



**AMMUNITION AND EXPLOSIVES TECHNICAL INFORMATION**

**MINE, OFF ROUTE, 84MM C14  
ASSEMBLY  
(BILINGUAL)**

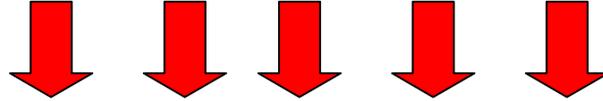
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Issued on Authority of the Chief of the Defence Staff

OPI: DAPM 3-3

2001-05-30

**Canada**



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## MINE, OFF ROUTE, 84 mm C14

### GENERAL

1. The mine, off route, 84 mm, C14 is a Canadian adaptation of the Swedish FFV654 off route mine and is a system which makes use of reduced performance lots of 84 mm FFV65 HEAT cartridges restricted from live shoulder firing in the Carl Gustaf weapon. The mine is remotely operated from a safe distance, making the shoulder-fire restriction irrelevant. The mine is characterised as a one-shot, horizontal effect, stand-off weapon designed to attack moving targets such as vehicles, AFV's and tanks by means of a projected shaped charge warhead. The mine is suitable for both offensive and defensive operations and is designed as a simple, easily emplaced weapon which can complement existing defensive minefields. Other suitable uses for the C14 mine are as a delaying tactic to close narrow defiles, lanes of approach or crossing choke points.

### DESCRIPTION (See Figures 1 and 2)

2. The mine is packed in a wirebound box and consists of a:
  - a. modified AT4 launch tube containing a cartridge 84 mm FFV65 HEAT;
  - b. tripod assembly;
  - c. percussion firing device;
  - d. "None!" shock tube (100 m) with igniter assembly;
  - e. trip wire (100 m); and
  - f. braided cotton pull cord (10 m).

### MODIFIED AT4 LAUNCH TUBE (See Figure 1)

3. The launch tube is a Standard Swedish FFV AT4 barrel assembly constructed of fibreglass reinforced plastic with an aluminum alloy venturi. The standard AT4 trigger mechanism has been replaced by a squib activated assembly (See Figure 4), and minor changes have been incorporated in the launch tube chamber/venturi area to accommodate standard 84 mm FFV65 Heat cartridges. Each end of the launch tube is jilted with a rubber bumper/blow-out seal assembly to provide internal protection against moisture and foreign object contamination.

### NOTE

These seals are left in place for firing.

4. A ball socket adapter is fitted at the launcher point of balance to allow attachment of a tripod assembly. A locking lever allows both units to be attached quickly and without the use of tools. The original AT4 sights have been retained and are of an adjustable pop up rifle type. When not in use, the sights are folded down and protected by sliding plastic covers. The front sight has three aiming posts to aid alignment on either stationary or moving targets. In the off route mine role, the centre aiming post is normally used. The rear sight is graduated from 100 to 500 metres in 50 metres "click" increments and is of the sliding aperture type. Two sizes of aperture are incorporated, with the larger size designed for either low light or battle emergency sighting conditions.

### TRIPOD ASSEMBLY (See Figure 1)

5. The tripod is conventional in design and is used in Sweden with the FFV area defence mines types FFV013 and 016. The tripod is attached to the launch tube by inserting the tripod ball in the adapter and clamping the unit in place with the locking lever.

**NOTE**

Due to the length and inherent instability of the launch tube, the tripod legs should be firmly entrenched or secured in place by sandbags, or equivalent means, when siting and setting up the equipment.

**PERCUSSION IGNITER** (See Figure 3)

6. The percussion igniter is a Standard Swedish army firing device designated as Model M42/P. The device may be activated either by pressure or by tripwire pull on the trigger pin.

