SECTION 2
NOTES ON THE PREPARATION OF CHARGES AND FIRING CIRCUITS

Bulk Explosives

0201. **Placing**. In cutting and pressure charges, the explosive must be in close contact with the target. If the surface of the target is uneven (eg. rivet heads) and there is insufficient plastic for the whole charge, mould what is available to the surface and then and then bed-in slabs to make up the balance. If clay has to be used as packing remember that it shrinks when it dries out and so must be renewed periodically in long standing demolition in hot climates. When a cutting charge is divided and placed on both sides of a target ensure that the two portions are staggered and not immediately opposite one another. This does not apply to beehives and hayricks.

0202. **Dimensions of Cutting Charges**. The charge must be continuous along the line of the intended cut; the width should be about twice the thickness, but the thickness should not exceed 6 inches.

0203. **Point of Initiation**. Whenever possible the primer should be in the face of the charge opposite to the target and central relative to the length and width of the charge. In a long continuous charge there must be a point of initiation every 5 feet.

0204. **Tamping**. This is required in borehole, pier footing and pressure charges. In boreholes, damp sand is best, but whatever is used must be free from sharp stones, etc, which could damage the detonating cord. For pier footing and pressure charges filled sandbags, at the rate of one bag per pound of explosive, should be packed round the exposed faces of the charge to a minimum thickness of 10 inches. Tamping is not required with RDD (concrete).

Shaped Charges (other than RDD)

0205. **Placing**. The maximum effect from a 6-inch beehive is obtained with a stand-off of $5\frac{1}{2}$ inches, ie, with the full length of leg. This must not be forgotten when fixing beehives against vertical and sloping surfaces. The effect of "stand-off'' on hayricks is shown in Table 8.If two or more beehives are to be fired together the minimum spacing should be 2 feet center to center.

Primers

0206. The standard 1-oz CE primer is water proofed before use, ensure that the waxed paper cover is undamaged. This cover must not be removed nor must the waterproof skin on the surface of the central hole be tampered with, eg, a rectifier must not be used.

0207. The 1-cm CE primer for which the hole in the CE/TNT slab were provided in now obsolete. The accepted substitute is a 1-oz CE primer bound in close contact with the CE/TNT slab.

Detonating Cord

0208. Cut off the first 12 inches of a new or part used reel before the cord is used.

0209. At the charge end ensure that the cord passes through the full length of the primer hole and is wedged in contact with the surface with a matchstick or the like. Arrange that it cannot be pulled out easily; with a plastic charge a thumb knot should be made in the cord.

0210. At the initiating end, 12 inches of spare cord must be left as a seal. Methods of initiating are shown in Figure 2-1.

0211. Between ends, the cord must be aligned so that there are not sharp bends in it nor sharp edges for it to pass over, and it must be weighted, eg, with sandbags, or tied so that it is not easily displaced.

0212. Junctions should always be made with junction clips if available, a 12-inch spare end being left on the branch. If junction clips are not available a strapped Y junction (or, for hasty demolitions, a clove hitch junction) can be made. Junctions are illustrated in Figure 2-2.

Detonators

0213. Except in preliminary demolitions where the risk of premature firing is insignificant, detonators will not be inserted directly into charges; they must be placed in a position protected from enemy fire or other source of shock and connected to the charges by detonating cord.

0214. When fitted into a primer, the closed end of the detonator should be about $\frac{1}{4}$ inch short of the far end of the primer hole.

