

TECHNICAL MANUAL

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

DEMOLITION MATERIALS

DEMOLITION KIT, CRATERING: M180

NSN 1375-00-148-7159

AND

DEMOLITION KIT, CRATERING,

TRAINING: M270 (INERT)

NSN 6920-01-087-0038

HEADQUARTERS, DEPARTMENT OF THE ARMY
SEPTEMBER 1980

This copy is a reprint which includes current
pages from Changes 1 through 5.

WARNINGS

CONNECTING OF BLASTING MACHINE TO FIELD FIRING LEAD IS THE LAST OPERATION PRIOR TO FIRING. TO AVOID PREMATURE CONNECTION AND FIRING, OPERATOR IN CHARGE WILL HAVE THE BLASTING MACHINE WITH HIM AT ALL TIMES.

THE YELLOW-TAGGED SAFETY PLUG IS A SHORTING DEVICE FOR THE ELECTRICALLY ACTIVATED EXPLOSIVE COMPONENTS OF THE ROCKET MOTOR AND MUST BE IN PLACE WHEN WORKING IN THE AREA OF AN ASSEMBLED KIT OR WHEN A ROCKET MOTOR IS HANDLED. THE SAFETY PLUG MUST BE REMOVED PRIOR TO FIRING.

AS WITH ALL AMMUNITION CONTAINING ELECTRO-EXPLOSIVE INITIATORS (EEI), AVOID TRANSPORTING OR OPERATING THE M180 DEMOLITION KIT IN THE VICINITY OF OPERATING TELEVISION, RADIO, RADAR, ETC. TRANSMITTERS. THE RADIO FREQUENCY (RF) ENERGY EMITTED BY THESE TRANSMITTERS CAN FIRE THE EEI UNDER SOME CIRCUMSTANCES EVEN WITH THE SHORTING DEVICES IN PLACE. FOR EXAMPLE, DO NOT OPERATE OR TRANSPORT THE KIT WITHIN 100 FEET (30 METERS) OF AN OPERATING WALKIE-TALKIE. FIGURES FOR SAFE DISTANCES FROM VARIOUS POWERED TRANSMITTERS ARE GIVEN IN TM 9-1300-206, APPENDIX C.

CHANGE)
)
 No. 6)

HEADQUARTERS
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**OPERATOR'S AND UNIT MAINTENANCE MANUAL
 (Including Repair Parts and Special Tools List)
 FOR
 DEMOLITION MATERIALS
 DEMOLITION KIT, CRATERING: M180
 NSN 1375-00-148-7159
 AND
 DEMOLITION KIT, CRATERING, TRAINING: M270 (INERT)
 NSN 6920-01-087-0038**

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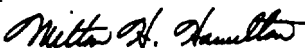
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OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL
(Including Repair Parts and Special Tools List)
FOR
DEMOLITION MATERIALS
DEMOLITION KIT, CRATERING: M180
NSN 1375-00-148-7159
DEMOLITION KIT, CRATERING, TRAINING: M270 (Inert)
NSN 6920-01-087-0038

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(Including Repair Parts and Special Tools List)
FOR
DEMOLITION MATERIALS
DEMOLITION KIT, CRATERING: M180
NSN 1375-00-148-7159
DEMOLITION KIT, (CRATERINC, TRAINING: M1270 (Inert)
NSN 6920-01-087-0038

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(Including Repair Parts and Special Tools List)
FOR
DEMOLITION MATERIALS
DEMOLITION KIT, CRATERING: M180
NSN 1375-00-148-7195
DEMOLITION KIT, CRATERING, TRAINING: M270 (Inert)

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(Including Repair Parts and Special Tools List)
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DEMOLITION KIT, CRATERING: M180
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DEMOLITION KIT, CRATERING, TRAINING: M270 (INERT)

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OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL
(Including Repair Parts and Special Tools List)
FOR
DEMOLITION MATERIALS
DEMOLITION KIT, CRATERING: M180
NSN 1375-00-148-7159
DEMOLITION KIT, CRATE RING, TRAINING: M270 (INERT)

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TECHNICAL MANUAL)
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HEADQUARTERS
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OPERATOR'S AND UNIT MAINTENANCE MANUAL
 (Including Repair Parts and Special Tools List)
 FOR
 DEMOLITION MATERIALS
 DEMOLITION KIT, CRATERING M 180
 NSN 1375-00-148-7159
 AND
 DEMOLITION KIT, CRATERING, TRAINING: M270 (INERT)

REPORTING OF ERRORS

You can help improve this manual. If you find any mistakes or know of a way to improved the procedures, please let us know. Mail your DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct , to Commander, US Army Armament Research, Development and Engineering Center, ATTN: SMCAR-LSB, Picatinny Arsenal. NJ 07806-5000. A reply will be furnished to you.

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* This manual is a supplement to TM 9-1375-213-12, 30 March 1973.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL.

1-1. Scope

a. This manual provides the user with operating instructions, operator and organizational maintenance procedures and description for the tactical Demolition Kit Cratering: M180 (fig. 1-1 and 1-2) and the inert Demolition Kit, Cratering Training: M270 together with information on their functioning, storage and use. Procedures for the M180 Demolition Kit are detailed in this manual. Procedures for the M270 demolition kits are not separately detailed since the basic operating and maintenance procedures are identical.

NOTE

Where differences exist between the tactical and training kits, they will be noted in this manual.

b. This kit is designed to produce a large crater in compacted soil or road surfaces, but not in reinforced concrete, arctic tundra, bedrock or sandy soil. The only exceptions are the tundra of the arctic and bed rock or sandy soil in other regions. The kit produces its crater in two stages. The shaped charge blows a pilot hole in the surface and the rocket propelled warhead enters the hole and detonates, enlarging the pilot hole. A number of kits may be fired together to produce an exceptionally large crater.

c. Kit(s) may be used in barrier, denial, flank security ambush, and retrograde, cratering operations. Because of the speed and ease of emplacement, the kit(s) may be used both in forward and rear areas for producing road and defile craters, destroying bridge abutments, destroying railroad beds, and pocking airfields in denial operations.

d. Refer to FM 5-25 for general demolition techniques and doctrine on demolition projects.

1-2. Forms, Records and Reports

a. *Forms.* Maintenance forms, records, and reports which are to be used by maintenance

personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. *Field Report of Accidents.* Accidents involving injury to personnel or damage to materiel will be reported on DA Form 286 (Accident Report) or DA Form 1051 (Record of Injury), in accordance with instructions in AR 385-40.

c. *Malfunction Reports.*

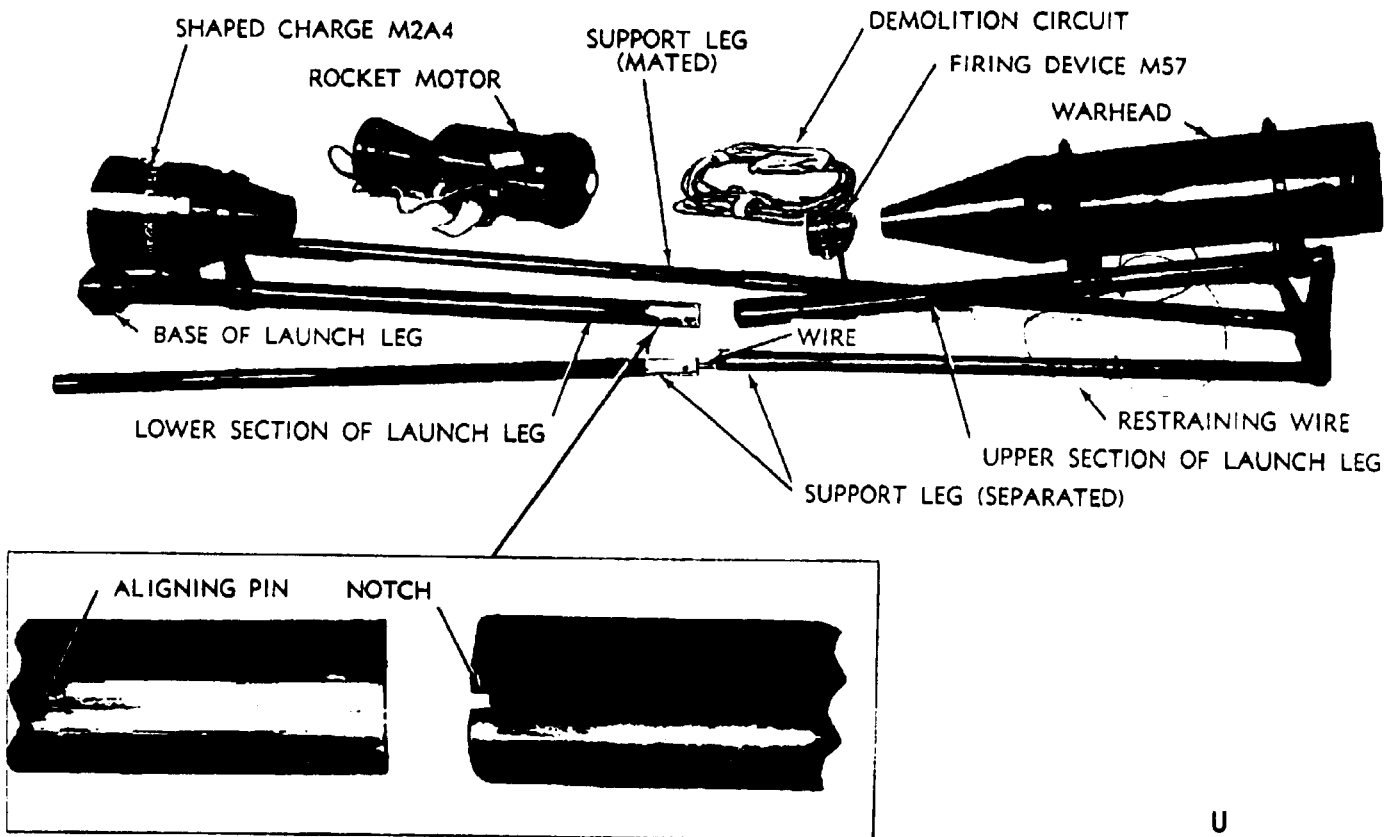
(1) *Definition of a malfunction.* A malfunction is a failure of the kit to perform as expected when fired. For reporting purposes, malfunctions do not include accidents and fires resulting from negligence, malpractice and the like. However, malfunctions do include abnormal or premature functioning if they occur in the course of normal handling, maintenance, storage, transportation and tactical deployment.

(2) *Malfunctions involving ammunition.* Malfunction reports involving the kit must be forwarded to the Commander, US Army Armament Materiel Readiness Command, ATTN: AMSMC-QA, Rock Island, IL 61299. A preliminary report will be made by the most expeditious means (e.g. by telephone Autovon 793-4851/Commercial 309-782-4851). The report will conform to the requirements of AR 75-1.

(3) *Report of defective or unsatisfactory non-explosive equipment.* Report and turn-in for replacement or repair, non-explosive equipment (e.g., blasting machines, tools, etc.) which is found defective or develops problems in use. Report such equipment by completing DA Form 2407 as prescribed in TM 38-750. forward completed DA Form 2407 to managing activity having managing supply responsibility for the equipment. Managing activity is specified in SC 1375-94-CL-P02.

d. *Report of Damage or Improper Shipment.* Damage or improper shipments will be reported immediately on DD Form 6 in accordance with items attributable to shippers report (AR 735-11-2), of transportation discrepancies in shipments (AR 55-38).

e. *Equipment/Improvement Recommendations (EIR).* If your demolition kit need improvement, let us know. Send us an EIR. You, the user, are



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Figure 1-1. Demolition Kit, cratering, M180 components.

the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on an SF 368 (Quality Deficiency Report). Mail it to us

at Commander, USA Armament, Munitions and Chemical Command, ATTN: AMSMC-DSM-A, Picatinny Arsenal, NJ 07806-5000. We'll send you a reply.

Section II. DESCRIPTION, FUNCTIONING AND DATA

1-3. Description

a. Tactical Demolition Kit. The Demolition Kit, M180 (Fig. 1-3) consists of a Shaped Charge M2A4, an Electrical Firing Device M57 (which has been fitted with a protective metal cover) a warhead, a rocket motor, a tripod assembly, and a demolition circuit. The shaped charge, firing device and warhead are permanently attached to the launch leg of the tripod; the rocket motor and the demolition circuit (packaged in a wooden subpack) are shipped unattached and are connected to other components at time of use.

b. Training Demolition Kit. Demolition cratering training kit M270 consists of an inert shaped charge (M2A3), warhead, rocket motor and firing device M57 (which has been fitted with a protective aluminum cover). The new version of the M270 differs from the old in that the inert shaped charge, rocket and warhead are made of plastic instead of metal. Instead of being available under an NSN as was the old item, the new item is available (as a hand receipt training item) through TRADOC PAM 71-9 under the designation of TRADOC Training Device DVC-T 5-42. Otherwise, it is assembled just like the old version and the live M 180 item.

c. Color and Marking. The M270 demolition kit is identical in appearance to M 180 demolition kit except for color and markings. The major components of the tactical kits are olive drab with yellow markings. The major components of the training kits are blue with white marking.

NOTE

Setup procedures are identical for the M270 and M 180 Demolition Kits. The training M270 Demolition Kit is totally inert, however, for training purposes, WARNING precautions required for the tactical M180 Demolition Kit must be observed.

d. Charge, Demolition: Shaped, 15-Pound (6.75 Kilograms), M2A4. The shaped charge (fig. 1-3) for the M180 Demolition Kit contains approximately 11 pounds (4.95 kilograms) of Comp B, with a booster of approximately 1.8 ounces (50 grams) of Comp A-3, in a moisture-resistant resistant molded fiber container. A cone of glass is used as a cavity liner, and a threaded cap well is located at the top of the charge.

NOTE

The cylindrical fiber base (standoff sleeve), normally used with the shaped charge to provide standoff distance, is not included with Demolition Kit M180 since the charge is attached to the launch leg at the desired standoff distance.

e. Firing Device Electrical, M57. The firing device (fig. 1-3) is a pulse generator which, by a single actuation of the handle, produces an electrical pulse. At one end of the device is an electrical connector with attached dust cover.

NOTE

For use with Demolition Kits M180 and M270, the firing device has been modified to prevent accidental actuation. The modification consists of an aluminum cover fitted over the handle to deny access. Do not remove this cover.

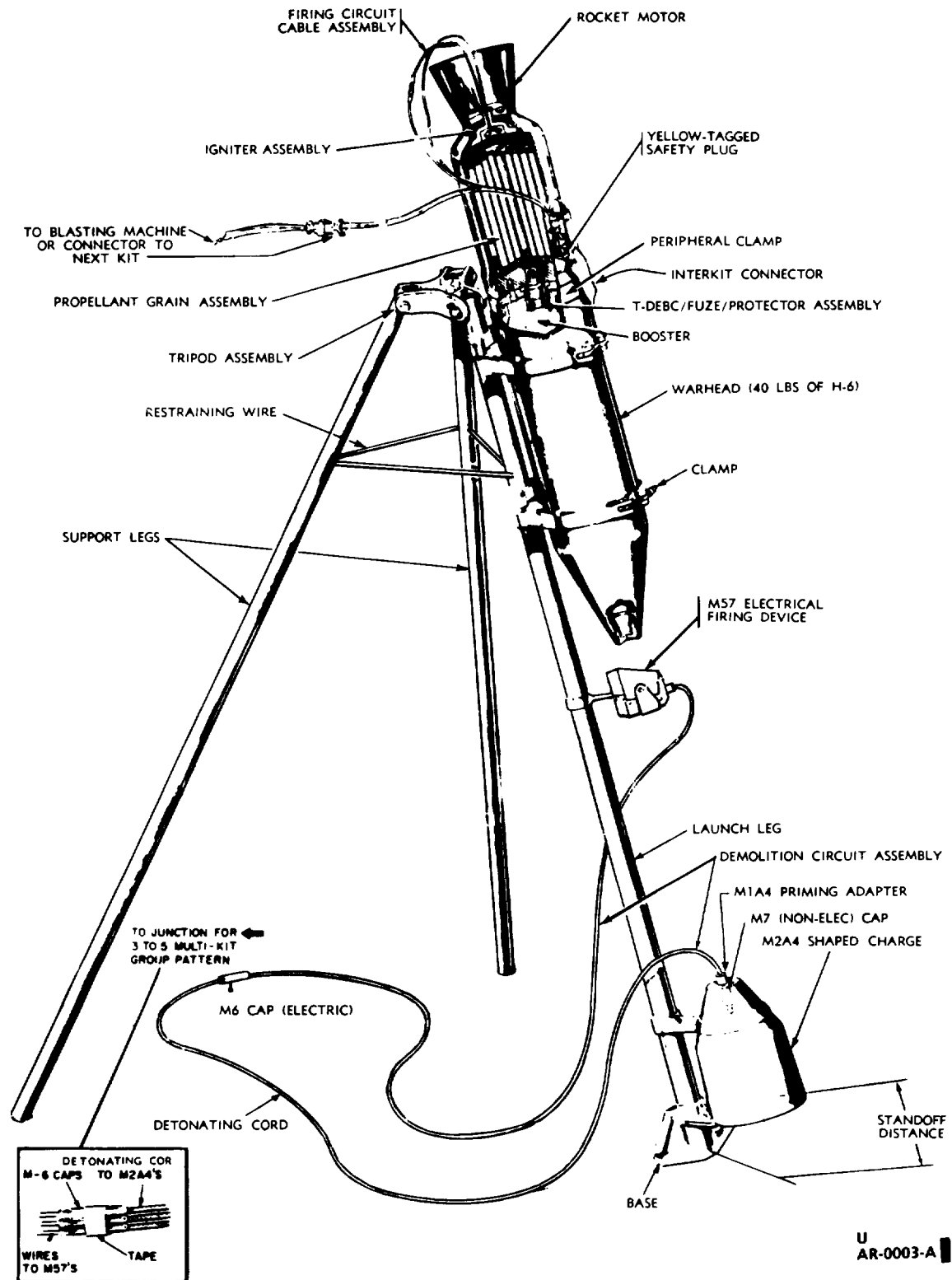
f. Warhead. The warhead (fig. 1-4) for the M180 Demolition Kit has a fiberglass body with a steel nose and an aluminum rear flange. Its main charge is approximately 40 pounds (18 kilograms) of H6 high explosive. A peripheral clamp at the rear flange of the warhead holds a protective disk in place for shipment. The clamp is also used to secure

the rocket motor to the warhead during operation. A loop of nylon cord goes through a hole in the clamp handle. This permits the clamp to be opened easily. Initial construction of warheads for the M270 and M 180 Demolition Kits are identical. However, the warheads for the M270 Demolition are inert loaded. Future warheads for the training kit will be constructed of plastic.

g. Rocket Motor.

(1) The rocket motor (fig. 1-5) for M180 Demolition Kit is a metal cased, solid fuel

unit containing a main propelling charge of approximately five pounds (2.25 kilograms) of propellant grain M7 modified. A one-ounce (28 grams) RDX booster for initiation of the warhead is separately contained in the forward end of the rocket motor (fig 1-6). Three initiating elements are contained within the rocket motor; two M2 squibs (used to initiate the propellant igniter) and 500-millisecond-delay electric blasting cap (used to initiate the booster, via a one-grain tetryl lead). The rocket motors on initially produced M270 and M180 demolition kit. Future rocket motors for the training kit will be constructed of plastic.



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Figure 1-3. Demolition kit assembly, M180.

