the direction of the boobytrap. The symbol could only be considered as a means to identify an area as being boobytrapped.



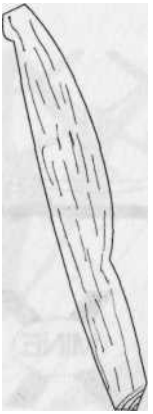
ARROW MARKERS (con't.)

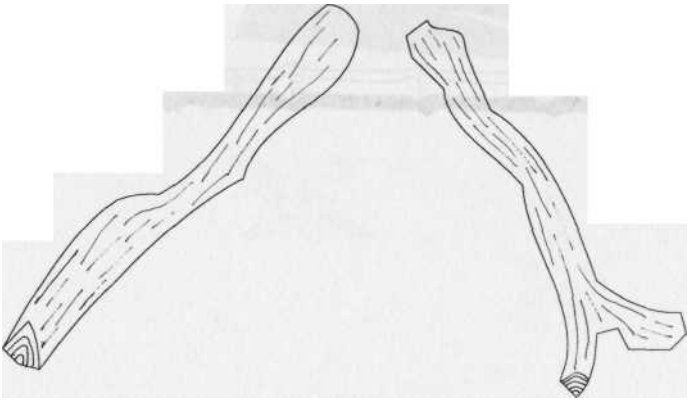
A variation of the three-stick arrowhead showed a fourth stick. Again, no definite pattern was established as to the direction or the reason for the fourth stick (usually broken). But it did mean boobytraps in the area.



ARROW MARKERS (con't.)

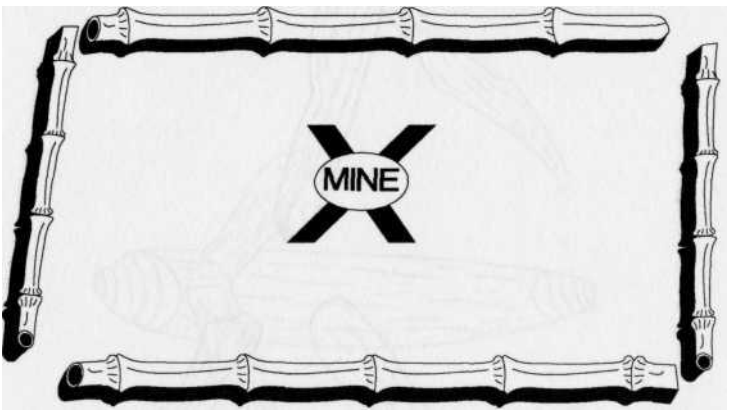
The "Y" arrangement was sometimes found farther down the trail from the arrowhead indicating the limit of the danger area. No pattern or specific distance was ever established.





BAMBOO RECTANGLE MARKER

As shown, this marker usually indicated a boobytrap within the square. Most of these symbols found had been laid out with bamboo 18 to 42 inches in length.

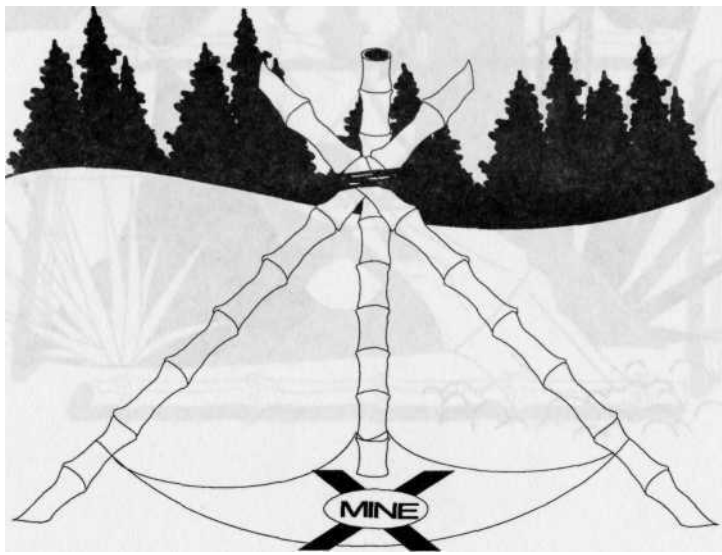


BAMBOO MARKER

A piece of bamboo 6 to 8 inches long was stuck in the ground at an angle of 45 degrees. Generally, boobytraps could be expected along the axis of the bamboo in either direction.

BAMBOO TRIPOD MARKER

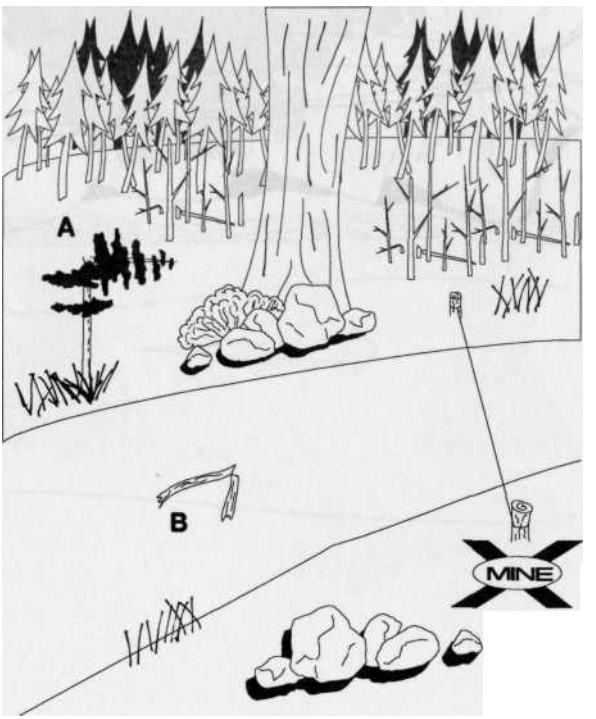
The bamboo tripod consisted of bamboo, usually about 18 inches long, tied together to form a tripod. Wire, vines, cord or string was wrapped around the legs near the bottom to hold the tripod in place. This device was found directly over punji pits, boobytraps, and mines.



BROKEN BUSH OR STICK MARKERS

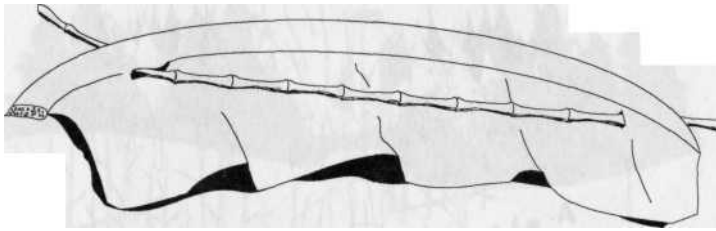
A. The Viet Cong were known to break the tops of small saplings and bushes pointing the broken part in the direction of the boobytrapped area. Usually mines and boobytraps were planted 50 to 100 meters from this marker.

B. A stick or length of bamboo broken at a right angle and lying across the road or trail could mean an enemy mine or boobytrap 200 to 400 meters ahead.



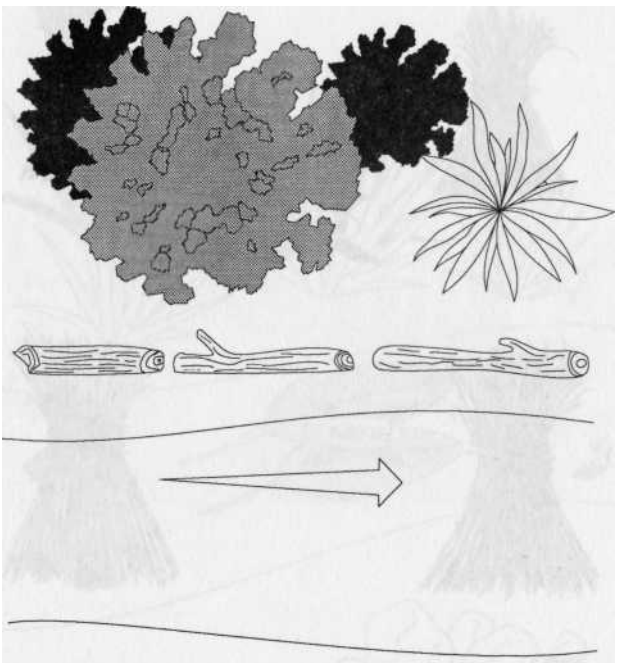
BANANA LEAF MARKERS

A banana leaf or other similar leaf was folded down the center with a thin stick approximately the thickness of a toothpick woven through in two places. In addition to marking mines, this could indicate an ambush area. There was no pattern as to location or distance of mines or ambushes from this marker.



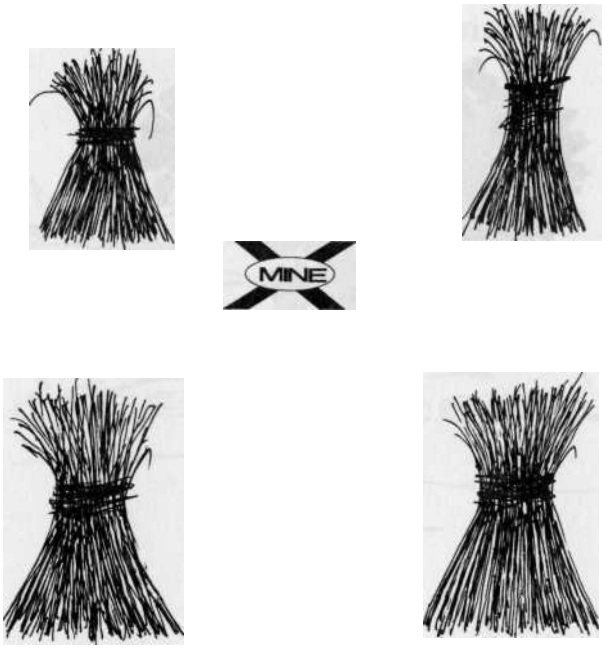
PARALLEL STICK MARKER

Short sticks or lengths of bamboo laid parallel to a road or trail usually meant the road or trail was free of mines or boobytraps.



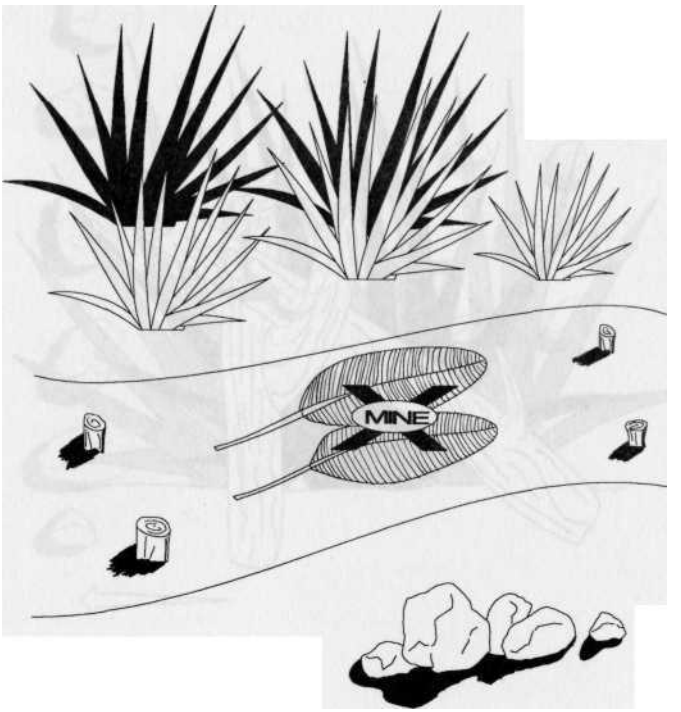
GROWING GRASS MARKER

Growing grass was sometimes tied to form four growing sheaves of grass. The tied sheaves formed a square of about 6 feet. The mine was buried or concealed in the center of the square.



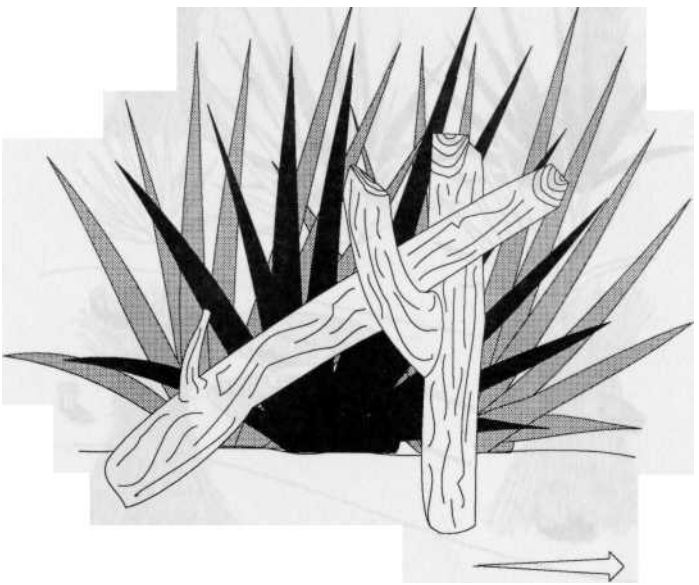
TRAIL MARKERS

These devices were used extensively together. The mine or boobytrap was placed (buried) under two large leaves. In front and to the rear, at no special distance, stakes were driven. The markers have also been used independently of each other at times.



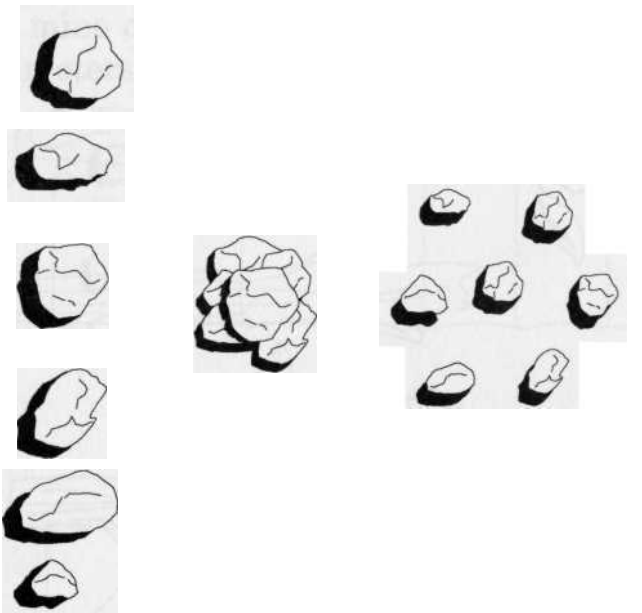
FORKED-STICK MARKER

A forked stick was driven vertically into the ground and another stick laid into the fork with the elevated end pointing to the danger area. This sign could also indicate enemy direction of movement.