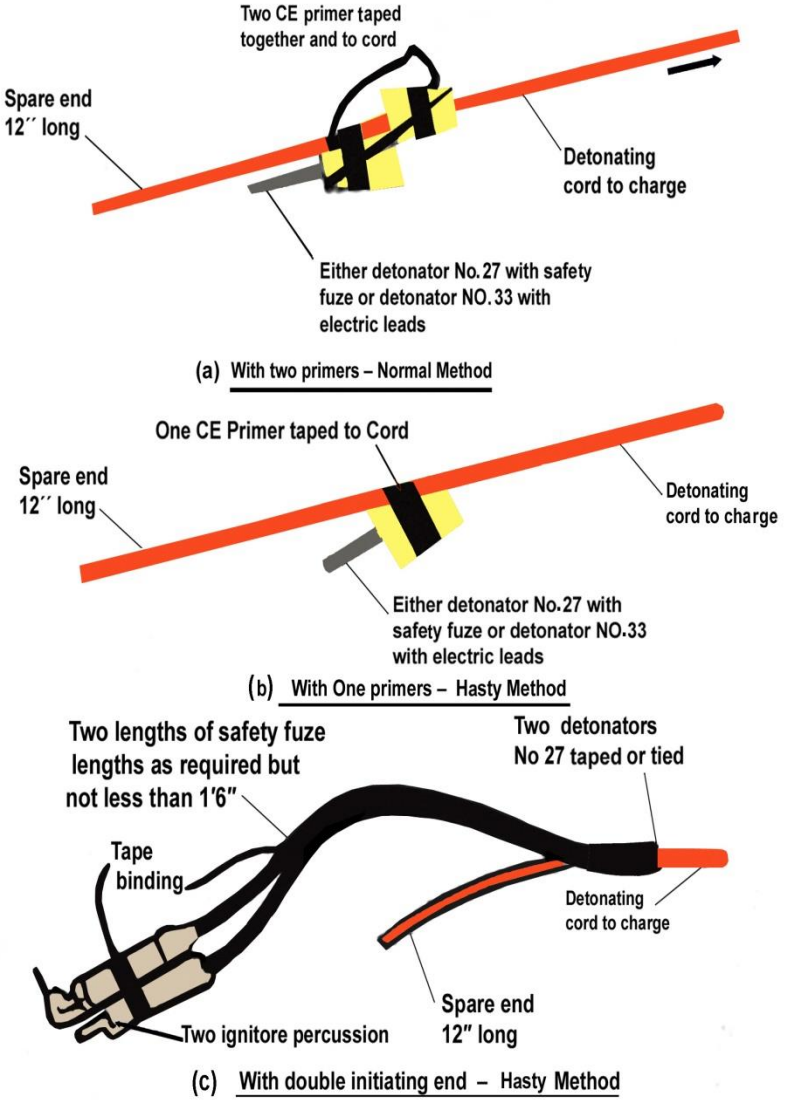

Figure 2-1: Initiating detonating cord

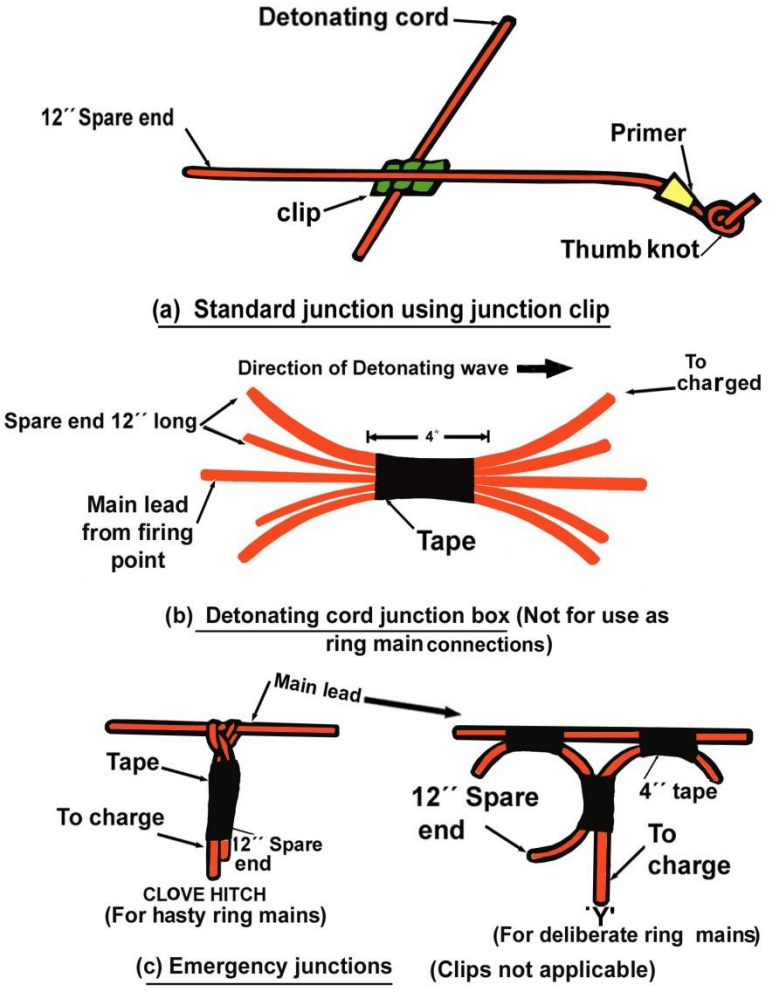

Figure 2-2: Junctions in detonating cord

215. In electrical firing, never use different types of detonator in the same circuit. If possible all the detonators should be taken from the same box.

Safety Fuze

0216. Cut off the first 12 inches of a new or part used reel before the fuze is used.

0217. Cut off the next 12 inches and test for rate of burning. The acceptable time is not more than 33 seconds and not less than 27 seconds. If outside these limits the reel should be discarded and whenever possible returned to Ordnance with a report.

0218. The minimum length of safety fuze to be used on any demolition is 18 inches.

0219. Lengths of five feet or less not required for immediate use should be discarded ; they must not be returned to storage . Longer lengths and remains of the reel, if sealed ,may be kept for use later , provided account is taken of the possible effect of climatic conditions.

0220. To prepare fuze for insertion in detonator or percussion igniter cut end square with a sharp knife on a hard surface. The fuze should be crimped into detonators and percussion igniters.

0221. Safety fuze should not be prepared until required, and then should be kept in the dry until State of Readiness 2 (ARMED) is ordered .

0222. Fuze can be lighted in an emergency with a safety match ; scarf the end, bed the match head in the exposed gunpowder core, and rub the striking surface of the march-box on it.

Electric Firing Leads

0223. Methods of making joints in cables and of joining cables and detonators are shown in Figure 2-3. Avoid creases in the insulating binding tape; they let in damp.

Firing Circuits

0224. For firing circuit diagrams see Figure 2-4.There should be:

a. Two initiating sets for every circuit.

b. Two initiating points (primers) in each charge, except in the case of hasty demolitions when one initiating point is acceptable.