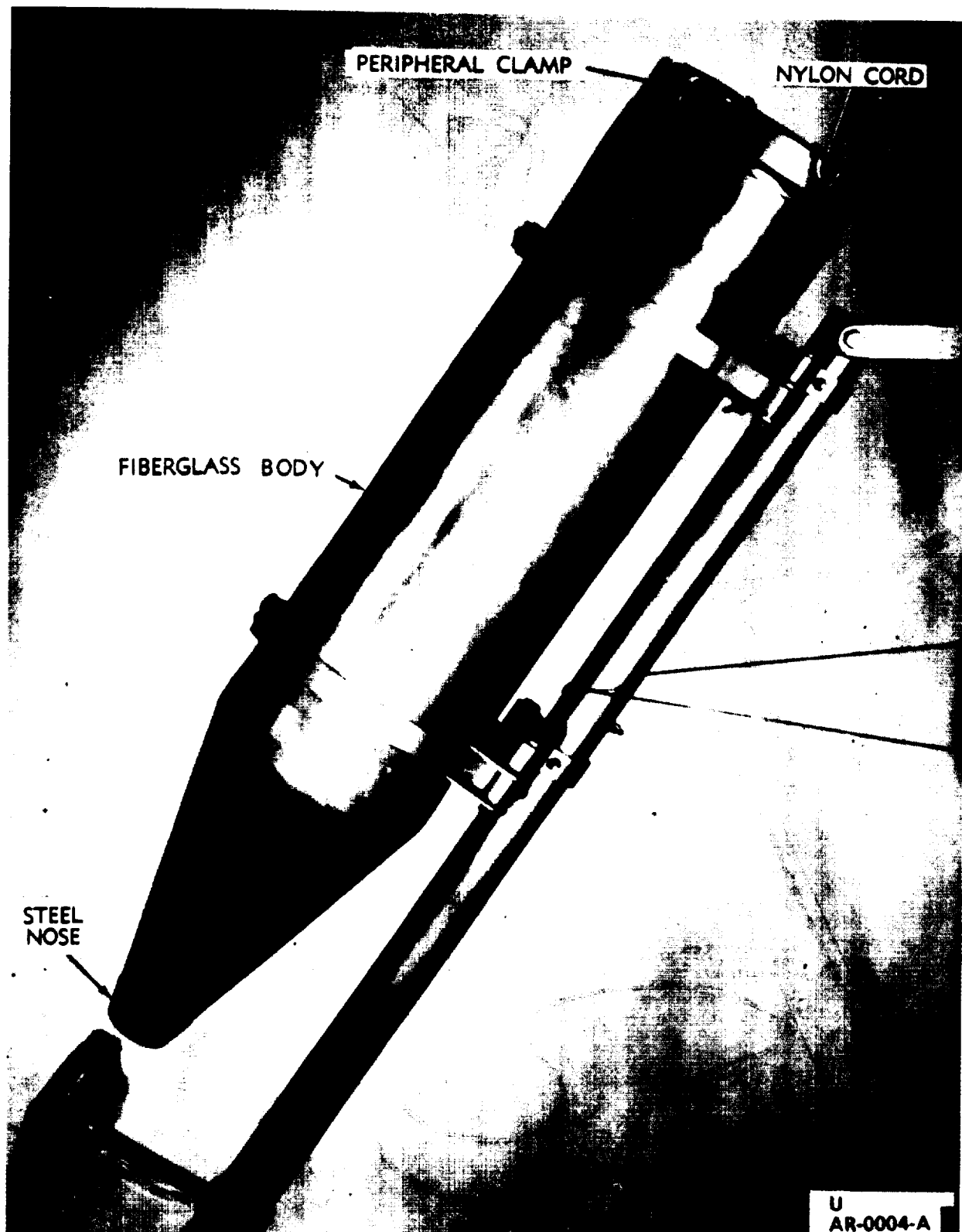
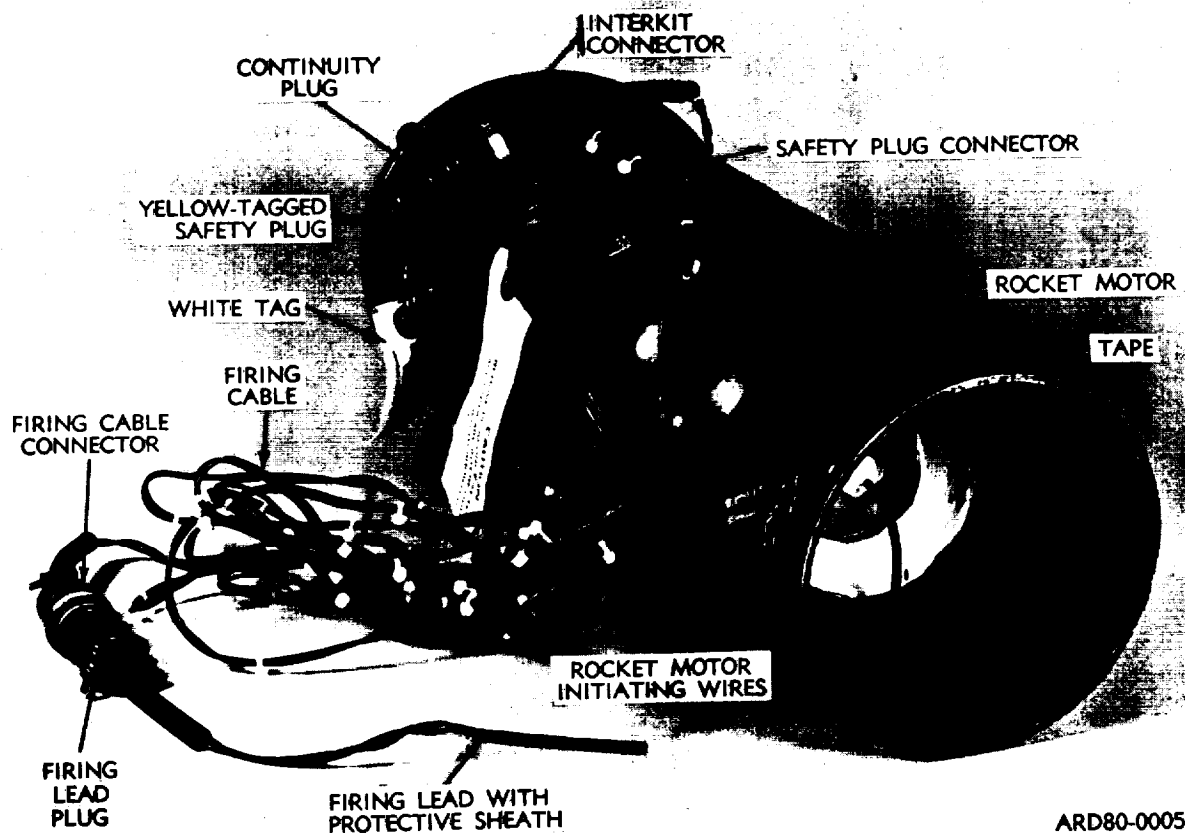


Figure 1-4. Warhead.



ARD80-0005

Figure 1-5. Rocket motor, rear view.

(2) Each rocket motor has a permanently attached firing circuit which is electrically wired to permit initiation as a single kit or as a part of a series circuit when a number of kits are employed together.

(a) The circuit consists of a firing lead (with protective sheath and firing lead plug), 10-foot (300 centimeters) firing cable with firing cable connector, rocket motor initiating wire, detonator wires, safety plug connector and interkit connector (fig. 1-2).

1. The firing lead is used to splice the firing circuit to the field firing lead.

2. The firing lead plug is connected to the firing cable connector.

3. The firing cable ends in a junction consisting of the wires for the rocket motor initiating wires, detonator wires, safety plug connector, and interkit connector.

4. The rocket motor initiating wires are taped to the outside and inside edge of the nozzle and connect to the M2 squibs in the rocket motor initiator.

5. The detonator wires are routed through

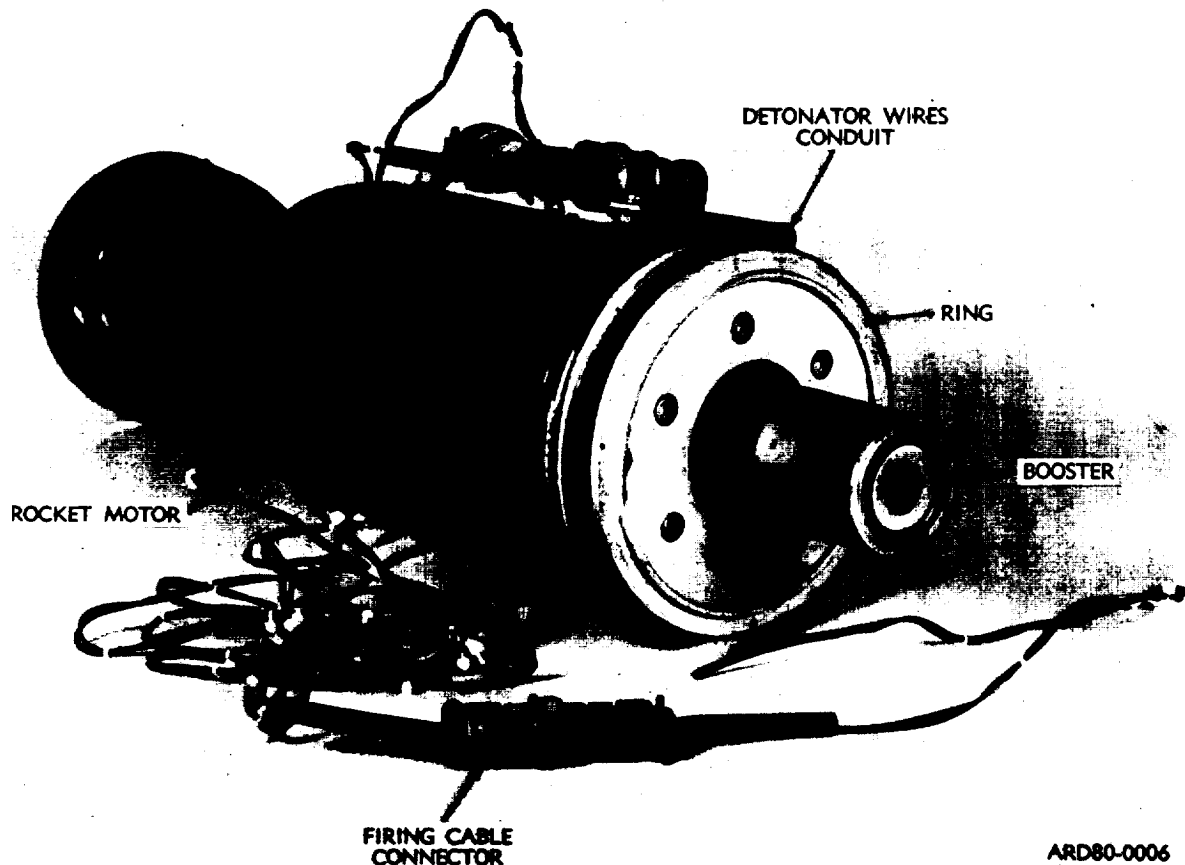
their conduit to the delay blasting cap in the booster.

6. A yellow-tagged safety plug is connected to the safety plug connector and a white tagged continuity plug is connected to the interkit connector.

NOTE

To remove the safety plug, just pull it out of its connector. The outer collar on the safety plug is NOT threaded. It is free to rotate but does not touch the safety plug's mating connector. To insert the safety plug in its connector hold it by its body (not its outer collar) and turn it so that its notch aligns with the mating guide pin in the connector and push in.

(b) The yellow-tagged safety plug prevents firing of the kit and must be removed in either the single or multi-kit hookup. The continuity plug must be installed in the interkit connector in order to fire a single kit. In order to fire a multi-kit hookup, the kits must be installed in a single series circuit as follows:



ARD80-0006

Figure 1-6. Rocket motor, forward view.

1. The continuity plugs are removed from all interkit connectors except from the kit farthest from the blasting machine.

2. All the firing lead plugs are removed from all firing cable connectors except from the kit nearest the blasting machine.

3. Starting with the kit farthest from the blasting machine each firing cable connector is connected, in turn, to the interkit connector of the next kit in line. All the kits are connected in this manner, to complete the series circuit.

NOTE

The designations of "farthest kit" and "nearest kit", as used hereafter, refer to the position of the kits in relation to the blasting machine.

h. Demolition Circuit.

(1) The demolition circuit (fig. 1-7) is shipped in a plastic bag which is enclosed in a wooden box. The box top is secured by two nylon straps.

(2) The demolition circuit consists of several electrical and nonelectrical components.

(a) A 10-foot (300 centimeter) length of No. 18, two-conductor wire with an electrical connector on one end and a M6 electric blasting cap at the other end.

(6) A 9-foot (270 centimeter) length of detonating cord with a priming adapter M1A4 and a M7 nonelectrical blasting cap at one end.

(c) The M6 cap is connected to the free end of the detonating cord by a plastic sleeve to assure close contact between the detonating cord and the blasting cap for good propagation of the detonation.

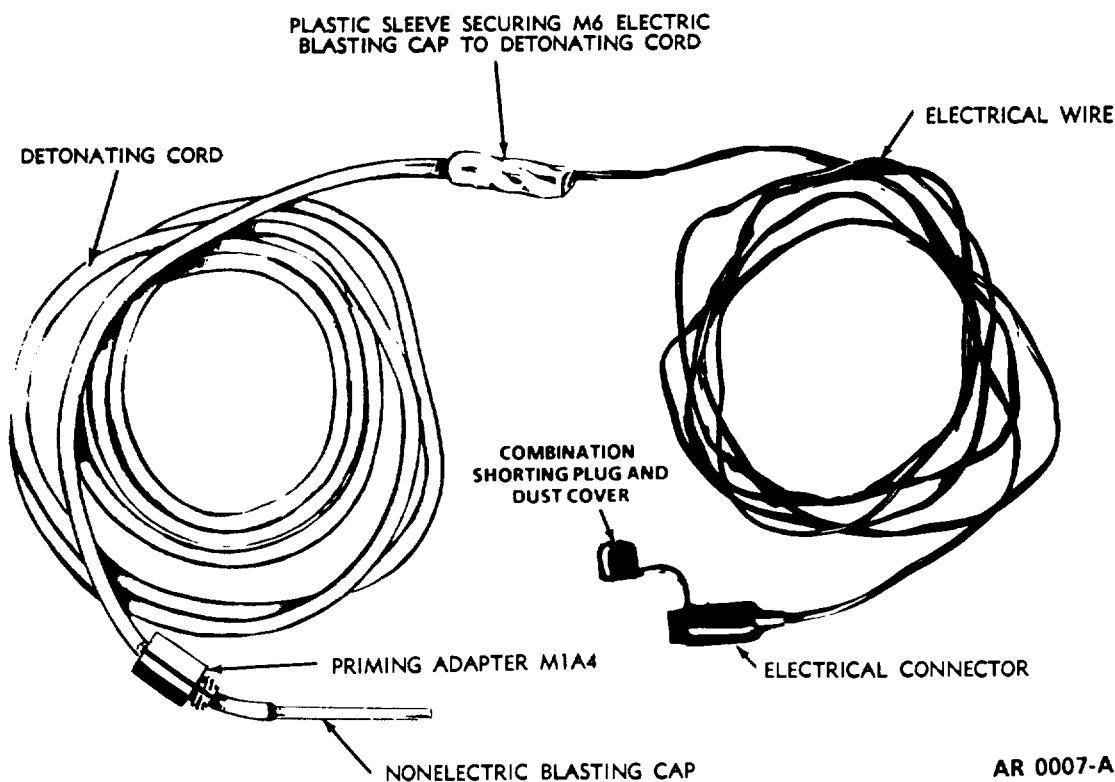
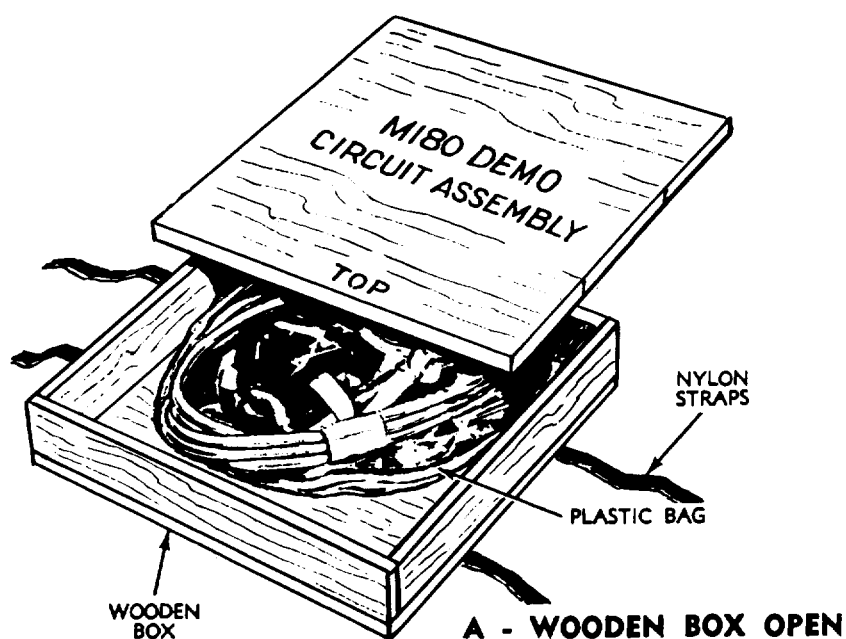
(3) These components form a continuous firing train connecting the firing device to the shaped charge.

(4) For multi-kit hookups, the demolition circuit detonating cords are taped together at the plastic sleeve area to form an explosive junction, to assure simultaneous functioning of the shaped charges.

i. Tripod. The tripod (fig. 1-3) consists of three two-section tubular legs, permanently joined at the top by a metal fixture. Approximately 12

inches (300 MM) from the top are three restraining wires which hold the legs at the proper angle when the tripod is emplaced. The lower section of each leg slips onto the upper section to form a

snug fit. The two sections of each support leg are joined together by a short wire which allows the sections to be separated and folded. The launch leg, on which the other components are mounted,



B - DEMOLITION CIRCUIT ASSEMBLY UNPACKED

Figure 1-7. Demolition circuit.

AR 0007-A

has a larger diameter than the other legs and its two sections are not joined together by a wire. The lower section of the launch leg has an aligning pin which fits into a notch in the upper section to assure proper alignment of components. A base, located on the bottom of the launch leg, prevents the leg from digging into the earth thus assuring the proper standoff distance for the shaped charge.

1-4. Identification, Demolition Kit, M180

The major components are olive drab with yellow markings. The tripod assembly and demolition circuit have no markings. The following are examples of yellow markings on the shaped charge, warhead and rocket motor

Shaped Charge

Charge, Demolition, Shaped, 15-lb (6.75 kilograms), M2A4

Comp B

Lot HM1-79

Loaded 10-78

Warhead

Warhead for Demolition Kit, Cratering M180

Lot 167151

High Explosive 40 lbs (18 kilograms) - Type H-6

Lot PA-57380 Loaded 10-78

Rocket Motor

Rocket Motor for Demolition Kit, Cratering: M180

Lot 6970-001 Loaded 12-78

Firing Temp Limits: -40° F to +130° F (-40° C to +54° C)

Storage Temp Limits: - 40° F to + 140° F (- 40° C to +60° C)

Prop Lot PA-57704 Mfr Date 10-78

The firing device has the following markings in raised letters.

Firing Device, Electrical, M57

The firing device has markings, such as the following, stamed in black ink.

Lot No. JLP 1-Z

Date of Mfr 3-76

the demolition circuit wooden subpack has the following markings stenciled in black ink.

M180 DEMO

CIRCUIT ASSEMBLY

TOP

1-5. Identification, Demolition Kit, M270

The major components are blue with white markings. The following are examples of white markings on the inert, shaped charge, warhead and rocket motor.

Shaped Charge-Inert

Charge, Demolition, Shaped, Practice: M2A3

Lot HM1-79

Warhead-Inert

Warhead for Demolition Kit, Cratering, Practice: M270

Lot 167151

Mfr Date 10-78

Rocket Motor-Inert

Rocket Motor for Demolition Kit, Practice: M270

Lot 6970-001

10-78

The firing device has the following markings in raised letters:

Firing Device, Electrical, M57

The firing device has markings, such as the following, stamped in black ink:

Lot No. JLP 1-Z

Date of Mfr 3-76

The demolition circuit wooden subpack has the following markings stenciled in black ink:

Circuit Demolition (Inert)

1-6. Functioning

a. Demolition Kit, M180. A 50-cap blasting machine is used to fire the kit. Current generated by the machine simultaneously ignites the M2 squibs and the delay-type electric blasting cap in the rocket. The squibs ignite the propellant grain which causes the rocket motor to build thrust until the shear strength of the attaching hardware is exceeded. When this occurs, the entire assembly, rocket motor and warhead, moves toward the firing device. On impact, the cover and the firing device handle are crushed, current is then generated by the firing device which causes initiation of the following demolition circuit components in sequence: M6 electric blasting cap, detonating cord and M7 nonelectric blasting cap. The M7 nonelectric cap initiates the shaped charge which blasts a pilot hole in the surface. As the hole is being created, the rocket motor propels the warhead through the hole. The delay-type blasting cap initiates the tetryl lead which detonates the booster that detonates the warhead. Detonation of the warhead completes the cratering action of the kit.

b. Demolition Kit, M270. The training M270 Demolition Kit is completely inert and therefore nonfunctional.

NOTE

Resistors are incorporated in the training kit's firing circuit to electrically simulate the squibs and cap used in the tactical kit's firing circuit. The training firing circuit can be checked in the manner as the tactical firing circuit.

1-7. Packing and Marking

a. The shipping container for the M180 kit (fig. 1-8) is a wirebound wooden box with a rope handle at each end and two skids underneath to provide for movement for forklift. Six large loops of wire along one edge of the box top and six small loops of wire along the mating edge are secured together to form closures. The M270 is packed in a conventional wooden box (fig. 1-9) which is more suited to the continuous reuse required with a training item.

b. Within the composition-board-lined box, the collapsed kit is sealed in a barrier bag (fig. 1-10). The kit components are strapped or taped together and polyethylene spacers are used to prevent movement. The demolition circuit wooden subpack is located to the rear left side of the shipping container. A wooden load spreader is placed at each end of the strapped assembly for further protection. The whole kit is surrounded by bound fiber padding within the bag (fig. 1-11).

c. The wirebound wooden box for the Demolition Kit, M180 bears markings in black as follows:

Nomenclature ----- Demolition Kit Cratering:
M180
Weight ----- 165 lb (74.25 Kilograms)
Cubical displacement ---- 7.2 cu ft (0.216M³)
DODAC ----- 1375-M965
Department of
Transportation (DOT)
marking ----- Rocket Ammunition with
Explosive projectile
NSN 1375-00-141%7159
Storage Temperature
Limits ----- -40°F to +140°F (-40°C to
+60°C)

d. An additional marking in black on top of wirebound wooden box is as follows:

WARNING

CONTAINS EED, DO NOT SET UP IN
AREA OF HIGH INTENSITY RF ENERGY

e. The wooden box for the Demolition Kit, M270 bears marking in black as follows:

Nomenclature -----Demolition Kit Cratering,
Training M270
Lot No. ----- □ □ □
Cubical displacement ----8.0 cu ft (0.240 M³)
Weight ----- 170 lb (77.0 kg)
NSN-----6920-01-87.0038or
TRADOC Trainin~
Device DVC-T-5-42

1-8. Data

a. M180 and 270 Demolition Kits.

Kit (disassembled and strapped for shipment)
Length -----39.0 in. (975 mm)
Weight (approx)-----100 lb. (45 kg)
Width -----11.0 in. (275 mm)
Height -----16.0 in. (400 mm)
Shaped Charge (without fiber base):
Height -----12.0 in. (300 mm)
Major diameter -----7.0 in. (175 mm)
Firing device:
Length -----4.25 in. (106.25 mm)
Width -----1.25 in. 31.25 mm)
Height -----3.5 in. (87.5 mm)
Warhead:
Length -----29.5 in. (737.5 mm)
Diameter -----6.5 in. (162.5 mm)
Rocket motor:
Length -----18.0 in. (450 mm)
Diameter -----6.5 in. (162.5 mm)
Demolition Circuit:
Length (overall) -----20 ft. (approx) (600 cm
approx)

b. Explosives, M180 Demolition Kit.