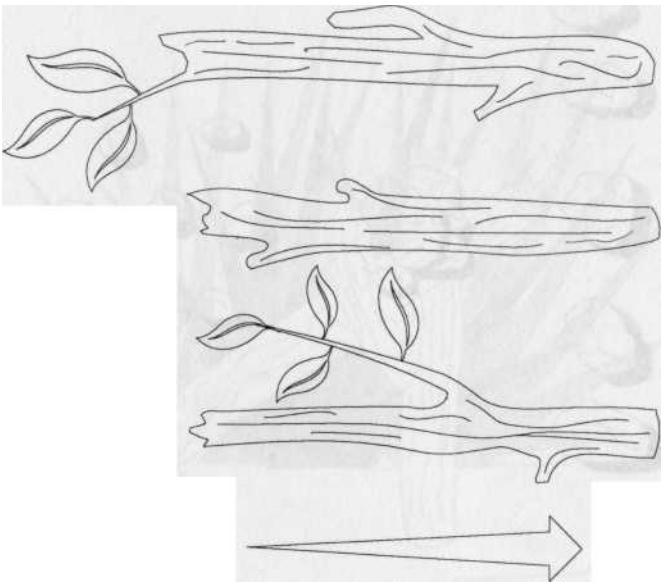
ROCK MARKERS

Various formations of rocks and small stones were used to mark boobytrapped areas.



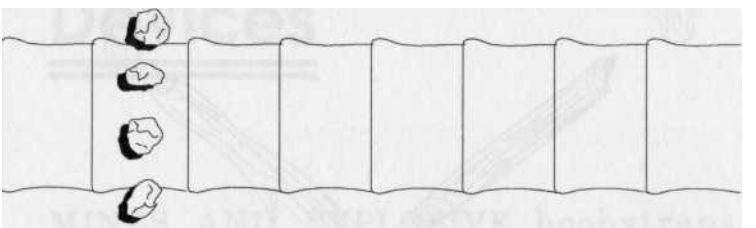
SPACED-STICK MARKER

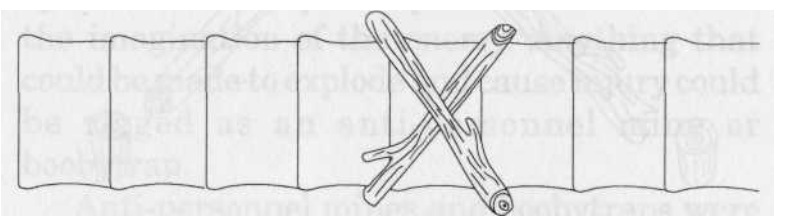
Three sticks, one on each side of a road or trail and one in the middle, usually meant the road was not to be used. A mine or boobytrap was usually 200 to 400 meters from the marker. Stones were sometimes also used in the same manner.



TRACK MARKER

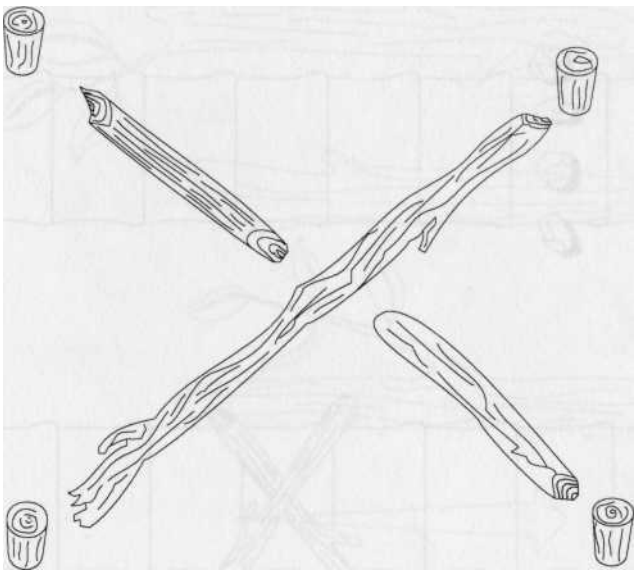
The Viet Cong capitalized on the habit of American troops of following old vehicle tracks by placing mines in these tracks. Mines were sometimes marked with crossed sticks or an arrangement of stones. The location of the mine in relation to these markers was unpredictable. The mine could be under the marker or up to 400 meters farther on.





STAKES WITH X-MARKER

An M1A1 anti-tank mine with approximately twenty-five pounds of TNT was discovered under this marker. The mine had been marked with stakes at each corner and three sticks forming an "X" over the mine.



Explosive Anti-Personnel Devices

MINES AND EXPLOSIVE boobytraps employed by the Viet Cong against American forces were limited in type and quantity only by the availability of explosive materials and the imagination of the enemy. Anything that could be made to explode and cause injury could be rigged as an anti-personnel mine or boobytrap.

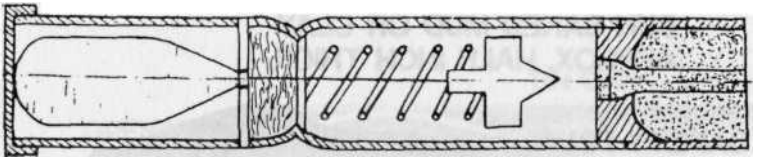
Anti-personnel mines and boobytraps were very successfully employed by the VC/NVA. Part of this success was because US troops were not familiar with the physical description of explosive devices normally employed by the

enemy, and thus failed to recognize them prior to accidental detonation.

The following illustrations represent some of the devices employed by the VC/NVA in South Vietnam.

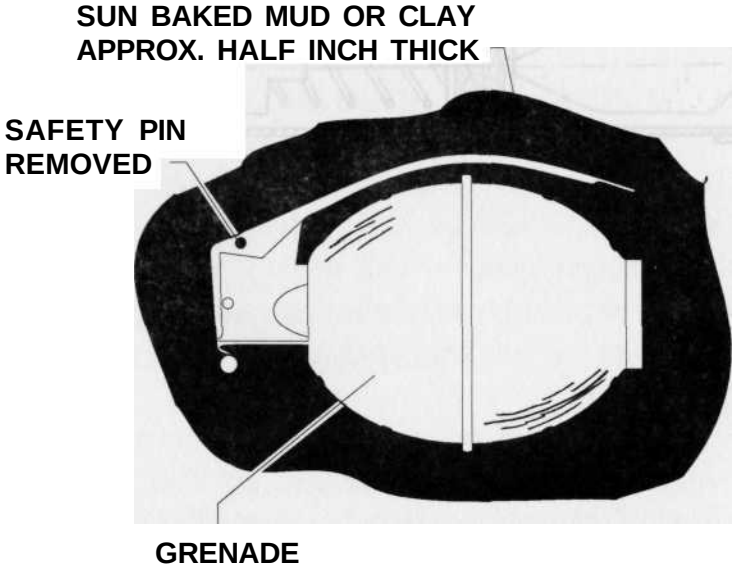
VIET CONG CHEMICAL FUZE

This fuze was employed to set off mines and TNT demolition blocks. It was eight inches long and operated as follows: The tube at the left contained a solution of copper sulfate. When it was broken, the solution soaked the cotton in a container that surrounded a release wire. The resulting chemical reaction eroded the release wire. The spring forced the firing pin against the primer. The primer detonated a fuze that had a tetryl charge. Delay was between 20 to 38 minutes.



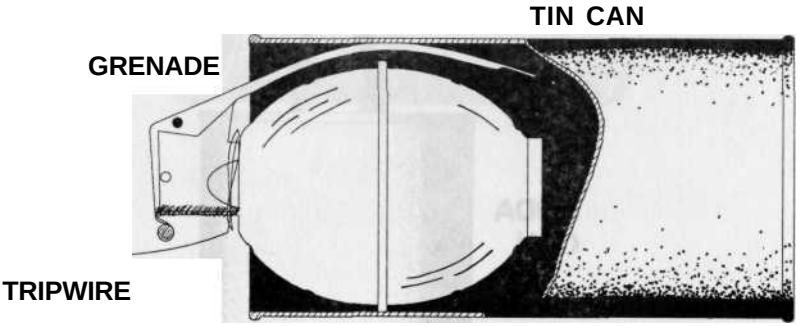
VIET CONG MUDBALL MINE

The mudball mine consisted of a hand grenade encased in sun-baked mud or clay. The safety pin (pull ring) was removed and mud molded around the grenade. After the mud dried it held the lever of the grenade in the safe position. The mudball was placed on trails or anywhere troops may walk. Stepping on the ball broke the dried mud apart and released the lever detonating the grenade. The US M26 and M33 hand grenades were the most commonly used grenades for this purpose.



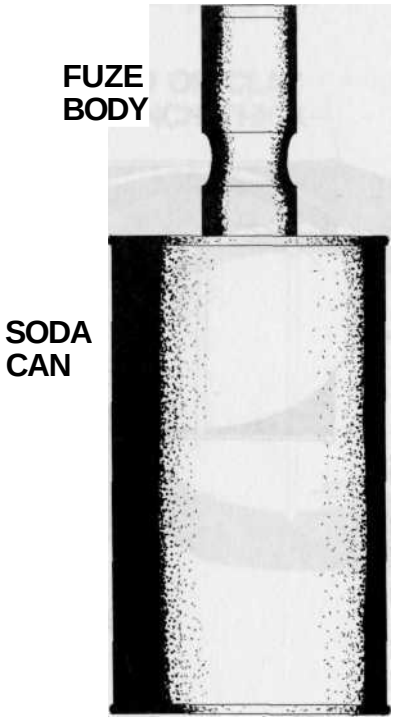
GRENADE IN TIN CAN MINE

A tripwire was wrapped around the fuze of a grenade and then the grenade was placed inside a tin can that held the safety lever in place. The tin can was then tied securely in place, the tripwire strung and the safety pin removed from the grenade. When a victim tripped the wire, the grenade was pulled out of the can releasing the safety lever which detonated the grenade.



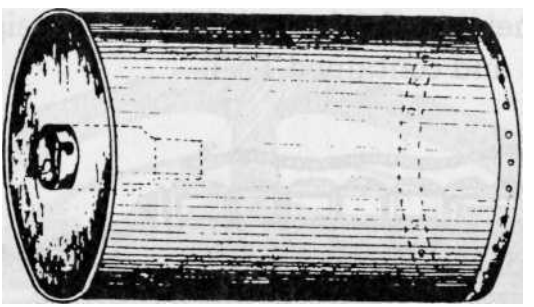
TIN CAN ANTI-PERSONNEL MINE

The tin can mine was constructed from sheet metal or any discarded metal container (C-ration, beer, or soft drink can). The firing device for the explosive was an improvised fuze with zero delay action. A hand grenade fuze could be used by removing the delay element. The mine functioned by a tripwire attached to the pull ring. Pressure on the tripwire pulled the pull ring, activating the mine in the same manner as a hand grenade.



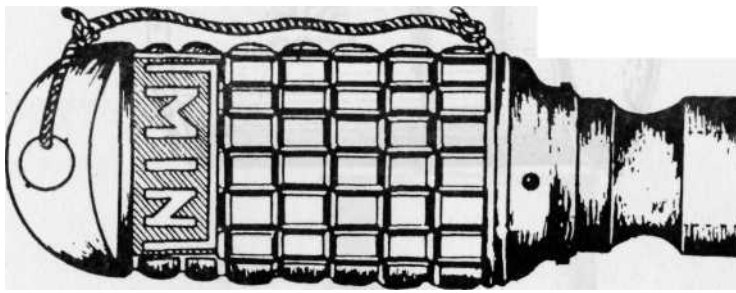
81mm MORTAR CONTAINER MINE

This mine was constructed of an 81mm mortar shell container with the cap intact and the bottom plugged with a round piece of wood of the same diameter, 5/8 inches thick. An electric blasting cap or fiction fuse were utilized with this mine. In the friction fuse, a brass friction wire was pulled through a black powder charge.



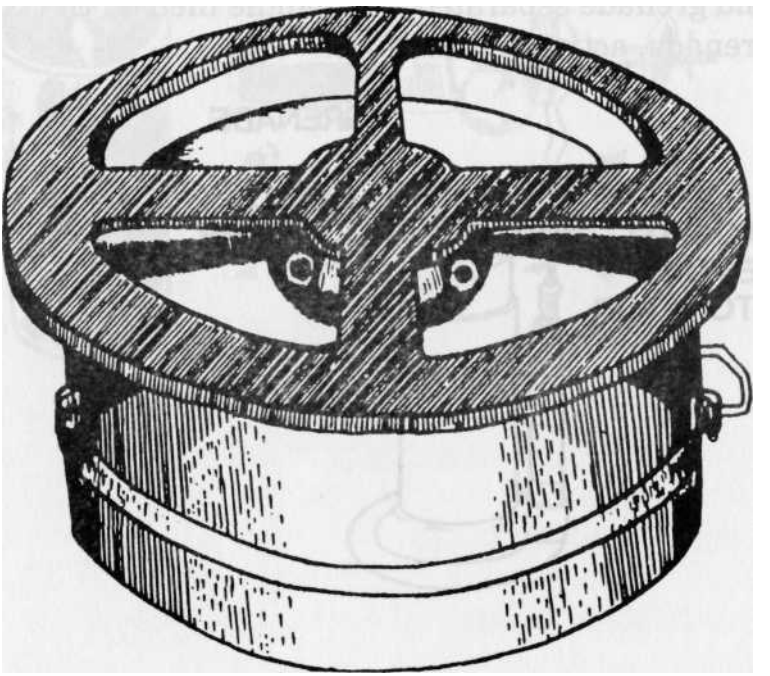
CAST-IRON ANTI-PERSONNEL FRAGMENTATION MINE

This locally made cast iron mine resembled a stick hand grenade with a very short handle. The mine body was usually painted grey and had serrations for fragmentation effect. The word "MIN" was often found cast into the body. The handle housed a pull-friction igniter. A tug on a tripwire attached to the friction igniter would activate the fuze. The mine was 2 inches in diameter and 6 *V2* inches long. It weighed 2 pounds and contained TNT.



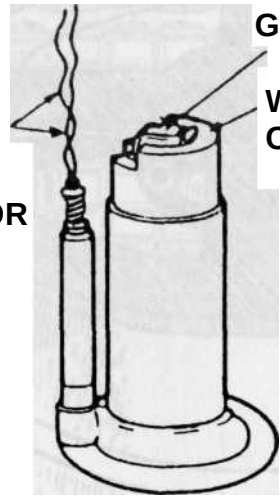
CHINESE COMMUNIST NO 8 DUAL-PURPOSE MINE

This device had a double-acting fuze. A pressure of 30 pounds on the pressure spider or a pull of 10 pounds on an attached tripwire would detonate the mine. This mine contained five pounds of explosive, had an overall weight of 12 pounds and was 9 inches in diameter by 4 inches high. It was made of cast iron and coated with creosote for waterproofing.



