HEADQUARTERS
U.S. ARMY SECTION
MILITARY ASSISTANCE ADVISORY GROUP
APO 143, San Francisco, California

MAGAR-OT (S&A)

18 January 1963

SUBJECT: Lessons Learned Number 26 - M113 Operations [U]

TO: See Distribution

1. INTRODUCTION:

a. This "Lessons Learned" is devoted to employment of the M113 Armored Personnel Carrier in counterinsurgency operations in South Vietnam.

b. No attempt has been made to reiterate well known principles and techniques of APC employment. Rather the intent is to point out either new applications and concepts or to expand on familiar ones which have assumed a greater importance here. For example, the carriers' capability to move rapidly in flooded rice paddy areas assumes prime importance in South Vietnam.

c. These lessons are derived from the operations of two mechanized rifle companies (15 carriers each) primarily in the delta region of Vietnam in which considerable success was achieved during the period June through October 1962 (in this period the two companies killed 517 VC and captured 203 with friendly casualties of 4 killed and 13 wounded).

2. AGAINST A GUERRILLA ENEMY WITH LIMITED ANTI-ARMOR MEANS, THE CARRIER IS A FIGHTING VEHICLE, AND TROOPS ARE DISMOUNTED ONLY WHEN THE SITUATION DEMANDS.

a. In the typical successful use of mechanized units in the delta, the climax is achieved when several M113's close on a sizable concentration of VC. The VC are killed by fire or are crushed under the tracks as the carriers attack at maximum cross-country speed, often ten to fifteen miles per hour even through water three feet deep in hard-bottom paddies. The VC either attempt to evade with the limited mobility of sampans or foot, turn to fight, or hide in place. Only after as many as possible of these

have been shot, crushed, or captured, should riflemen be dismounted from the carriers for final mopping up. Premature dismounting leads only to unnecessary casualties and needlessly sacrifices the speed, armor protection, and psychological effect of the carriers. In order to make maximum use of the mounted riflemen, the scheme diagrammed in inclosure 1 has been used with success.

b. Just as there are times to keep the riflemen aboard, (in fact dropping the back ramp often would swamp the carrier), so there are also many occasions when dismounting is required:

(1) As mentioned above, in mopping up after an assault, prisoners must be secured and the area must be searched for VC hidden in the reeds or under water. This task is most efficiently accomplished by carriers and dismounted riflemen working together.

(2) When terrain obstacles preclude finally closing with the VC, a dismounted continuation of the attack should be started immediately. Often the carriers are able to fix the VC with machinegun fire while the dismounted elements continue the attack.

(3) When the mechanized unit is unavoidably halted in an unsecured area, OP's, LP's, patrols, and local security must be provided by dismounted elements of the unit.

(4) When special missions are assigned, such as encirclement and search of a village, the use of dismounted elements is necessary; however, the speed and protection of the carrier should be used whenever possible. In the search of a village, for example, encirclement might be accomplished mounted with the detailed dismounted search following.

3. PRIOR KNOWLEDGE OF TERRAIN OBSTACLES TAKES A TOP PRIORITY IN MECHANIZED COUNTERINSURGENCY OPERATIONS IN THE DELTA. Although the M113 can operate without difficulty in a large percentage of the delta area, its mobility is restricted by certain terrain obstacles such as canals with banks too steep for the vehicle to negotiate. The limiting effect of these obstacles can, however, be significantly reduced by a careful selection of routes based on accurate information. This knowledge will permit crossing of each barrier at the easiest point practicable.

a. In most cases a map reconnaissance serves only as the starting point from which plans for direct reconnaissance of the terrain are developed. In South Vietnam large-scale map coverage, either photographic or topographic, is complete; however, even maps based upon recent

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survey data do not provide the details needed to select easiest points for passage of obstacles. Thus, movements, especially cross-country, should not be based on map information alone.

b. Observation aircraft often serve as a means for reconnaissance prior to an operation. These flights should be made by the mechanized unit commander and a pilot with experience in supporting mechanized units. Persons unfamiliar with the capabilities of the carriers and without some experience in judging trafficability from the air cannot provide required information. It must be recognized, however, that such flights may well disclose the planned action unless they are tailored to fit the existing patterns of aircraft activity. Unusual air activity over an area inevitably alerts the VC. This disadvantage can be overcome if reconnaissance is made sufficiently in advance of the operation to permit the VC to return to the area and drop their alert status. As a general rule, whenever the required information can be obtained by other means, such as records of previous operations, aerial reconnaissance should not be performed, and when security is of paramount importance, aerial reconnaissance must not be used.

c. Prior reconnaissance on the ground is usually limited to the route of approach to the area of operations. In order to achieve surprise, the approach march often covers a long distance over secondary roads, and the requirement for accurate timing of this march makes a route reconnaissance of some type essential. Here the physical risks of ground travel must be weighed against the detailed information required, and often aerial observation must suffice. Within the area of operations, these risks, combined with the difficult terrain and the requirement for surprise, make a ground reconnaissance impractical.

d. During <u>each</u> operation detailed records must be kept of pertinent terrain information. In counterinsurgency, many areas are fought over again and again, so that recorded information can reduce or eliminate the need for future aerial or ground reconnaissance with its risk of disclosing the planned attack. Care must be taken, however, to avoid use of identical routes each time the same area is attacked; otherwise the VC can concentrate his limited anti-armor weapons to best advantage.

e. Experience has developed certain indications of <u>poor</u> trafficability:

(1) Areas close to river and canal banks are normally soft mud in which the carriers sink and lose traction.

(2) Rice fields in the rainy season, which do not contain standing water, do contain soft mud through which the carriers normally cannot move.

(3) Inundated areas where reeds are yellowish and water is cloudy usually have soft mud bottoms in which the M113 will be unable to move.

(4) Areas in which water buffalo sink to their bellies in the mud will stick carriers attempting to cross.

f. Areas of good trafficability are:

(1) Paddies with clear water and green reeds.