Weights of explosives (approx):

Shaped charge:
Comp B ----- 11.0 lb. (4.95 kg)
Comp A-3 -----1.802. (50.4 gm)
Warhead:
H6 high explosive ---- 40.0 lb. (18.0 kg)
Rocket motor
propellant grain MT
modified -----5.0 lb. (2.25 kg)
Booster:
RDX -----1.0 oz. (28.0 gm)
Tetryl -----1.0 oz. (1.0 gm)
Demolition Circuit:
PETN -----1.0 oz. (28.0 gm)

c. Packing M180 Demolition Kit.

Kits per shipping
container ----- 1
Outer dimensions of
container (approx) 45½ x 13¼ x 20½ in.
(1137.5 x 331.25 X 512.5
mm)

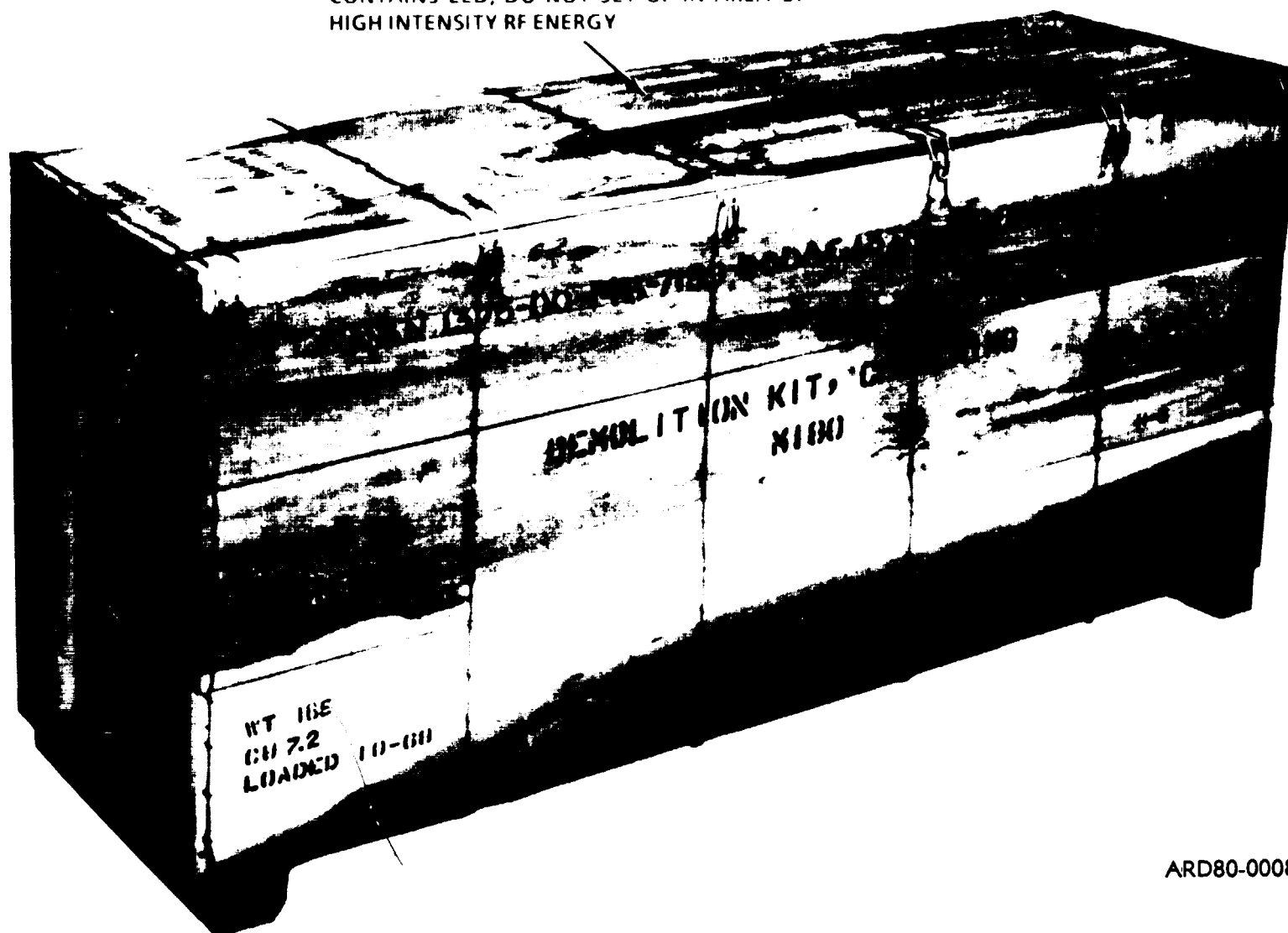
Weight of container
(w/contents)
(approx) ----- 165lb. (74.25 kg)
Cubical displacement
of container 7.2 cu ft (0.216 M³)

d. Packing M270 Demolition Kit.

Kits per shipping
container ----- 1
Outer dimensions of
container (approx) 46 1/8 x 13 5/8 x 21 7/8 in.
(1153.1 X 340.6 x 546.8
mm)
Weight of container
(w/contents)
(approx) ----- 170 lb. (77.0 kg)
Cubical displacement
of container -----8.0 cu ft (0.24 M³)

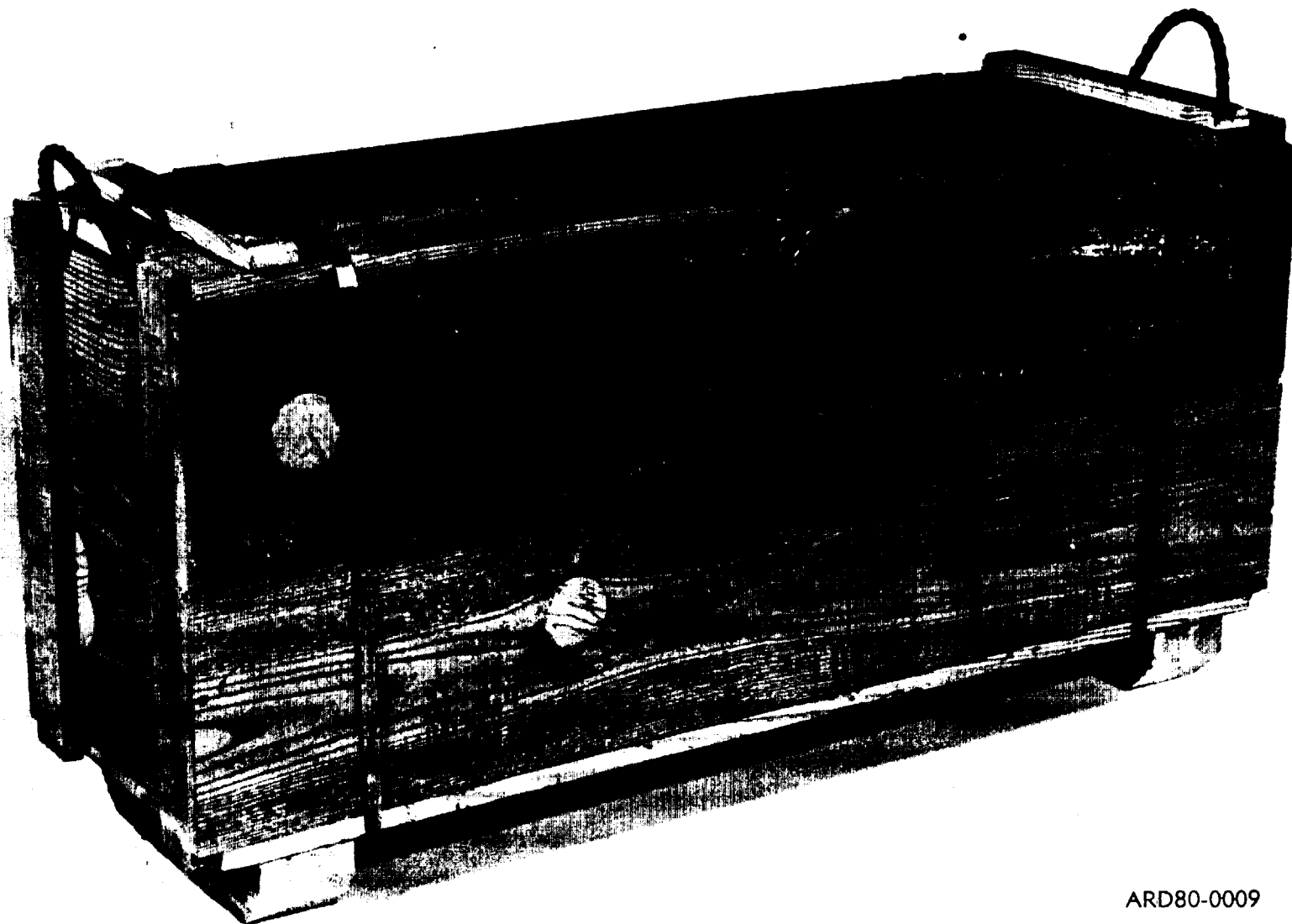
WARNING

CONTAINS EED, DO NOT SET UP IN AREA OF
HIGH INTENSITY RF ENERGY



ARD80-0008

Figure 1-8. Shipping container, M180.



ARD80-0009

Figure 1-9. Shipping container, M270.

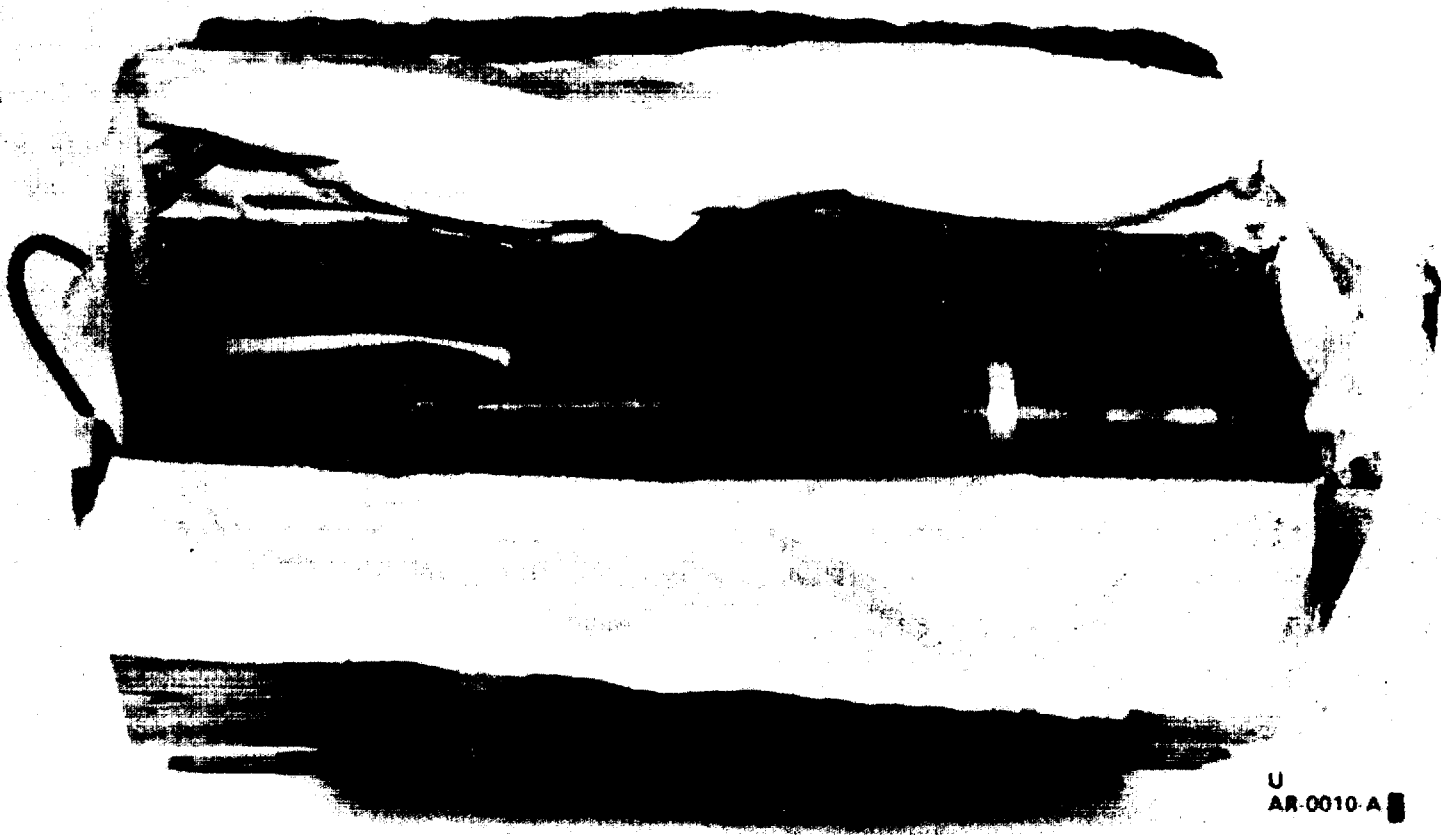


Figure 1-10. Shipping container, opened.

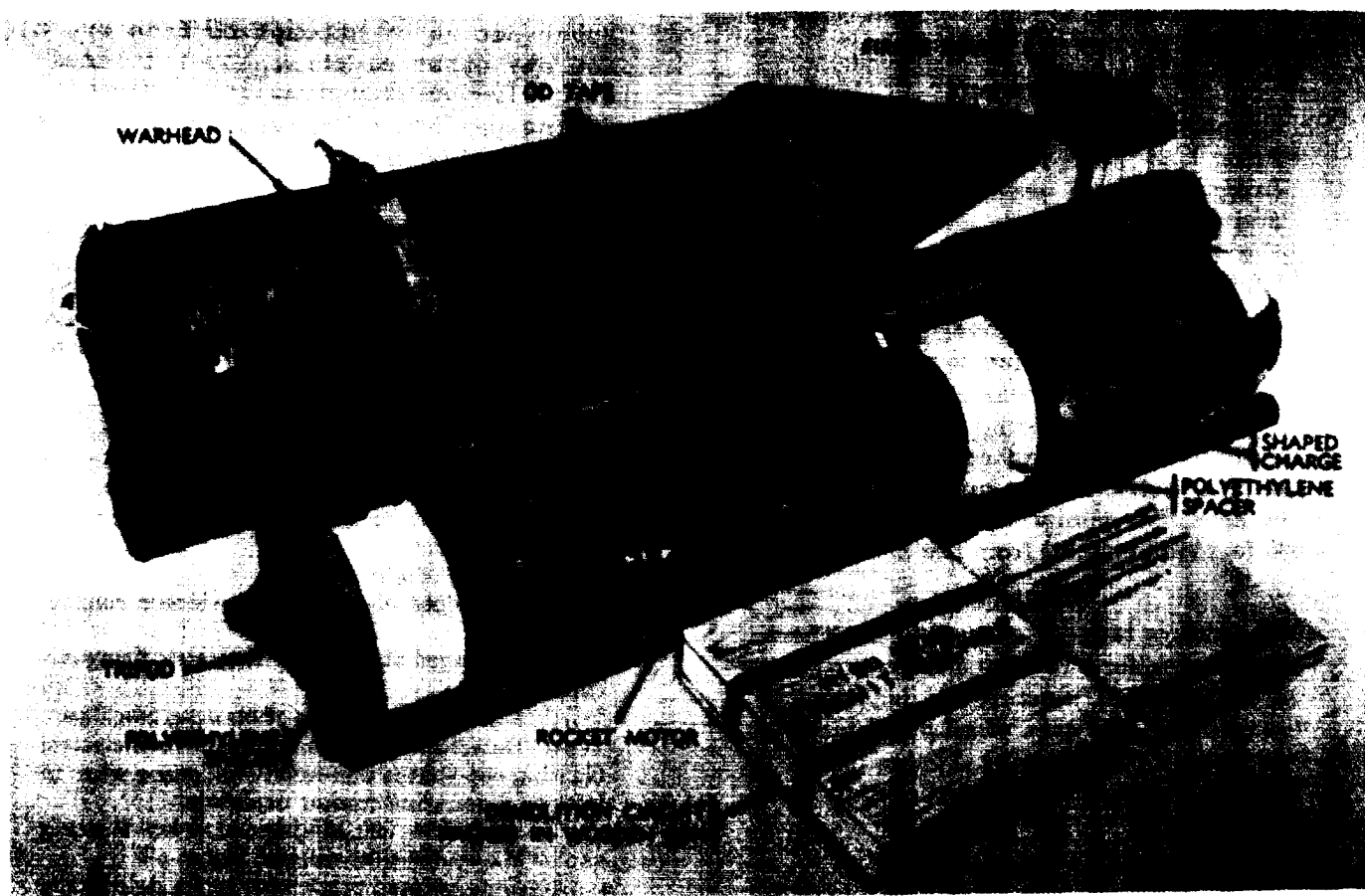


Figure 1-11. Kit removed from shipping container.

Section III. SAFETY, CARE, AND HANDLING

1-9. General

a. General precautions for handling, transporting, storage and firing explosives are defined in TM 9-1300-206, TM 9-1375-213-12, and FM 5-25.

NOTE

The warning and caution safety requirements pertain to the tactical kit.

b. Even though the M270 contains no explosives, it should be treated exactly as the live, loaded tactical kit in training exercises. The safety precautions warning and caution requirements are for *your* protection. Observing them during training will prepare you to observe them when operating the tactical kit.

1-10 Safety

a. Do not operate kits when kit temperature is below -40°F (-4°C) or above $+130^{\circ}\text{F}$ ($+54^{\circ}\text{C}$). The upper $+130^{\circ}\text{F}$ ($+54^{\circ}\text{C}$) limit must be strictly adhered to for safe and reliable operation.

NOTE

To determine whether the temperature of a kit lies outside the above safe firing temperature limits, one cannot always go by the thermometer reading alone. At low temperatures, the kit's temperatures will be close to that of the air temperature of the area where it has been located for an hour or two. At high temperatures, the sun can quickly raise the temperature of an exposed kit or an enclosed shelter (such as a box-car) far higher than that of the outside air. A good rough method of determining whether a kit is too hot to fire is to (carefully) touch the surface of the rocket motor. If you can keep your hand on the surface without discomfort, the kit is cool enough to fire.

b. Do not store kits at temperatures below 40°F (-40°C) or above $+140^{\circ}\text{F}$ ($+60^{\circ}\text{C}$).

c. Do not attempt to repair any kit components beyond that provide in Chapter 3.

WARNING

Connection of blasting machine to field firing lead is the last operation prior to firing. To avoid premature connection and firing, operator in charge will have the blasting machine with him at all times.

d. If there is overhead cover at the firing location, the firing location may be as close as 500 feet (150 meters) from the nearest kit. If there is no overhead cover, the firing location cannot be closer than 4000 feet (1200 meters) from the nearest kit. The restriction also applies to all personnel in the area. The minimum distance, in any case, is 500 feet (150 meters) from the nearest kit.

WARNING

The yellow tagged safety plug is a shorting device for the kit's electro-explosive initiators and *must be* in place when working in the area of an assembled kit or when a rocket motor is being handled. The safety plug *must be* removed prior to firing.

NOTE

If the safety plug is lost or missing, a safety plug (the original or one from previously fired kit) should be installed as soon as possible. Do not handle a kit without a safety plug any more than necessary. Do not transport a kit without a safety plug any long distance.

WARNING

As with all ammunition containing electro-explosive initiators (EEI), avoid transporting or operating the M180 Demolition Kit in the vicinity of operating television, radio, radar, etc, transmitters. The radio frequency (RF) energy emitted by these transmitters can fire the EEI under some circumstances even with the shorting devices in place, for example, do not operate or transport the kit within 100 feet (30 meters) of an operating walkie-talkie. Figures for safe distances from various powered transmitters are given in TM 9-1300-206, Appendix C.

WARNING

Never set up or attempt to fire the M180 (or any other electrically-initiated directly-operated demolition circuit) during periods of impending or active electrical storms.

1-11. Misfires

Except as otherwise indicated in paragraph 1-10 above, this ammunition is safe to handle and fire. However, the following potentially hazardous conditions, which could arise during firing, should be handled as indicated to avoid injury to personnel and damage to equipment:

a. *Misfires and Hangfires.* A misfire is a complete failure to function. A hangfire is a failure to function involving an abnormal lag beyond the instant of initiation. Because electric initiation is used with this kit, hangfires of more than a second are unlikely

b. *Causes of Misfires.*

(1) Improper electric or nonelectric connections.

(2) Damaged electric or nonelectric firing circuits.

(3) Improper operation of blasting machine.

(4) Deteriorated M6 electric or M7 nonelectric blasting cap that is non-functional or too weak to initiate detonating cord or explosive.

(5) Defective 500 millisecond delay blasting cap or M2 squibs that will not fire at all.

(6) Deteriorated propellant grain, detonating cord or explosive charge.

(7) Malfunctioning blasting machine.

c. *In the event of a misfire:*

(1) Assure that firing wires are securely connected to blasting machine terminals.

(2) Actuate blasting machine again several times with maximum possible effort,

(8) If repeated actuation of blasting machine does not fire kit(s), remove firing lead from blasting machine and recheck firing circuit with blasting galvanometers or Blasting Cap Test Set M51 to determine the most probable cause of trouble (i.e., an open or a shorted circuit).

NOTE

Lighting of indicator lamp on Tent Set M51 indicates that the circuit is continuous; the test set cannot indicate whether such a circuit is a GOOD firing circuit or a SHORTED circuit. In addition, a resistance reading on a blasting galvanometers does not necessarily rule out the possibility of a short, since resistance will be present if the short is located some distance from the blasting machine,

(4) After determining the most probable cause

of misfire, remove firing lead from test instrument and short the conductors at firing location.