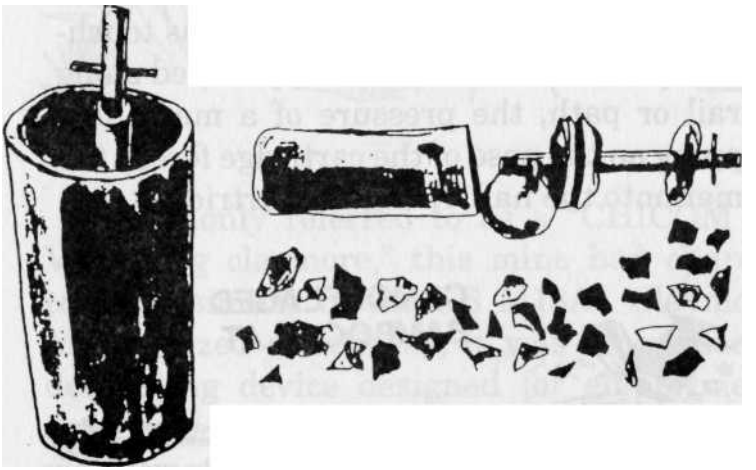
BOUNDING FRAGMENTATION MINE

The bounding mine was improvised from expended US M2 bounding mines or M48 tripflare cases. A wooden cylinder slightly smaller in diameter than the mine case was hollowed out so that a standard grenade could fit inside. The wooden cylinder (with enclosed grenade) was then fitted into the mine case and the grenade's safety pin extracted. When the mine was detonated the cylinder and grenade were propelled upward. As the wooden cylinder and grenade separated, the handle flied off the grenade, activating the fuze.



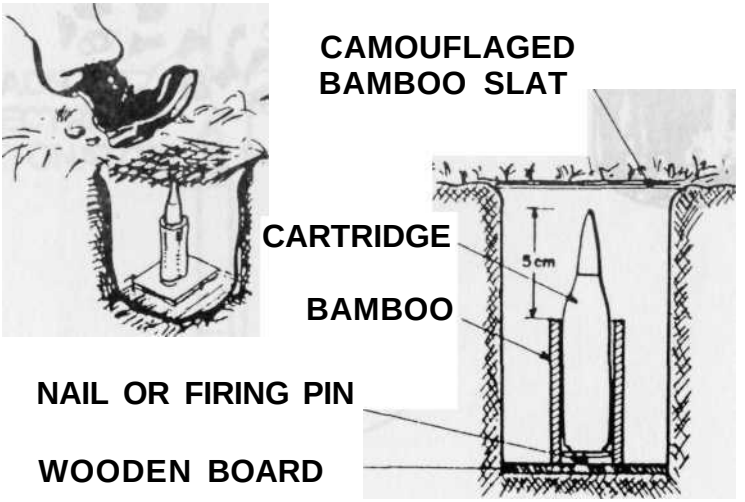
VIET CONG "TOE POPPER" MINE

This mine was fabricated of cartridge cases or pieces of pipe of various sizes. It was loaded with a charge of black powder, a primer, and a variety of fragments for missile effect. When a victim stepped on the mine, the igniter detonated the black powder charge and propelled the fragments upward.

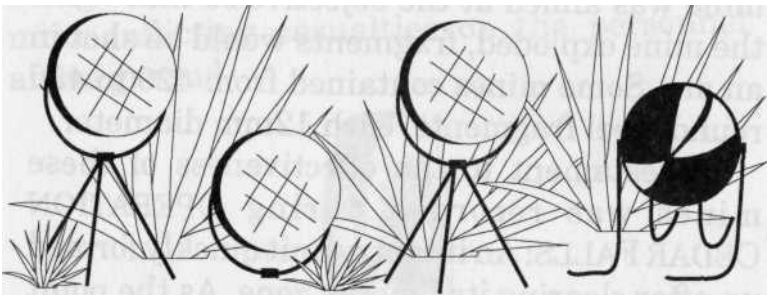


CARTRIDGE TRAP

Four simple and easily obtainable components made up this mine; a bamboo tube, a nail, a piece of wood, and any small arms ammunition or M79 round. The piece of wood was used as a base. The bamboo tube was placed upright on the wooden base and a nail driven up through the wood to penetrate the bottom of the bamboo. The cartridge was then wedged into the bamboo so that the primer was touching the point of the nail. Partially buried along a trail or path, the pressure of a man's foot stepping on the nose of the cartridge forced the primer onto the nail, firing the cartridge.



DIRECTIONAL FRAGMENTATION MINE (DH-10)



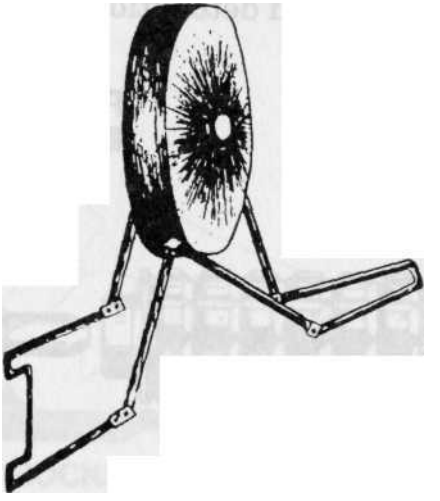
Commonly referred to as a "CHICOM or Viet Cong claymore," this mine had characteristics similar to the US M18A1 Claymore Mine. Fuzed electrically, it was a command-detonating device designed for employment from ambush or defensive positions. This mine was sometimes fixed on bipods and placed on all types of terrain. Effective range against personnel was over 200 meters and against thin-skinned vehicles of over 50 meters. Constructed of a cone shaped piece of steel, it was 12 inches in diameter and 2 inches wide. It weighed 20 pounds. The bipods where composed of four steel rods and two frames. Five or

ten pounds of explosives where placed on one side while the other side was covered with scrap metal or steel pellets. The explosion propelled the pellets. The concave side of the mine was aimed at the objective so that when the mine exploded, fragments would be shot in an arc. Some mines contained from 420 to 450 round steel fragments, each 12mm diameter.

A testament to the effectiveness of these mines was recorded during OPERATION CEDAR FALLS: An infantry unit quickly formed up after clearing its landing zone. As the point squad moved forward from the landing zone toward its designated blocking position, tragedy struck. Two command-detonated claymore mines exploded and two men fell. A large boobytrap (probably another claymore mine) mounted in a tree exploded and its fragments downed two more men. The squad had wandered into an enemy minefield. The platoon medical corpsman was injured when he stepped on an anti-personnel mine while trying to aid the wounded.

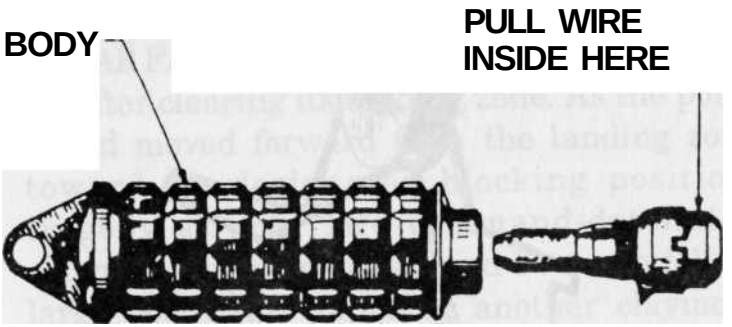
Another technique where the claymore were used was around tunnel entrances. Whenever a tunnel was located, a Tunnel Rat squad would be sent down to clear and explore it. In many instances other personnel would gather

around the tunnel entrance to provide security or just out of curiosity. The Viet Cong would place claymore mines near the tunnel entrance and upon learning of the Tunnel Rat squad being inside the tunnel would detonate the mine inflicting casualties on the personnel above ground.



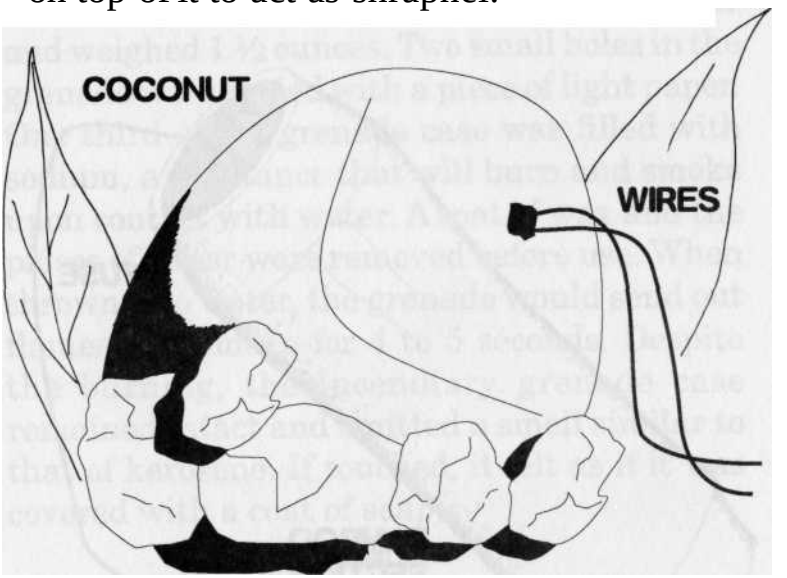
POMZ-2 ANTI-PERSONNEL MINE

Chinese Communist copies of the Soviet POMZ-2 mine were also employed by the VC/NVA. Weighing only 4.4 pounds, it was easily carried and could be placed quickly. Fuzed for detonation by tripwire (tension release or pressure release), it could also be rigged electrically for command detonation.



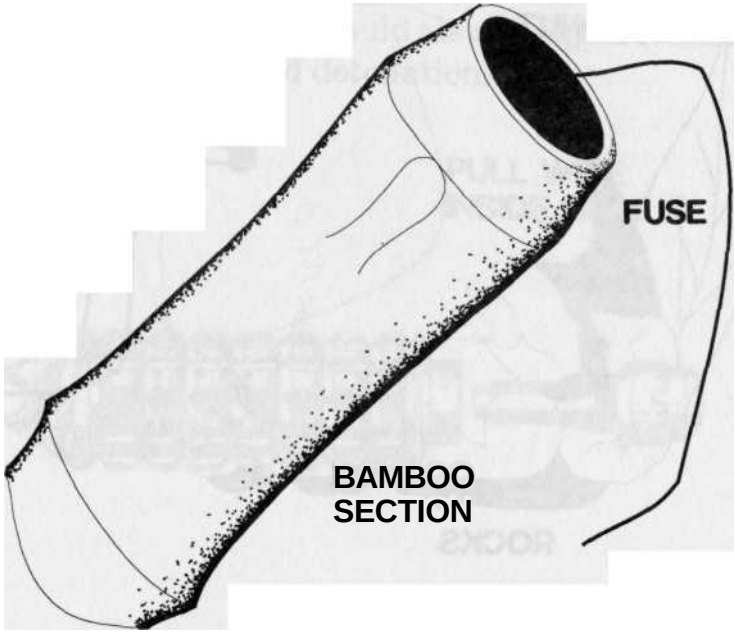
COCONUT MINE

This mine consisted of packing a hollowed-out coconut with explosives and placing rocks on top of it to act as shrapnel.



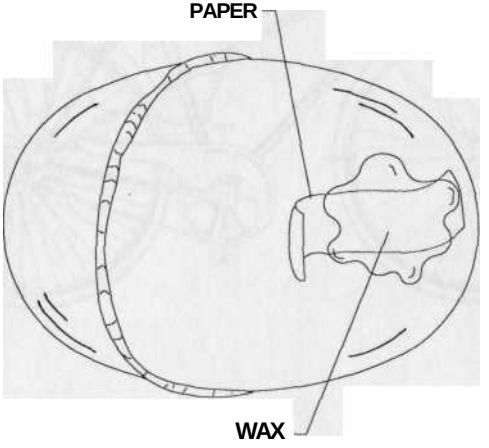
BAMBOO MINE

A cleaned-out joint section of bamboo was filled with explosive, scrap metal, and a friction fuze which was activated by a tripwire.



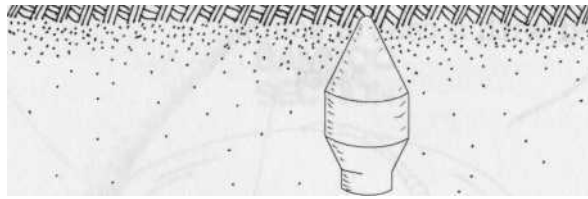
IMPROVISED INCENDIARY GRENADE

This spherical-shaped grenade was used to set fire to flammable materials. It was made of two hemispherical shaped pieces of metal welded together. It was 11/2inches in diameter and weighed 1 1/2 ounces. Two small holes in the grenade were sealed with a piece of light paper. One third of the grenade case was filled with sodium, a substance that will burn and smoke upon contact with water. A coat of wax and the pieces of paper were removed before use. When thrown into water, the grenade would send out flames and smoke for 4 to 5 seconds. Despite the burning, the incendiary grenade case remained intact and emitted a smell similar to that of kerosene. If touched, it felt as if it was covered with a coat of soap.



IMPROVISED MORTAR HEAD MINE

This mine was a mortar head buried with the fuze at ground level. When a victim stepped on the fuze the mortar would detonate.

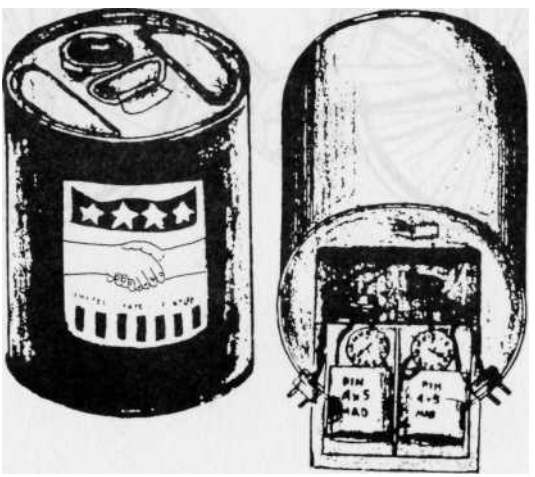


BICYCLE BOOBYTRAP

Bicycles were sometimes rigged to serve as boobytraps by the Viet Cong. The main charge and electric detonator were held in the upright tube of the frame under the seat. An electric wire was wound outside the frame to lead to a watch and two 4.5-volt batteries that were placed inside the bicycle's headlight. During movement, the ignition device was not linked to the explosives. Upon arrival at the target area, these two components were connected, and the watch preset to donate the charge some time later.