(2) Inundated areas where water buffalo are feeding.

(3) Rice fields in the dry season (although the dikes between fields are often difficult to traverse).

4. MECHANIZED COUNTERINSURGENCY OPERATIONS REQUIRE CONTROL MEASURES WHICH MAINTAIN MOMENTUM AND PERMIT MAXIMUM FLEXIBILITY.

a. The mechanized unit normally gains surprise by entering the area of operations from the approach march without pausing in an assembly area or attack position. Coordination with other elements of the operation depends upon an assigned time for arrival at a designated point at the edge of the operations area. Where terrain difficulties or limted reconnaissance make an accurate time questionable, it may be possible and necessary to base the maneuver of other elements (e.g., a heliborne force) on the actual arrival time of the mechanized unit.

b. Within the area of operations, phase lines, boundaries, and axes of advance may be used in the normal manner, but assignment of objectives must be qualified to permit immediate reorientation of the mechanized maneuver, should worthwhile VC concentrations be developed in unforseen locations. If the mission of the operation is seizure of a terrain feature or destruction of enemy installations, then firm objectives are warranted. However, the normal counterinsurgency operation seeks to kill the VC rather than to occupy a specific terrain feature, and even the best intelligence can rarely predict with certainty exactly where he will be found.

5. OPERATIONAL MOBILITY PROVIDES ADEQUATE SECURITY FOR ARMORED CARRIERS AGAINST THE VC ANTI-ARMOR CAPABILITY. The VC are known to have weapons which can defeat the M113, such as caliber .50 machineguns and 57mm recoilless rifles. Although this is a limited capability at present,

the potential danger cannot be overlooked. The threat to mechanized units is two fold: first, the type weapons noted above may be already positioned in an area of operations; or, second, the VC may be given enough time to bring the weapons in. These two possibilities are minimized by exploiting the mobility of the unit. First, the unit must not be habitually employed in a particular area; rather its mobility should be used to gain surprise by penetration of new areas in which the VC are unprepared for mechanized attack. Second, within an area of operations, the mechanized unit should stay in a particular locality no longer than necessary and in no case more than a few hours.

6. AERIAL OBSERVATION DURING ACTUAL OPERATIONS IS INVALUABLE FOR SELECTION OF ROUTES, FOR LAND NAVIGATION, AND FOR IMMEDIATE INTELLIGENCE OF FLEETING VC TROOP CONCENTRATIONS. As discussed in paragraph 3, aerial observation is one means of gathering the terrain information required in planning a mechanized operation. This capability is essential during the execution phase of an operation for the following reasons:

a. Delta terrain is flat, offering only an occasional tree or rooftop as a vantage point, and the trees which normally line canals and streams limit observation to a kilometer or two at most. Although the height of the carrier itself provides its crew with better observation than that of a dismounted soldier, no ground observation can approach the effective coverage available from an observation aircraft in the search for VC troop concentrations.

b. Even with meticulous prior reconnaissance, some terrain obstacles are frequently underestimated or overlooked; canal crossing points are less negotiable, mud is deeper and softer, or dikes are harder to breech than expected. An experienced aerial observer can help to keep the unit moving by finding by-passes or alternate routes in a fraction of the time required for similar action on the ground.

c. Land navigation in the delta is a difficult task due to limited observation, lack of identifiable terrain features, and, for mechanized units, the frequent changes of course necessary to avoid obstacles. From the air, positions can be determined easily and the carriers can be oriented by radio.

d. Support of mechanized units by aerial observation is of sufficient importance to justify full-time assignment of an observation aircraft to each mechanized element throughout an operation. The knowledge required of the carriers' capabilities and limitations and the experience necessary for accurate estimates of trafficability are strong arguments for habitual assignment of the same pilot for this task.

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7. TWO OR THREE CARRIERS CAPABLE OF IMMEDIATELY RESPONDING TO A DEVELOPING SITUATION SHOULD NORMALLY BE COMMITTED, EVEN IF THE REST OF THE UNIT IS LEFT STUCK IN THE MUD. In a conventional armor attack, piecemeal commitment is a major tactical error; in carrier attacks against VC caught in the open, the leading two or three vehicles are sufficient to fix VC troop concentrations of company size or larger until the remainder of the mechanized unit or other forces arrive. Thus unit integrity takes much lower precedence than immediate response. In that attack against VC in the open, there is no substitute for speed.

8. THE MOBILITY WHICH IS ESSENTIAL TO SUCCESSFUL COUNTERINSURGENCY OPERATIONS WITH M113'S IN DELTA AREAS IS WON ONLY BY EXPERIENCE AND HARD WORK IN THE SUCCESSIVE AVOIDANCE OR PASSAGE OF THE EVER PRESENT TERRAIN OBSTACLES. Despite thorough prior planning and continuous aerial observation during the operation, mechanized units will normally encounter obstacles such as steepbanked canals or areas of poor trafficability which will impede or temporarily block the progress of the unit. Prior preparation and proper driving techniques will assist in overcoming many of these obstacles. Frequently, however, hard work and prompt use of applicable recovery techniques will be required to maintain the forward progress of the unit.

a. Preparations should include the following:

(1) Equipping each carrier and each unit with special self-recovery means. While not yet decided in all details, this equipment should be essentially as shown on inclosure 2. Selected items, as well as additional special equipment, should be available in the pioneer platoon organic to the squadron headquarters. The mission of this platoon is to support the mechanized troops in passage of terrain obstacles, normally by attachment of squads. These squads and their equipment must be accommodated in the carriers of the supported troop; however, sufficient space for these ten men can easily be found within the carriers of the troop.