WARNING

If necessary to work on firing lead(s) or kit(s), temporarily reinstall each yellow-tagged safety plug and remove each plug when work is completed.

(5) Take blasting machine and all previously removed safety plugs and proceed to kit location. While proceeding to kit location, visually check field firing lead as follows:

(a) If an open circuit is indicated, operator will check for cuts, breaks, or penetrating objects in the firing lead wires and for loose wire connections.

(b) If there is no open circuit, operator will check for a possible short in the electrical circuit or wire splices which are uninsulated or lying in water.

(c) If a problem is found during visual inspection of field wire, install each yellow-tagged safety plug and correct lead as necessary.

(6) If visual observation of the field firing lead does not reveal the cause of misfire, insert safety plug(a), disconnect kit(s) from field firing lead at kit location and check field firing lead for continuity. Replace or repair field firing lead, as necessary.

(7) Check rest of electrical hookup as indicated in (6) above. Also check for loose continuity plug or electrical connectors. Correct as necessary.

(8) After all corrections have been made:

(a) Remove all yellow-tagged safety plugs.

(b) Count plugs to assure the number removed agrees with the number of kits to be fired.

(c) Proceed to firing location.

(d) Unshort field firing lead, check for continuity with galvanometers or blasting cap test set, and then attach to blasting machine.

(e) Again try to fire.

(9) If above action does not correct difficulty recover the kit(s) in accordance with paragraph 2-11 and return as unserviceable. Also have Blasting Machine checked.

d. Prevention of Misfires. Care in connecting firing circuits will prevent most misfires.

1-12. Care

These kits are packed to withstand conditions ordinarily encountered in the field. Each kit is individually sealed within the shipping container to provide adequate protection against moisture during shipment and storage. Protect kits as follows:

a. Keep shipping containers from becoming broken or damaged.

b. Repair broken containers immediately and re-mark if original markings are illegible.

c. Keep kits in original packing; unpack just prior to use.

d. The usual precautions taken to avoid exposing ammunition to high temperatures in accordance with TM 9-1300-206 should be observed. For example, avoid long exposure of the kit to the hot summer sun. Provide overhead cover with ventilation, don't just place a tarpaulin over the kit. Allow approximately 18 inches (450 mm) of air-space between the top of the kit and tarpaulin being used for ventilation. The firing temperature limits for the kit apply to the temperature limits of the kit itself, *not* the temperature of the surrounding air. Several hours of direct exposure of a strong summer sun can heat the kit to a temperature well over its limit even though the air temperature is well below the kit limit. Malfunction of the kit (especially its rocket) could result when it is operated beyond its limit. Storage in unventilated shelter (such as a box car) can also raise component item's temperature well beyond that of the surrounding air in a strong summer sun.

1-13. Handling

Do not drop, throw, tumble or otherwise strike demolition kits, packed or unpacked. Handle explosive materials carefully. The explosive material in blasting caps is particularly sensitive to shock and high temperature.

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. OPERATION UNDER USUAL CONDITIONS

2-1. General

a. Table 2-1 contains an operator's checklist for quick reference. This checklist is a condensation of the detailed operating instructions. Operators must be familiar with the detailed operating instructions in this chapter and use the checklist only after being *THOROUGHLY* familiar with the detailed instructions.

NOTE

Operators should be familiar with FM 5-25 and TM 9-1375-213-12.

b. Two men will be required for handling and assembly of kit.

c. Operational characteristics are as follows:

Maximum number of closely spaced kits that can be simultaneously fired to produce one large crater -----	5
Maximum number of widely spaced kits that can be simultaneously fired for airfield pocking, etc. -----	15
Approximate time required to set up and fire one kit (good conditions) (two men) -----	5 min
Approximate time required to set up and simultaneously fire five closely spaced kits (good conditions) (two men) -----	20 min

2-2. Precautions

Observe the precautions contained in section III, chapter 1.

2-3. Preparation for Use

a. *Locally Obtained Equipment.* From local sources, obtain the items listed below. Except for the cable (a (2), below), these items are sufficient for firing either a single kit or a multi-kit hookup. However, when operations call for simultaneous firing of a number of kits located some distance from each other (e.g., as when pocking an airfield), additional cable will be required.

NOTE

Refer to table 2-2, Chapter 2, Section II, for NSN's and packing information of material used in conjunction with the demolition kits. The items which are not

included in the standard demolition equipment sets are authorized for issue in TM 9-1375-213-12.

- (1) A 50-cap blasting machine. (Standard or M34).
- (2) 500-foot (150 meters) lengths of electrical power cable or type WD-1/TT telephone cable.
- (3) One reel for each 500 feet (150 meters) of cable.
- (4) One reeling machine.
- (5) A pocket knife with screwdriver blade.
- (6) A pair of pliers.
- (7) A roll of electrical insulation tape.
- (8) A blasting galvanometers or a Test Set M51.

NOTE

If available, a sallee closer (see RPSTL) should be used to open (or resecure) wire-bound box loops. If a sallee closer or a screwdriver and pliers is/are not available, the screwdriver blade of a cap crimper may be used but *NEVER* use the crimper as a pliers or wire cutter. A knife blade will be used to cut nylon straps on the demolition circuit wooden subpack. A pair of tin snips or some other cutting tool will be required to remove steel strapping if it has been used on the shipping containers (in overseas areas).

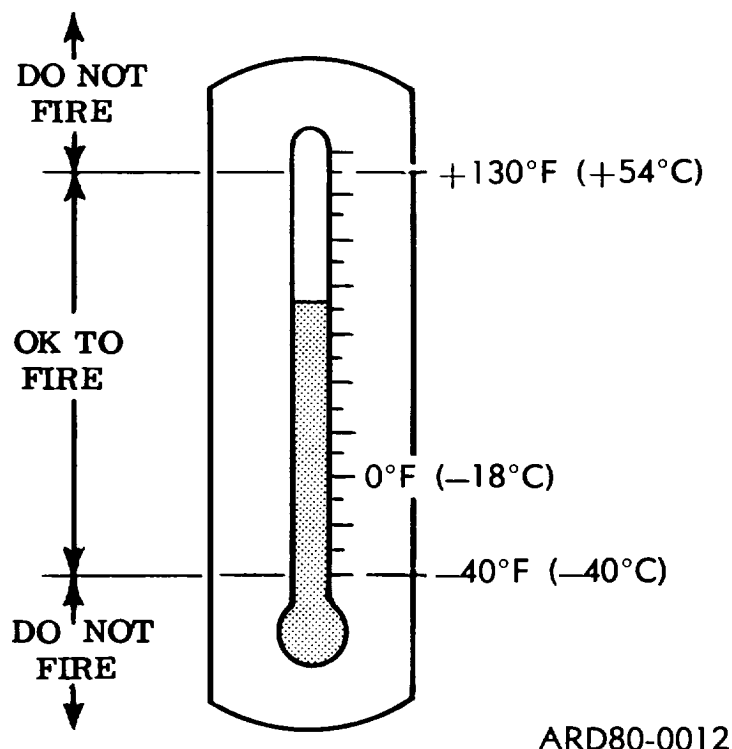
b. Deployment.

CAUTION

Firing of the M180 kit at temperatures above or below the firing temperature limits can results in malfunctioning of the item. The firing temperature limits are -40°F to + 130°F (-40°C to 54°C) fig. 2-1).

NOTE

To determine whether the temperature of a kit lies outside the above safe tiring temperature limits, one cannot always go by the thermometer reading alone. At low



ARD80-0012

Figure 2-1. Temperature firing limits.

temperatures the kit's temperature will be close to that of the area where it has been located for an hour or two. At high temperatures, the sun can quickly raise the temperature of an exposed kit or an enclosed shelter (such as a box-car) far higher than that of the outside air. A good rough method of determining whether a kit is too hot to fire is to (carefully) touch the surface of the rocket motor. If you can keep your hand on the surface without discomfort, the kit is cool enough to fire.

(1) *General.*

(a) Because the shaped charge and rocket propelled warhead are aimed at a 60° angle to the ground, the resulting crater will tend to have a steeper slope on the side toward which the launch leg is aimed. Therefore, when kits are being used to make a vehicle obstacle, the steeper side should be oriented so as to make exit more difficult in the anticipated direction of enemy travel. When the steeper side lies at an angle to the road (rather than straight across the road), vehicle movement will be further hindered in that the vehicle will be channeled off the roadway in its attempts to back up the shallowest slope of the crater. To obtain the most effective vehicle obstacle, the deployment angles and placement of the kits shown in figure 2-2 must be strictly adhered to.

(b) In an airfield pocking operation, the orientation cited in b (1) (a), above is not required since the main objective is to create many holes in the airfield runways, with no particular regard to direction.

(2) *Road cratering.* Road widths that can be successfully cratered by a single kit or by several closely spaced kits are indicated in figure 2-2. No more than five kits may be fired at once in close multi-kit deployment, and only the deployment setups shown in figure 2-2 may be used. Any other spacings or orientations may reduce the effectiveness of the shot.

(3) *Airfield pocking.* In operations such as airfield pocking, up to 15 kits may be fired simultaneously if there is a minimum of 25 feet (7.5 meters) between kits.

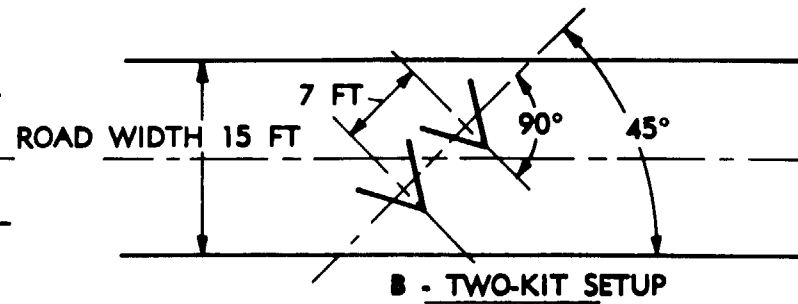
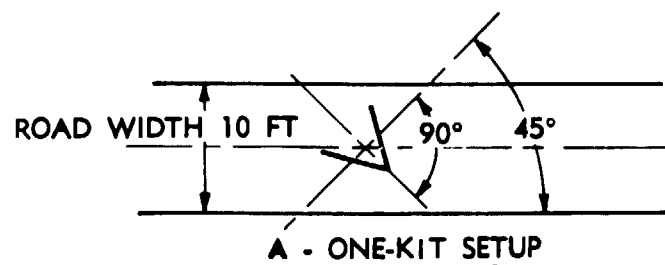
2-4. Initial Preparations

a. Unless otherwise noted, the following paragraph refers to single kit and multi-kit operations.

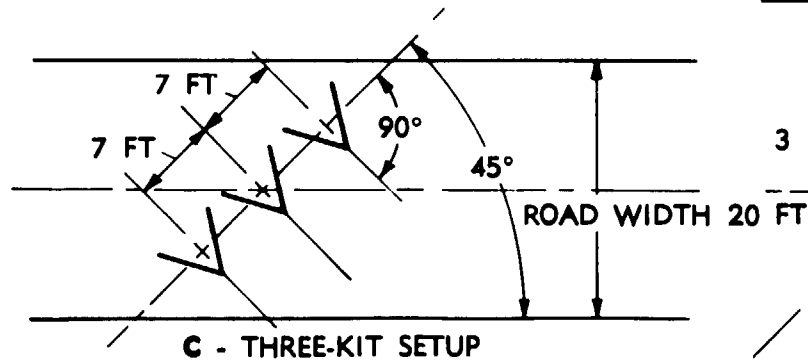
(1) Determine number of kits to be used and method of deployment (b above).

(2) Select a suitable location for the firing site (no closer than 500 feet (150 meters) if there is cover, or 4000 feet (1200 meters) if there is no cover).

(3) Mark target point for each kit that is to be used.



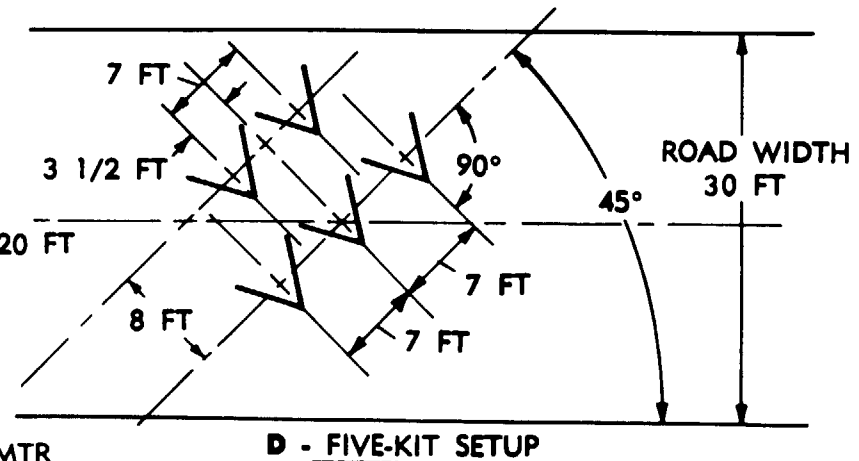
ANTICIPATED DIRECTION OF ENEMY TRAVEL



NOTE:

3 1/2 FT = 1.05 MTR
 7 FT = 1.86 MTR
 8 FT = 2.40 MTR
 10 FT = 3.00 MTR

15 FT = 4.50 MTR
 20 FT = 6.00 MTR
 30 FT = 9.00 MTR



ARD80-0013

Figure 2-2. Deployment setups.

b. Setup of kit(s)

WARNING

Connection of blasting machine to field firing lead is the last operation prior to firing. To avoid premature connection and firing, operator in charge will have the blasting machine with him at all times.

WARNING

As with all ammunition containing electro-explosive initiators (EEI), avoid transporting or operating the M180 Demolition Kit in the vicinity of operating television, radio, radar, etc. transmitters. The radio frequency (RF) energy emitted by these transmitters can fire the EEI under some circumstances even with the shorting devices in place. For example, do not operate or transport the kit within 100 feet (30 meters) of an operating walkie-talkie. Figures for safe distances from various powered transmitters are given in TM 9-1300-206, Appendix C.

WARNING

Never set up or attempt to fire the M180 (or any other electrically-initiated, directly-operated demolition circuits) during periods of impending or active electrical storms.

(1) Transport each kit to its target point: recommended method of transport is by vehicle.

(2) Obtain equipment listed in paragraph 2-3a or table 2-2.

WARNING

The yellow-tagged safety plug is a shorting device for the kit's electro-explosive initiators and must be in place when working in the area of an assembled kit or when a rocket motor is being handled. The safety plug must be removed prior to firing.

NOTE

If the safety plug is lost or missing, a safety plug (the original or one from previously fired kit) should be installed as soon as possible. Do not handle a kit without a safety plug any longer than necessary. Do not transport a kit without a safety plug any long distance.

(3) Unpack kit(s) as follows (fig. 2-3):

NOTE

Packing of the M180 and M270 kits is internally identical.

(a) Break car seal securing wire twist lock or hasps on shipping container and remove car seal.

NOTE

If available, a sallee closer (see RPSTL) should be used to open (or resecure) wire-bound box loops. If a sallee closer or a screwdriver and pliers is/are not available, the screwdriver blade of a cap crimper maybe used but NEVER use the crimper as a pliers or wire cutter.

(b) Unfasten wire loops or open hasps along edge of container and lift up top of container.

(c) Open barrier bag by slitting edge (cut edge that has more area) and remove sufficient packing materials so that demolition circuit wooden subpack and kit can be lifted out.

(d) Carefully lift out demolition circuit wooden subpack and place on ground.

(d.1) Check the integrity of the warhead mount to the tripod by inspecting the clamp and tripod parts and/or other serious damage and by attempting to rotate the warhead in the clamps. If the warhead is loose or the mounting hardware seriously damaged, repack and return the kit as unserviceable to the ammunition supply point (ASP). The defective kit must be reported on an Ammunition Condition Report (ACR).

(e) Carefully lift out kit and place on ground.

(f) Cut nylon straps or tape to free components.

(g) Remove rocket motor from pack and carefully set it aside.

(h) Make sure rocket motor's yellow-tagged safety plug is securely in place.

(i) Remove all polyethylene spacers and dessicant pucks from kit. Open subpack (remove nylon straps) and check that all components are present and intact. Leave each demolition circuit in wooden subpack.

(4) Assemble and erect each tripod as follows:

NOTE.

Before completing steps below, assure that packing materials are not wedged in the cavity of the shaped charge.

(a) Align lower and upper sections of support legs (fig. 2-4).

NOTE

Support legs may come apart when the tripod is raised. This can be eliminated by taping the sections together at the joint.

(b) Insert lower sections of support legs into upper sections, assuring a snug fit.

(c) Mate lower section of launch leg to upper section, assuring that aligning pin is fully seated in notch.

(d) Set base of launch leg on target point (fig. 2-5).

NOTE

If kit is being used to make a vehicle obstacle crater (paragraph 2-3b (1) (a)), launch leg must be positioned so that the base of

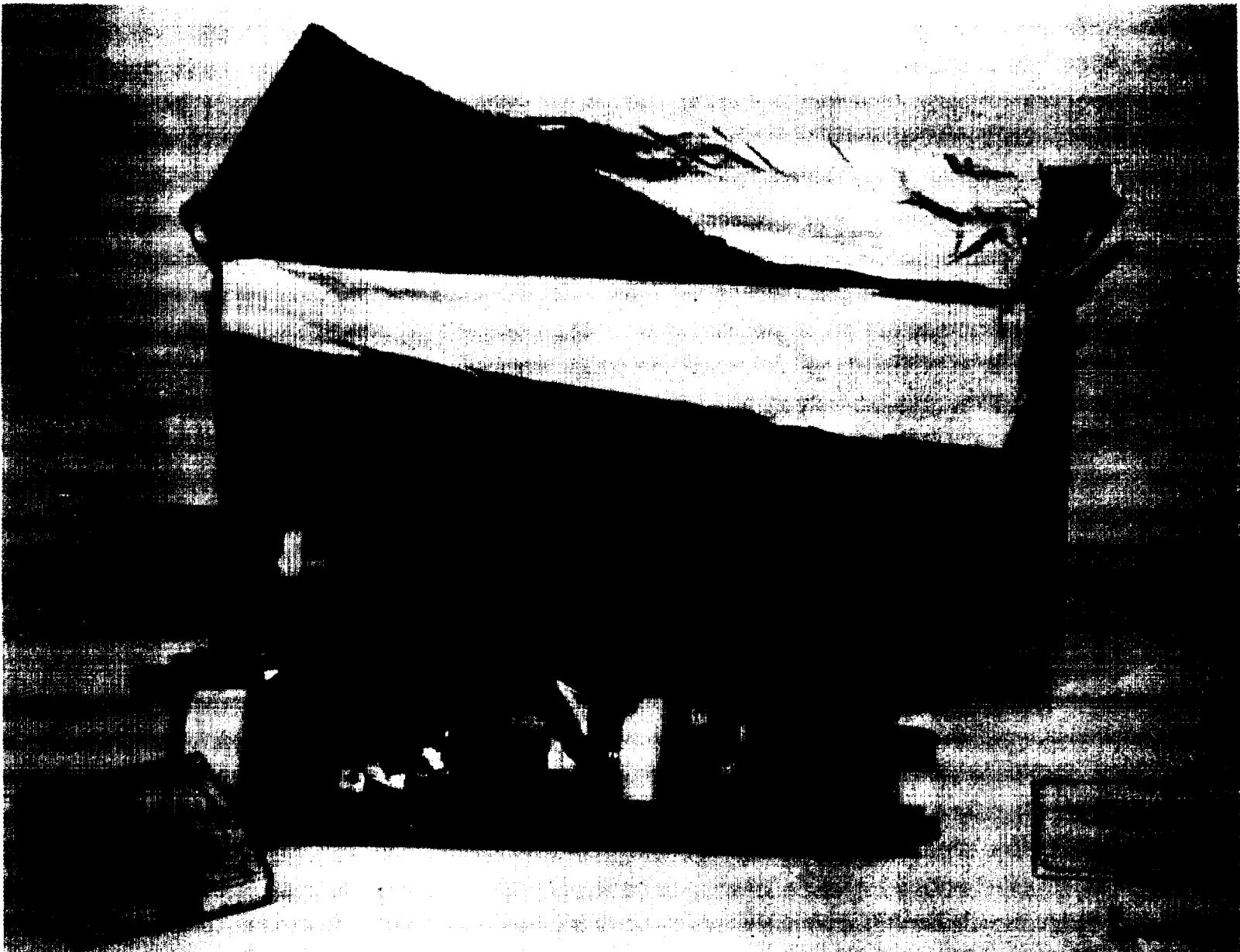


Figure 2-3. Unpacked kit: M270



Figure 2-4. Position legs.

