

CHAPTER 7

Flame Field Expedients**Flame Field Expedients (FFE) Checklists****Location of Fuel Mixing Site**

- No fire hazards
- Firm, well-drained terrain
- Convenient to supply delivery
- Central location
- Well-ventilated and outdoors
- Posted with NO SMOKING signs

Employment in the Offense

- Raids
- Ambushes
- Low-intensity conflicts
- MOUT operations

Employment in the Defense

- Reinforce obstacles
- Augment final protective fires
- Cover dead spaces and gaps in the defense
- Illuminate critical areas of the battle

Items necessary to mix fuel

- Water-free, standard-issue gasoline, JP4, JP5, or JP8 fuels.
- Nongalvanized fuel containers
- Wooden paddles
- Air hose and air supply source
- M4 fuel-thickening compound
- FM 3-11 or FM 5-250
- Unthickened fuel (a 60/40 mixture of gasoline and oil)

Basic items required to construct an exploding device

- Container to hold the fuel
- Fuel (thickened or unthickened)
- Buster: explosive charge
- Igniter: trip flare, M34 wP
- Grenade, raw gasoline
- Method of initiation: blasting caps

Basic items required to construct an illuminating FFE

- Container to hold the fuel
- Fuel (thickened or unthickened)
- Igniter: trip flare

Safe Handling and Minimum Safe Distance for Explosives

Safe Handling

Handling, transport, and storage of explosive items must conform to AR 385-63 and local regulations.

Responsibility for preparing, placing, and firing of charges must not be divided. Supervising all phases of the mission must rest with one person.

Personnel handling explosives, blasting caps, and demolitions must—

- Follow safety rules.
- Observe post regulations.
- Adhere to local unit SOPS.

Minimum Safe Distance for Missile Hazard

The MSD table gives distances at which personnel in the open are relatively safe from missiles created by bare charges placed in or on the ground, regardless of type or condition of the soil. See AR 385-63 and FM 5-250 for further details.

| <i>Table 7-1. Minimum Safe Distances (MSDs).</i> | |
|--|-----------------|
| Pounds of Explosives | MSD (in meters) |
| 1-2 | 300 |
| 30 | 311 |
| 35 | 327 |
| 40 | 342 |
| 45 | 356 |
| 50 | 369 |

Fire and Burn Safety

Thickened flame fuel—

Burns much longer than raw gasoline.

Sticks to objects and continues to burn.

Cannot be stamped out with a boot, it will only spread and continue to burn.

Burning Fuel on Personnel

If burning fuel splashes on an individual, he or she must react as follows:

- DO NOT run (running can result in extensive and severe burns).
- React quickly to extinguish the fire.
- Fall to the ground, face down, if burning fuel is on the front.
- Fall to the ground, face up, if burning fuel is on the back.
- Remain motionless.
- Smother the flame by depriving it of oxygen.

Soldiers not affected by the flame must —

- React quickly to help smother the flame.
- Use soil, sand, canvas, or CO₂ fire extinguishers (in training).
- Use BDU garments, poncho liners, or shelter halves (in combat).

Burning Fuel on Equipment

If FFE fires are on equipment, personnel must use either standard Army CO₂ fire extinguishers or expedients (water, sand, soil, other nonflammable dry substances).

Detection of Water in Gasoline

Water in gasoline is one of the chief causes of poor or unsatisfactory flame fuel. When mixing flame fuel, assume that all gasoline contains water unless it has just been removed.

Water in gasoline is most easily detected by sampling the liquid at the bottom of the container with an aspirator.

Removing Water from Gasoline

Siphon

Tilt the drum and allow it to stand for several minutes. Water will accumulate in the lowest portion of the drum. Insert a flexible tube or hose and siphon off the water. See FM 3-11 for additional methods.

Fuel Mixing Procedures

1. Determine quantity of M4 thickener needed.

Rule of thumb: Number of ounces of M4 thickener = gals of gasoline x 3
(constant)

Example M4 = 50 gallons of gasoline x 3

M4 = 150 ounces of my fuel thickening compounds = 3 3/4 cans
(2 1/2 pounds each) of M4 thickener to be added to the gasoline.