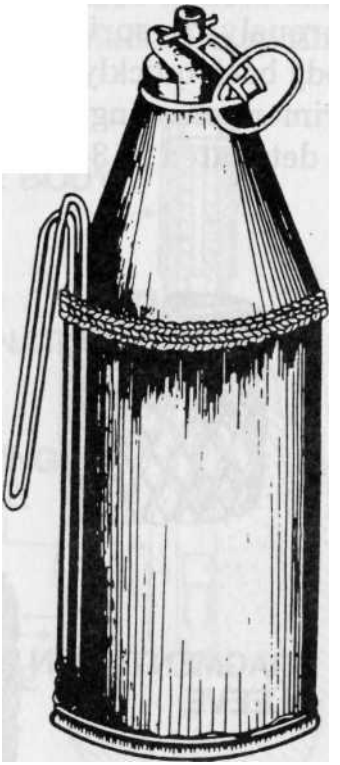
FIVE GALLON CAN BOOBYTRAP

This was a homemade boobytrap that functioned by electricity and was detonated by a time delay firing device. The explosive charge was placed in a US 5-gallon can. A rectangular hole was cut in the bottom with a hinged cover under which a firing device was placed. The ignition device was composed of two 4.5-volt batteries and two watches. Duplication made the device more reliable. The can contained 45 pounds of explosives. Two holes were bored on the center plate and two wires from the explosive went through these holes and were connected to two outer plugs. The watches were then adjusted to explode the mine at a prescribed time. At the prescribed time, the hour hand touched a copper screw inserted into the watch crystal closing the circuit to the electric detonator.



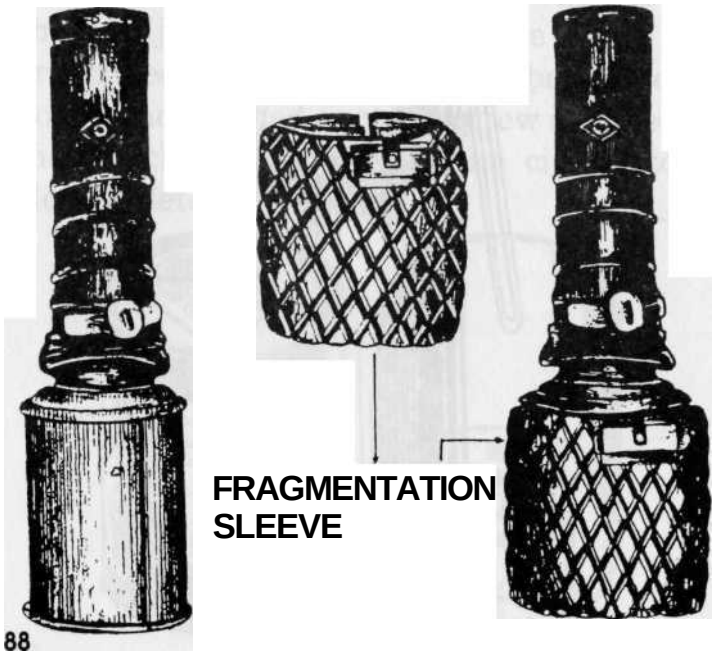
ANTI-PERSONNEL MINE

This mine was constructed of sheet metal with a dark painted case. It was a modified grenade equipped with one iron or tin lug on its body. When the safety ring was pulled out, a spring was released and a firing pin would strike the primer and detonate the mine. The mine was 2 inches in diameter and 6 inches long. It weighed 2 pounds.



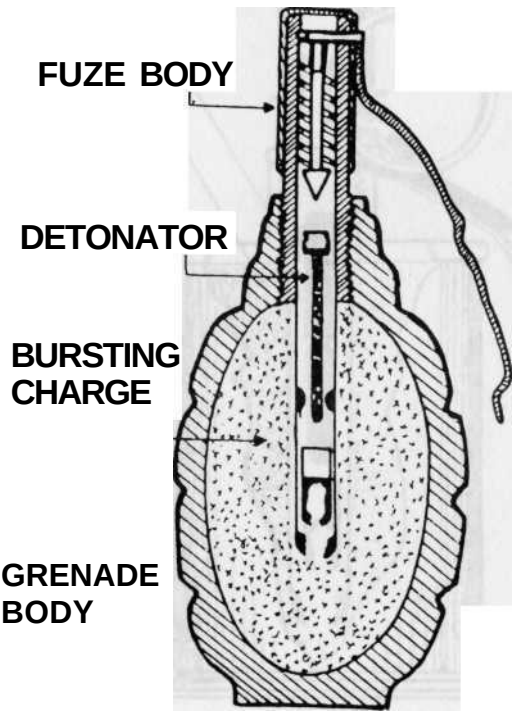
SOVIET HAND GRENADE, RGD-33

The RGD-33 offensive and defensive hand grenade was a dual-purpose grenade. As an offensive grenade, it had a 5.5 yard lethal radius. By adding a fragmentation sleeve, it became a defensive grenade, which had a 27 yard lethal radius. This sheet metal grenade was normally painted olive brown. The grenade was 2 inches in diameter and 71/2inches long. It weighed 1 1/2 pounds. The grenade was thrown vigorously. A spring in the handle forced the body back quickly and the firing pin struck the primer actuating the delay element. The grenade detonated in 3-4 seconds.



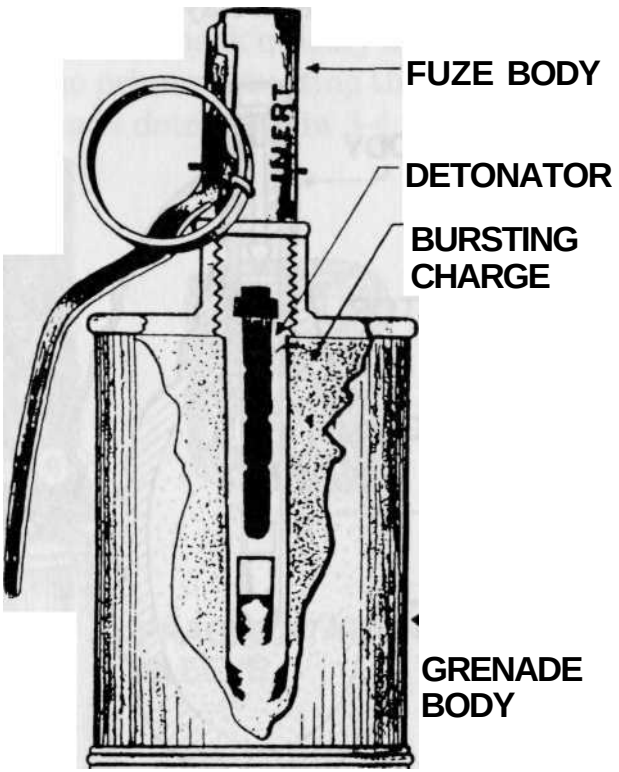
SOVIET HAND GRENADE, F-l

The shape and operation of the F-l hand grenade were similar to those of the US Mk 2 grenade. The case was of serrated cast iron and painted olive drab. The grenade weighed 1 1/2 pounds and was 2 1/4 inches in diameter by 5 inches long. The effective fragmentation radius was 15 yards. When thrown, the safety lever of the grenade was released, loosening the spring of the firing pin that ignited the primer and detonated the grenade. Delay time was 3 to 5 seconds.



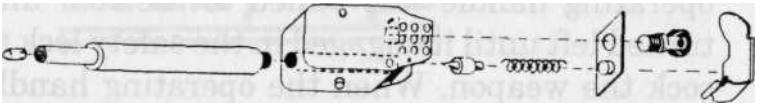
SOVIET HAND GRENADE, RG-42

This anti-personnel grenade had a sheet metal cylindrical body that contained 100 gm TNT. It was 2 1/4 inches in diameter and 5 inches long. It weighed 14 ounces. When the grenade was thrown, the safety lever would spring upward and leave the grenade body. The firing pin was forced down and struck the primer that ignited the time fuze and set off the grenade. Delay was 3 to 4 seconds.



VIETNAMESE CIGARETTE LIGHTER PISTOL

This item was actually a firearm that was probably made for assassination missions. The body of the lighter housed a tube containing the functional parts. This weapon was primarily a short range device. The user probably could not hit a man-size target beyond 10 feet.



FOUNTAIN PEN WEAPON

This weapon had the shape of an ordinary fountain pen with a fastening clip. It was 5 inches long, half inch in diameter, and fired caliber .22 bullets. The pen body was made of a smooth, thin metal tube and the bore had no riflings. The weapon was employed at short range (point-blank to 5 feet). To load, the barrel was removed and a cartridge inserted. The operating handle was pulled to the rear and turned left until it engaged in the safety lock to cock the weapon. When the operating handle was turned right, it disengaged from the safety lock and by the force of the spring the firing pin was pushed forward striking the primer and firing the weapon.

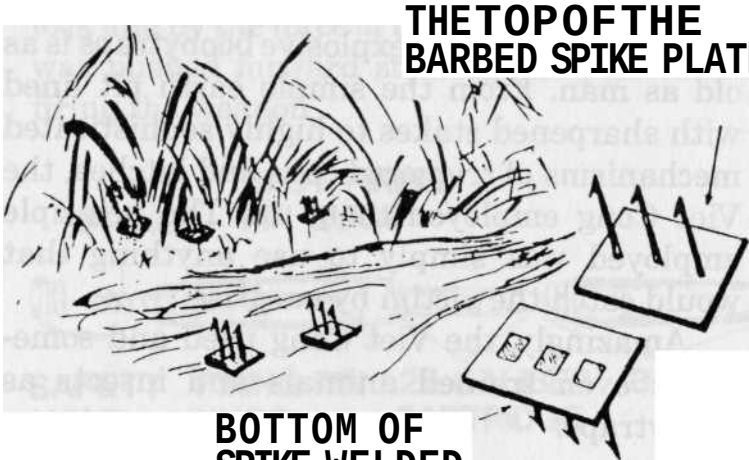
Non-Explosive Boobytraps

THE IDEA OF non-explosive boobytraps is as old as man. From the simple earth pit lined with sharpened stakes to highly sophisticated mechanisms of triggered coils and latches, the Viet Cong employed them all. The principle employed was simply to use anything that would catch the victim by surprise.

Amazingly, the Viet Cong used and sometimes even trained animals and insects as boobytraps.

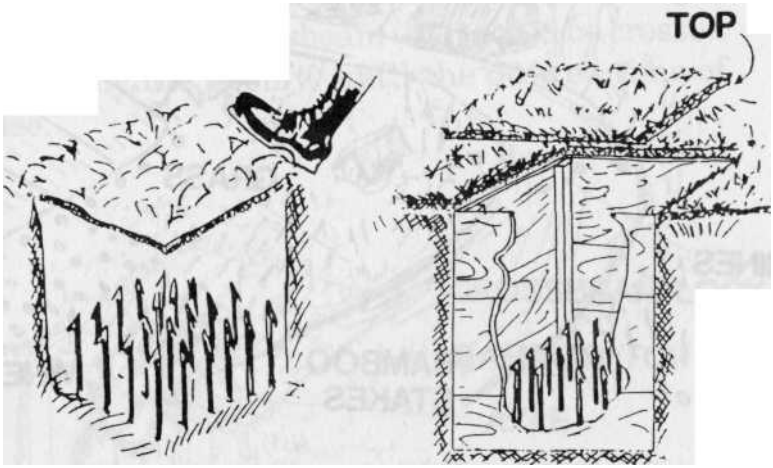
BARBED-SPIKE PLATE

The barbed-spike plate was the basic element of all Viet Cong non-explosive boobytraps. The plate, a flat piece of wood or metal, was used as a base to fasten any number of barbed spikes. The spikes, ranging in length from several inches to several feet, were fastened securely to the base. When a man stepped or fell on the spiked plate, or was struck by one, the spikes would penetrate, producing a serious wound.



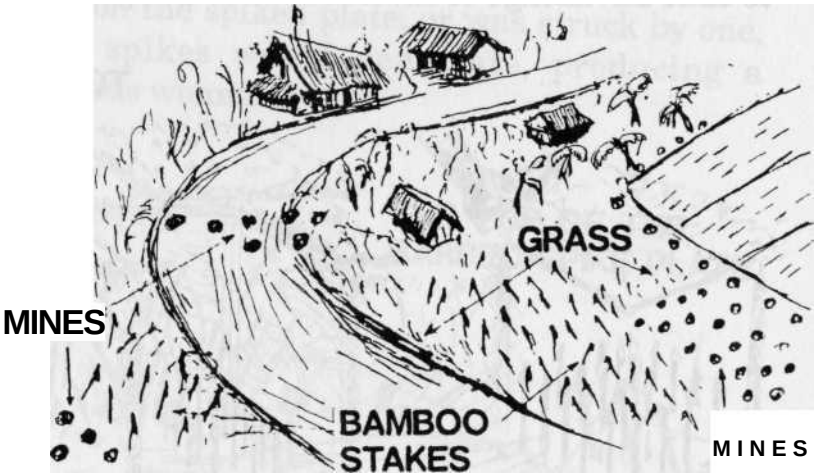
SPIKE TRAP BOX

This device was a simple wooden box made of boards joined together with four corner posts. The box had a lightweight top but the bottom was removed. Barbed spikes were placed in the ground at the bottom pointing upward. This trap was usually set up on dirt roads and trails to take advantage of favorable camouflage.



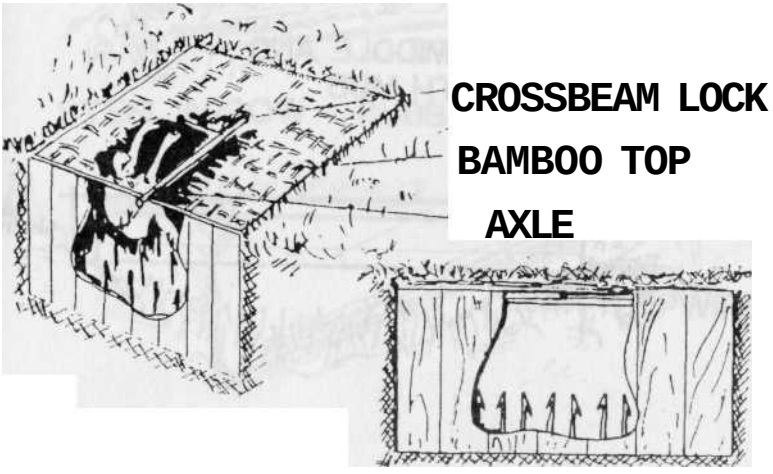
POINTED BAMBOO STAKES

Made of bamboo which had been sharpened, the stakes were stuck in the ground and covered with grass. When a weapon was fired or a grenade thrown, troops seeking cover were impaled.



SPIKE TRAP PIT

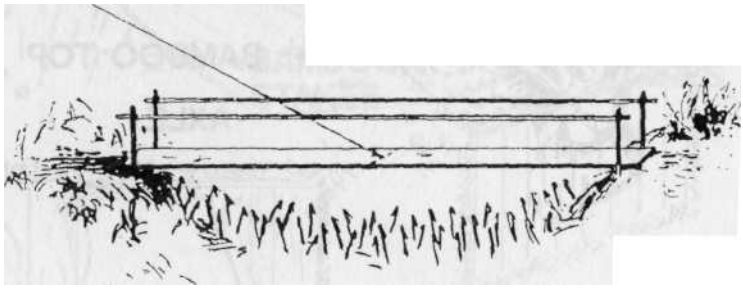
A trap pit was a large trap box with a bamboo top. Stakes were made of sharpened bamboo or barbed spikes and used to line the box. When a man stepped on the trap he would fall into the pit. The top turned on an axle; therefore, the trap did not need to be reset to work again. The pit was often prepared as a defensive obstacle and then made safe by locking it in place with a crossbeam (so it could be crossed safely by the enemy) until the desired time of use.