(2) Planned loading and dispersal of equipment. Tow cables should be connected to the front and rear towing eyes on each carrier at all times; otherwise, when these points are buried in mud, considerable digging is required before cables can be attached. Bridge balks, blocks, and tools should be carried where they can be readily obtained, normally on carriers well forward in the unit formation (see photograph at inclosure 3 for stowage of bridge balks on carriers).

b. The following are two fundemental principles in delta cross-country driving.

(1) The standard caution against following the tracks of

preceding vehicles during cross-country movement is especially applicable in the delta. Most cross-country routes should be traversed only once, and when possible the following carriers should pick their own parallel paths over fresh terrain.

(2) Momentum is vital to cross-country movement in the delta. Even momentary stops should be made only where the terrain indicators show reasonably firm bottom. Many areas which are trafficable to a carrier in motion will yield to the weight of a halted carrier and stick it thoroughly in a matter of seconds.

c. Despite the best efforts of reconnaissance and preparation, very often obstacles can be passed only by using special techniques. Using the manpower and special equipment available, several techniques which have proved to be particularly effective are as follows:

(1) If a carrier simply becomes stuck in open paddy, it is usually necessary to hook two or more additional carriers together to provide enough pulling power (see figure a, inclosure 4). This requirement follows from the generally poor trafficability in the vicinity, which does not give the towing carriers much margin of traction to use in extracting the stuck vehicle. In many cases four carriers are needed, connected as shown in figure b, inclosure 4. One-hundred-foot connecting cables are used to permit in-line pulling without requiring the second carriers to traverse the churned ground left by the leaders.

(2) If sufficient traction cannot be provided, either in open paddy or in climbing canal banks, a base can be built to increase traction of the stuck carrier. This base can be made of brush, logs, or both. A brush base should be 12 inches thick; four-inch diameter logs or timbers can serve the same purpose (see photograph at inclosure 5).

(3) Common obstacles to carrier progress are the drainage canals which frequently separate rice paddies. Inclosure 6 shows the crossection of such an obstacle, which is normally a carrier-length or less in width. Usually the adjacent paddies are inundated but separated from the deeper water in the canal by earth dikes. These barriers are best negotiated by attempting a crossing at maximum safe speed. In this manner the first dike is broken down, permitting the carrier to reach the far bank without "nosing over" which would result from climbing over the dike at a slower speed. Further advantage is that the carrier tends to plane across the canal without setting to the bottom. This may permit the carrier to break through the far dike, or at least to place the forward portion of the track against the dike high enough for a successful exit.

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(4) If the canal or stream is too wide for the method described in the preceding paragraph or if that method fails, the carrier will settle in the canal and will be unable to climb the far bank. An effective method of providing the necessary traction is attachment of cleats to the tracks. These may be two-foot lenghts of log, timber, or angle iron attached across each track at the forward end of the carrier (see photographs at inclosure 7). The cleats must, of course, be removed at the rear of the vehicle and reattached at the front if recovery is not complete. Care must be taken as to avoid damage to the rear track shrouds as the cleats reach the rear of the carrier. Preparation of these devices with pre-attached S-hooks will permit easy attachment to the tracks and thus save considerable time in recovery operations of this type.

(5) If the foregoing methods are judged infeasible at the outset, or they fail, the aluminum bridge balks listed in inclosure 2 can be assembled using the appropriate stiffeners to make a pair of treadways, each three balks wide. These may be used either to span the canal or to form a ramp up the exit bank. (See inclosure 8 for assembly and use of aluminum balks). On dry land with all components readily available, two 23-foot spans (one per track) can be assembled in less than twelve minutes. Where the need is known in advance, assembled bridge balks can often be delivered by helicopter (see photograph at inclosure 9).

(6) When an obstacle is met, an estimate should be made of its difficulty, and an immediate attempt to cross should be made if at all feasible. If such an attempt fails, the methods discussed above should be applied to force a crossing. If an unaided crossing is not judged possible, the obstacle should be reduced by use of hand tools or demolitions prior to any crossing attempts by carriers. In the use of demolitions, however, possible requirements for surprise must be considered. Inclosure 10 contains a brief discussion of demolition techniques in the reduction of typical obstacles.

(7) If a fixed point of sufficient strength can be found or installed (such as the ground anchor OVE on wreckers) on the far bank, rigging techniques can be used for canal exiting. A straight cable connection from anchor to track will often enable the carrier to extricate itself (see sketch at inclosure 11), although care must be taken to avoid damage to the track shrouds, which are necessary for swimming. Use of a pulley at the anchor and a long cable will let a carrier on the near bank provide the needed pull (see figure a, inclosure 12).

(8) Where a canal is about the same distance in width as the carrier is in length and banks are vertical, a vehicle which has failed in

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an attempted crossing has little room for maneuver. Here the value of pre-attached tow cables is obvious; however, some digging is still required to clear the final drives. For this method of recovery, two or three additional carriers are needed on the bank to which the stuck carrier is to be recovered. One of these, located near the bank, serves to redirect the pull of the other, so that the stuck carrier is lifted as well as moved forward. Logs are affixed to the rear vehicle to serve as bearing points as the cable is pulled (see figure b, inclosure 12). As the stuck vehicle moves up and out, the rear vehicle must ease forward to gradually redirect the pull towards the horizontal.

(9) Nine-foot, 4x4-inch timbers can be cabled together as shown on inclosure 13, to be available for reinforcement of river and canal banks, or for use eleswhere to increase traction. Such an assembly is called "army track".

9. Despite the considerable body of experience already collected in operations with the M113, much remains to be learned as mechanized units come into wider use and as the M113 is joined by the smaller T114 armored command and reconnaissance vehicle. Addressees equipped with these vehicles are requested to inform this headquarters, ATTN: MAGAR-OT, of other problem areas and suggested solutions. Future "Lessons Learned" will report new concepts and techniques as they are developed.