2. Add unclotted M4 thickener to gasoline while stirring.
3. Mix until applesauce texture is achieved (5-10 minutes).
4. Allow the fuel to age for 6 to 8 hours (can be emplaced while aging). Although aging is desirable, newly mixed fuel may be fired with acceptable results.

Unthickened Fuel

When M4 (or M1) fuel thickening compound is not available, an acceptable alternative fuel can be prepared using a 60% - 40% combination of MO GAS and oil. (NOTE: Any kind of oil will work, such as standard 30 weight motor oil, fog oil, or crank case draining.) The best oil to use is 90 weight oil. Example: In a

FM 3-7

55-gallon drum, 30 gallons of MOGAS should be mixed with 20 gallons of oil. Join the two substances and shake or stir vigorously for a minute or two. The fuel is now ready for use.

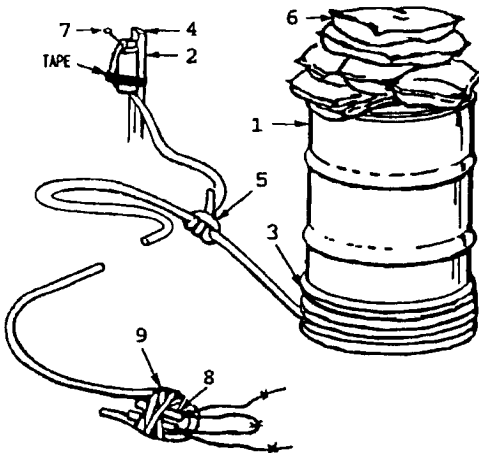
Exploding Flame Devices

See FM 3-11 for step-by-step instructions.

Vertical Flame Mine with Detonating cord

Area coverage is approximately 50 to 80 meters in diameter. Each 55-gallon flame land mine requires the following:

- One 55-gallon container.
- Fifty gallons of gasoline.
- One hundred feet of detonating cord.
- Two electric blasting caps.
- One hundred and fifty ounces of M4 thickening compound.
- One M49 trip flare or (in combat) M34 WP grenade.
- Six or seven sandbags.



SAFETY NOTE: It is vital that electrical cap-up procedures are accomplished correctly and in the proper sequence.

NOTE: During entire cap up process, radio transmitters in the area (within 50 meters of the cap) must be turned off.

Figure 7-1. Sample vertical flame mine with detonating cord.

The illustration below shows a horizontal exploding 55-gallon flame device (detonating cord).

Area coverage is approximately 80 to 10 meters in diameter. Each horizontal 55-gallon flame land mine requires the following:

- One 55-gallon container.
- Fifty gallons of gasoline.
- One hundred feet of detonating cord.
- Two electric blasting caps.
- One hundred and fifty ounces of M4 thickening compound.
- One M49 trip flare or (in combat) M34 WP grenade.
- Two 1.25-pound blocks of composition C4 or two 1-pound blocks of TNT.

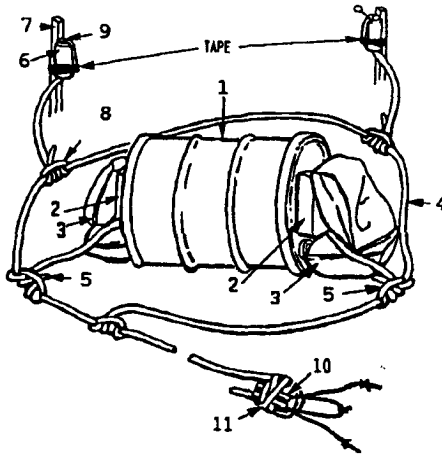


Figure 7-2. Example of a horizontal flame mine.

5-Gallon Flame Device

The illustration below shows a 5-gallon fragmentation exploding flame device (explosive charge or M4 burster). Area coverage is approximately 20 to 25 meters.

Each 5-gallon flame device requires the following:

- One 5-gallon container.
- Five gallons of gasoline.
- Twenty-five feet of detonating cord.
- Two electric blasting caps.
- One M4 field incendiary burster.
- Fifteen ounces of M4 thickening compound.