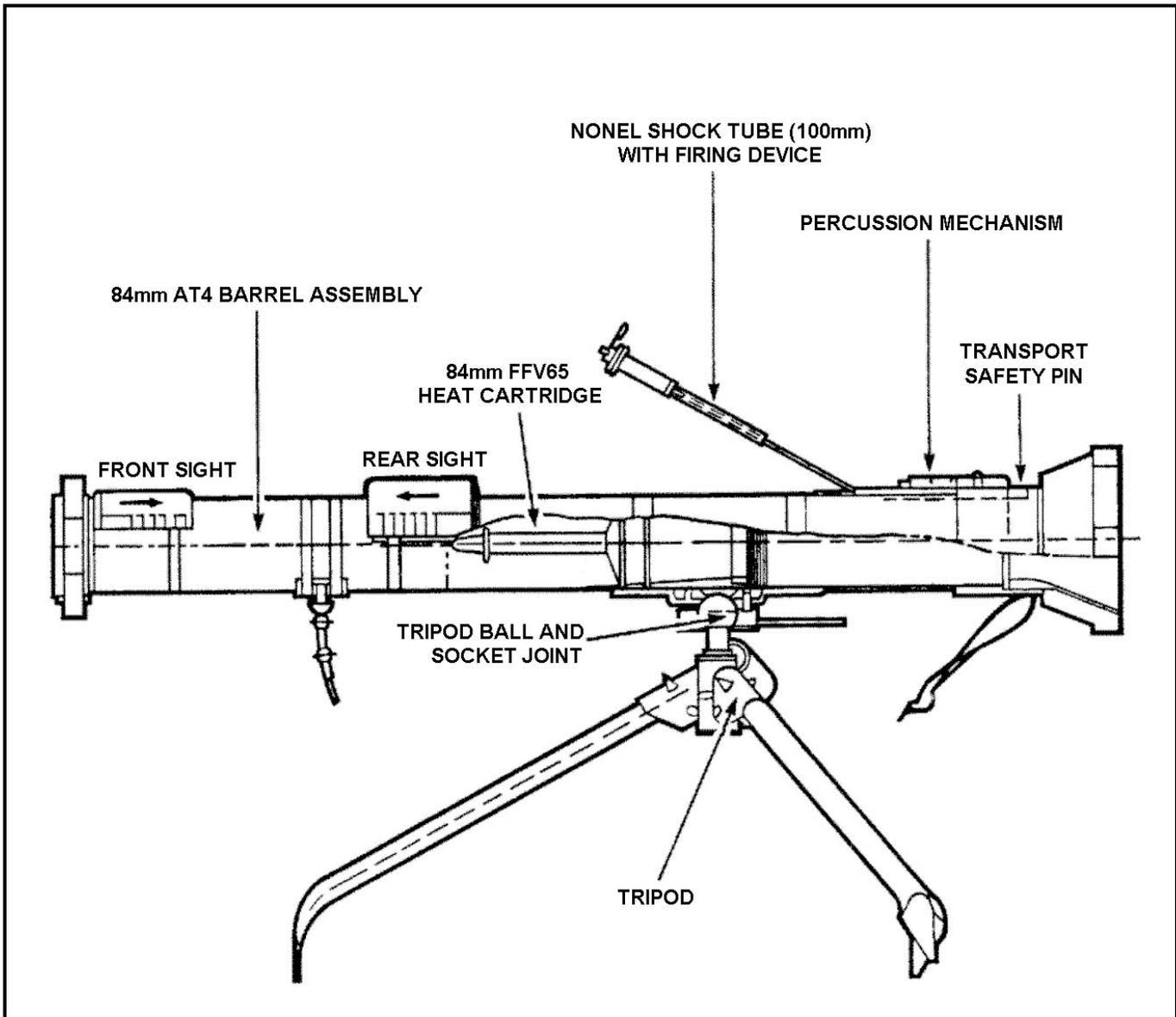


Figure 1 Mine, OFF Route, 84 mm, C14, Assembly

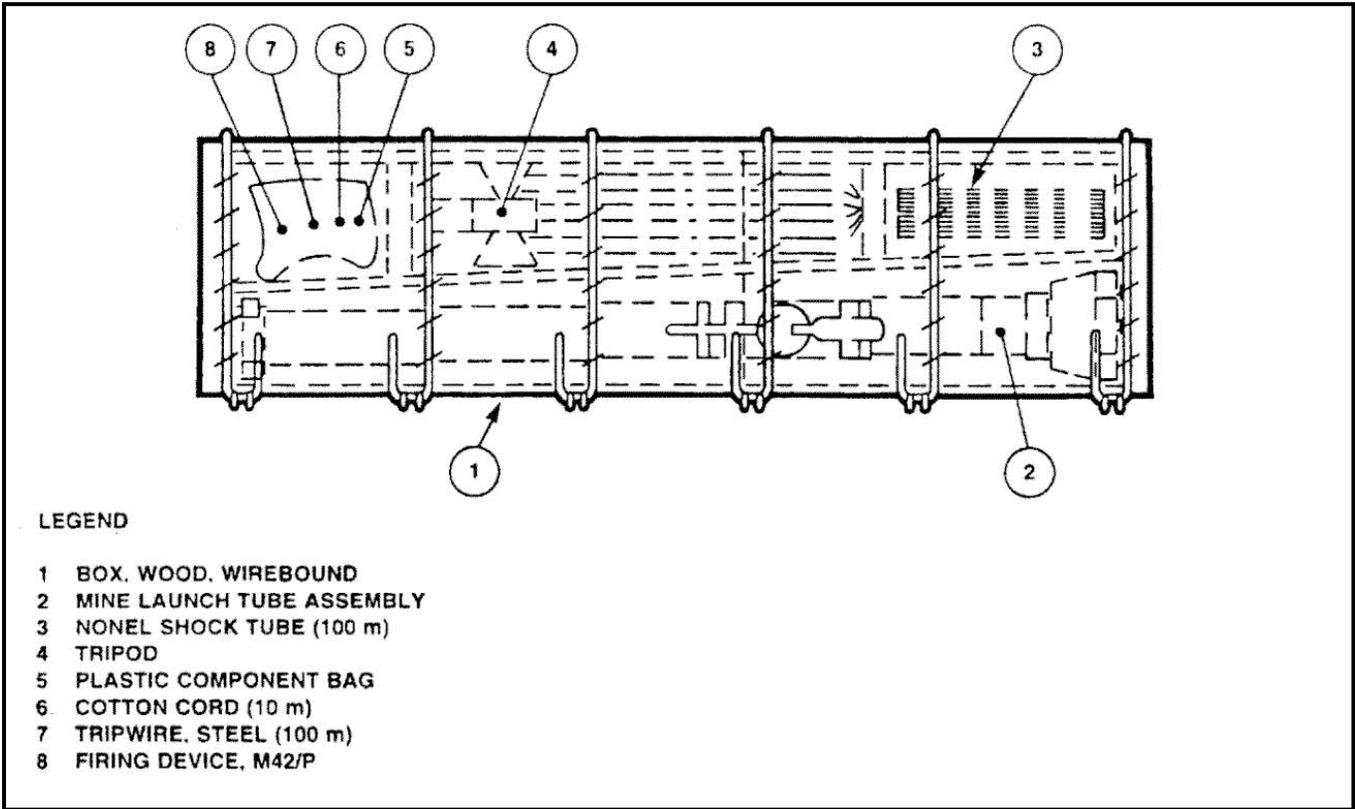


Figure 2 Mine, OFF Route, 84 mm, C14, Packaging Detail

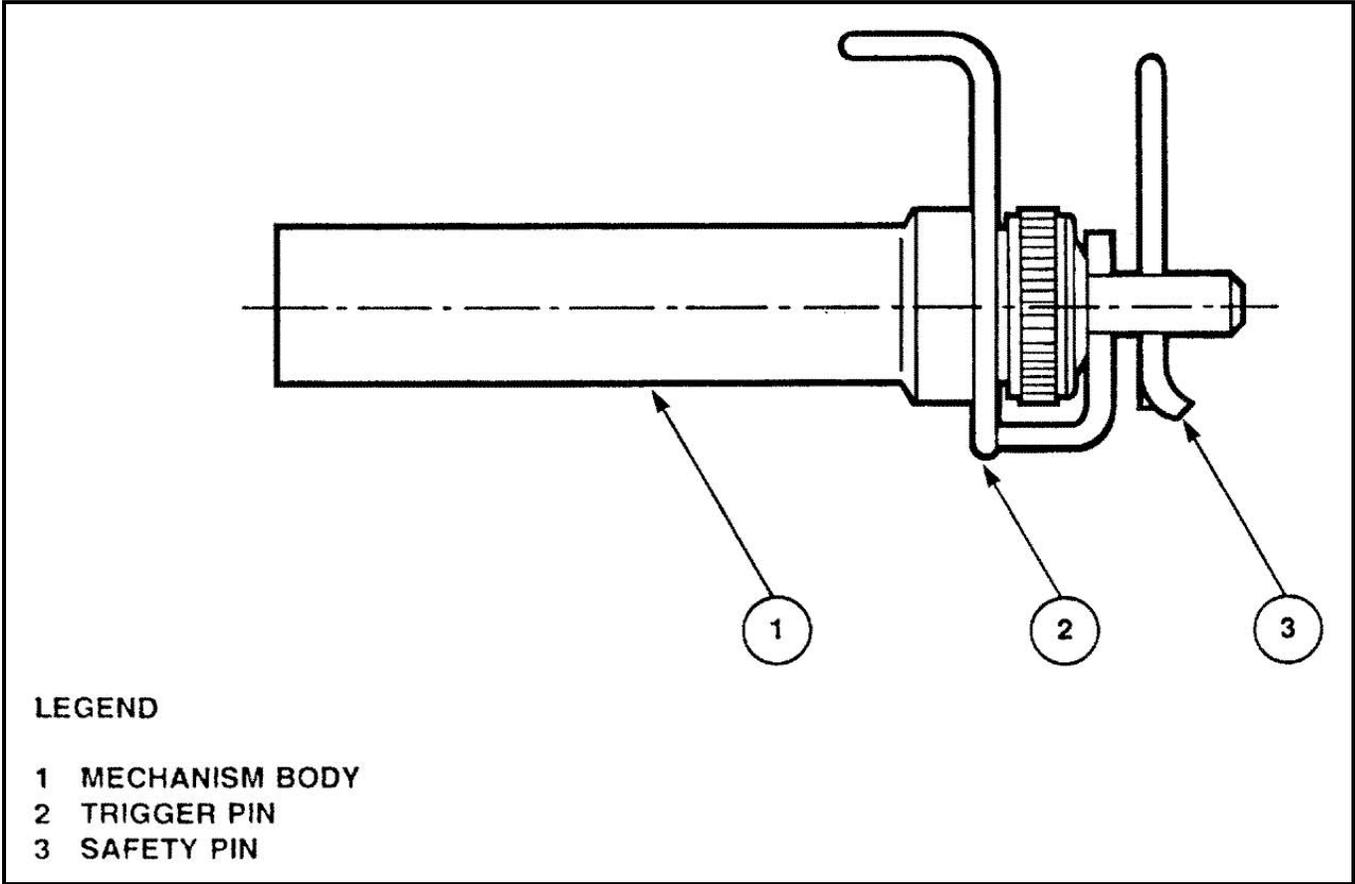


Figure 3 Firing Device M42/P

## **"NONEL" SHOCK TUBE ASSEMBLY**

7. The shock tube assembly consists of a 100-metre length of olive drab coloured polyethylene tubing which is fitted with a percussion cap at one end and a squib/propellant charge unit at the other. The tubing is coated internally with a thin layer of finely powdered HMX explosive composition, which when properly initiated, transmits a low intensity shock wave signal along its length at approximately 1900 to 2000 metres per second. The light explosive loading of 15 to 20 milligrams per metre ensures that the explosive signal does not disrupt the tubing, but is of sufficient intensity to activate the mine percussion firing mechanism when augmented by the squib/propellant charge assembly (See Figure 4).

## **TRIP WIRE**

8. A 100-metre coil of No. 25 SWG steel trip wire is provided to facilitate remote or target self-activation of the mine assembly. Note that the trip wire is of standard variety and is interchangeable with trip wire used with the M49A1 trip flare.

## **CORD COTTON**

9. A 10-metre roll of waterproof braided cotton cord is provided for use with the percussion igniter, or for general applications such as attaching the launch tube to objects other than the tripod (e.g., trees or fences).

## **SAFETY FEATURES - STORAGE AND TRANSPORT**

10. The mine assembly safety features incorporate:

- a. a launcher transport safety pin which locks the firing mechanism firing pin away from the cartridge primer cap;
- b. disassembly and separate stowage of the firing device and shock tube within the package; and
- c. two independent safety devices in the warhead fuze to hold the electric detonator out of line with the main explosive filling and out of contact with the electrical circuit.