13 Incls
as

s/t H. K. EGGLESTON
Brigadier General, USA
Chief

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Joseph Grezaffi

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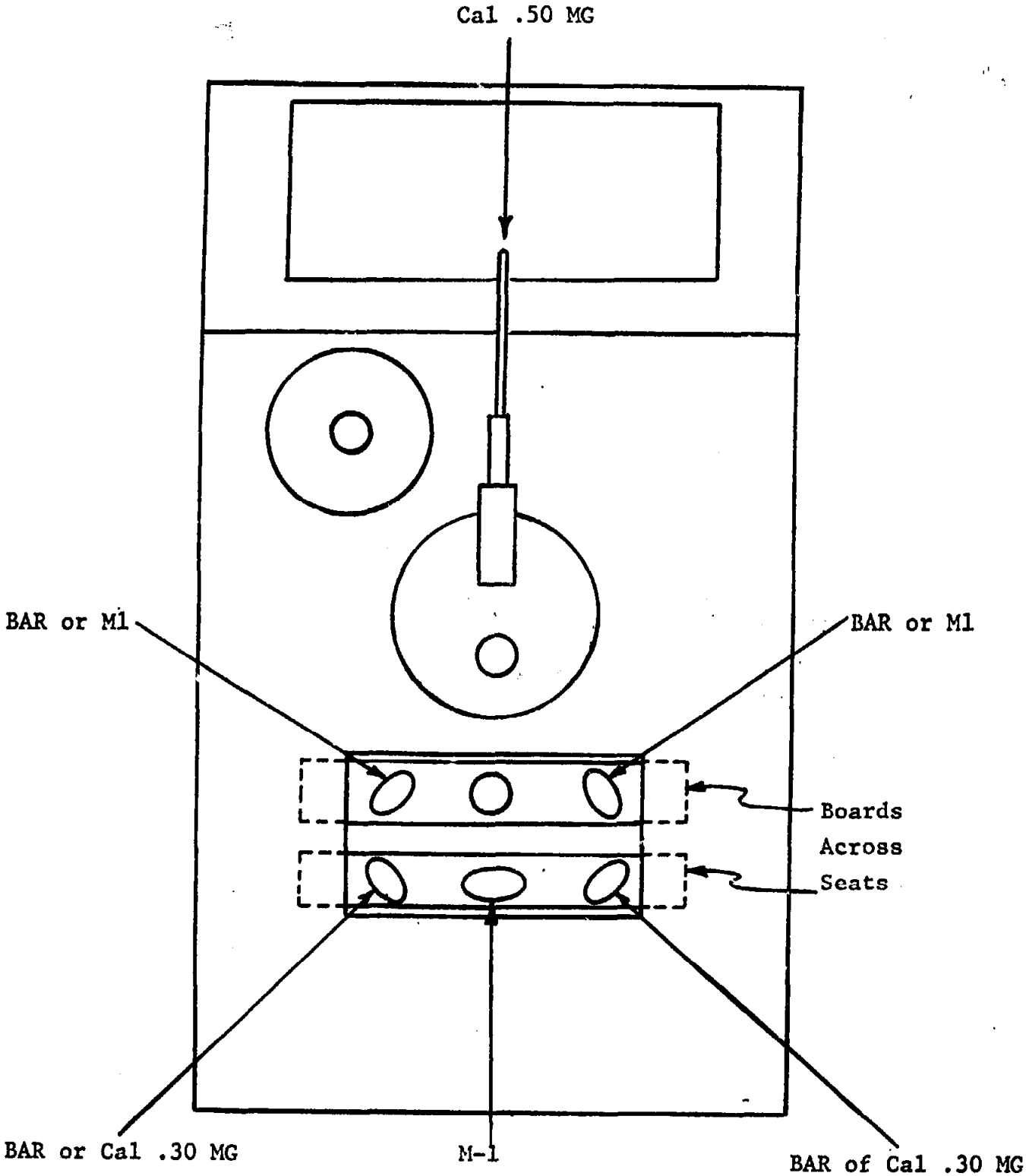
LTC, GS
Doctrine Branch, J343