55-Gallon Flame Fougass Container

Area coverage is approximately 150 to 200 meters in diameter.

Each 55-gallon flame fougasse device requires the following:

- One 55-gallon drum.
- Fifty gallons of gasoline.
- One hundred feet of detonating cord.
- Two electric blasting caps.
- Two 1.25-pound blocks of composition C4 or two 1-pound blocks of TNT.
- One hundred and fifty ounces of M4 thickening compound.
- One M49 trip flare or (in combat) M34 WP grenade.
- Fifty to eighty sandbags.

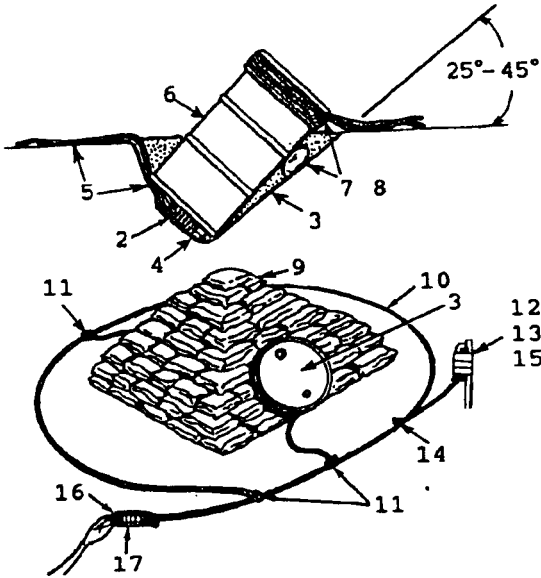


Figure 7-3. Fougasse made with a 55-gallon container.

One ammunition-can flame bunker bomb requires the following eight items:

- One small-arms ammunition container.
- One gallon of gasoline.
- Fifty feet of detonating cord.
- One nonelectric blasting cap.
- One M60 fuse igniter.
- Seven and a half feet of M700 time fuse.
- Three ounces of M4 thickening compound.
- One M49 trip flare or (in combat) M34 WP grenade.

Area coverage is approximately 5 to 10 meters in diameter. The bunker bomb is designed as a portable FFE device to be used during mobile defensive operations or raids into enemy rear areas during deep operations. This device is ideally suited for use in built-up areas during mobile operations in urban terrain.

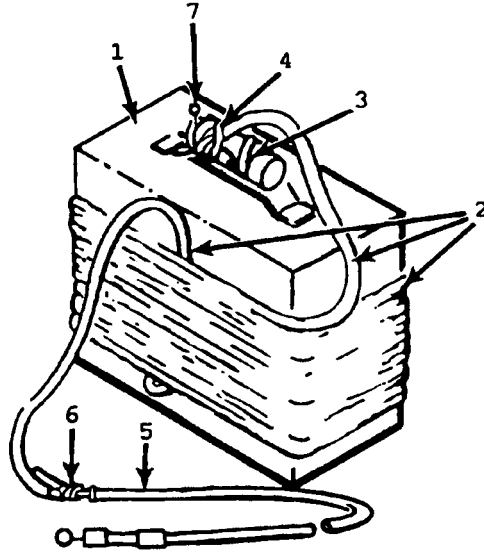


Figure 7-4. Example of bunker bomb made from an ammunition

Propellant Charge Container

Area coverage is approximately 30 to 45 meters in diameter. Each propellant charge fougasse requires the following:

- One metal cylinder or propellant charge container.
- Three gallons of gasoline.
- One hundred feet of detonating cord.
- Two electric blasting caps.
- Nine ounces of M4 thickening compound.
- One M49 trip flare or (in combat) M34 WP grenade.
- One 1.25-pound block of composition C4.
- Twenty to thirty sandbags.

The 155 powder charge Fougasse has a range of approximately 30 to 40 meters.