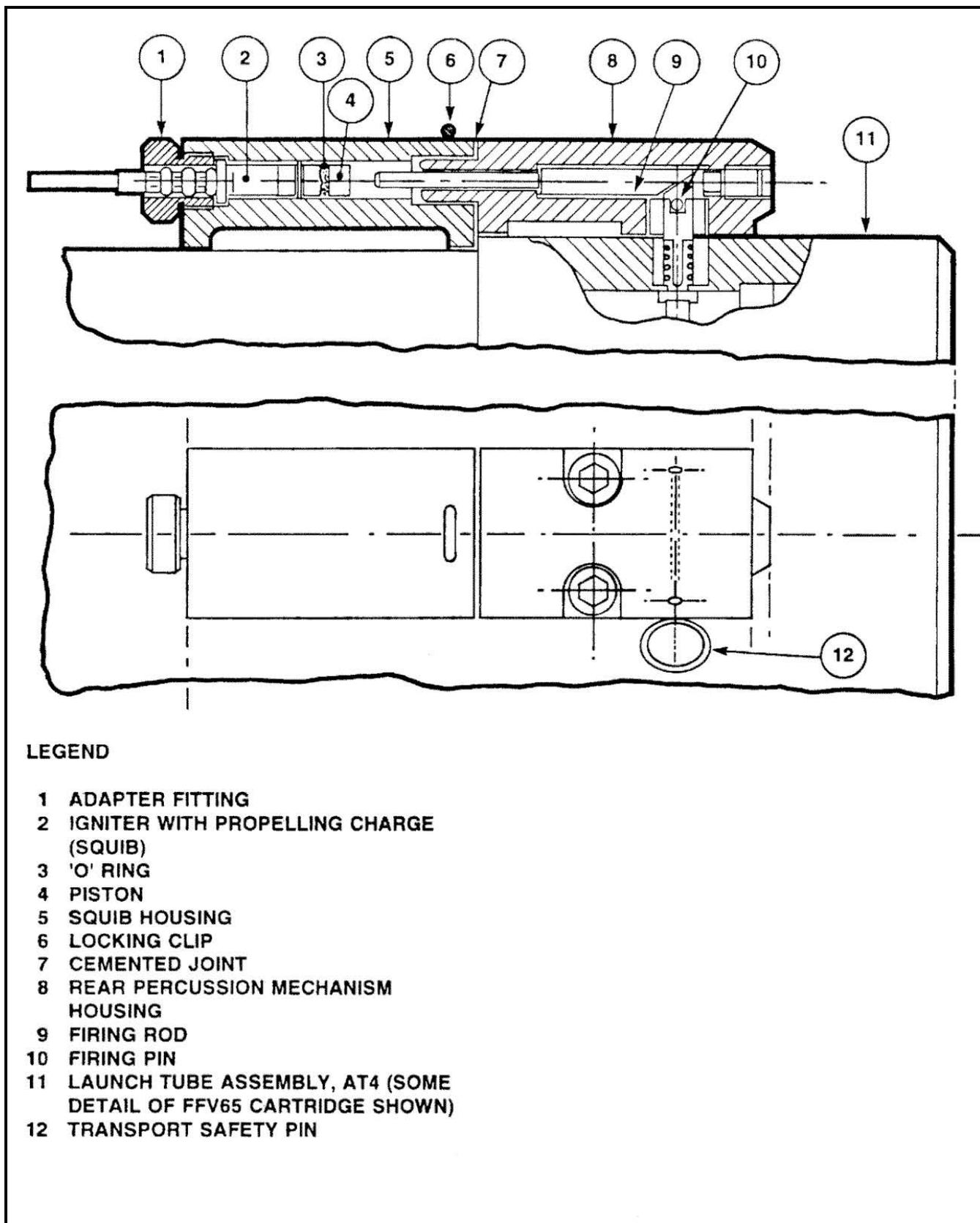


Figure 4 Squib Housing and Firing Mechanism Assembly

## IN-FLIGHT WARHEAD SAFETY

11. On firing, two setback sleeves are released by acceleration forces in excess of 5000 g. The detonator rotor is immobilized by setback force and cannot rotate into the armed position until the warhead has left the launch tube. Full arming is completed at between 7 and 15 metres from the launch tube muzzle. Small electrical charges generated by the piezoelectric assembly on firing setback and when firing through light undergrowth are dissipated by two parallel circuit bleeder resistors. A solid strike on a hard target surface is required to generate voltages in excess of the resistor threshold limits and initiate the electric fuze detonator.

## FUNCTIONING

12. With the mine assembled in a ready to fire configuration, the following actions occur:
- a. The percussion firing device fires the percussion cap when the trip wire is pulled.
  - b. Flash from the percussion cap is picked up and transmitted as a rapid explosive signal along the "None!" shock tube to initiate the squib/propellant charge within the launcher firing mechanism.
  - c. Gas pressure from the squib/propellant charge acts on the free-floating piston (See Figure 4) to drive the firing rod forward against the bevelled head of the firing pin. This action, in turn, forces the firing pin down to strike the percussion primer located in the side wall of the FFV65 cartridge case.
  - d. The percussion primer ignites, in turn, the cartridge igniter and main propellant charges. Resultant rapid gas pressure build-up ruptures the plastic blow-out disc in the rear of the cartridge and simultaneously drives the projectile from the launch tube. Ejection of gas through the rear launch tube venturi acts to balance the recoil forces generated by the moving projectile and thus neutralise rearward motion of the launcher. There is a backblast danger area of 60 m to the rear of the launch tube as a result of this action.
  - e. Additional detail on 84 mm FFV65 Ammunition may be found in CFTO C-74-315-EAO/TA-000, Parts 2 and 3.