ARRANGEMENT OF M113 FOR MOUNTED COMBAT



LEGEND

1 - Commander
2 - Driver
3 - Gunner

FIGURE 1

Inclosure 1

SELF-RECOVERY EQUIPMENT FOR AMPHIBIOUS ARMORED VEHICLES

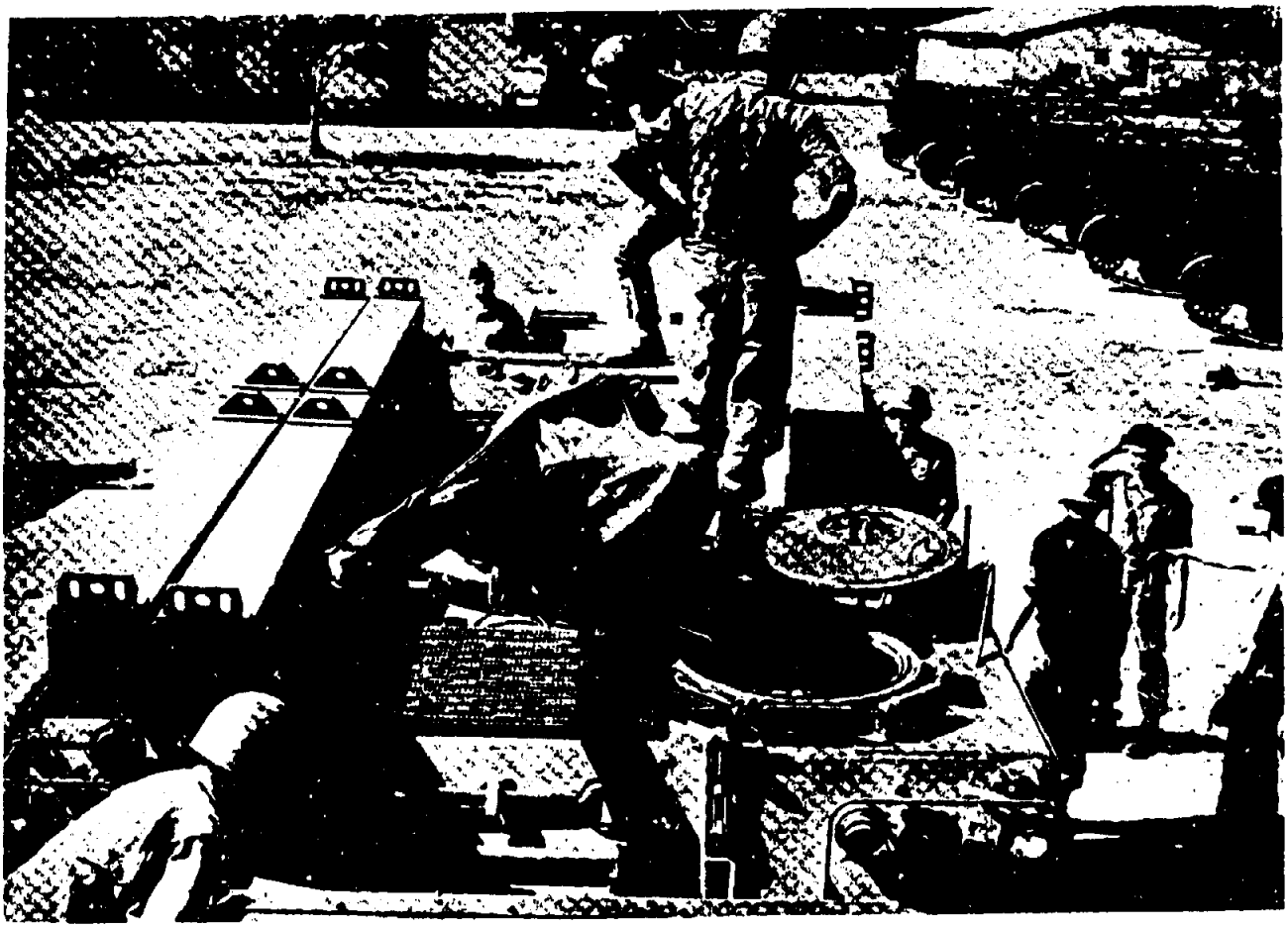
1.	BALK, aluminum, 15-foot	6 ea per Mech Co
2.	BALK, aluminum, 8-foot	6 ea per Mech Co
3.	STIFFENER for balk assemble (locally made)	8 ea per Mech Co
4.	BOAT, pneumatic, 3-man	6 ea per Mech Co
5.	DEMOLITION EQUIPMENT SET explosive-initiating, non-electric	4 ea per Mech Co
6.	SAW, chain, portable, 18-inch	3 ea per Mech Co
7.	BLOCK, fiber rope, 1-inch, 2 sheaves	2 ea per Mech Co
8.	BLOCK, fiber rope, 1-inch, snatch	2 ea per Mech Co
9.	BLOCK, wire rope, 3/4-inch, snatch	5 ea per Mech Co
10.	HOOK, hoist, 21-pound	5 ea per Mech Co
11.	WIRE, 0.0625-inch, 5-pound coil	3 ea per Mech Co
12.	CABLE, tow, ½-inch, 100 feet long	1 ea per Carrier
13.	CABLE, tow, 3/4-inch, 50 feet long	1 ea per Carrier
14.	CARRIER, timber, handled, 48-inch	4 ea per Mech Co
15.	CUTTER, wire rope, 1-inch capacity	1 ea per Mech Co
16.	ROPE, fiber, 1-inch, 600 feet long	1 ea per Mech Co

NOTES:

1. All of the above items in reduced quantities are also provided to the pioneer platoon organic to each Headquarters, Headquarters and Service troop of the Armored Cavalry Squadron.

2. Winches are planned for three carriers in each mechanized rifle troop when development is completed.

Inclosure 2



STOWAGE OF BRIDGE BALK ON M113 VEHICLE

Trial stowage shown above includes two 15-foot balks at left and two 8-foot balks at right. Rear hatch remains clear, and caliber .50 machinegun is not blocked to the front or left of the vehicle. Straps through existing brackets must be added to secure balks when moving.