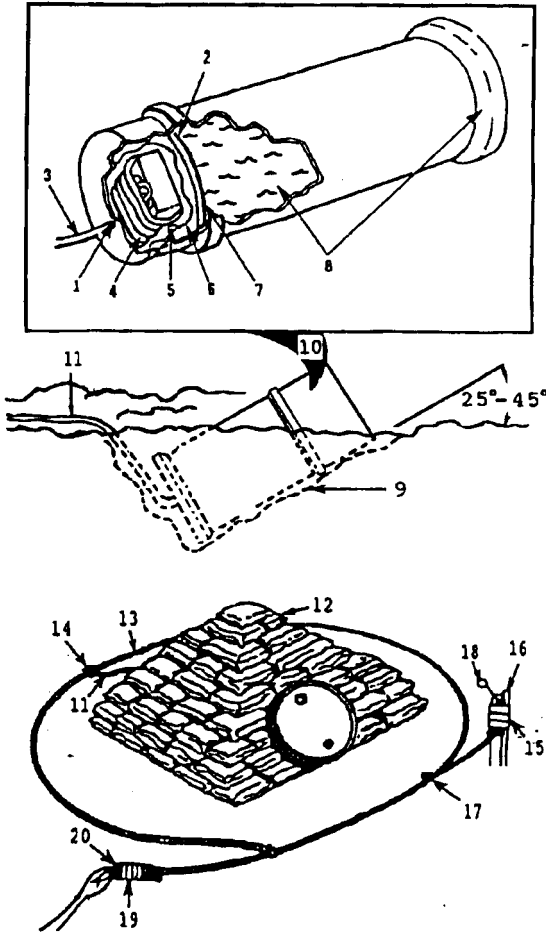


Figure 7-5. Example of a propellant charge fougasse.

Flame Illuminators

The Husch-type flare is a sealed, metal container (powder canister) 3/4 full of thickened fuel with a 1/8 to 3/16th-inch hole in the bottom. The container is placed with cap end down in half of a 55-gallon drum 3/4 full of thickened fuel. A reflector assembly made from 24-inch culvert should extend about 24 inches above the top of the drum half rim (figure below). When the fuel in the drum half is ignited, the heat from the burning fuel produces vapor in the powder canister, this vapor is

expelled as a burning jet through the hole in the canister.

A Husch-type flare will illuminate an area of about 50 meters radius for 4 to 5 hours.

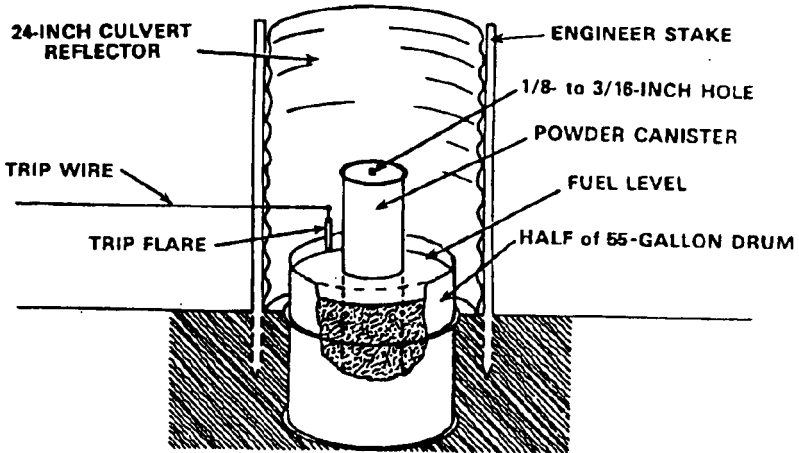


Figure 7-6. Cutaway showing composition of a Husch flare.

Methods of Firing

Exploding flame devices can be wired to fire electrically on an individual basis, in groups, or with simultaneous ignition. Also, they may be rigged with trip wires for immediate or delayed firing.

NOTE: Electric and nonelectric blasting caps can be used with various bursters or igniters.

An exploding or illuminating FFE device can be constructed, emplaced and camouflaged by 3 trained soldiers in less than an hour, provided all necessary equipment is on hand and the selected shot sites designated in advance.

Alternative explosive charges

Although M4 field incendiary bursters are designed specifically for field expedient flame weapons, this does not mean they are the only charge to be used. Alternative explosive charges, such as composition C4, TNT, claymore mines or detonating cord, may be used in lieu of M4 bursters to produce a powerful explosion.