TRAP BRIDGE

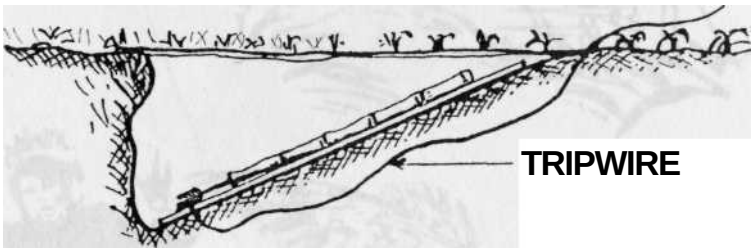
A small footbridge was partially cut in the middle. The cut was then camouflaged with coverings of mud, grass etc. Barbed spikes or sharpened bamboo stakes were placed under the cut, using the water, mud or foliage under the bridge as camouflage. The weight of a man on the bridge would cause it to collapse, tumbling the victim onto the spikes. Like the spike trap pit, bridges could be prepared in this manner, then braced for normal use. At the approach of American or South Vietnamese forces the braces would be removed.

CUT AT THE MIDDLE AND COVERED WITH MUD



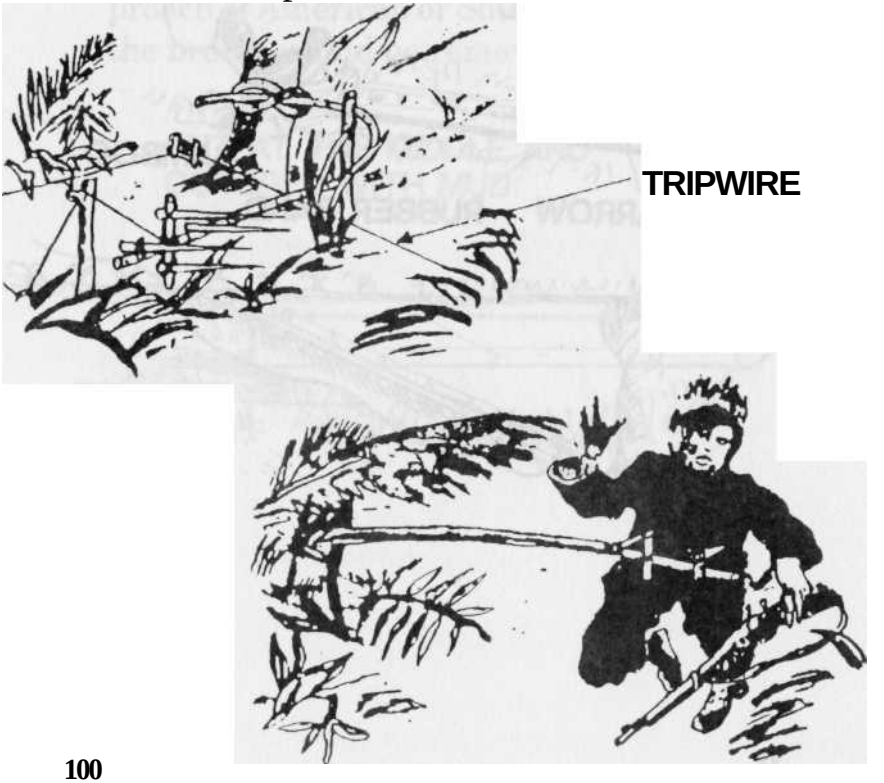
STEEL ARROW TRAP

This trap utilized a bamboo tube (usually about 3 feet long) as a launcher. A steel arrow was placed in the tube. Using a block of wood as the bolt, a strip of strong rubber for power and a catch to lock the rubber strip, the device was fired with a tripwire. When the victim tripped the wire, the latch disengaged, allowing the rubber strip to launch the arrow.



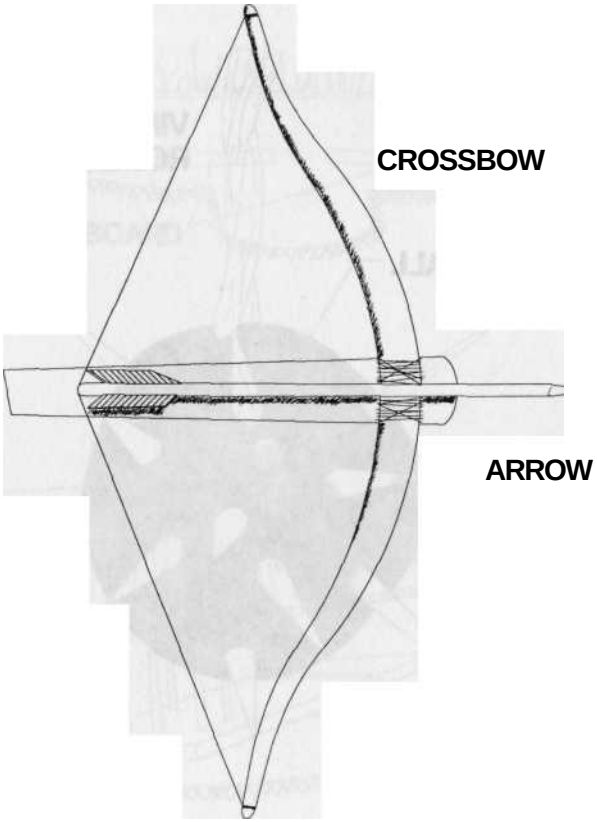
BAMBOO WHIP

A strip of springy bamboo from 3 to 10 feet in length was used to make a bamboo whip. A barbed-spike plate was secured to the tip of the bamboo (or several of the spikes driven through the bamboo), and the whip was drawn back and secured. A tripwire was then latched to the whip and the wire strung across the trail. When a man tripped the wire, the bamboo was released, and swung around, striking the victim with the spikes.



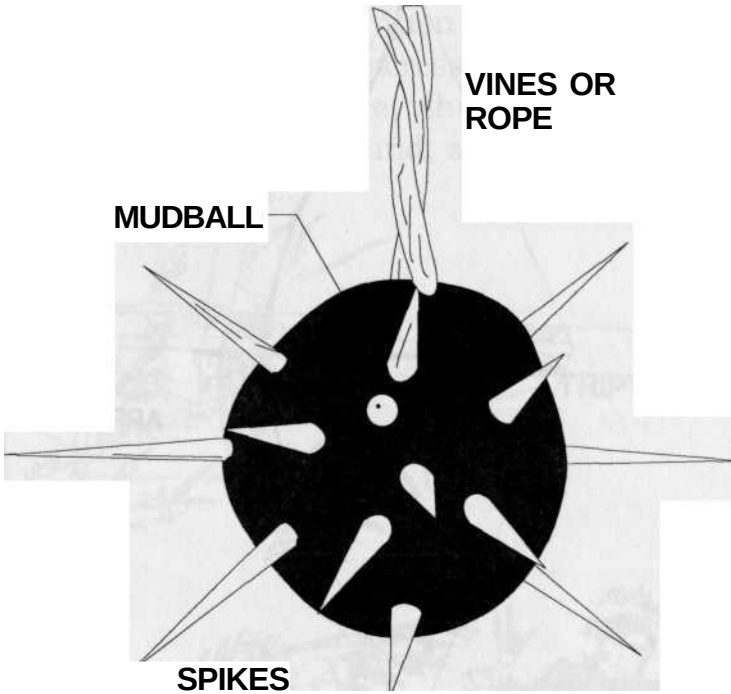
CROSSBOW AND ARROW

Similar to the Steel Arrow Trap, this trap held an arrow under tension in the bow. A trip wire tied to a release devise released the arrow.



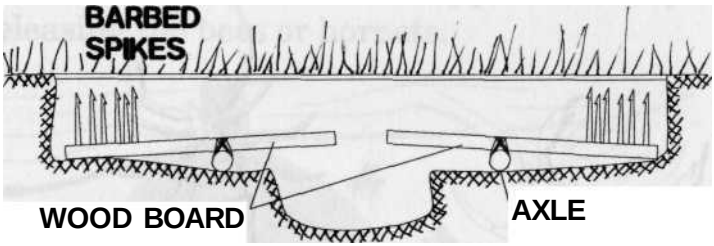
SPIKED MUD BALL

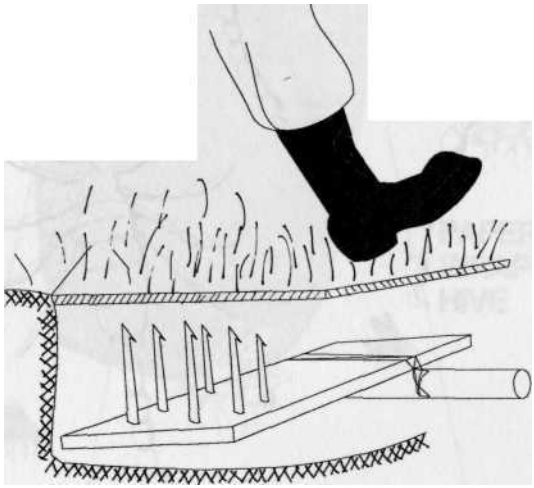
Bamboo spikes were run through a heavy mud ball which was suspended from a tree using vines. Released by a tripwire, the ball swung like a pendulum across the trail or road striking its victim.



BEAR TRAP

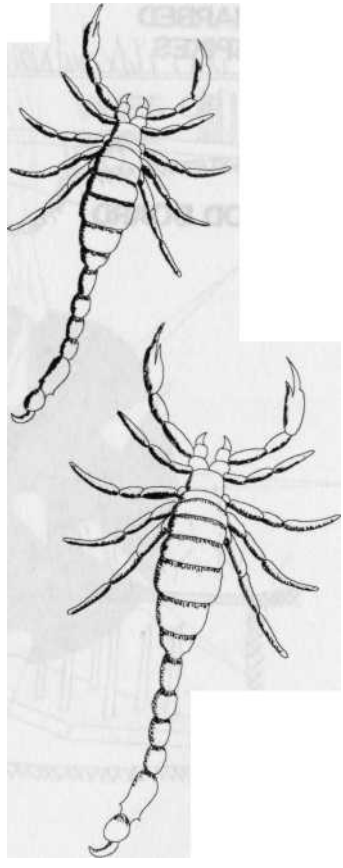
A bear trap was two spiked boards joined at the ends so they would pivot. The boards would pivot upward, when a victim stepped on them, impaling the spikes into the leg above the foot.





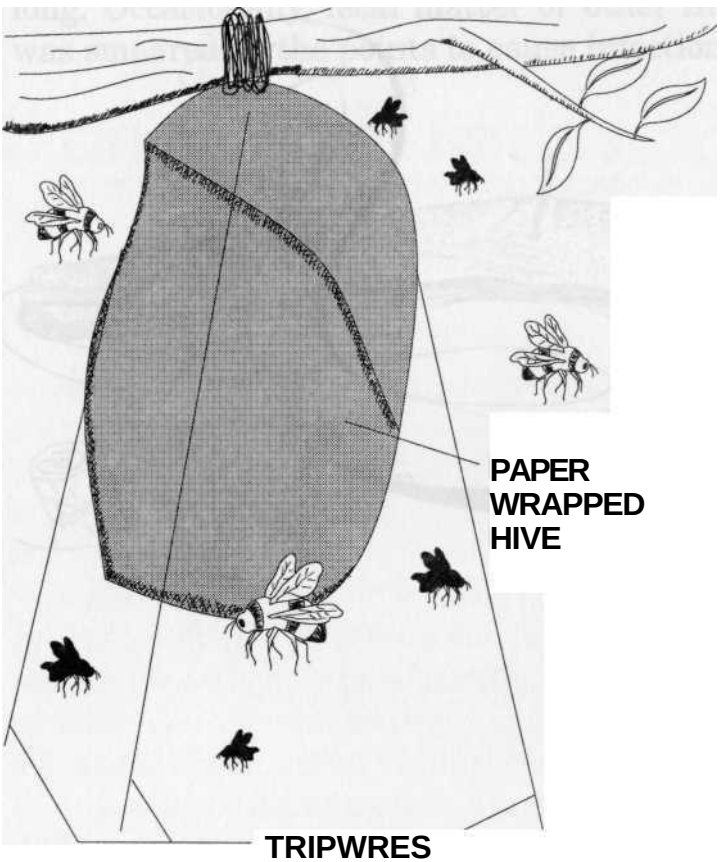
SCORPIONS

A box full of scorpions was rigged with a tripwire. When the wire was tripped the box would open and release the scorpions.



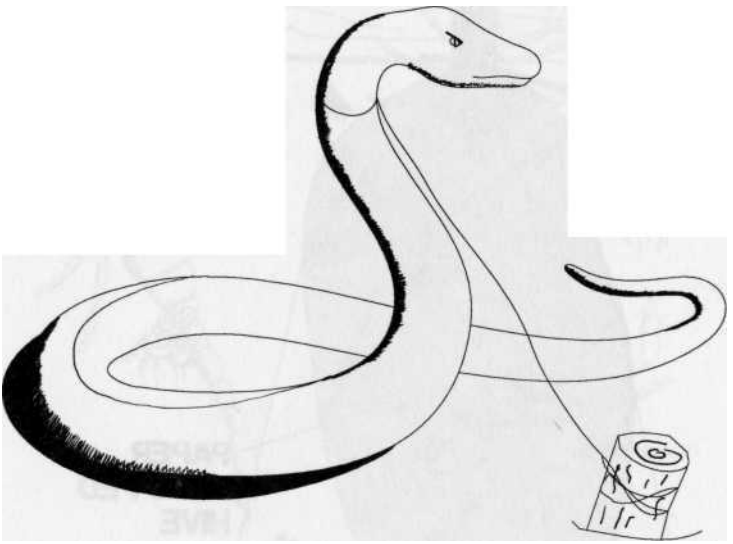
BEES AND HORNETS

Hives of aggressive bees and hornets were placed along trails and roads. The hives were sometimes covered with paper that was rigged to a trap on the trail with wire. When the trap was disturbed, the wire ripped the paper releasing the bees or hornets.



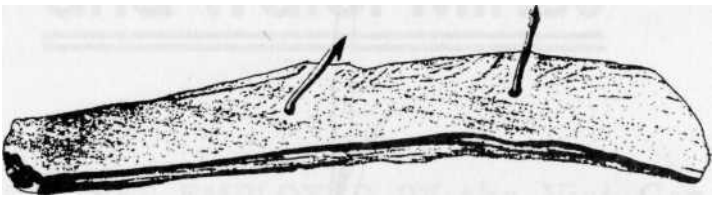
VENOMOUS SNAKES

Snakes were tied up using wire or string on a board or a piece of bamboo in tunnel entrances and narrow passages. When the board was tripped the snake came out and bit the victim.