Inclosure 3

TOWING CONNECTIONS

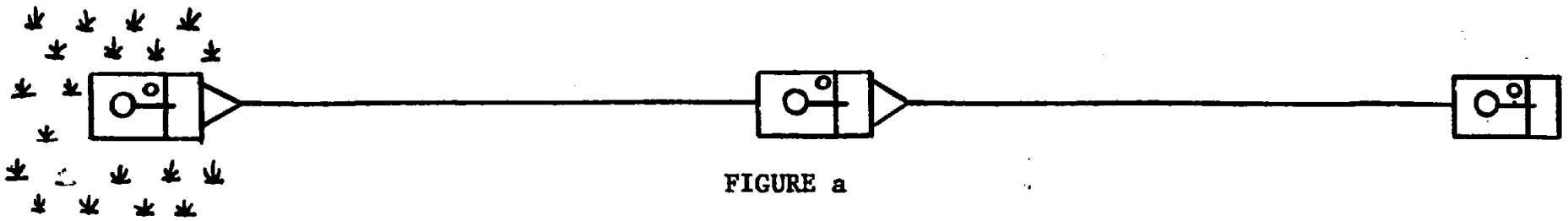


FIGURE a

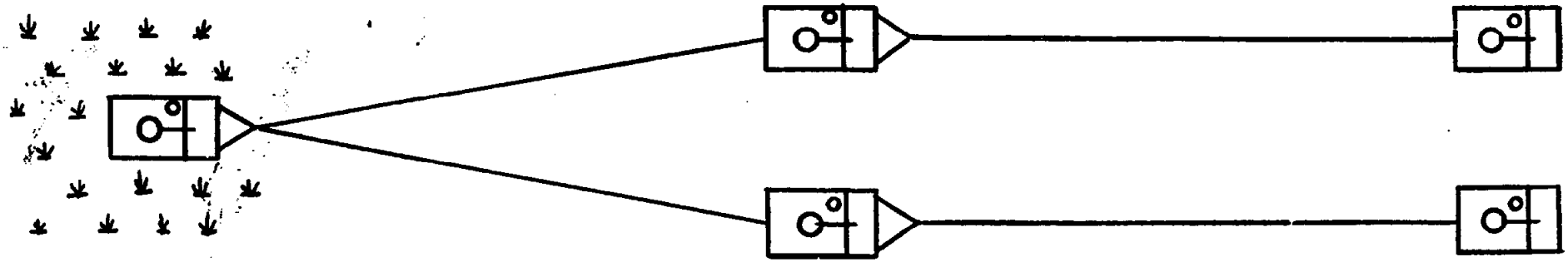
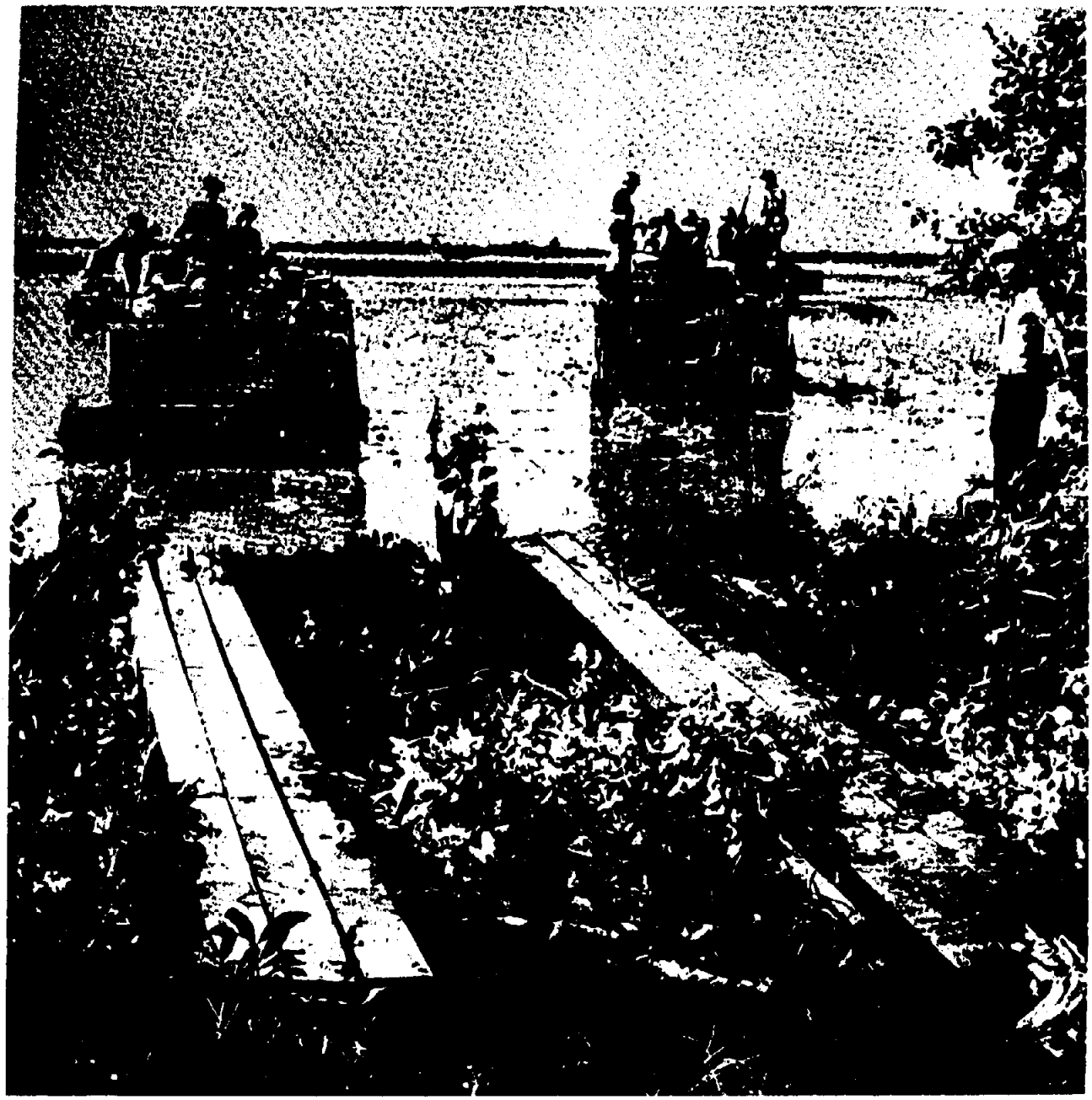


FIGURE B

NOTES:
1. Long connections above are 100 ft ½ inch wire rope provided in the self-recovery kit.
2. Yoke connections at the front of each carrier are made with the 10 ft tow cables issued with each M-113.