## ACTION ON IMPACT

13. Action on the 84 mm FFV65 HEAT warhead is described in CFTO C-74-315-EAO/TA-000, Part 3, 84mm Ammunition. Action of the FFV65 safe and arm (fuzing) system is described in CFTO C-74-390-AEO/TA-000, Part 4, Fuzes Base Detonating.

## CHARACTERISTICS

14. The following characteristics are applicable:
- a. Length of launch tube ..... 1000mm.
  - b. Calibre of launch tube..... 84mm.
  - c. Weight of launch tube ..... 6.0kg.
  - d. Total system weight ..... 10.2kg.
  - e. Muzzle velocity at 21°C..... 290-305m/s.
  - f. Arming distance from muzzle ..... 7-15m.
  - g. Effective Range..... 20-150m (See Note).
  - h. Maximum Range ..... 450-500m.
  - i. Warhead Type ..... 84 mm FFV65 HEAT.

- j. Penetration (maximum)..... 390-400mm RHA.
- k. Warhead explosive..... 500g cast  
Weight/Type..... octol 70/30.
- l. Propellant Weight/Type..... 370g AKB 204 double-base composition.
- m. Fuzing System..... FFV65 Nose and shoulder initiated piezoelectric  
base fuze with instantaneous action.

#### **NOTE**

The projectile may tumble or experience other stability or accuracy loss after 150m due to smooth-bore launch environment factors.

#### **PACKAGING AND MARKING**

15. The mine assembly is packed in a wirebound wooden box (See Figure 2). Details required for transport and storage will be found in CFTO C-74-300-D01/TA-000, Logistical Data for Ammunition. Outer packaging is marked in accordance with Standard D-09-002-005/SG-000, Minimum Requirements for Packaging and Marking Ammunition.

#### **INSPECTION AND PROOF**

16. Inspections will be in accordance with CFTO C-74-300-B02/NJ-000, Inspection of Ammunition. Performance of the mine will be monitored through user reports and CF 410's. Proof will not be carried out except on authority of NDHQ/DAPM.

#### **DISPOSAL**

17. After firing, units will return all launchers and accessories, including the fired shock tube assembly, to the issuing facility. Returned items will be retained either as aids to production (launcher tubes, tripods only) or training aids (all components) depending on condition.

#### **NOTE**

Launch tubes containing misfired FFV65 cartridges will not be disassembled but will be destroyed by detonation in accordance with CFTO C-09-008-002/FP-000, Destruction of Dud and Misfired Ammunition.