0225. The following tests will be carried out:

a. Test every detonator for continuity before it is taken into use.

b. Test exploder for power (see Table 5)

c. Make visual examination of cable while it is being prepared and laid.

d. Test completed circuit for continuity (see Table 6)

e. On long standing demolitions carry out test (d) periodically, depending on the state of readiness. At state 2 (ARMED) the interval between tests will not exceed 15 minutes.

Protection of Long Standing Charges and Firing Circuits

0226. **Initial Arrangements.** Where it is known from the outset that it is unlikely that the demolition being prepared will be fired soon after it is ready, the officer or NCO in charges of the work will pay particular attention to protection form the Weather, traffic, and enemy action.

a. **From Rain and Damp**. Prevent water running down leads to detonators or charges by bending the lead into a shallow U as near the detonator or charge as possible. Keep safety fuze in a sealed container, and do not prepare it before it is necessary; then keep it under cover. Alternatively leave an extra 6 inches for cutting off the initiating end and seal junction with detonator with insulating tape. Ensure that 12 inches of spare end are left on all detonating cord leads.

b. **From the Sun's Heat**. Provide shade from the direct rays of the sun. In very hot climates it is not enough to put the charge on the shady side of metal; the metal itself must be shaded or a thin layer of insulating material inserted between the charge and the metal. Keep the use of clay packing down to the minimum essential; it shrinks when it dries out.

c. **From Risks of Displacement and Breakage**. Likely causes are vibration form wind, traffic or enemy fire, and physical impact of traffic, particularly vehicles with overhanging loads and overhead projections, such as crane jibs and wireless aerials. There may be special risks such as hot ashes form locomotives on a railway bridge.