DOUBLE-SPIKE CALTROP

This device was one type of caltrop used by the Viet Cong. It consisted of a board with nails driven through it. The pointed ends were barbed to make removal from the victim more difficult. The Viet Cong used these devices with as many as seven points from 2 to 12 inches long. Occasionally, fecal matter or other filth was smeared on the points to cause infection.



DOUBLE-BARBED SPIKE

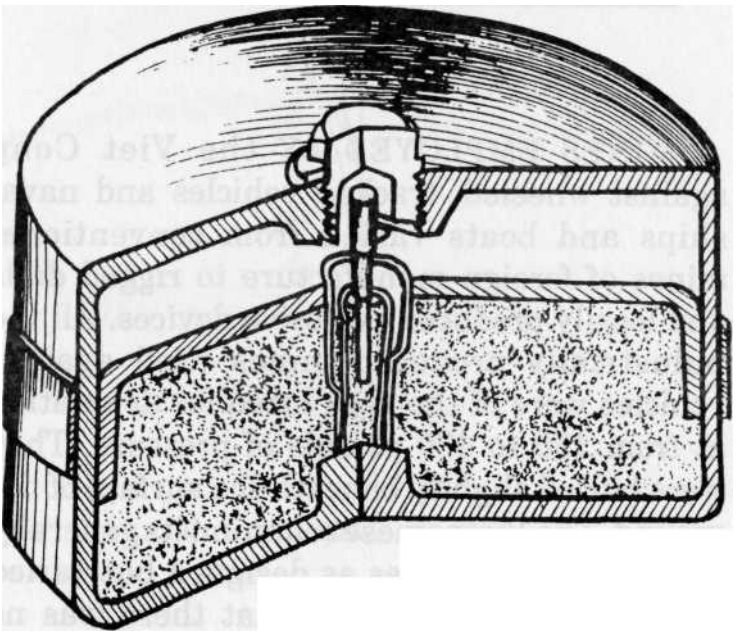
This was an improved caltrop spike. The improvement consisted of a second barb pointed in a different direction then that of the first. This arrangement made removal more difficult. In use, a number of these spikes would be driven through a board so as to stand upright.

Anti-Tank, Vehicle, and Water Mines

MINES EMPLOYED BY the Viet Cong against wheeled, tracked vehicles and naval ships and boats varied from conventional mines of foreign manufacture to rigged duds and locally produced explosive devices. All the industrially produced mines used against vehicles were of the type fuzed for detonation at from 150 to 400 pounds of pressure. They were buried slightly beneath the surface of the ground. The Vietnamese communists generally employed these mines as designed but varied fusing and positioning so that there was no definite pattern.

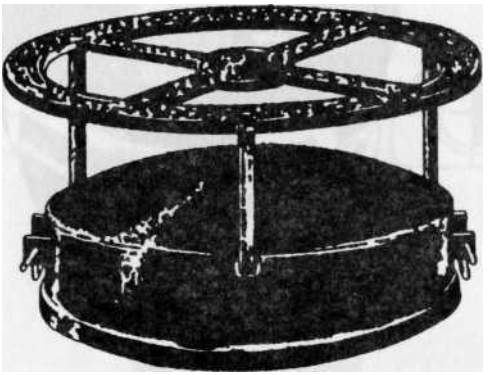
SOVIET ANTI-TANK MINE TMB-2

Designed to avoid detection by a mine detector, this mine was constructed of black or brown tar-impregnated cardboard, 11 inches in diameter and 6 inches high. It was usually gauged for activation by a force of 350 pounds of pressure. Further, it could be waterproofed by the use of wood and plastic sheeting, without losing its non-detection characteristic. It contained 11 pounds of explosive and had an overall weight of 15.4 pounds.



CHINESE COMMUNIST NO 4 DUAL-PURPOSE MINE

Intended for employment against both vehicles and personnel, this mine incorporated a double-acting fuze that could detonate the mine under either of two circumstances: the first, when a load of 30 pounds of pressure was applied to the pressure spider; the second, when a pull of 10 pounds was exerted on a tripwire fastened to the fuze's striker-retainer pin. Constructed of creosoted metal, it carried 4 pounds of explosive and had an overall weight of about 10 pounds.

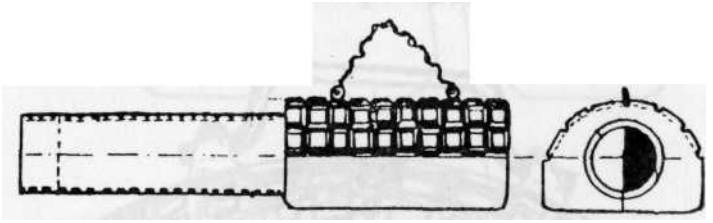


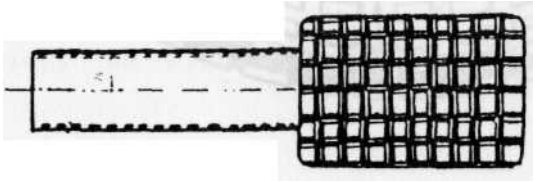
VIET CONG ANTI-TANK MINE

The Viet Cong locally constructed anti-tank mines with iron case consisting of two parts, a cap or pressure plate and a body. Two holes were located in the top of the mine, one to accommodate the fuze and the other to load the explosive (TNT). The mine was 8 inches in diameter and 3 inches high. It weighed 11.5 pounds.

CONCRETE FRAGMENTATION MINE

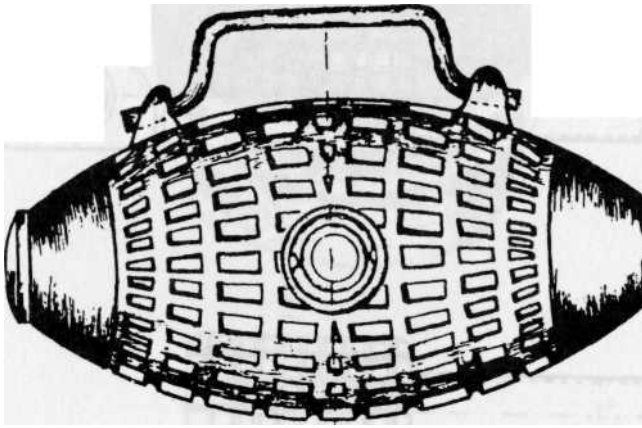
This mine was constructed of explosive encased in a cylindrically shaped concrete shell with a flat side for stable emplacement. A 2-inch diameter pipe on one end of the mine served as a carrying handle and detonator housing. The two swivels on top of the mine were used to tie it to an object. Usually employed as a command-detonating mine, it was equipped with an electrical firing device. The mine was 7 inches wide and 22 inches long. It weighed 13 pounds and contained TNT.





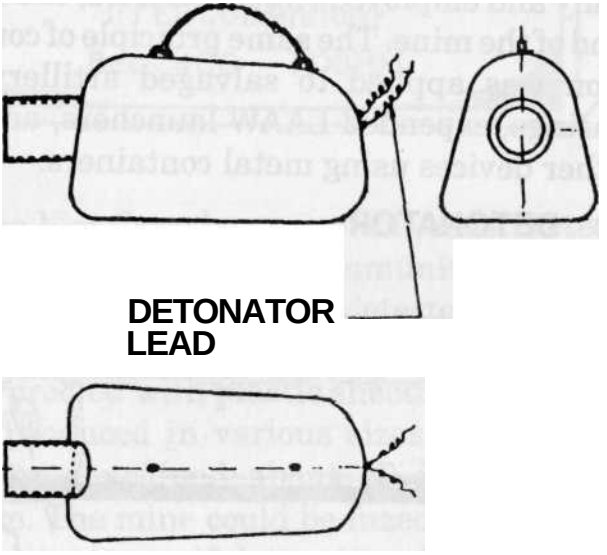
NVA CAST-IRON FRAGMENTATION ANTI-TANK MINE

Produced in North Vietnam, this egg-shaped mine was made of cast-iron with serrations on its outer surface. On the mine body and between the ends was a handle that was passed through two eye hooks attached to the mine body. There was a hole, 2 inches in diameter, with a cover at one end of the mine. When used this cover was removed and replaced by an electric blasting cap for command detonation. This mine was 5 inches in diameter, 9 inches long and weighed 12 pounds.



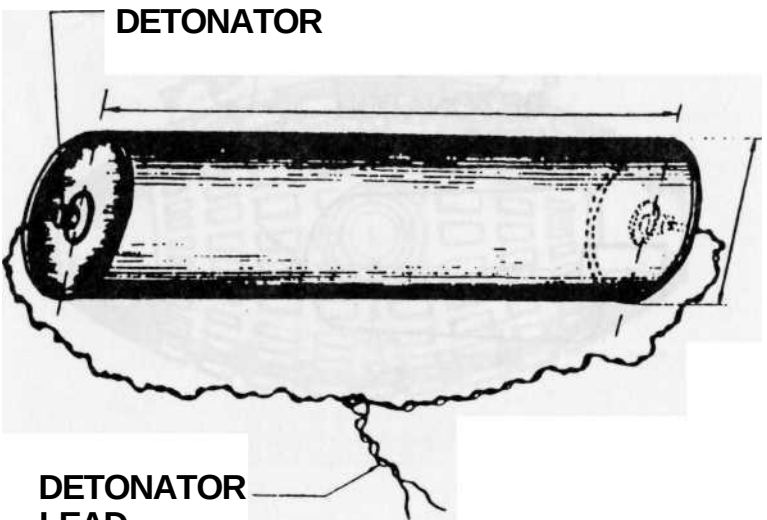
VIET CONG MOUND-SHAPED MINE

Manufactured locally in Viet Cong mine factories, this mine contained an iron-pipe detonator encased in concrete. There were two iron swivels on the mine body to tie it to an object. Another command-detonating mine, it was fuzed electrically. The mine was 12 inches long, 5 3/4 inches wide, and 6 inches high. It contained TNT and weighed 13 pounds.



VIET CONG ROUND VOLUME MINE

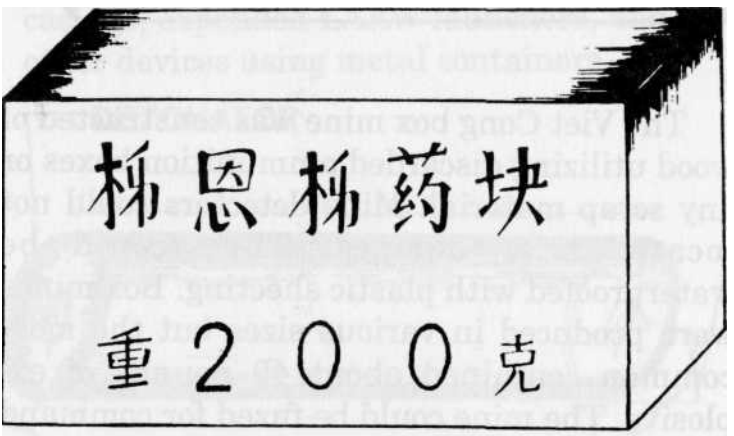
Produced locally in Viet Cong mine factories, this mine was a prototype of numerous other Viet Cong-manufactured explosive devices. Constructed of sheet metal, with welded seams, it generally weighed about 15 pounds, of which 13 pounds were explosive. The mine was 5 inches in diameter and 17 inches long. Command detonated, it was fuzed electrically and employed two detonators, one in each end of the mine. The same principle of construction was applied to salvaged artillery shell casings, expended LAAW launchers, and most other devices using metal containers.



VIET CONG BOX MINE AND DEMOLITIONS

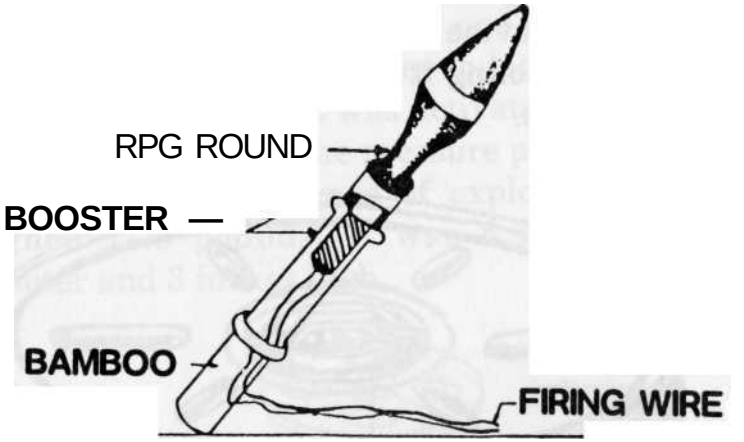
The Viet Cong box mine was constructed of wood utilizing discarded ammunition boxes or any scrap material. Mine detectors could not locate these devices. They could be waterproofed with plastic sheeting. Box mines were produced in various sizes but the most common contained about 40 pounds of explosive. The mine could be fuzed for command detonation or self-detonation by the use of various devices. The explosive charge was usually made up of standard Soviet or Chinese Communist 1-pound demolition blocks. The Soviet TNT demolition block was rectangular

shaped and had a1/4inch diameter hole in the end of the block. Its size was 2 by 2 by 4 inches and weighed 3/4 pound. It was covered with wax paper that had an inscription in Russian as to the contents. This demolition block was used as a booster block for all demolition work. The Chinese Communist TNT demolition block was rectangular in shape, yellowish in color, wrapped in oil paper with Chinese markings on the outside meaning: TNT Demolition block, 200 grams. It was 1 by 2 by 4 inches in size and weighed half pound.



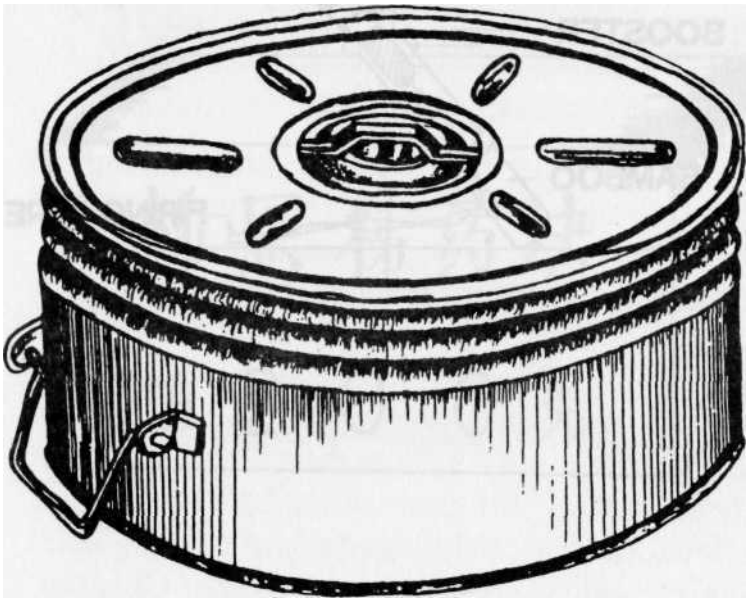
B-40 ANTI-TANK BOOBYTRAP

A length of bamboo was placed at an angle of 45 degrees along the shoulder of the road. A B-40 rocket was then placed in the bamboo tube and fired electrically by command detonation as the tank or vehicle crossed the line of fire.