Inclosure 4

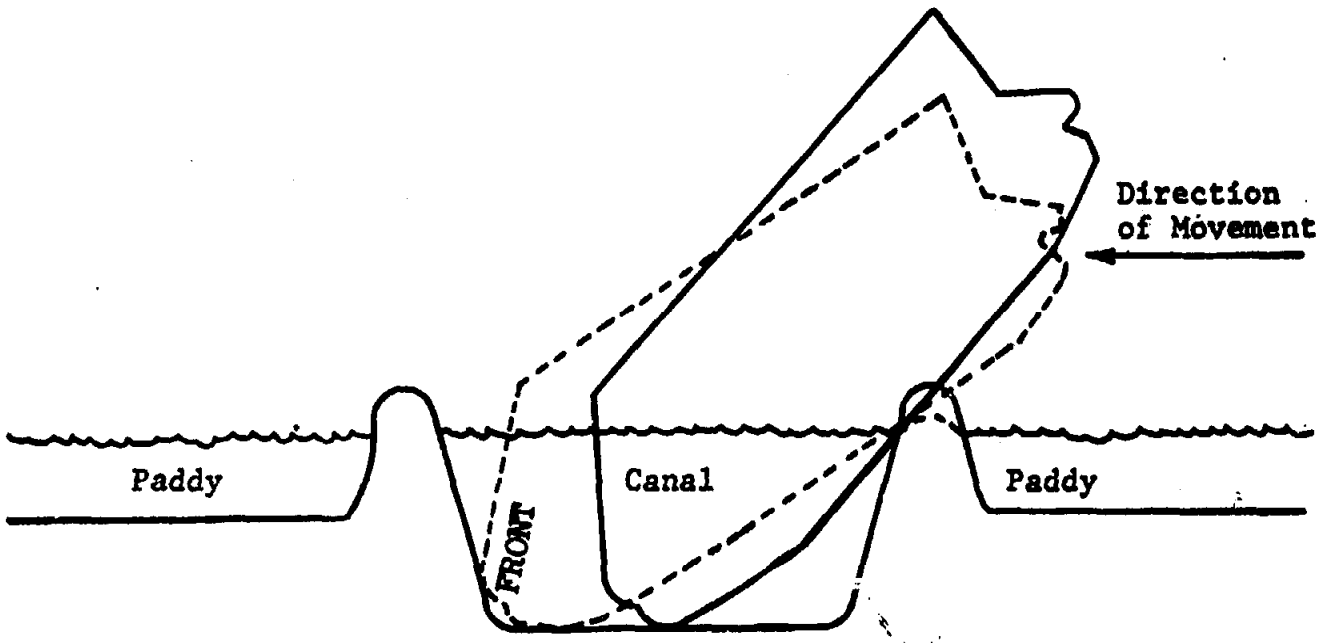


USE OF TIMBER BASE TO IMPROVE TRACTION

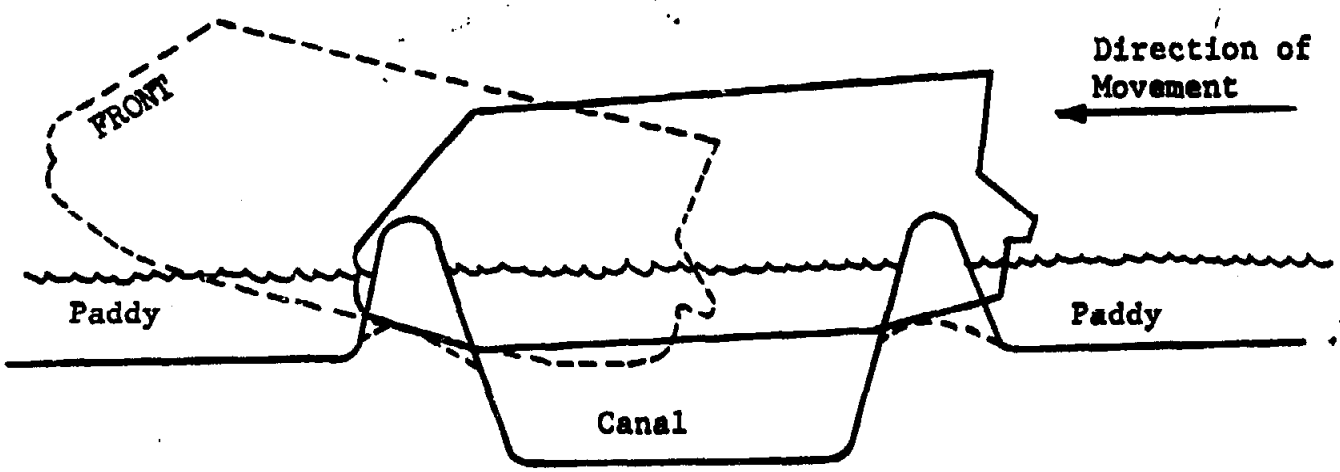
Here timbers are simply laid over a questionable stretch, as carrier exits from an inundated area. Logs or brush can also be used for this purpose.