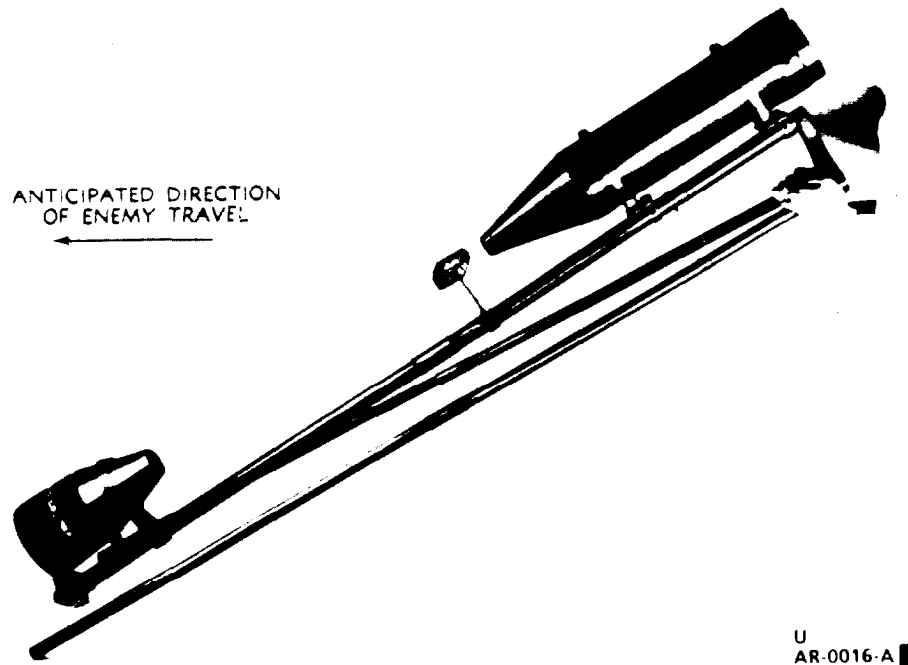


Figure 2-5. Erecting tripod.

the launch leg is pointed in the direction of the enemy travel (fig. 2-6).

c. The rocket motor may be assembled to the warhead prior to erecting the tripod by following the procedures in *f* below, prior to proceeding to *d*.

d. Using base of launch leg as a pivot, and standing at rear of warhead, raise tripod and pivot support legs outward as far as possible.

e. Keeping support legs fully extended, tilt tripod backward until support legs meet ground. To avoid accidental toppling of tripod, assure that restraining wires are taut and legs are firmly positioned on ground.

f. Mount each rocket motor as follows:

(1) Unlatch peripheral clamp holding protective disk on warhead by pulling on the nylon cord loop (A, fig. 2-7).

(2) Remove protective disk and put it in shipping container; leave clamp on warhead.

(3) Align ring (B, fig. 2-7) of rocket motor with mating groove on rear of warhead flange. Insert ring into groove and insure that clamp is over both rocket and warhead flanges.

(4) Rotate rocket motor so that continuity plug and yellow-tagged safety plug are on top.

(5) Hold peripheral clamp in place and snap shut to secure rocket motor to warhead (fig. 2-8).

(6) Step back about 10 feet (3.0 meters) and check alignment of components on launch leg. If components are not aligned, attempt improvement by using the hex socket head wrench which is taped to one of the legs to change the position of the upper bracket holding the shaped charge to the launch leg.

2-5. Preparing Field Firing Lead

NOTE

Make sure electrical wire splices are securely twisted together. Use at least two inches of bared conductor from each wire end being spliced. Insulate each conductor splice with tape to prevent shorting.

a. Lay field firing lead (electrical power cable or type WD-1/TT telephone cable) from kit (s) to firing location. To prevent accidental toppling of the M180 kit due to pulling or tripping on the firing lead, wind field lead around a stake or other object secured to the ground.

b. Short circuit firing lead Conductors at firing (blasting machine) location.

c. At kit location, check firing lead with galvanometer or Blasting Cap Test Set M51. If a galvanometer is being used, about 23 ohms should be

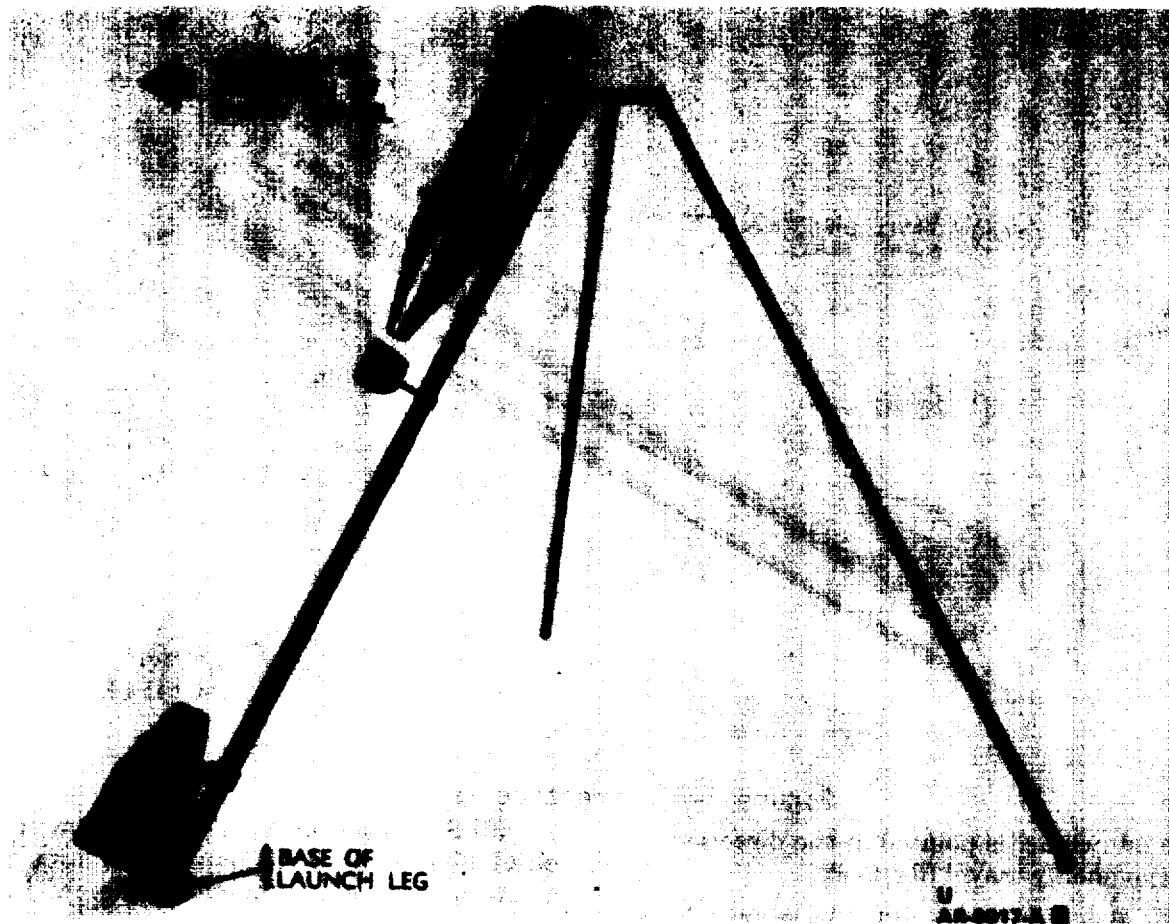


Figure 2-6. Tripod erected.

read for each 500-foot (150 meters) length of type WD-1/TT telephone cable or about 6 ohms should be read for each 500 feet (150 meters) of electrical power cable. Because of the high resistance of the WD-1/TT cable, test set M51 may not indicate a good circuit when used to test a 4000 foot (1200 meters) length of WD-1/TT cable even if the circuit is good. If the M51 indicates a bad circuit, and the length of the circuit is long, recheck the circuit with a galvanometers if available. If circuit resistance is too high, check the lead and correct as necessary.

2-6. Hookup of Single Kit (fig. 2-9)

NOTE

Refer to paragraphs 2-7 and 2-8 below for multikit hookups.

- a. Cut nylon tapes (if not previously done) on the demolition circuit wooden subpack (fig. 1-7) and remove the lid.

CAUTION

Ensure that the combination shorting plug and dust cover is assembled to the connector of the demolition circuit. Do not remove the shorting plug until ready to connect the demolition circuit.

b. Remove the demolition circuit from the subpack and from the plastic packing bag and place the plastic bag over rocket nozzle. Tape securely around narrow section of nozzle to provide moisture and dust protection. This is most important if you are going to leave the kit set up for some time.

Ensure that the continuity plug (fig. 1-5) is threaded onto the interkit connector. If continuity plug is missing, short the two pins in interkit connector with a piece of wire.

- d. Ensure that firing plug is attached to the firing cable connector.
- e. Connect firing circuit to field firing lead as follows:

WARNING

Before connecting firing circuit to field firing lead, operator in charge must assure that all other personnel are at least 500 feet (150 meters) from nearest kit and under cover or at least 4000 feet away (1200 meters) if no overhead cover is available.



Figure 2-7. Removing protective disk from warhead and mating rocket motor to warhead.

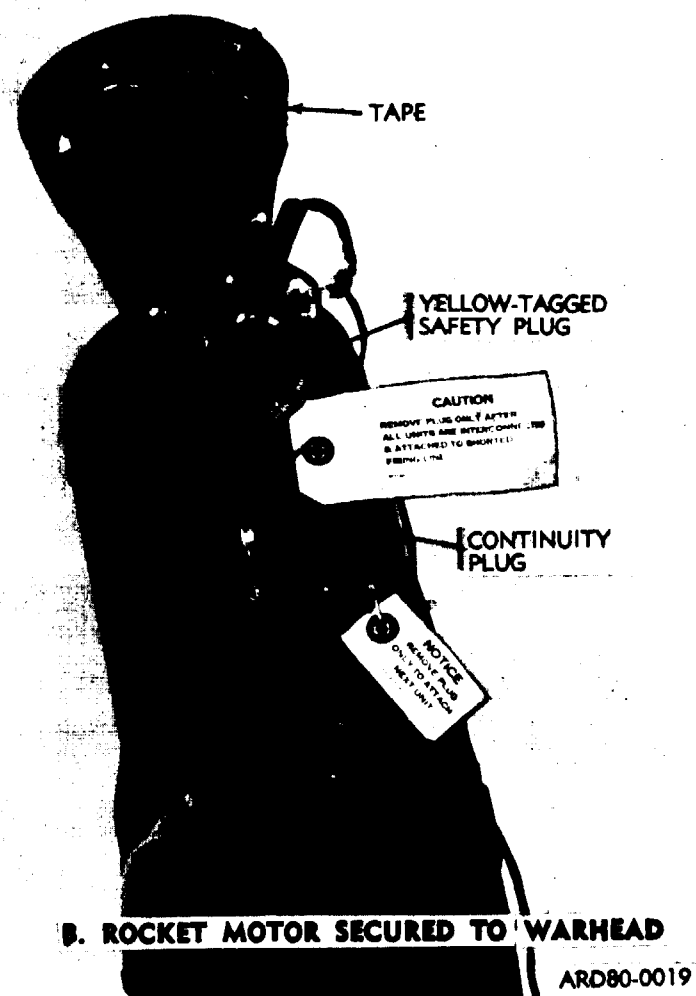


Figure 2-8. Securing rocket motor to warhead.

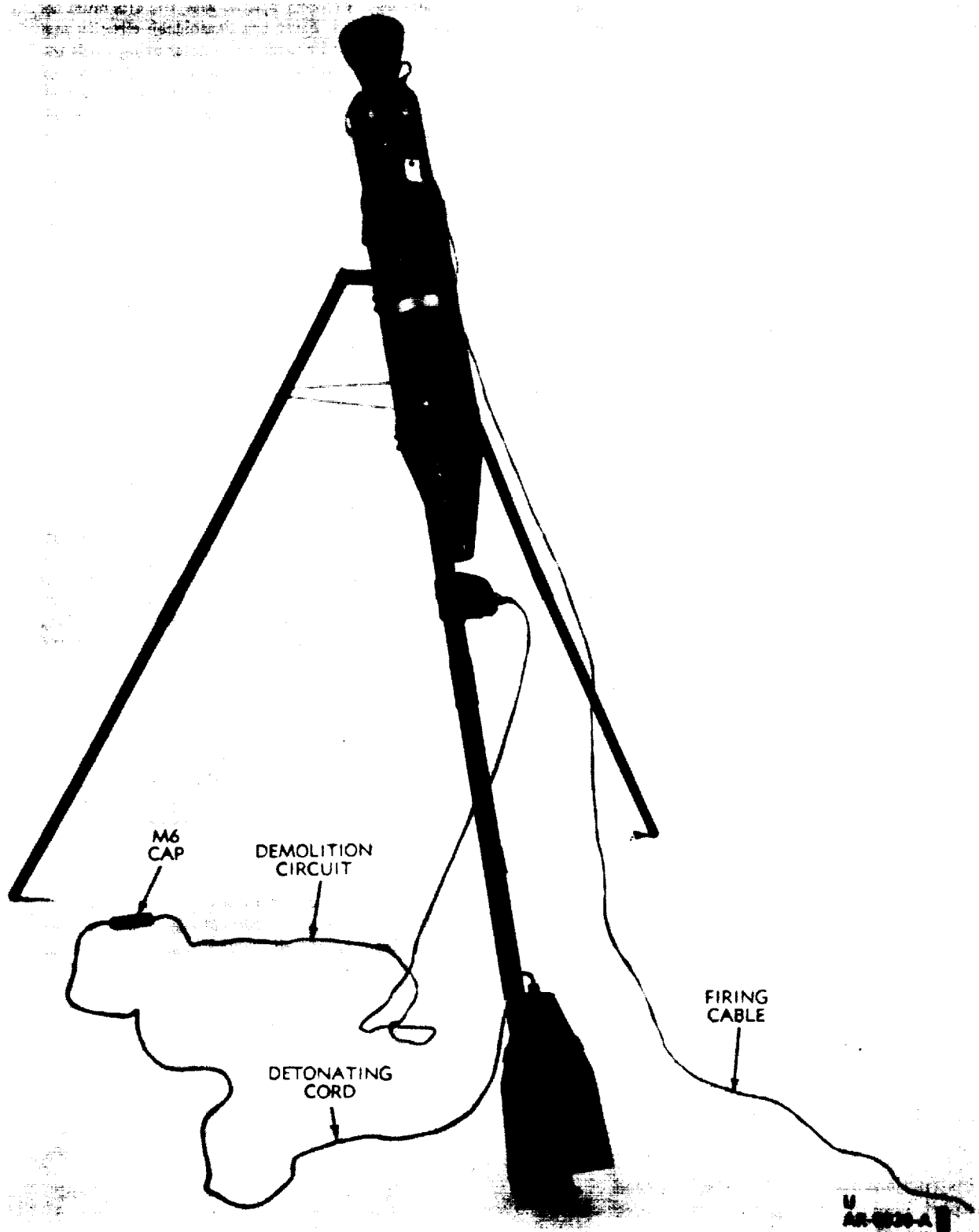


Figure 2-9. Single kit hookup, ready to fire.

(1) Pull protective sheath from end of firing lead (A, fig. 2-10).

(2) Untwist and separate the two bared conductors (B, fig. 2-10), and assure that conductors are clean and uncorroded. If corrosion is present, it may be easier to strip insulation from conductors below bared portions than to scrape corrosion off bared conductors. Each wire must have at least two inches of bared conductor.

(3) Splice one conductor of the firing lead to each conductor of the field firing lead. Make sure splices are secure.

(4) Insulate each splice with tape to prevent shorting.

f. Remove dust cover from M 57 and dust cover/shorting plug from demolition circuit electric lead and insert electrical connector of demolition circuit into mating connector on firing device M57 (A fig. 2-11).

CAUTION

When laying out detonating cord, make sure there are no kinks, sharp bends or overlapping of detonating cord.

g. Lay out demolition circuit electrical wire on ground in a direction away from the kit and then lay detonating cord on ground from end of wire back to kit.

h. Remove the protective adhesive tape from the cap well of the shaped charge and insert the non-electric blasting cap (crimped to end of detonating cord) into the cap well (B, fig. 2-11). Place blasting cap into well and secure by threading priming adapter M1A4 into well.

i. Remove yellow-tagged safety plug (fig. 2-12) from rocket motor. Retain the safety plug until kit is fired.

NOTE

Personnel that regularly use the kits should keep one or two safety plugs on hand to replace a damaged or missing plug.

j. Take plug and blasting machine to the firing location.

k. Proceed to final preparations (para 2-9).

2-7. Multi-Kit Hookup of Closely Spaced Kits (Two, Three or Five Kits)

NOTE

No instructions are given for closely spaced multi-kit hookups using four kits since there would be little difference in the cratering effect between 3 or 4 kit hookups. A hookup of more than five kits is not considered practical.

a. General. Instructions in paragraphs 2-3b, 2-4 and 2-5 apply to a multi-kit hookup. However, in the hookup of closely spaced kits, the kits must be interconnected. First the demolition circuits are interconnected by taping the detonating cords together at the plastic sleeve area, thus forming an explosive junction of the electric blasting caps and detonating cord (see *b* below). Then the rocket motors are interconnected by attaching the firing cable connector of one rocket motor to the interkit connector of another. BOTH of these interconnections are necessary to assure simultaneous firing of all kits (see *c* below); figure 2-13 shows the general layout for these interconnections.

b. Interconnection of demolition circuits (forming explosive junction) (fig. 2-14).

(1) Cut nylon tapes of each demolition circuit wooden subpack, if not previously done, and remove the lid (fig. 1-7).

CAUTION

Ensure that the combination shorting plug and dust cover is assembled to the connector of the demolition circuit. Do not remove the shorting plug until ready to connect the demolition circuit.

(2) Remove each demolition circuit from its subpack and plastic packing bag. Place each plastic bag over each rocket nozzle and tape securely around narrow section of nozzle. This is most important if kits are to be left emplaced for a long period prior to firing since it provides a dust and moisture barrier.

NOTE

Normal demolition procedures would call for connection of the demolition circuits AFTER interconnection of the rocket motors and connection of the circuit to the field firing lead. This standard order of assembly is being varied in this procedure to ease the assembly.

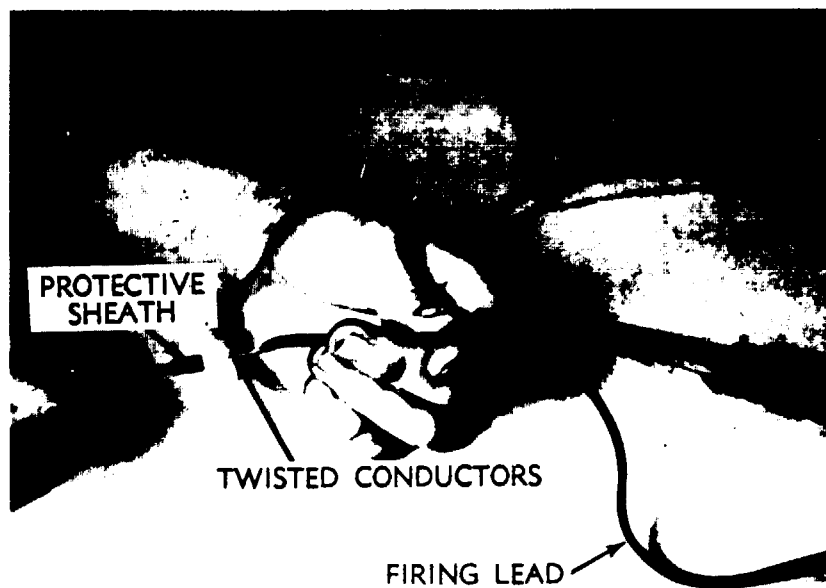
CAUTION

When laying out detonating cord, make sure there are no kinks, sharp bends, or overlapping of individual cords.

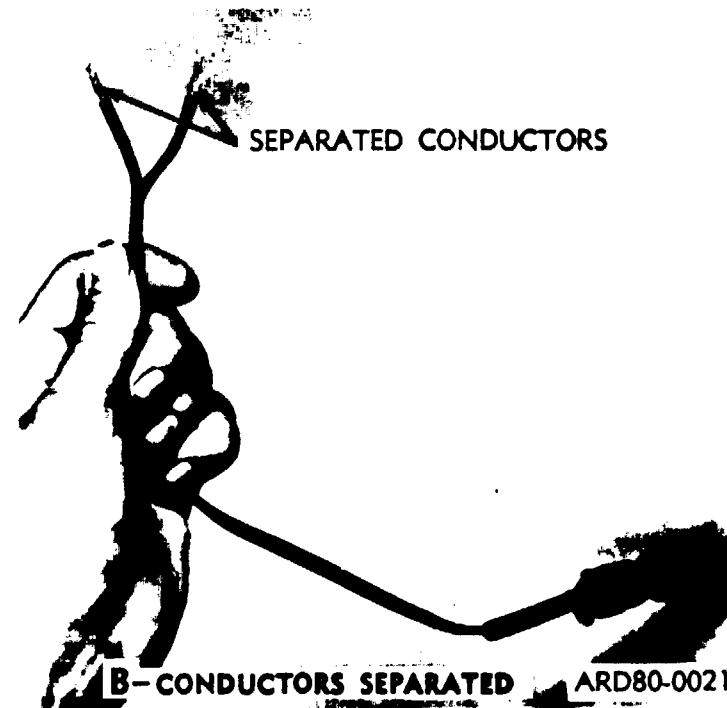
(3) Lay out demolition circuit electrical wire on ground in a direction toward the center of the assembled kits and then lay detonating cord on ground from end of wire back to its kit.

(4) Remove the protective adhesive tape from each shaped charge cap well and insert each non-electric blasting cap (crimped to end of detonating cord) in the well of its kit's shaped charge (B, fig. 2-11). Secure the caps in the wells by threading each priming adapter, M1A4 into its well.