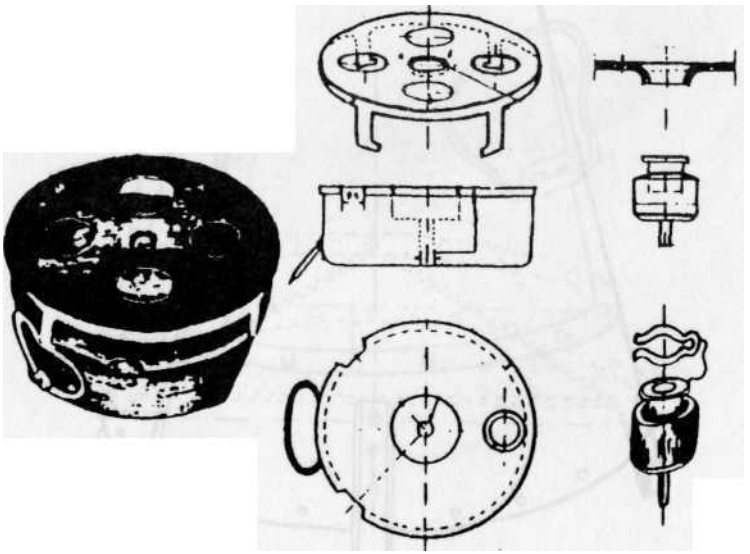
SOVIET ANTI-TANK MINE TM-41

Constructed of blued steel, sometimes painted olive drab or white, the TM-41 carried an explosive charge of 8 pounds and had a total weight of 12 pounds. It was 10 inches in diameter and 5 inches high. A force of 350 pounds of pressure on the lid would activate the firing device. With very little additional waterproofing it could remain operational indefinitely.



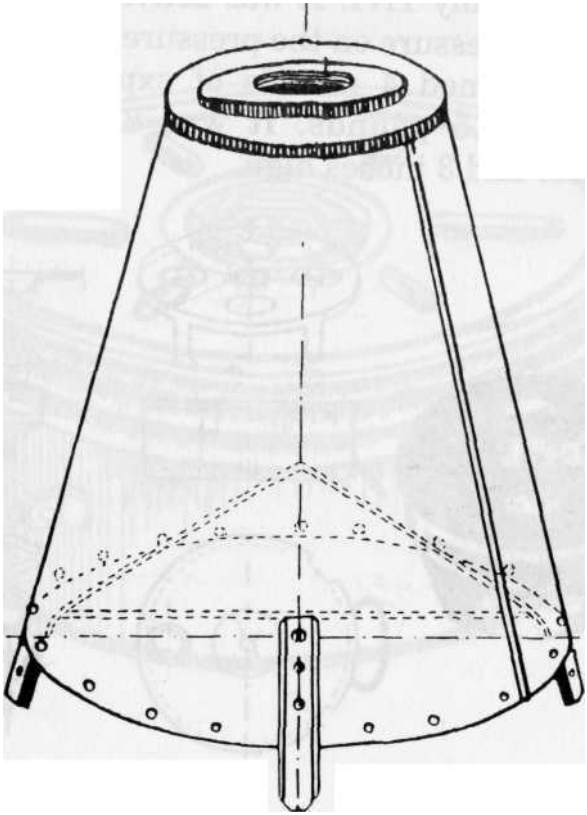
CHINESE COMMUNIST MI AI ANTI-TANK MINE

Manufactured in Communist China and locally, this mine was similar to and often mistaken for a US pre-World War II mine. Made of metal, it was painted olive drab with the yellow markings "MINE M1A1-TNT". Two holes were located in the top of the mine, one to accommodate the fuze and the other to load the explosive, usually TNT. It was activated by 200 pounds of pressure on the pressure plate. This mine contained 4 pounds of explosive and weighed 11.5 pounds. It was 8 inches in diameter and 3 inches high.



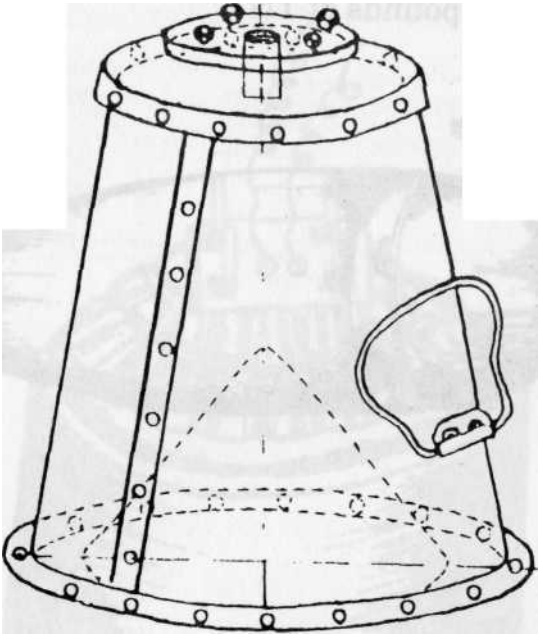
VIET CONG IMPROVISED SHAPED CHARGE MINE

This homemade shaped charge had three legs to serve as stand-off. The explosive charge container was constructed of black sheet metal, rolled and hermetically welded. It was 9 inches in diameter, 11 inches high and weighed 21 pounds. The charge contained 13 *Vi* pounds of TNT that was ignited electrically.



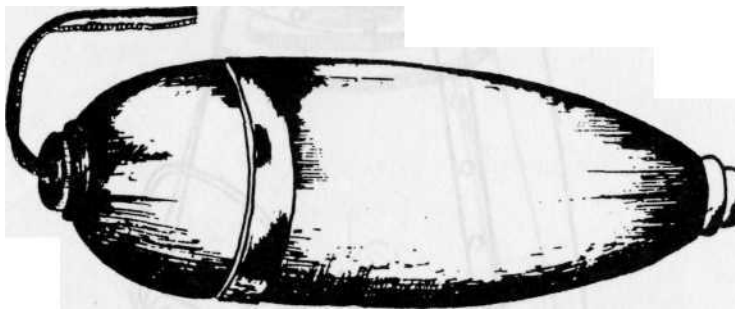
VIET CONG RIVETED SHAPED CHARGE

This short pyramidal shaped charge functioned by electricity and was constructed of rolled black sheet metal that was fastened together by rivets. It stood 8.5 inches high and weighed 17.5 pounds. The charge contained 11 pounds of Melinite explosive.



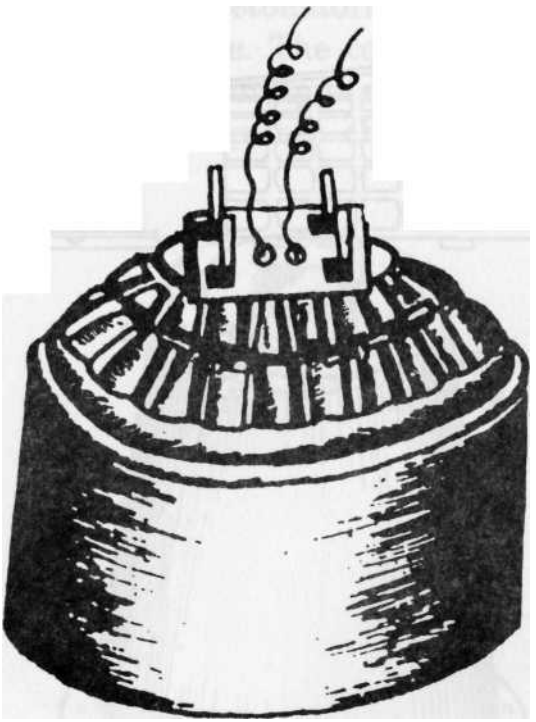
VIET CONG MORTAR SHELL MINE

This mine was a modified British 100mm mortar shell (oval-shaped case) utilizing an electric firing device. The fuze well was cut off and a hole was drilled into the explosive to accommodate an electric blasting cap. The shell was made of cast iron, 4 inches in diameter and 15 inches long. It weighed 13 pounds and contained 3 *V2* pounds of TNT.



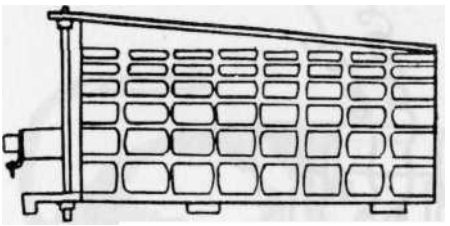
VIET CONG BOX-SHAPED MINE

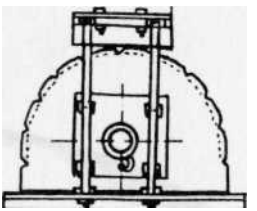
This mine was constructed of cement with an electric firing device and serrations in the center of the case. The end of the mine had a piece of iron attached by four bolts to hold the electric blasting cap. The mine was 8 inches in diameter and 8 inches high. It weighed 13 pounds and contained TNT.



VIET CONG TURTLE-SHAPED MINE

This mine was constructed of cement with an electric firing device. Usually the mine was fastened to a long pole. Apart of the case had a square piece of iron attached by four screws to hold the fuze in place. The mine was 5 inches in diameter and 9 inches long. It weighed 13 pounds and contained TNT.



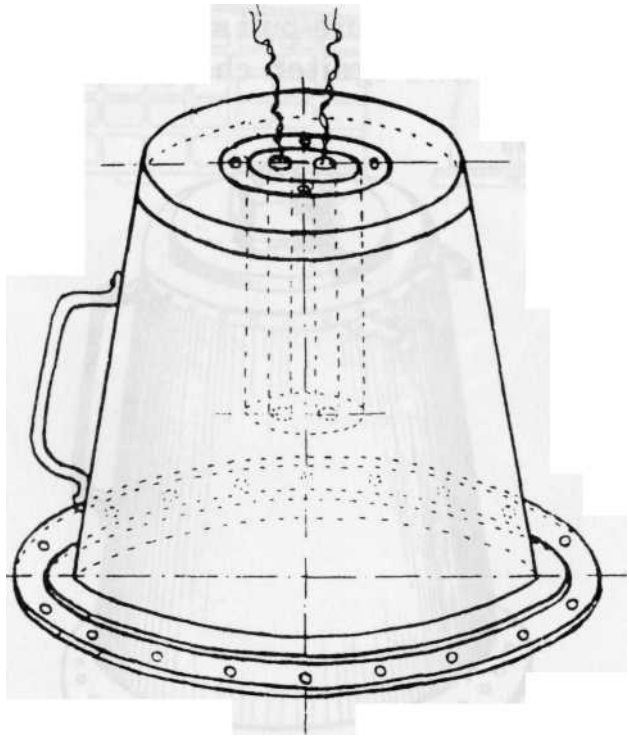


VIET CONG HOLLOW CONE MINE

This mine was cone shaped and made of sheet metal held together with rivets. It was equipped with two pressure-pull igniting devices that detonated the mine in 9 seconds. The mine was 9 inches in diameter and 8 inches high. It weighed 15 pounds. The igniting device was locally made. It consisted of a Caltex oil can that contained two detonators, placed in parallel lines in the mine. The components of the mine were two pressure-pull strings, two igniting devices, two igniter charges, and two detonators.

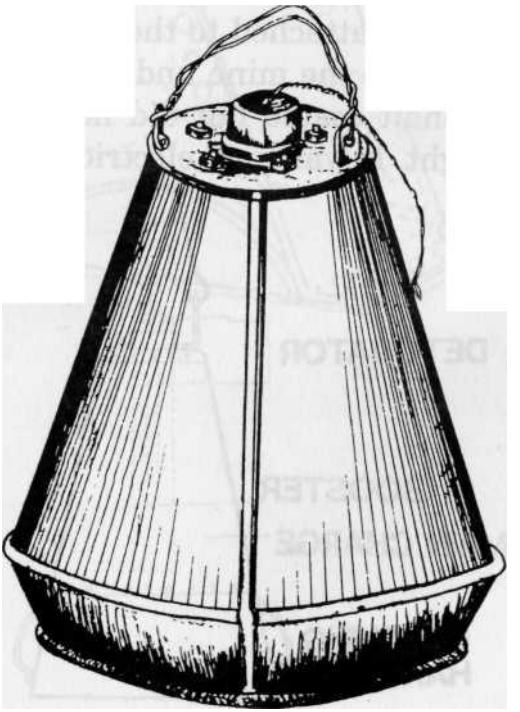
VIET CONG SHORT CONE-SHAPED MINE

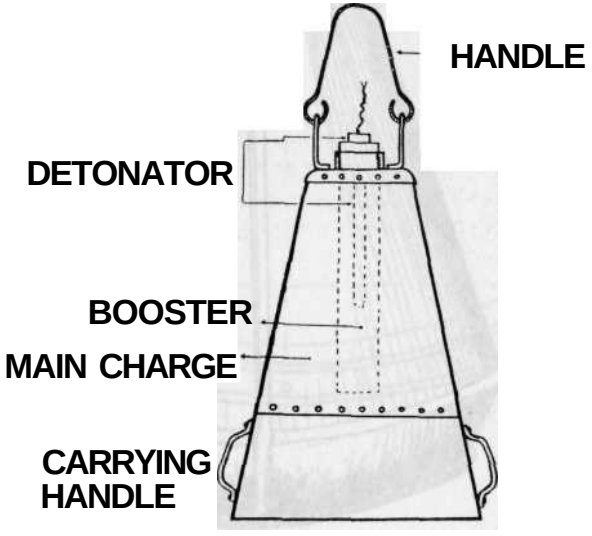
The Viet Cong locally made short cone-shaped mine weighing 27 pounds and containing 15 pounds of TNT. The outer case was made of sheet iron and the upper part had two holes through which two electric blasting caps were introduced to increase reliability. The mine had a bell-shaped base, 11 inches in diameter. A handle was attached to the side of the mine case by two rivets.



VIET CONG WATER MINE

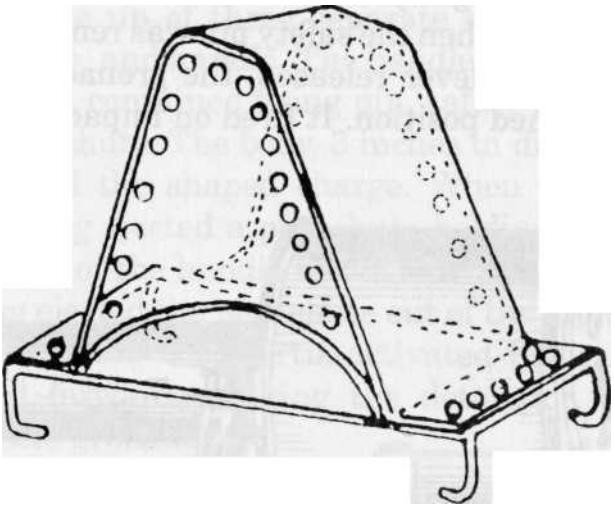
The Viet Cong homemade water mine was constructed in shape of a short cone and fabricated from sheet metal held together by rivets. The mine was usually painted black and marked with the number 4 at three different spots on its outer case. It was 11 inches in diameter and 12 inches high. It weighed 27 pounds and contained TNT. The mine was constructed in different sizes and was operated by electricity. It was employed to attack naval ships and boats.