#### **ADDITIONAL INFORMATION - HEAT TESTING**

18. Due to the unavailability of special tooling necessary to safely remove live FFV65 cartridges from the launchers, heat tests of the AKB204 propellant contained therein will not be carried out until further advised by NDHQ/DAPM.

#### **ASSEMBLY AND FIRING INSTRUCTIONS**

19. The following steps are applicable when preparing the mine for use:
- a. Unpack mine and check that all accessories and components are complete and serviceable.
  - b. Check that launcher end covers are not damaged. If damaged check for objects or obstructions in the launch tube. If the bore is clear, the launcher may be used, but will no longer be fully waterproof.
  - c. Locate tripod in a suitable position and sandbag the legs or otherwise secure in place.
  - d. Attach launcher to tripod assembly, or alternatively secure to a suitable solid object such as a tree.

- e. Open front and rear sight covers to expose the pop-up sights and aim at proposed targets or lanes of approach.
- f. Tighten handle on ball-socket tripod assembly as applicable to lock the launch tube in place.

• • • • •  
• **CAUTION** •  
• • • • •

When setting up, observe a back blast danger zone of 60 m to the rear and ensure that all flammable material, equipment, friendly troops, etc. are clear of this area.

- g. Attach the squib end of the "Nonel" shock tube assembly to the launch tube percussion mechanism (See Figure 5).

**NOTE**

The shock tube may be taped to a tripod leg to avoid any direct pull on the squib adapter.

- h. Remove the transport safety pin, but leave attached to the elastic cord provided.
- j. Unwind the shock tube, avoiding all kinks and sharp bends. Lead back to the firing point location and attach the percussion firing device. Mine is now ready for command firing by the operator (See Figure 6).
- k. If mine is to be activated by trip wire, the firing device must be securely taped to a solid object such as a tree or picket. Ensure that the firing device angle to the direction of trip wire pull is approximately 90 degrees for most reliable functioning.
- m. Attach trip wire to the firing device trigger pin and check for proper tension before attaching the shock tube assembly.
- n. Remove upper safety pin from the firing device and retain for future replacement, if necessary.
- p. The system is now armed and ready for use.

**DE-ARMING PROCEDURE**

20. The following steps are applicable:

- a. Replace firing device upper safety pin and remove trip wire, if applicable.
- b. Unscrew percussion cap adapter from the firing device.
- c. Reinsert launch tube transport safety pin.
- d. Unscrew shock tube adapter and withdraw squib assembly from the launch tube firing mechanism.
- e. Remove launch tube from tripod, as applicable,
- f. Check all components for serviceability before repacking in original packaging.