(5) Place all plastic covered detonating cord/cap junctions together so that they are all aligned



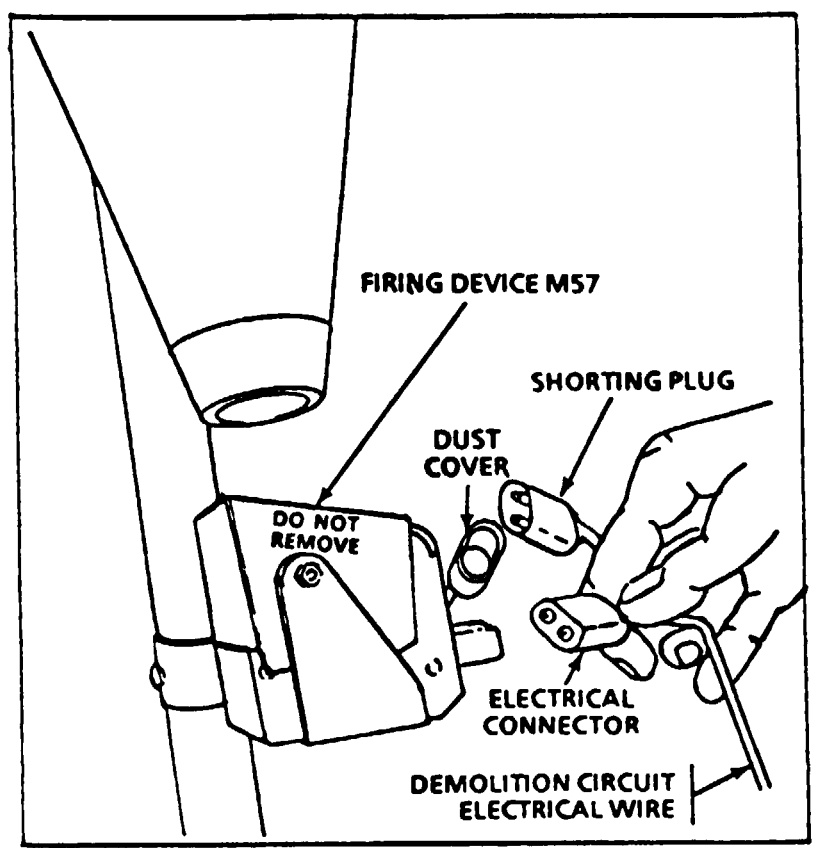
A-PROTECTIVE SHEATH REMOVED



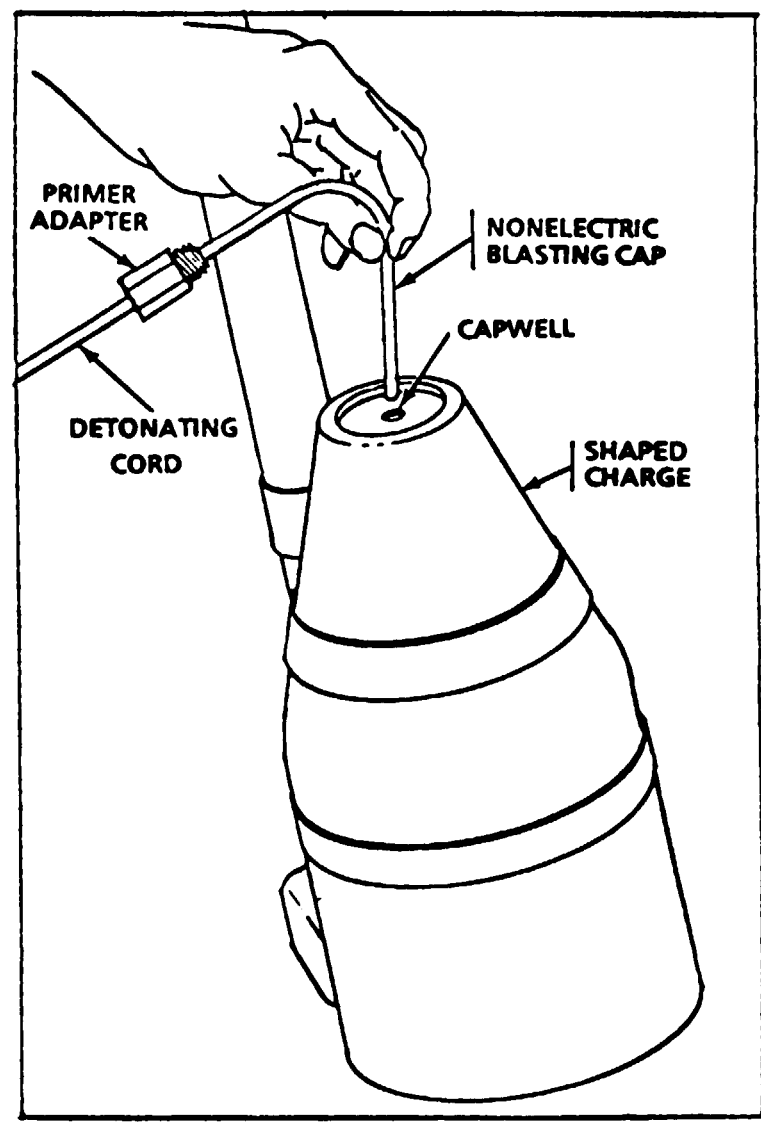
B-CONDUCTORS SEPARATED

ARD80-0021

Figure 2-10. Preparing firing lead.



A-SECURING ELECTRICAL CONNECTORS



B-INSERTING CAP IN SHAPED CHARGE

U
AR 0022-C

Figure 2-11. Connecting demolition circuit.

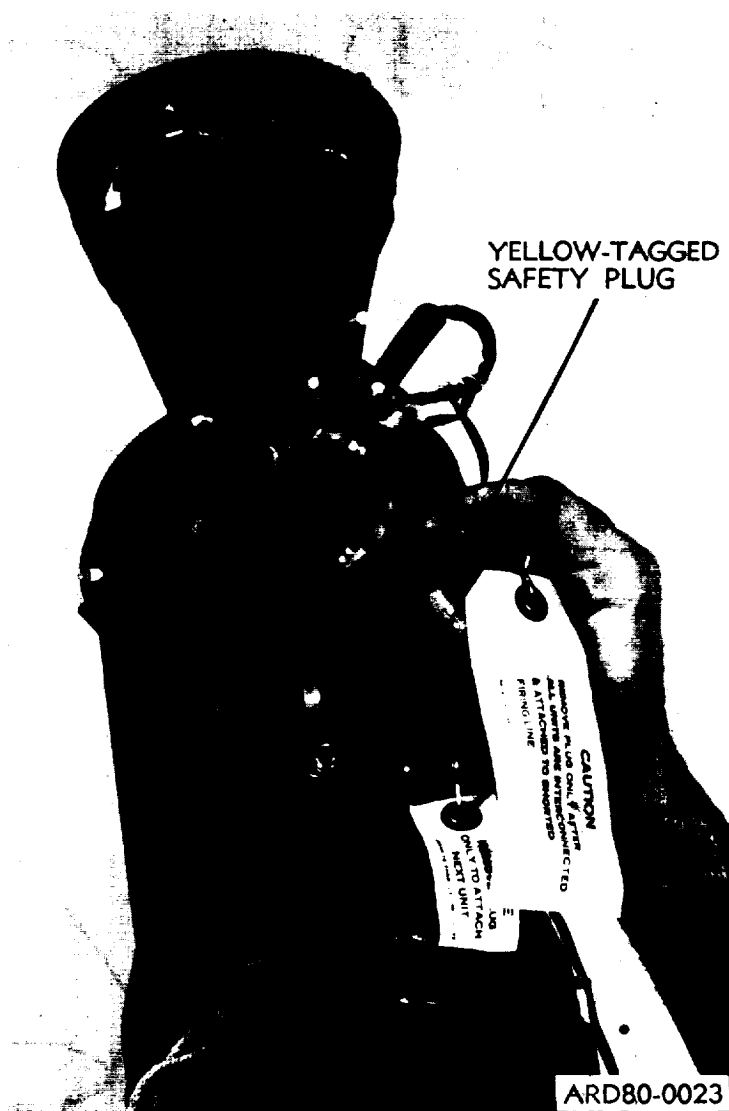


Figure 2-12. Removing yellow-tagged safety plug.

and the detonating cords are all on the same side. Take care not to kink the detonating cord. Tape the junctions together and tape the detonating cords adjacent to the junctions as well. Make sure everything remains properly connected and that the tape is secured.

c. *Interconnection of Rocket Motors.*

NOTE

The suggested method of rocket motor interconnection is to have operator begin with the kit farthest from the blasting machine and work toward the kit nearest the blasting machine. (The designations of "farthest kit" and "nearest kit," as used hereafter, refer to the position of the kits in relation to the blasting machine.)

(1) Remove and retain continuity plugs (fig. 2-15) from all kits EXCEPT farthest kit.

(2) Assure that the continuity plug is threaded onto the interkit connector of the farthest kit in order to complete the circuit.

(3) Remove the firing lead plug from the firing cable connector of the farthest kit and thread the cable connector (fig. 2-16) onto the inter-kit connector on next kit in line.

(4) Repeat interconnecting procedure of (3), above, with each kit in line, working from farthest kit toward nearest kit, as shown in figure 2-12.

(5) Do not remove the firing lead plug from the firing cable connector of the firing circuit of the nearest kit. Check to assure that plug is properly secured to cable.

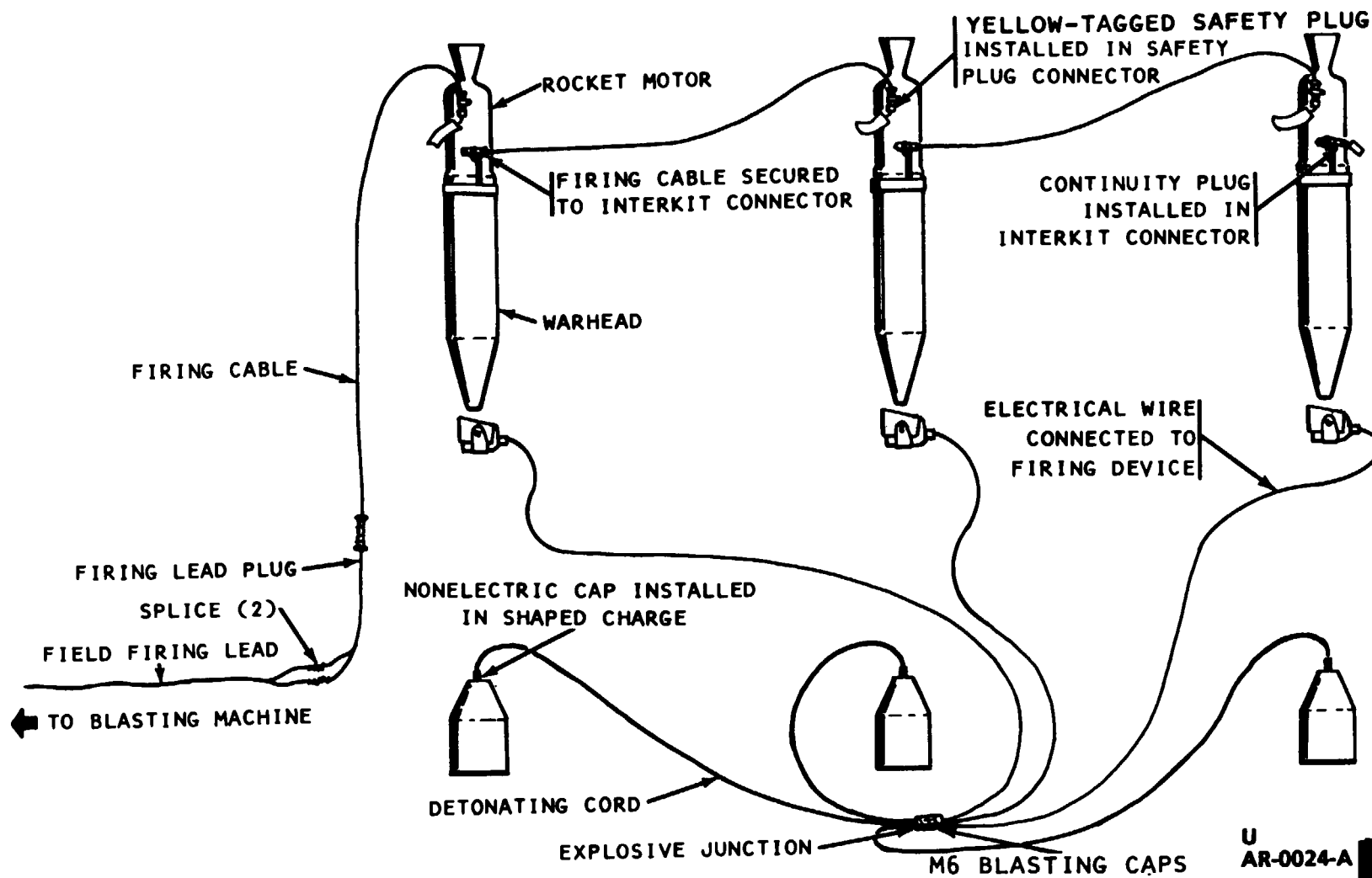


Figure 2-13. General layout for interconnecting closely spaced kits.



Figure 2-14. Multi-kit hookup, closely spaced.

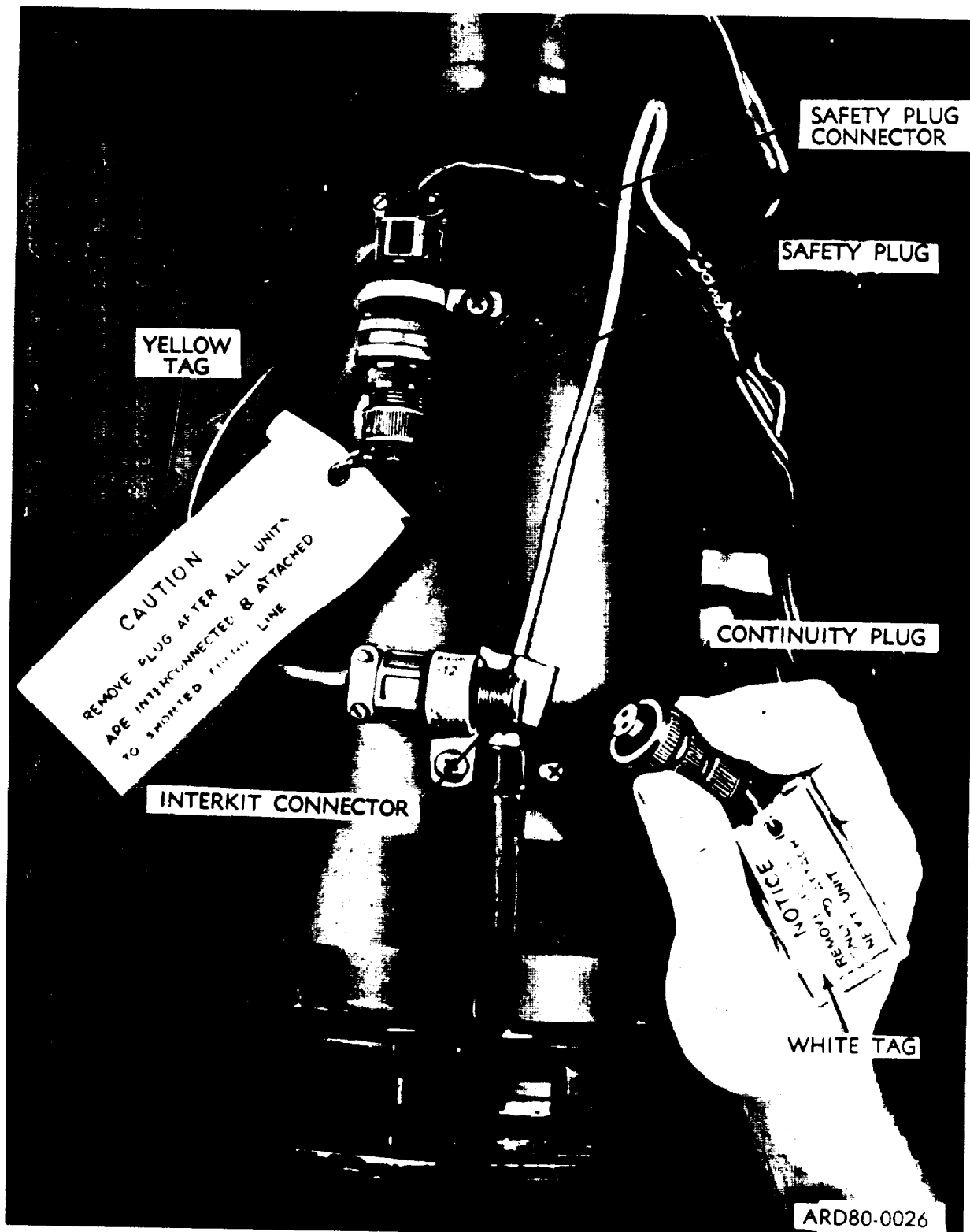


Figure 2-15. Removing continuity plug.

d. *Final Check of Hookup.* Make final check of hookup by assuring that:

(1) There are no kinks, sharp bends or overlapping of detonating cord lengths.

(2) Detonating cord passes no closer than three feet from any kit except kit to which it is secured.

(3) Continuity plug is installed in farthest kit.

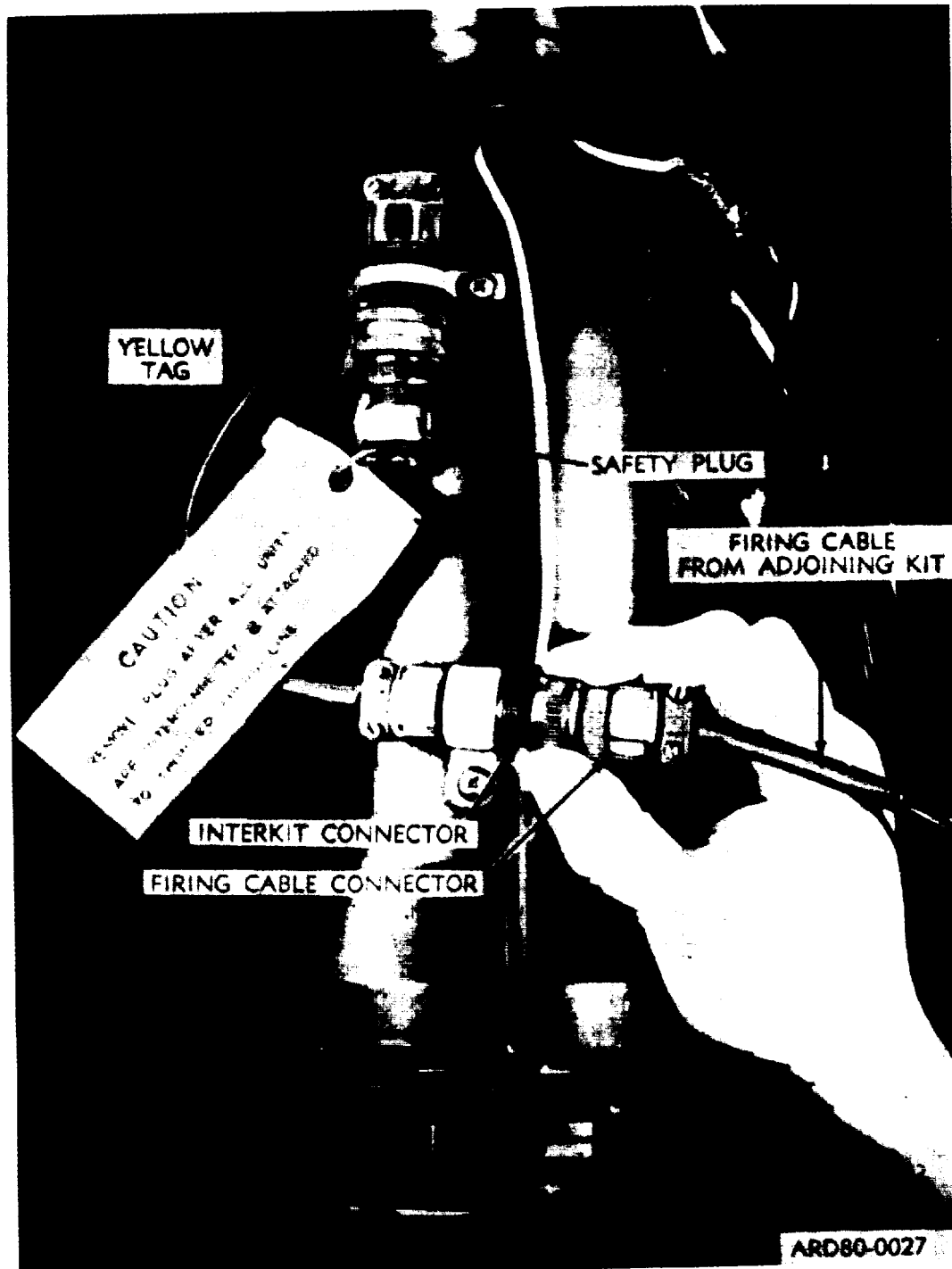


Figure 2-16. Securing firing cable connector.

(4) Kits have not been missed in rocket motor interconnection or in demolition circuit interconnection.

(5) All connections are secure.

e. Final Procedures At Kit Site.

(1) Connect firing circuit to field firing lead as follows:

WARNING

Before connecting firing circuit to field firing lead, have operator in charge assure that all other personnel are at least 500 feet (150 meters) from nearest kit and under cover (or at least 4000 feet (1200 meters) away if no overhead cover is available).

(a) Pull protective sheath from end of firing lead (A, fig. 2-10).

(b) Untwist and separate both bared conductors (B, fig. 2-10) and assure that conductors are clean and uncorroded. If corrosion is present, it may be easier to strip insulation from conductors below bared portions than to scrape corrosion off bared conductors. Each wire must have at least two inches of bared conductor.

(c) Splice one conductor of the firing lead to each conductor of the field firing lead. Make sure splices are secure.

(d) Insulate each splice with tape to prevent shorting.

(2) Remove yellow-tagged safety plug (fig. 1-5) from each rocket motor after all units are interconnected and attached to the shorted firing line. Retain the plugs.

(3) Count yellow-tagged safety plugs to assure that number of removed plugs agrees with number of kits to be fired.

(4) Count continuity plugs to assure that number of removed plugs is one fewer than number of kits to be fired.

(5) Retain all plugs until after firing.

(6) Take plugs and blasting machine to the firing location.

(7) Proceed to final preparations (para 2-9).