(1) Charges must be fixed securely by tying or strutting, and if necessary they must be covered or have timber baulks fixed alongside to take blows from traffic.

(2) Leads, both electric and detonating cord, must be run in protected places, covered if exposed, or buried. If buried, the line must be clearly marked to facilitate recovery for repair or inspection; 2 feet depth should give protection from splinters. Loose lengths must be held clear of traffic and other risks of accidental pulling, either by tying with spun yarn or by holding down by soft weights. eg, sandbags or earth sods.

0227. **Subsequent Inspection**. This is the responsibility of the firing party; when the firing party has not yet been nominated, a special maintenance party will be detailed. The following are points to look for :-

a. **Moisture Penetrating Into Charges and Detonators**. Coverings should be examined for deterioration or damage. In the cause of buried charges it should be enough to dig up one or two samples (different ones at successive inspections) for examination.

b. **Fixing Working Loose**. Spun yarn stretches, timber warls, swells or shrinks, packing becomes sodden and swells or shrinks.

c. **Faults in electric circuits.** See paragraph 0217 above.

d. **Breaks in other leads.** These must be found by eye ; cracking due to extreme cold may occur in safety fuze and detonating cord.

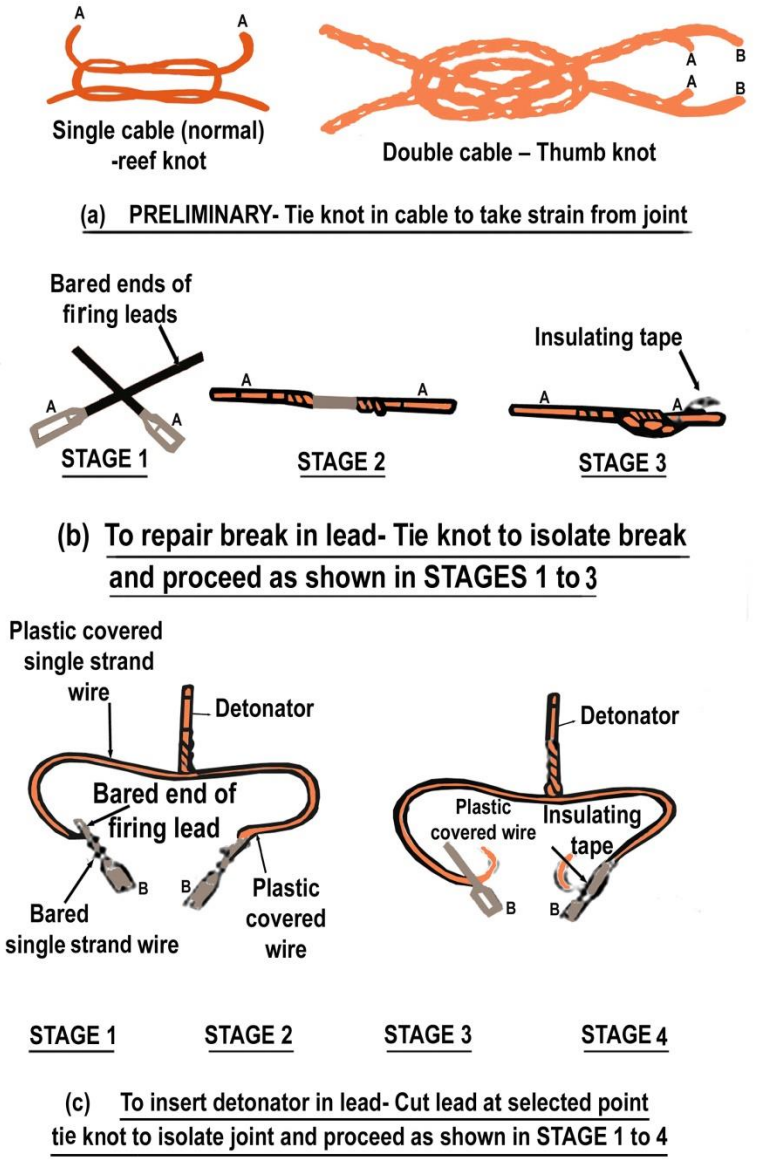

Figure 2-3: Joints in electric cables

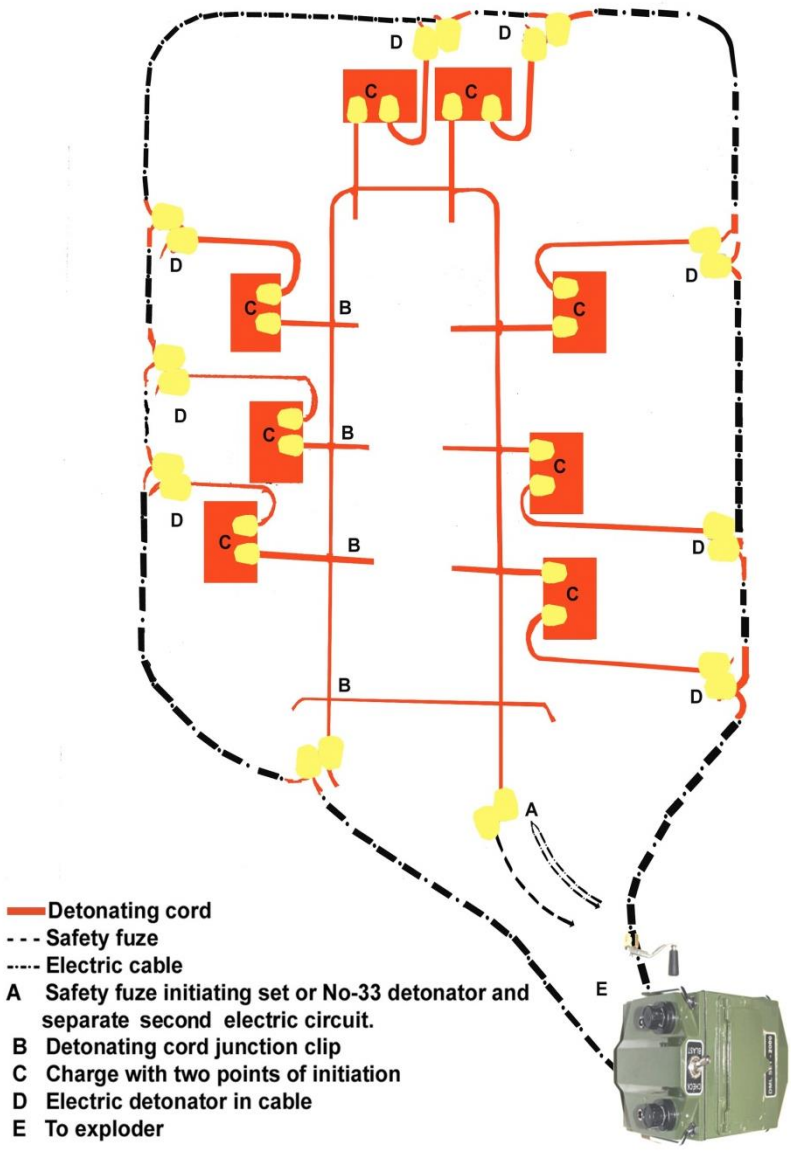

Figure 2-4: Firing circuit diagram

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