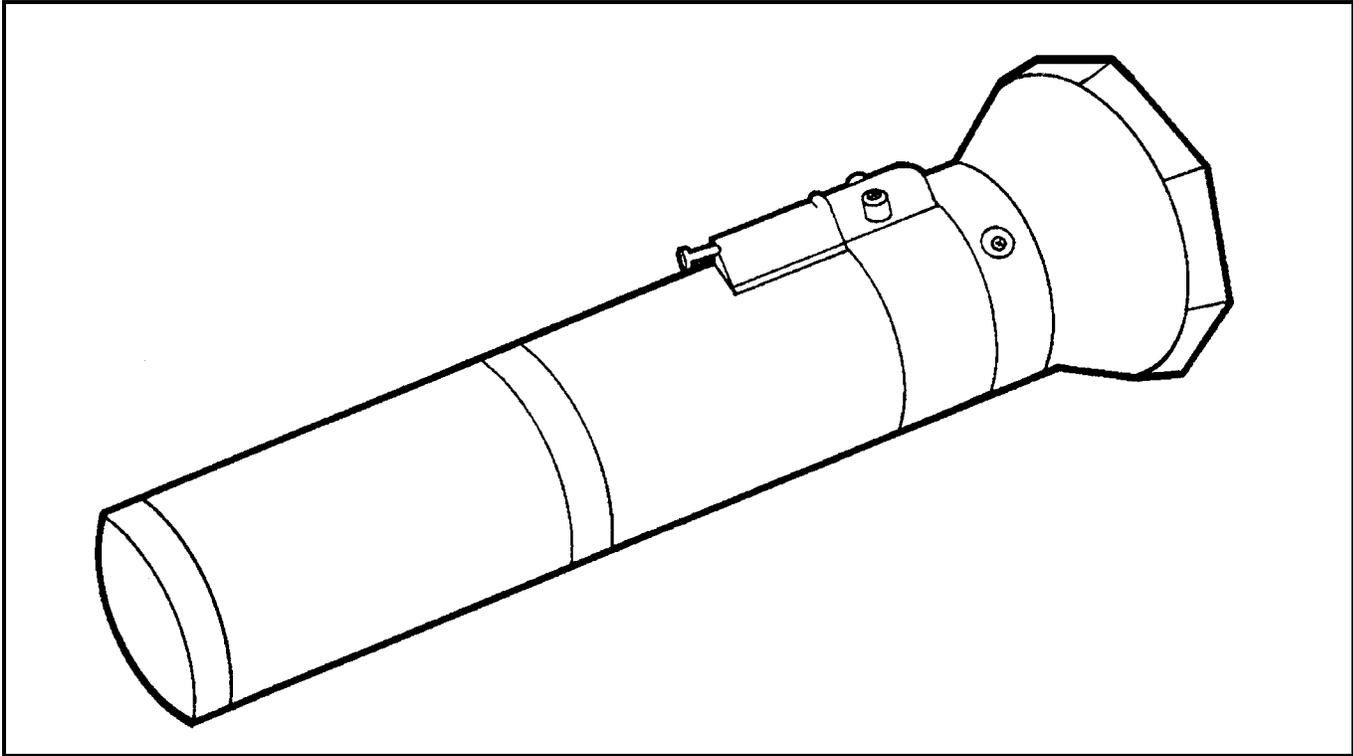


Figure 5 Nonel Shock Tube and Squib Assembly

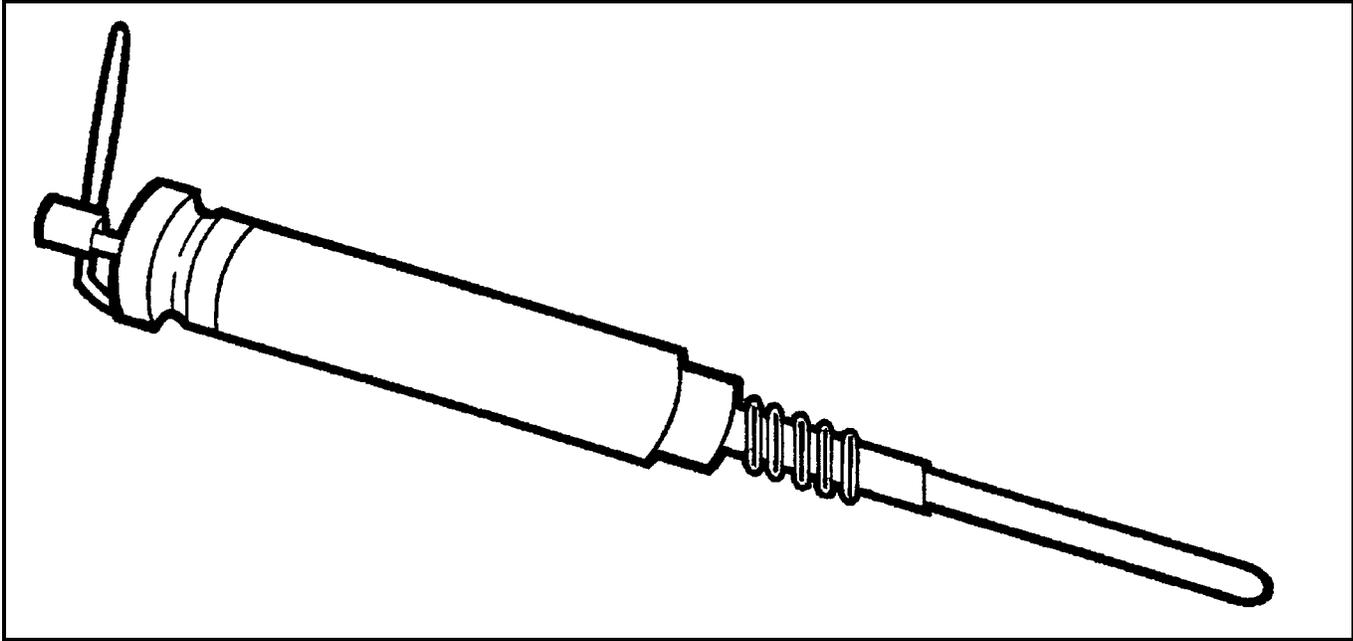


Figure 6 Firing Device and Percussion Cap Assembly

## **SAFETY PRECAUTIONS**

21. The following interim safety precautions should be used in conjunction with normal procedures as listed in operational training B-GL-304-003/TS-0A1, Volume 3, Part 1, Training Safety and applicable range standing orders:

- a. Observe a minimum 60 m danger area to the rear of the mine, extending out at an angle of 45 degrees to the sides from the launch tube venturi. Ensure that all material, equipment and friendly troops are kept clear of this area.
- b. Maximum distance to the intended target should not exceed 150m as the projectile tends to lose stability and accuracy beyond this distance.
- c. Ensure that target area is provided with a solid backstop to activate warheads in the event of a target miss.
- d. The warhead becomes armed at a distance of between 7 and 15 metres from the launch tube, however, to ensure maximum warhead function, the minimum target distance should be approximately 20 m.
- e. The warhead has a shaped charge effect and moderate fragment hazard. All personnel should observe remote firing procedures and be under suitable cover when operating system. The "Nonel" shock tube firing assembly should be extended to the full 100-metre length whenever possible, and firing points should not be located forward of the launch tube.
- f. Do not cut or otherwise modify the shock tube assembly as increased failures will result.
- g. Ensure that the launch tube is securely anchored to prevent inadvertent movement off original target setting.