2-8. Multi-Kit Hookup of Widely Spaced Kits (2 to 15 Kits)

(fig. 2-17)

a. Airfield Pocking. In operations like airfield pocking, up to 15 kits may be fired at once by the interkit firing circuit if there is at least 25 feet (7.5 meters) between kits. This distance is necessary to prevent the blast of one kit from interfering with the operation of others. Even though the rockets of all kits are initiated by the same elec-

trical impulse, there may be a difference of a few milliseconds in shaped charge initiation. As a result of this time difference, the blast from the shaped charge on one kit could topple another kit before its shaped charge fires if it is closer than 25 feet (7.5 meters) to its neighboring kit. Refer to figure 2-17 for interconnection of rocket motors.

(1) A multi-kit hookup of widely spaced kits differs from a multi-kit hookup of closely spaced kits as follows:

(a) In order to interconnect the electrical firing circuits for the rocket motors, the firing cables of all kits (except nearest kit) must be extended by using additional wire. See *c* below.

(b) there is no interconnection of demolition circuits, since each circuit remains independent and is connected to its respective kit only.

(2) Instructions in paragraphs 2-3b, 2-4 and 2-5 above apply to this multi-kit hookup.

NOTE

The normal order of assembly of demolition circuits has again been varied here (as with closely spaced kits) to ease the assembly process.

b. Installing Demolition Circuits. Beginning with nearest kit, install each demolition circuit in accordance with the procedures in paragraphs 2-6a through 2-6h above.

Interconnection of Rocket Motors.

NOTE

Operator will determine firing circuit path to be used, and make a sketch of the path prior to undertaking steps below.

NOTE

The suggested method of rocket motor interconnection is to have operator begin with farthest kit and work toward nearest kit. (The designations of "farthest kit" and "nearest kit," as used here, refer to the position of the kits in relation to the end of the field firing lead.)

(1) Extend rocket motor firing cable of farthest kit as follows:

(a) Cut firing cable in half.

(b) Strip three inches (7.5 cm) of insulation from the two conductors (wires) at each cut end of cable.

NOTE

Use 500-foot (150 meter) reels (using cable reel and reeling machine) of electrical power cable or type WD-1/TT telephone

cable to extend the firing cables. Use only as much cable as necessary.

(c) Strip three inches (7.5 cm) of insulation from the two conductors at the free end of the reel of wire.

(d) Splice free end of reeled wire to the portion of firing cable still attached to rocket motor, i.e., splice one conductor to the black wire and splice the other conductor to the blue wire. Insulate splices with electrical tape.



Figure 2-17. Multi-kit hookup, widely spaced.

(e) Assure that the continuity plug is threaded onto the interkit connector in order to complete the circuit.

(f) Taking along cutoff portion of rocket motor firing cable, lay out reeled wire to next kit to be connected.

(g) When enough extension wire has been unreeled, cut wire and strip three inches (7.5 cm) of insulation from the two conductors in the extension wire.

(h) Secure extension wire to cut off portion of rocket motor cable in same manner as indicated in c (1) (d) above.

(2) Connect just-extended cable to next rocket motor in line as follows:

(a) Remove and set aside firing lead plug from the firing cable connector of the just-extended cable.

(b) Remove and retain continuity plug (fig. 2-15) from next kit's interkit connector.

(c) Thread the firing cable connector of the just-extended cable on to the next kit's interkit connector (fig. 2-16) and secure it.

(3) Working from farthest kit toward nearest kit (excluding the nearest kit), extend all cables and connect all rocket motors in the manner described in paragraphs c(1) and c(2) above. The firing circuit of the nearest kit remains intact for connection to the field firing lead.

d. Final Check of Hookup. Working from nearest kit toward farthest kit, make a final check of hookup by assuring that:

(1) All electrical connections and splices are secure.

(2) All splices are insulated to prevent shorting.

(3) No kite have been missed in the rocket motor interconnection.

(4) Continuity plug is installed in farthest kit in line.

e. Final Procedures At Kit Site. Perform the final procedures in paragraph 2-7e above.

2-9. Final Preparations

a. At firing location unshort firing lead conductors and check circuit with a blasting galvanometers or Blasting Cap Test Set M51. If a galvanometers is being used, about 23 ohms should be read for each 500-foot length (150 meters) of type WD-1/TT telephone cable, about 6 ohms should be read for each 500 feet (160 meters) of electrical power cable. Because of the high resistance of the WD-1/TT cable, test set M51 may not indicate a good circuit when used to test a 4000 foot (1200 meters) length of the cable even if the circuit is mod. If M51 indicates a bad circuit end the length of the circuit is long, recheck the circuit with a galvanometer, if available.

b. If circuit does not check out properly, reshort

firing lead conductors and take whatever corrective action is required.

WARNING

If necessary to work in area of kit(s), temporarily reinstall each yellow-tagged safety plug. Remove each plug when work is completed.

CAUTION

Never use any power source other than a blasting machine to fire the M180 - it could produce a warhead misfire.

c. If circuit checks out, actuate blasting machine several times with nothing attached to it. Then attach one firing lead conductor to each terminal of blasting machine.

2-10. Operation

Fire kit(s) by using maximum possible force to actuate blasting machine (standard SO cap) or keep squeezing handle until fire lamp lights (M341).

2-11. Recovery of Kit(s) Prepared For Use But Not Used

CAUTION

As required, clean and thoroughly dry all parts of recovered kit(s).

a. Disassembly of Firing Circuit(s).

(1) Disconnect field firing lead from blasting machine terminals and short firing lead conductors.

(2) At kit site, reinstall a yellow-tagged safety plug in the safety plug connector of each kit.

(3) Unscrew priming adapter (s) and remove non-electric blasting cap(s) (fig. 2-7) from shaped charge(s) and place a piece of tape over the cap well(s) of the shaped charge(s).

(4) Disconnect the field firing lead from the firing lead of nearest or single kit. Short the conductors of the firing lead and wrap them with tape.

(5) For multi-kit hookups, disconnect the firing cable connectors from the interkit connectors of remaining kits. Connect the firing lead plugs to the firing cable connectors and connect the continuity plugs to the interkit connectors.

(6) Coil firing circuit(s) (with extension wire if used) and secure with tape. The coil should look similar to the configuration shown in B, fig. 2-18.

(7) Short the field firing lead conductor.

(8) Reel the field firing wire onto the reel(s).

b. Disassembly of Demolition Circuit(s).

(1) If disassembling a closely spaced hookup, remove the tape from the explosive junction (fig. 2-13).

(2) Disconnect demolition circuit electrical



Figure 2-18. Kit with firing circuit taped.

connector from firing device electrical connector and install both protective covers.

(3) Remove plastic packing bag from rocket nozzle.

(4) Coil demolition circuit and replace in its packing bag.

(5) Press as much air as possible out of bag; tape bag closed, place inside of wooden subpack, and tape cover in place.

c. Disassembly of Remaining Components.

(1) Unlatch peripheral clamp, carefully remove rocket motor from warhead and set rocket motor aside (figs. 2-7 and 2-8).

(2) Place protective disk over warhead and latch peripheral clamp.

(3) Tip tripod slightly, bring tripod legs to-

gether, and carefully lower tripod to ground (fig. 2-5).

(4) Separate each support leg and fold lower section against upper section.

(5) Separate launch leg, and place lower section against upper section, assuring that base end of launch leg is near firing device.

d. Repacking Kit(s)

(1) Position components and strap or tape in three places as shown in figure 1-11.

(2) Position barrier bag and packing materials as shown in figure 1-10.

(3) Compress bound fiber pads slightly against sides of shipping container and place kit and demolition circuit wooden subpack between pads.

(4) Position remaining packing materials and

pull barrier bag together over all packing materials.

(5) Press as much air as possible out of barrier bag tape bag closed.

(6) Close container top and refasten wire loops along edge of container.

(7) Mark exterior of wooden box to indicate it will be given priority of issue. If original shipping box is not being used, remark box with complete information normally found on box (Chapter 1).

Table 2-1. Operator's Checklist

No.	Operation
SINGLE KIT	
1.	Unpack kit.
2.	Assemble and erect tripod.
3.	After assuring that yellow-tagged safety plug is tightly installed to its connector, unlatch peripheral clamp on warhead to remove protective disk and mount rocket motor. Rotate rocket motor so that continuity plug and safety plug are on top. Latch peripheral clamp to secure motor to warhead.
4.	Lay field firing lead between kit location and firing location. Make splices, as necessary, and then check continuity of wire with galvanometers or Test Set M51.
5.	Unpack demolition circuit and place its plastic bag over rocket motor nozzle.
6.	Remove protective sheath from firing lead. Untwist and separate conductors, and connect firing lead to field firing lead.
7.	Attach demolition circuit by connecting electrical connector to M57 firing device and securing nonelectric blasting cap in cap well of shaped charge and secure with attached priming adapter M1A4.
8.	Assure that continuity plug and firing lead plug are tightly installed to their connectors.
9.	Remove yellow-tagged safety plug from rocket motor. Keep safety plug and proceed to firing location.
10.	Check firing circuit using galvanometers or Test Set M51. Connect circuit to blasting machine. Assure firing area is clear, and actuate machine to fire kit.
CLOSELY SPACED KITS (2, 3 OR 5)	
1.	Refer to figure 2-2 to determine deployment setup, and mark target points.
2.	Conduct following operations for each kit: a. Unpack Kit. b. Assemble and erect tripod. c. After assuring that yellow-tagged safety plug is tightly installed to its connector, unlatch peripheral clamp on warhead to remove protective disks and mount rocket motor. Rotate rocket motor so that continuity plug and yellow-tagged safety plug are on top. Latch peripheral clamp to secure motor to warhead.
3.	Lay field firing lead to the firing location from the nearest kit, making splices as necessary. Check continuity of wire with galvanometers or Test Set M51.

Table 2-1. Operator's Checklist-Continued

No.	Operation
4.	Unpack each demolition circuit and place a plastic bag over each rocket motor nozzle.
5.	Connection of demolition circuits: a. Insert electrical connector of each demolition circuit into mating connector of each M57 firing device. b. Insert nonelectric blasting cap of each circuit into capwell of each shaped charge and secure with attached priming adapter M1A4. c. Interconnect the demolition circuits by taping all detonating cordblasting cap junctions together to form an explosive junction.
6.	Connection of rocket motors: a. Remove continuity plugs from all interkit connectors except the farthest kit. b. Remove firing lead plug from all firing cable connectors except the nearest kit. c. Starting from the farthest kit, connect the firing cable connector to the interkit connector of the next kit.
7.	Remove protective sheath from firing lead. Untwist and separate conductors, and connect firing lead to field firing lead.
8.	Remove each yellow-tagged safety plug from rocket motor. Keep all safety plugs and continuity plugs and proceed to firing location.
9.	Check firing circuit using blasting galvanometers or Test Set M51. Connect circuit to blasting machine. Assure firing area is clear, and actuate machine to fire kits.
WIDELY SPACED KITS (2 TO 15)	
1.	Determine deployment setup, assuring that there is at least 25 feet (7.5 meters) between kits, and mark target points.
2.	Conduct following operations for each kit: a. Unpack kit. b. Assemble and erect tripod. c. After assuring that a yellow-tagged safety plug is tightly installed to its connector, unlatch peripheral clamp on warhead to remove protective disk and mount rocket motor. Rotate rocket motor so that continuity plug and yellow-tagged safety plug are on top. Latch peripheral clamp to secure motor to warhead.
3.	Lay field firing lead to the firing location from the nearest kit making splices as necessary. Check continuity of wire with galvanometers or test set M51.
4.	Unpack demolition circuit and place a plastic bag over each rocket motor nozzle.
5.	Attach each demolition circuit to its respective kit by connecting electrical connector to M57 firing device and securing nonelectric blasting cap in cap well of shaped charge and secure with attached priming adapter M1A4.
6.	Connection of rocket motors: a. Remove continuity plugs from all interkit connectors except the farthest kit. b. Remove firing lead plug from all firing cable connectors except the nearest kit. c. Extend rocket motor firing cables, as necessary, by splicing one extension wire to black wire of firing cable and the other extension wire to the blue firing cable wires.

Table 2-1. Operator's Checklist-Continued

No.	Operation
	d. Starting from the farthest kit, connect the firing cable connector to the interkit connector of the next kit.
7.	Remove protective sheath from firing lead. Untwist and separate conductors, and connect firing lead to field firing lead.
8.	Remove each yellow-tagged safety plug from each

Table 2-1. Operator's Checklist—Continued

No.	Operation
	rocket motor. Keep all yellow-tagged safety plugs and continuity plugs and proceed to firing location.
9.	Check firing circuit using galvanometers or Test Set M51. Connect circuit to blasting machine. Assure firing area is clear, and actuate machine to fire kits.

Section II. OPERATION OF MATERIEL USED IN CONJUNCTION WITH M180 DEMOLITION KIT

2-12. General

Demolition kit M180 is fired by a 50-cap blasting machine and a firing lead of electrical power cable or type WD-1/TT telephone cable. A 500-foot (150 meters) length of cable is usually wound on a reel (cable reel and RL-39 reeling machine). A blasting galvanometers or blasting cap test set M51 is used to test the firing circuit. Knife, pliers, blasting cap crimper, and insulation tape are also used in opening containers, splicing electrical wires, etc. Operation of these items is described in FM 5-25 and TM 9-1375-213-12.

NOTE

If available, a sallee closer (see RPSTL) should be used to open (or resecure) wire-bound box loops. If a sallee closer or a screwdriver and pliers is/are not available, the screwdriver blade of a cap crim-

per may be used but *NEVER* use the crimper as a pliers or wire cutter.

2-13. Related Items

Table 2-2 lists the preferred items to be used with Demolition Kit M180. (See SC 1375-94-CL-P02 for complete details, all are part of the standard demolition equipment set covered by that supply catalog except the older model 50 cap blasting machine which should be a TO & E item for user organizations.)

NOTE

Older model 50 cap or 100 cap blasting machines may be used with the M180 if they are in good working order but the models listed are preferred especially for multi-kit hook ups.

Table 2-2. Related Items

Item	NSN
Battery, special, silver chloride, dry cell: BA-245/u; 0.9 v total voltage; cylindrical shape; 2-terminal, stud and nut type; 3/4 in. (18.75 mm) diameter, 2 3/8 in. (59.0 mm) length; Spec MI L-B-13136B (standard battery) (installed in galvanometers)	6135-00-128-1632
Battery, special, silver chloride, dry cell: BA-2245/u; 0.9 v total voltage; cylindrical shape, 2-terminal, stud and nut type; corrosion-resistant; 3/4 in. (18.75 mm) diameter, 2 3/8 in. (59.00 mm) length; Spec MIL-B-13136B (low temperature battery for galvanometers.)	6135-00-833-9909
Blasting machine, M34: 50-cap capacity.	1375-00-567-0223
OR	
Blasting machine: 50-cap capacity.	1375-00-141-9496
Cable, power, electrical: No. 18 AWG 2-conductor wire 500-ft. (150 meters) reel.	6145-00-299-6172
OR	
Cable, telephone: 2-conductor wire 500-ft (150 meters) reel, type WD 1/TT, Spec MIL-C-13294C.	6145-00-226-8606
Crimper, blasting cap: M2 w/fuze cutter; MIL-C-43438.	5120-00-029-0683
Insulation tape, electrical: Adhesive; cotton; coated rubber impregnated per spec; 0.75 in. (18.75 mm) w, 82.5 ft (24.75 meters) to 85 h. (25.50 meters) lg, 0.015 in (0.375 mm) thk, dielectric strength per spec; color coded black; 100 rolls per carton; Fed Spec HH-I-510.	5970-00-644-3167
Knife, pocket: special tools, can opener, punch blade, screwdriver and bottle opener; w/clevis; (MIL-K-818); one cutting blade, lg of blade 3 1/4 in. (81.25 mm)	5110-00-161-2205
Pliers: Lineman's w/slide cutter 8 in. (200 mm) nom size; (Fed Spec GGG-P-471, type IX, class 1, style A).	5120-00-239-8251
Reel, cable: 9 in. (225 mm) dia x 8 in (200 mm) lg; (No. DR-8)	8130-00-407-7859
Reeling machine, cable, hand: removable reel; collapsible frame; 7.500 in (187.5 mm) lg. 13.500 in. (337.5 mm) w, 7.250 in. (181.25 mm) h; (MIL-R-3206, type RL-39B).	3895-00-498-8343
Test Set, Blasting Cap: M51 (Dwg 9227694).	4925-00-999-3454
OR	
Galvanometer, blasting: w/1 ea case and carrying strap; Spec W-B-411, type 1. When exhausted use NSN 4925-00-999-3454 Test Set Blasting Cap M51.	6625-00-539-8444

Section III. OPERATION UNDER UNUSUAL CONDITIONS

2-14 General

Operation of this kit under unusual conditions is the same as for normal conditions.

Limits can result in malfunctioning of the item. The firing temperature limits are -40°F (-40°C) to +130°F (+54°C) (fig. 2-1).

2-15 Related Items

WARNING

The M180 (and other directly-operated, electrically-initiated demolition circuits) must not be set up or operated during periods of impending or active electrical storms.

CAUTION

Firing of the M180 kit at temperatures above or below the firing temperature

All the related items listed in table 2-2 are also used under unusual conditions with the exception of galvanometers batteries: in extremely cold conditions, only the low temperature batteries; (BA-2245/u) may be used; in normal to extremely hot conditions, only the standard battery (BA-245/u) may be used.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section 1. SERVICE UPON RECEIPT OF MATERIEL

3-1. Precautions

WARNING

The yellow-tagged safety plug is a shorting device for the kit's electro-explosive initiators and must be in place when working in the area of an assembled kit or when a rocket motor is being handled. The safety plug must be removed prior to firing.

NOTE

If the safety plug is lost or missing, a safety plug (the original or one from previously fired kit) should be installed as soon as possible. Do not handle a kit without a safety plug any more than necessary. Do not transport a kit without a safety plug any long distances.

When kit is unpacked assure that yellow-tagged safety plug is in place on rocket motor.

3-2. Inspection

When the kit is received, conduct an inspection to determine if it has been damaged. Figure 3-1 shows the general inspection flow chart. Determine if there is serious damage (total penetration, structural collapse, etc.) to the shipping container. If there is no serious damage and damage to the contents is unlikely, do not open the kit. Place the kit in the storage area. If the container is seriously damaged, proceed as follows:

a. Break the car seal holding wire twist lock (or hasp) on the shipping container and remove the car seal. Unfasten the wire loops (or hasps) holding the top of the container closed and open the container.

NOTE

If available, use a sallee closer (see RPSTL) to open or resecure wire-bound box loops. If a sallee closer or a screwdriver and pliers are not available, use the screwdriver blade of a cap crimper. DO NOT CUT the wire hops or use crimper as a pliers.

b. Inspect the barrier bag for rips or holes.

(1) If the barrier bag appears intact and damage to its contents appears unlikely, do not open the barrier bag. Repair or replace the container in accordance with the procedures in paragraph 3-4, repack as required and place kit in storage area

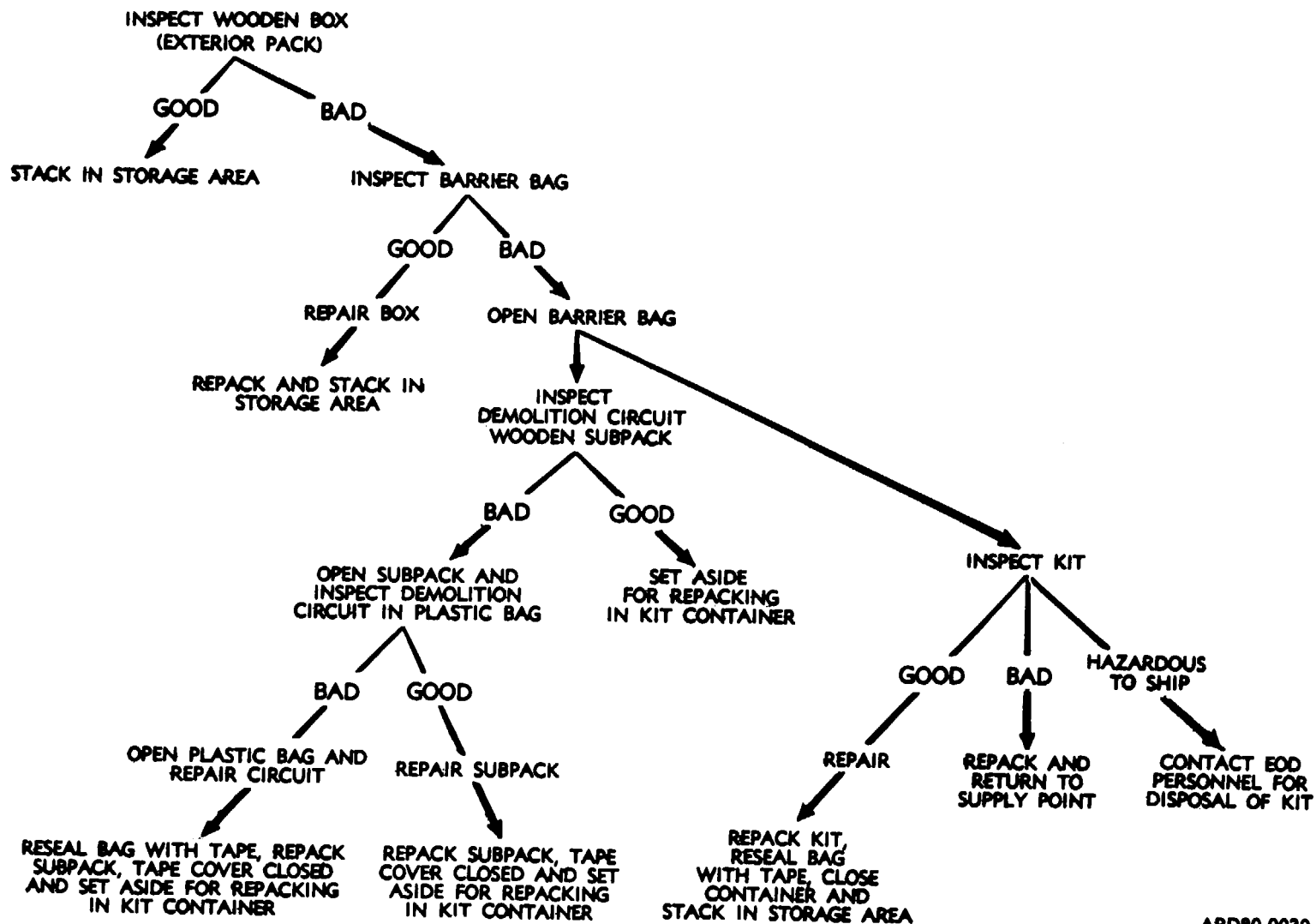
(2) If the barrier bag is ripped or torn or if damage to the contents seems likely, open the bag and remove the kit and demolition circuit wooden subpack from the container. Set the wooden subpack aside and unpack the kit components only to the extent necessary to determine the extent of damage. Use the applicable procedures of paragraph 2-4b(3).