HANDLE
DETONATOR
BOOSTER
MAIN CHARGE
CARRYING HANDLE

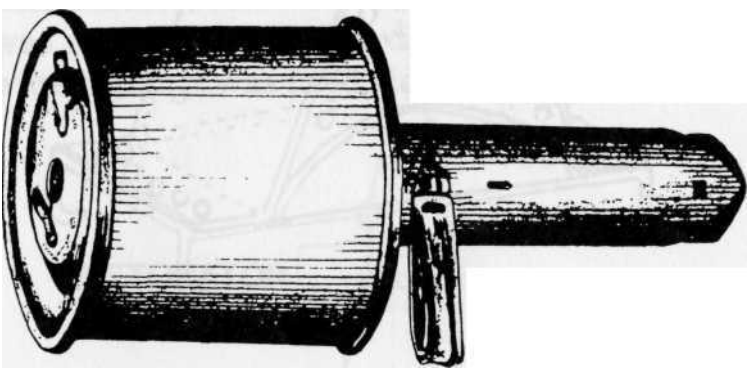
VIET CONG TURTLE MINE

This locally constructed mine was made of separate pieces of black sheet metal fastened together with rivets. There were four U-shaped supports placed across the bottom of the mine. The mine was 9 inches wide and 5 1/2 inches high. It weighed 20 pounds and contained 7 1/2 pounds of explosive.



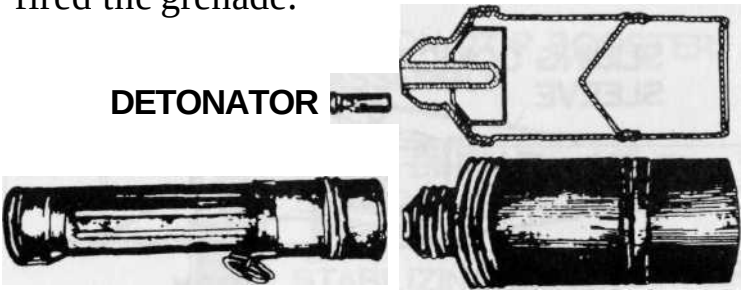
SOVIET HAND GRENADE, RPG-40

This grenade was used mainly against light armored vehicles. It was made of sheet metal and contained TNT. It was 3 1/2 inches in diameter and 8 inches long. It weighed 2 3/4 pounds. The effective fragmentation radius was 22 yards. A detonator was inserted into the grenade before the grenade was thrown. The igniting device was placed inside the handle that was tightly screwed into the top of the grenade. When the safety pin was removed and the safety lever released, the grenade was in the armed position. It fired on impact without delay.



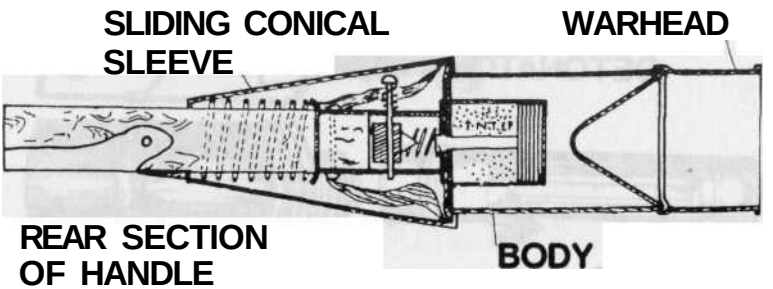
SOVIET PARACHUTE HAND GRENADE, SHAPED CHARGE

The parachute stabilized the grenade in flight. It exploded at a low impact angle and had approximately the same effect as a HEAT (High Explosive Anti-Tank) round. It could penetrate 5 inches of steel. The grenade was made of tin and was cylindrical in shape. The charge was cast TNT. Overall length was 15 inches and weighed 2 1/2 pounds. The grenade was made up of three separate components: body, fuze, and handle. The handle, 2 inches in diameter, contained firing pin, safety pin, and the parachute. The body, 3 inches in diameter, contained the shaped charge. When thrown, the spring ejected a parachute holding cap at the head of the handle to the rear and a recoil spring ejected the parachute out of the handle. Upon impact, the inertia-activated firing pin moved forward, striking the detonator, and fired the grenade.



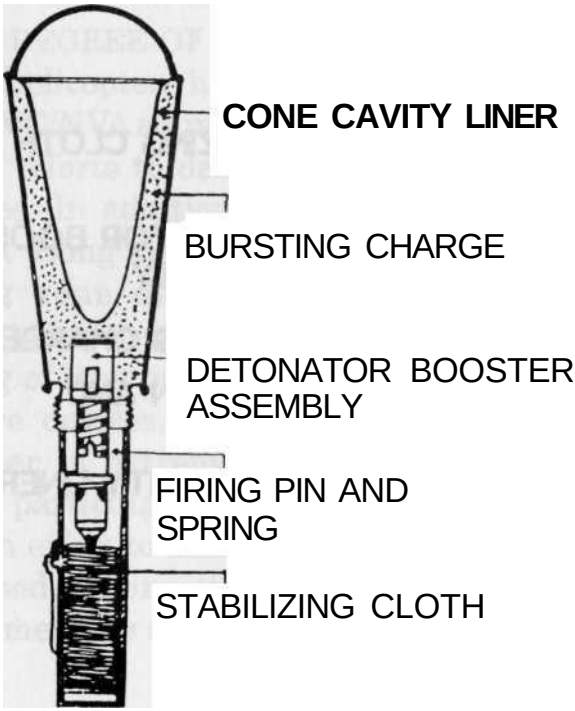
VIET CONG PARACHUTE HAND GRENADE, SHAPED CHARGE

This grenade was used against tanks and armored personal carriers. The parachute stabilized the grenade and assured proper impact angle at the target. It pierced up to 4 inches of steel. The grenade was made of sheet iron with a wooden handle and the charge was cast TNT. Overall length was 131/2inches and weighed 11/2pounds. The grenade was made up of four parts: handle, conical sleeve, body, and warhead. The cone housed the firing pin, safety pin, and parachute. The body, 3 inches in diameter, contained a detonator and the shaped charge while the warhead provided the stand-off. When thrown, a spring pulled the parachute cone to the rear and the parachute deployed. At the same time, the safety pin was pulled out of the grenade. Upon impact, the firing pin struck the detonator and exploded the grenade.



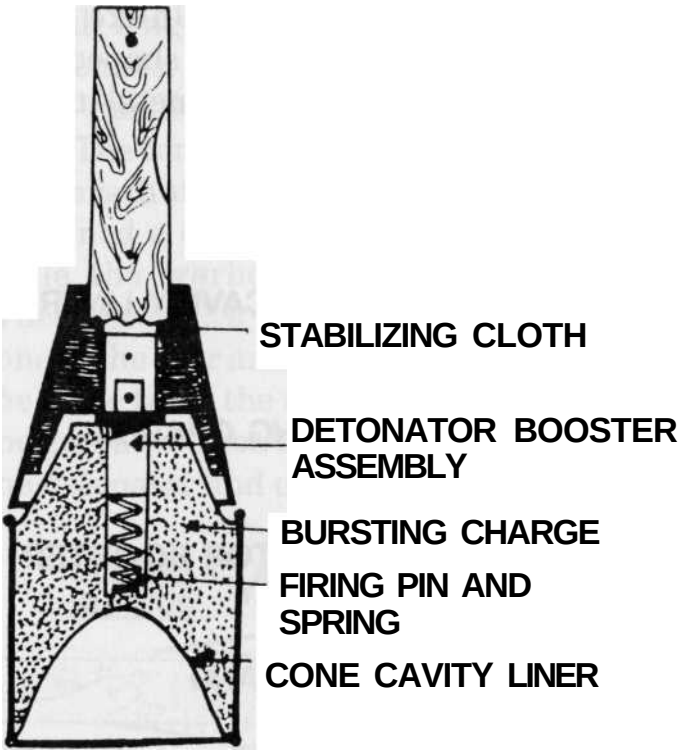
SOVIET HAND GRENADE, RPG-6

This shaped charge anti-tank grenade was also used against personnel because of its effective fragmentation radius of 22 yards. It was 13 1/2 inches long and weighed 2 1/2 pounds. When thrown, the grenade was balanced by four pieces of parachute cloth that ejected from the handle as the safety lever ejected. The grenade exploded on impact. Unlike other grenades, this type had a crescent shaped head and its handle was made of sheet metal instead of wood.



SOVIET HAND GRENADE, RPG-43

This anti-tank grenade could penetrate up to 3 inches of steel. It was 12 inches long and weighed 2 3/4 pounds. The grenade stabilizing device consisted of two pieces of cloth and a steel cone. The grenade exploded upon striking the target.



Anti-Helicopter Mining

THE DEGREE OF success that the employment of helicopters had on restricting and containing VC/NVA activities was evidenced by the enemy's efforts to destroy or neutralize these machines. In addition to intense ground fire, the Viet Cong devised numerous helicopter landing zone destruction systems. Such destruction systems ranged from the primitive planting of long pointed stakes to imaginative explosive devices. Because of its design, the helicopter is extremely vulnerable to these devices, particularly the rotors and airframe.

In an effort to minimize the threat of "hot" and mined landing zones, US forces developed several methods of creating or rapidly expand-

ing new landing zones. In a joint Army and Air Force effort, the "combat trap" was developed after experimentation. The M121 was a 10,000-pound bomb that was parachuted from a fixed-wing aircraft or helicopter over the desired landing zone site and detonated at a height that would clear away the dense foliage but not create a crater in the earth. After the combat trap had finished its job, a construction party and equipment were taken by helicopter to the new landing zone to expand it to the desired size.

Special construction equipment were developed for helicopter transport. Equipment that could be moved into forward areas by helicopter included roadgraders, bulldozers, scoop loaders, and many others, each of which were sectioned and lifted into the landing zone in two loads, and then assembled for operation.

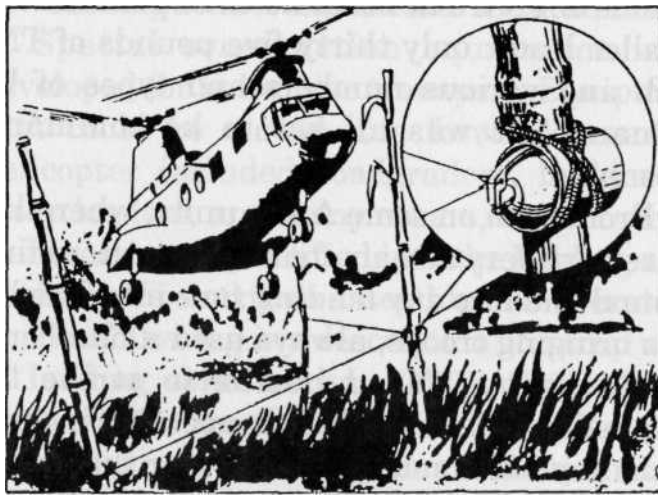
The following is a description of a trap used in landing zones during OPERATION JUNCTION CITY. As the three lifts of choppers touched down, five heavy command-detonated charges were set off by the Viet Cong in the tiny clearing. Three helicopters were destroyed and 6 more damaged with a toll of fifteen US soldier killed and twenty eight wounded. A Viet Cong Claymore-type mine was also detonated wounding five infantrymen.

On the following day Rangers discovered batteries and a wire in the wood line near another landing zone. Following the wire, they found four holes filled with explosives. There was a center hole, and radiating from it was wire leading to three other holes at a distance of about twenty-five meters. In each hole were the necessary detonating caps. In the center hole were also the following rounds: eight 75mm, seven 81mm, fourteen 60mm, and 105 pounds of TNT. The other holes had similar but smaller loads: only thirty-five pounds of TNT each and various numbers and types of US ordnance. It was all set to be command-detonated.

From then on some Army units, when they placed artillery and air strike preparatory fires around and into any landing zone into which it was bringing troops, always used a number of instantaneous fuzed bombs to strike the planned landing site of its chopper lifts in order to cut any wires and yet not chew up the terrain so much that it would be difficult to land and traverse.

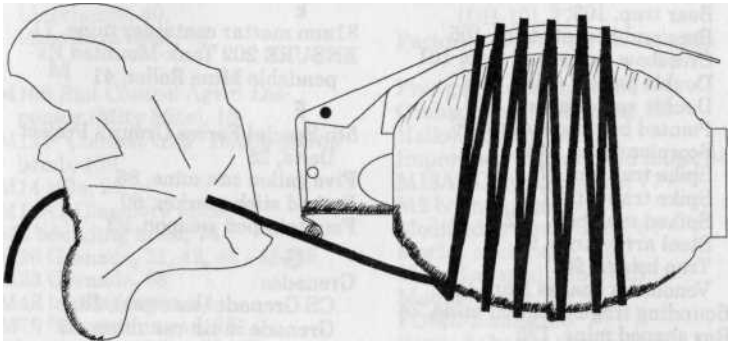
HELICOPTER EXPLOSIVE TRAPS

Grenades, artillery/mortar rounds, or any other type of exploding ordnance were mounted in trees or on the surface of the landing zone. The explosive devices were rigged for tripwire detonation and the wire strung to loosely placed poles. The rotorwash of landing helicopters would blow the poles from their loose position, tripping the device.



HELICOPTER EXPLOSIVE TRAPS

A 13-year-old Vietnamese boy once claimed that the Viet Cong had forced him to reconnoiter helicopter landing zones. The boy was instructed by the Viet Cong to place hand grenades in the zones with strings wrapped around the levers, pieces of paper attached to the free ends of the strings and the rings (pull rings) pulled. Rotorwash from landing helicopters would then blow the paper, unwrap the string, and release the safety lever.



Index

Closely examines the use of mines and boobytraps as an effective weapons system, and details how some of the devices were constructed.

This book, with more than 80 illustrations, captures the ingenuity and extraordinary variety of the Viet Cong's most feared weapons: mines and boobytraps.

During the early days of the Vietnam war approximately 65 to 75 percent of all US casualties were caused by mines and boobytraps, many of them improvised from easily obtained items discarded by American troops.

Here, for the first time, is a book that closely examines the use of mines and boobytraps as an effective weapons system, and details how some of the devices were constructed. Topics covered include: mine warfare, enemy sources of supply, VC mine factories, counter-measures, mine indicators, explosive anti-personnel devices, non-explosive boobytraps, anti-tank and vehicle mines, and anti-helicopter boobytraps. Must reading for anyone concerned with improvised weaponry and boobytraps!

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