## **MISFIRES**

22. Misfires may be caused by any one of, or a combination of, the following:

- a. A faulty firing device mechanism or percussion cap.
- b. A faulty squib assembly.
- c. Dampness, breaks, knots or kinks in "Nonel" shock tube.
- d. A faulty firing mechanism on launch tube.
- e. A failure to remove launch tube transport safety pin (jammed mechanism).
- f. A faulty FFV 65 cartridge primer.

## **MISFIRE PROCEDURES**

23. The following procedures are applicable before investigating any of the foregoing misfires:

- a. Observe a minimum waiting period of 2 minutes before approaching the mine assembly.
- b. Unscrew percussion cap from firing device and check that cap has been fairly struck. Recock firing device, reattach to percussion cap and refire. Replace mechanism if system fails to fire a second time.
- c. For faults at 22(a) through (c), replace assembly as applicable.
- d. For faults at 22(d) through (f), remove launch tube and dispose of by detonation. Do not attempt to disassemble firing mechanism or remove cartridge from launch tube.

## ALTERNATE INITIATION OR DUAL INITIATION PROCEDURES

24. The mine may also be prepared for initiation using standard demolition accessories as follows:
- Attach an initiating set consisting of approximately 0.5 m of detonating cord to the "Nonel" shock tube assembly using a clip cord detonating (See Figure 7).
  - Initiate the detonating cord by means of normal electric/non-electric blasting cap as desired.
  - The initiating set may be attached at any convenient point along the length of "Nonel" tubing but should be kept clear of the launch tube assembly in a visibly marked area for subsequent recovery or disposal as necessary (Refer to Note).

### NOTE

"Nonel" shock tube has no external explosive effect and will not initiate standard detonating cord. When the mine is initiated using the firing device assembly, the initiating set should also be functioned independently, as a precaution, prior to approaching the Firing Site.

## WARHEAD DUDS

25. Mine warheads which fail to function on target impact or which impact on soft ground will be disposed of by detonation in accordance with applicable range SOP's and CFTO C-09-008-002/FP-000, Destruction of Dud and Misfired Ammunition. Warheads will be disposed of in situ in accordance with precautions for piezoelectric fuzed ammunition.

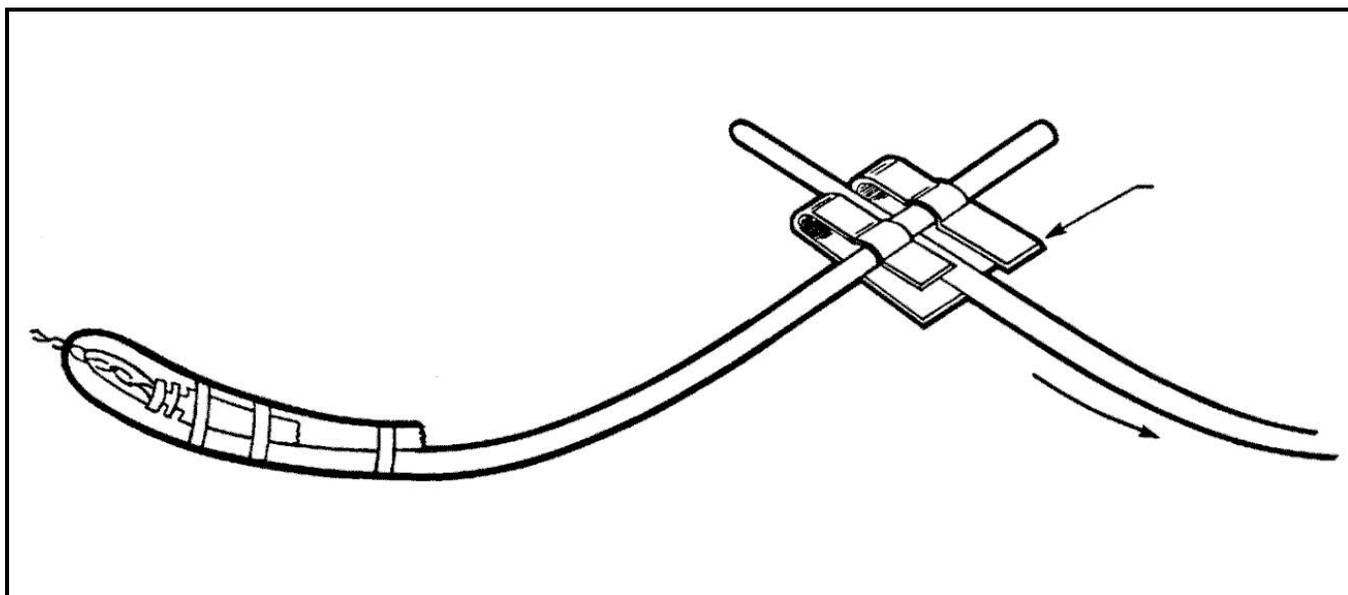


Figure 7 Alternate Initiation Method, Detonating Cord Assembly