(a) Inspect the unopened wooden subpack and kit components. If they are undamaged, repair or replace the bag and/or container, repack as required in accordance with the applicable procedures of paragraph 2-11d. Place kit in the storage area

(b) If the demolition circuit wooden subpack is damaged or if damage to the contents is suspected, open the subpack and inspect the demolition circuit without opening the plastic bag. Open the bag only if damage cannot be determined or if repair is necessary.

1. If the circuit is not damaged, repair the box as required, repack and tape the cover closed. Set the subpack aside for repacking in the kit container.

2. If the circuit is damaged, open the plastic bag (if not previously opened) and repair in accordance with the procedures in paragraph 3-7. Place the required circuit in the plastic bag and tape the bag shut. Place the bag into the box and



ARD80-0030

Figure 3-1. Inspection flow chart

tape the box cover closed. Set the subpack aside for repacking in the kit container. If the circuit is damaged beyond the authorized repair, repack all components (para 2-11d) and return the kit to the supply point.

(c) If the kit components are damaged, determine the type and extent of the damage.

1. If there is damage to the explosive components of the shaped charge, warhead, or rocket motor to the extent that the explosive filler is exposed or fragmented, the kit is in a hazardous

condition and should not be transported by user personnel. Contact EOD personnel for disposal of the kit.

2. If there is other damage, repair or replace damaged components, barrier bag, and container in accordance with the procedures in paragraphs 3-4 thru 3-6, repack as required using the applicable procedures of paragraph 2-11d and place the kit in the storage area. If the damage is beyond the authorized repair, repack and return kit to the supply point.

Section II. MAINTENANCE

3-3. General

Repair parts are not authorized for the equipment. Operator/organizational maintenance is limited to that provided in the following paragraphs.

3-4. Containers and Packing Materials

Containers and packing materials may be repaired or replaced. Replacement will be made using items from previously expended kits. Assure that all markings (nomenclature, lot identification, NSN, etc.) are transferred to the reworked/replaced items. When a container is damaged but there is no evidence of damage to the contents, or barrier bag, DO NOT OPEN BARRIER BAG, replace container ONLY.

3-5. Tripod

The authorized repair for the tripod is the straightening of bent legs.

3-6. Electrical Wires

Wires that have been severed or which have accidentally bared sections can be repaired.

a. To splice severed wires, use at least two inches of bare conductor from each wire and twist them together securely. Insulate each twisted splice with electrical insulating tape to prevent shorting.

b. Accidentally bared conductors should be repaired by covering with electrical insulating tape.

3-7. Detonating Cord

Detonating cord which has been severed may be repaired by tying the ends in a square or similar knot. Assure that at least six inches (150 mm) of each end extend beyond the knot. The six inch (150 mm) ends should lie flat against the cord and may be taped in place.

CHAPTER 4

SHIPMENT AND STORAGE

Section I. SHIPMENT

4-1. Precautions

WARNING

As with all ammunition containing electro-explosive initiators (EEI), avoid transporting or operating the M180 Demolition Kit in the vicinity of operating television, radio, radar, etc. transmitters. The radio frequency (RF) energy emitted by these transmitters can fire the EEI under same circumstances even with the shorting devices in place; for example, do not operate or transport the kit within 100 feet (30 meters) of an operating walkie-talkie. Figures for safe distances from various powered transmitters are given in TM 9-1300-206, appendix C.

a. Handle kits carefully since improper handling can degrade the ammunition so that it will not accomplish its mission.

b. Assure that ammunition being transported will not be damaged, contaminated or otherwise degraded to the extent that it becomes dangerous or its usefulness impaired.

c. Do not roll, drop or subject ammunition to high-stock loads.

d. Return as unserviceable ammunition that is subjected to severe handling and is damaged or suspected of being damaged.

4-2. Instructions

a. Ammunition transported in trucks, jeeps and other tactical vehicles will be blocked and braced. This blocking and bracing will be adequate to

withstand sudden stops and starts as well as off-road operations.

b. Load ammunition in an attitude which prevent movement.

c. If ammunition packing is broken or damaged, and the munitions are still serviceable, repair in accordance with the procedures in paragraph 3-4.

4-3. Transportation

Refer to TM 9-1300-206.

4-4. Shipment Data

Department of Transportation:

a. Demolition Kit, M180.

(DOT) shipping

designation ----- Explosive A

(DOT) container marking Rocket Ammunition w/
Explosive Projectile

National Stock Number

(NSN) ----- 1375-00-148-7159

Gross weight ----- 65 lb (74.25 kg)

Cubical displacement of

shipping container --- 7.2 cu ft. (0.216 M³)

DODIC ----- 1375-M965

Descriptive nomenclature

of packed item ----- Demolition kit, Cratering:
M180

b. Demolition kit, M270

(DOT) shipping

designation ----- Not applicable

(DOT) container marking Not applicable

National Stock Number

(NSN) ----- 6920-01-087-0038

Gross weight ----- 180 lb (81.0 kg)

Cubical displacement of

shipping container --- 8.0 cu ft (0.24 M³)

Descriptive nomenclature Demolition Kit, Cratering
of packed item ----- Training: M270 (inert)

Section II. STORAGE

4-5. Precautions

a. When it is necessary to store ammunition in the open, select a storage site not exposed to power lines and electrical cables.

b. Do not locate ammunition adjacent to reservoirs, water mains or sewer lines.

c. Select level, well drained sites free from readily ignitable and flammable materials.

d. Do not store ammunition under trees or adjacent to towers or other structures that attract lightning.

e. Provide nonflammable or fire-resistant over-

head covers (such as tarpaulin) for all ammunition. Maintain overhead air space of approximately 18 inches between cover and ammunition. Keep cover at least 6 inches (150 mm) from pile on ends and at sides, to permit air circulation.

4-6. Storage Data

a. Storage data for Demolition Kit M180 are indicated below. (Note that cited temperature limits refer to the temperature of the kit itself, rather than the temperature of the surrounding environment.)

Quantity-distance class ----- 1.1
Storage compatibility group E
Storage temperature limits:
Lower limit ----- -40°F-(-40°C)
Upper limit ----- + 140°F-(+60°C)

NOTE

Upper limits for storage must be strictly adhered to for safe and reliable operation. In unventilated containers, enclosures, shelters, freight cars, closed vehicles and similiar structures, temperatures considerably higher than the outside ambient temperature may be encountered. For

example, temperatures of approximately 160°F (+ 70°C) can be developed within such a structure exposed to an outside air temperature of 125°F (+ 52°C) plus the full impact of solar radiation for a period of four hours.

b. The restrictions specified in a above are not applicable to the M270 Demolition Kit since the kit is completely inert.

c. Minimum distances permitted between given quantities of explosives and inhabited buildings, etc., for ammunition in quantity distance class 1.1 are indicated in TM 9-1300-206.

4-7. Procedures

a. Use heavy, well supported dunnage to keep bottom tier of stack off ground and prevent it from sinking into ground.

b. Allow at least 6 inches (150 mm) of space beneath pile for air circulation.

c. Dig suitable trenches to prevent water from flowing under pile.

d. Use hard stand of bituminous material or gravel and sand in preference to excessive dunnage.

APPENDIX A

REFERENCES

A-1. PUBLICATION INDEXES

The following publication indexes should be consulted frequently for the latest changes or revisions of references given in this appendix and for new publication relating to the material covered in this manual:

Index of Administrative Publications	DA Pam 310-1
Index of Blank Forms	DA Pam 310-2
Index of Doctrinal, Training, and Organizational Publications	DA Pam 310-3
Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders	DA Pam 310-4
Index of Supply Catalogs and Supply Manuals (excluding types 7, 8, and 9)	DA Pam 310-6

A2. ARMY REGULATIONS

Reporting of Transportation Discrepancies in Shipments	AR 55-38
Transportation by Water of Explosives and Hazardous Cargo	AR 55-228
Military Traffic Management Regulation	AR 55-355
Malfunctions Involving Ammunition and Explosives	AR 75-1
Interservice Responsibilities for Explosive Ordnance Disposal	AR 75-14
Responsibilities and Procedures for Explosive Ordnance Disposal	AR 75-15
Accident Reporting and Records	AR 38540
Policies and Procedures for Firing Ammunition for Training, Target Practice, and Combat	AR 385-63

Identification of Inert

Ammunition and Ammunition Components . . .	AR 385-65
Fire Prevention and Protection	AR 420-90
Reporting of Item Discrepancies Attributable to Shippers	AR 735-11-2
Reporting of Quality Deficiency Data	AR 702-7

A-3. BLANK FORMS

Accident Report	DA Form 285
Record of Injury	DA Form 1051
Recommended Changes to Publications and Blank Forms	DA Form 2028
Equipment Inspection and Maintenance Worksheet	DA Form 2404
Maintenance Request	DA Form 2407
Equipment Maintenance Log . .	DA Form 2409
Ammunition Condition Report	DA Form 2415
Fire Report	DA Form 3985
Packaging and Improvement Report	DA Form 6
Discrepancy in Shipment Report	SF 361
Quality Deficiency Report	SF 368

A-4. DOCTRINAL, TRAINING AND ORGANIZATIONAL PUBLICATIONS

Explosives and Demolitions	FM 5-25
Engineer Field Data	FM 5-34

A-5. EQUIPMENT MANUALS

Technical Manuals:

Ammunition and Explosives Standards	TM 9-1300-206
Demolition Materials (Op & Org Maint)	TM 9-1375-213-12
Demolition Materials (DS&GS)	TM 9-1375-213-34
Army Maintenance Management Systems (TAMMS)	TM 38-750

Destruction of Conventional
Ammunition and Improved
Conventional Munitions to TM
Prevent Enemy Use 750-244-5-1

TRADOC Training Devices
for Army Wide Use.TRADOC
PAM 71-9

A-6. SUPPLY CATALOGS
Ammunition and Explosives:
Classes 1340 thru 1398 SC 1340/98-IL
Demolition Equipment Set,
Explosive Initiating,
Electric and Nonelectric SC 1375-94-
CL-P02

APPENDIX B

ORGANIZATIONAL MAINTENANCE REPAIR PARTS

Section I. INTRODUCTION

B-1. Scope

This appendix lists repair parts and special tools required for the performance of organizational maintenance of the M180 and M270 Demolition Kits.

B-2. Explanation of Columns

a. Illustration. This column is divided as follows:

(1) *Figure number.* Indicates the figure number of the illustration on which the item is shown.

(2) *Item number.* The number used to identify item called out in the illustration.

b. Source, Maintenance, and Recoverability (SMR) Codes.

(1) *Source code.* Source codes indicate the manner of acquiring support items for maintenance, repair, or overhaul of end items. Source codes are entered in the first and second positions of the Uniform SMR Code format as follows:

Code	Definition
PA -----	item procured and stocked for anticipated or known usage.
KF -----	An item of a maintenance kit and not purchased separately. Maintenance kit is defined as a kit that provides an item that can be replaced at organizational or intermediate levels of maintenance.
XB -----	Item is not procured or stocked. If not available through salvage, requisition.

(2) *Maintenance Code.* Maintenance codes are assigned to indicate the levels of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the Uniform SMR Code format as follows:

(a) The maintenance code entered in the third position will indicate the lowest maintenance level authorized to remove, replace, and use the support item. The maintenance code entered in the third position will indicate one of the following levels of maintenance:

(b) The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair (i.e., all authorized maintenance functions). This position will contain one of the following maintenance codes:

Code	Application/Explanation
O	Support item is removed, replaced, used at the organizational level of maintenance.
O	The lowest maintenance level capable of complete repair of the support item is the organizational level.

c. *National Stock Number.* Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

d. *Part Number.* Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

NOTE

When a stock number item is requisitioned, the item received may have a different part number than the part being replaced.

e. *Federal Supply Code for Manufacturer (FSCM).* The FSCM is a 5-digit numeric code listed in SB 708-42 which is used to identify the manufacturer, distributor, or Government agency, etc.

f. *Description.* Indicates the Federal item name and description to identify the item.

g. *Unit of Measure.* A two-character alphabetic abbreviation indicating the unit upon which the allowances are based; e.g., ft, ea, pr, etc.

h. *Quantity Incorporated in Unit.* Indicates the quantity of the item used with or on the equipment.

Section II. REPAIR PARTS

(1) Illustration		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(a) Fig. No.	(b) Item No.	SMR Code	National stock No.	Part Number	FSCM	Description	U/M	Qty inc in Unit
1-8	—	XB000	8140-01 050-5810	9241167	19200	BOX, WIREBOUND, PACKING, AMMUNITION (KIT CRA- TERING, DEMOLITION: M180).	1	1
1-9	—	XB000	To be assigned	9332620	19200	BOX, WOOD, PACKING MUNI- TION (KIT CRATERING DEMOLITION, TRAINING: M270) (INERT)	1	1

Section III. SPECIAL TOOLS

(1) Illustration		(2)	(3)	(4)	(5)	(6)
Fig. No.	Item No.	SMR Code	Federal Stock No.	Description	Unit of Measure	Quantity incorporated in unit
		PAO -----	3540-665-6242	STRAPPING AND SEALING KIT:	ea	1
		PAO -----	8135-281-4071	STRAPPING, STEEL: 5/8 in. x 0.023 in., 50 lb, QQ-S-781	-----	1
		PAO -----	8135-239-5291	SEAL, STRAPPING	-----	AR
		KFO -----	-----	SEALER	-----	1
		KFO -----	-----	STRETCHER	-----	1
		PAO -----	5110-293-0089	SHEARS, METAL CUTTING HAND: 12½ in., GGG-S-291	ea	4
		PAO -----	5120-224-7592	PRESS, LEAD SEAL, HAND: with re- movable dies, US and ORD insig- nia die legend.	ea	4
		PAO -----	5120-319-5434	SALLEE CLOSER 8864731 (19203)	ea	1

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

C-1. General

a. The Maintenance Allocation Chart designates responsibility for the performance of maintenance functions.

b. Only the lowest level of maintenance authorized to perform a maintenance function is indicated.

c. A maintenance function assigned a maintenance level will automatically be authorized to be performed at any higher maintenance level.

d. A maintenance function that cannot be performed at the assigned level of maintenance for any reason may be forwarded to the next higher maintenance organization. Higher maintenance levels will perform the maintenance functions of lower maintenance levels when required or directed by the appropriate commander.

C-2. Definitions

The implementation of maintenance tasks will be consistent with the assigned maintenance in accordance with the following definitions:

a. *Inspect*. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. *Test*. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. *Service*. Operations required periodically to keep an item in proper operating condition.

(1) *Unpack*. To remove item from packing box for service or for the performance of other maintenance operations.

(2) *Repack*. To return item to packing box after service or other maintenance operations.

(3) *Clean*. To rid the item of contamination.

(4) *Touch up*. To spot paint scratched or blistered surfaces.

(5) *Mark*. To restore obliterated identification.

d. *Install*. To emplace, seat or fix into position an item in a manner to allow the proper functioning of the equipment; also to assemble one component of an end item with another.

e. *Adjust*. To maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

f. *Renovate*. To restore item to serviceable condition.

(1) *Paint*. To repaint the entire item.

(2) *Repair*. To restore serviceability to an item by correcting specific damage, fault, malfunction, or failure through the application of maintenance services or other maintenance actions.

(3) *Replace*. To substitute a serviceable component in a manner to allow the proper functioning of equipment.

C-3. Symbols

Specific levels of maintenance are indicated by symbols, as follows:

Symbol	Maintenance level
C -----	Operator/Crew
O -----	Organization
F -----	Direct Support
H -----	General Support
D -----	Depot

In the maintenance Allocation Chart, these symbols reflect the *lowest* level of maintenance responsible for performing a particular function.

Section II. DEMOLITION KIT, CRATERING: MI80

(1)	(2)	(3)											(4)	(5)	
Group No.	Functional group	Maintenance function											Tools and equipment	Remarks	
		Inspect	Test	Service					Install	Adjust	Renovate				
				Unpack	Repack	Clean	Touch up	Mark			Paint	Repair			Replace
	Demolition Kit Assembly	C	D	C	C	C	O	F	---	---	D	---	---		
	Rocket	C	D	C	C	C	O	F	---	---	D	---	D		
	Shaped Charge	C	D	C	C	C	O	F	---	---	D	---	D		
	Demolition Circuit	C	D	C	C	---	---	---	C	---	---	C	D		
	Tripod	C	---	C	C	C	O	---	---	---	---	C	D		
	Firing Lead and other Accessible Wires	C	C	C	C	C	---	---	C	C	---	C	C		
	Packing Material	C	---	F	---	C	O	F	---	---	---	O	F		

Section III. Demolition Kit, Cratering: Training, M270 (INERT)

(1)	(2)	(3)											(4)	(5)	
Group No.	Functional group	Maintenance function											Tools and equipment	Remarks	
		Inspect	Test	Service					Install	Adjust	Renovate				
				Unpack	Repack	Clean	Touch up	Mark			Paint	Repair			Replace
	Demolition Kit Assembly	C	...	C	C	C	O	F	...	...	F	O*	...		
	Rocket	C	...	C	C	C	O	F	...	...	F	...	D		
	Shaped Charge	C	...	C	C	C	O	F	...	...	F	...	D		
	Demolition Circuit	C	...	C	C	...	...	...	C	...	...	O*	D		
	Tripod	C	...	C	C	C	O	...	...	...	...	...	D		
	Packing Material	C	...	F	...	C	O	F	...	...	...	O	F		

*As required, expedient repairs are authorized on this training item only. No procedures are given and no repair parts are available. Repairs will be strictly on a local expedient basis.

APPENDIX D

CONSUMABLE MATERIALS

Section I. INTRODUCTION

D-1. Scope

This appendix lists expendable supplies which are authorized for operator and organizational maintenance. Listed items should be requisitioned, as required, through normal supply channels.

c. Specification Number-Column 3. Indicates specification assigned to the item.

d. Unit of Issue-Column 4. Indicates the unit of issue of each maintenance supply item.

D-2. Explanation of Columns

The Following provides an explanation of columns in section II.

a. National Stock Numbers-Column 1. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

b. Description-Column 2. Indicates the item name and brief description.

D-3. list of Abbreviations

bg	-----	bag
bx	-----	box
cl	-----	coil
ea	-----	each
gl	-----	gallon
hd	-----	hundred
pg	-----	package
pt	-----	pint

Section II. CONSUMABLE MATERIALS

(1) National Stock No.	(2) Description	(3) Specification No.	(4) Unit of issue
6810-00-205-6786	ALCOHOL, DENATURED: Grade IV	O-E-760	qt
8020-00-597-4767	BRUSH, ARTISTS: Flat 5/8 in.	H-B-118	ea
8020-00-850-0084	BRUSH, PAINT: oval w/chisel edge 1/2 in. w, 1 1/8 in. min exposed lg. Type I, Class 1	H-B-491	ea
6850-00-174-9672	CORROSION REMOVING COMPOUND: wipe-off type, Type II, 1 gal bottle	MIL-C-10578	ea
7930-00-249-8036	DETERGENT, PAINTED SURFACE, POWDERED: 5-lb. cntr. ENAMELS: Spray Cans:	P-D-220	ea
8010-00-910-8054	Black, No. 37038	TT-E-516	pt
8010-00-848-9272	Olive Drab, No. 34087	TT-E-516	pt
8010-00-297-2119	Medium Blue, No. 35109	TT-E-516	gl
5315-00-597-9766	FASTENER, CORRUGATED, WOOD, JOINT: Tooth edge 1/2 in. deep	FF-F-133	bx
7520-00-558-1487	MARKER TUBE TYPE: broad tip, white	GG-M-1262	ea
7520-00-227-7137	MARKER TUBE TYPE: felt tip marker set CL No. 1 pocket size 6 in. lg, 1/4 oz ink cap.	GG-M-117	ea
5315-00-889-2743	NAIL, BOX: style 4, type II, 4d, 1 1/2 in.	FF-N-105	pg
7510-00-161-0811	INK, MARKING, STENCIL: black	TT-I-1795	pt
7510-00-161-0815	INK, MARKING, STENCIL: white	TT-I-1795	gl
7510-00-161-0816	INK, MARKING, STENCIL: yellow	TT-I-1975	gl
7920-00-205-1711	RAG, WIPING: cotton, unbleached mixture, Grade 8	DDD-R-30	bg
5340-00-902-0426	SEAL, ANTIPILFERAGE: lead and wire 2 strand, P/N 9267743	MS-51938-5	hd
8135-00-239-5291	SEAL, STRAPPING: for 5/8 in. steel strapping	QQ-S-766	bx
8135-00-281-4071	STRAPPING, STEEL: 5/8 in. .020 in. thk	QQ-S-781	cl

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