Inclosure 5

UNAIDED CROSSING OF CANALS

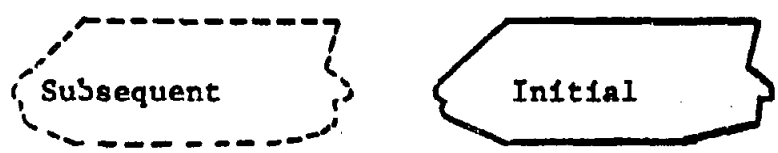


Slow Entry - Wrong

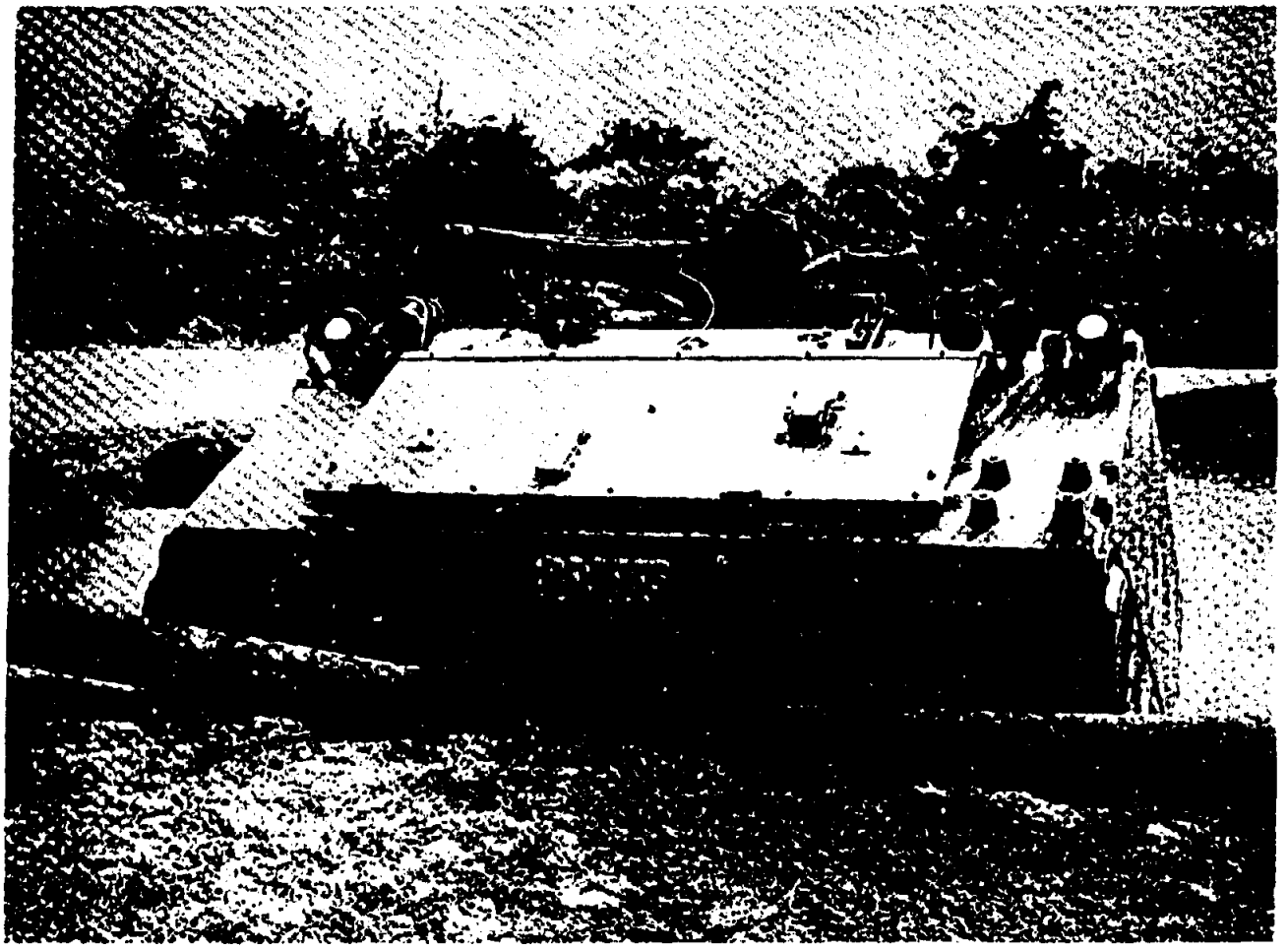


Crossing at Maximum Safe Speed - Correct

LEGEND



Inclosure 6



USE OF LOG CLEATS

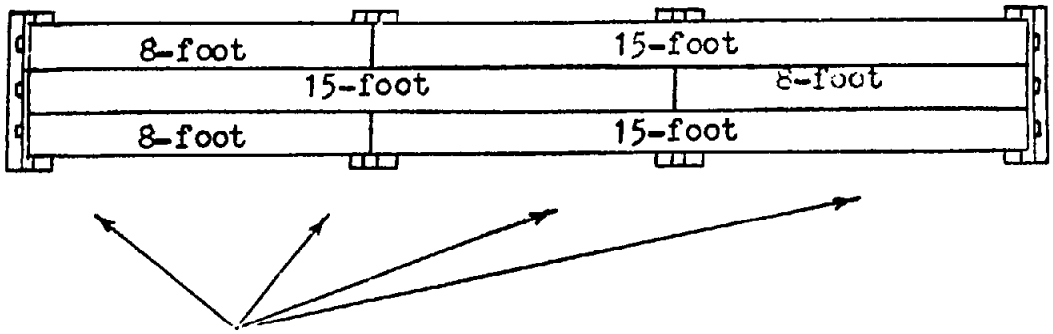
A short log is wired to each track to improve traction in climbing steep bank. Steel wire shown as item 11, inclosure 2, is used to attach these logs. Logs need not be as large as those shown above; normally two-foot lengths will suffice.

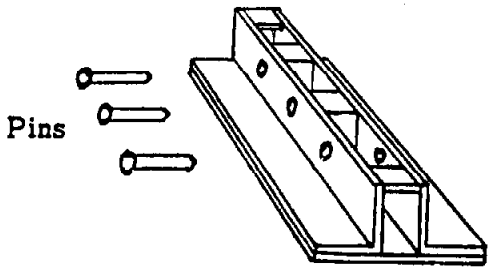
Inclosure 7

ASSEMBLY AND USE OF ALUMINUM BALKS

Top View

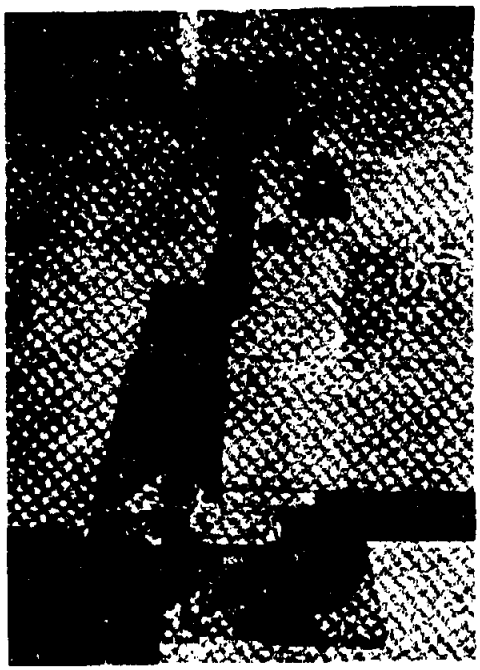
Assembly of Single 23-foot Treadway



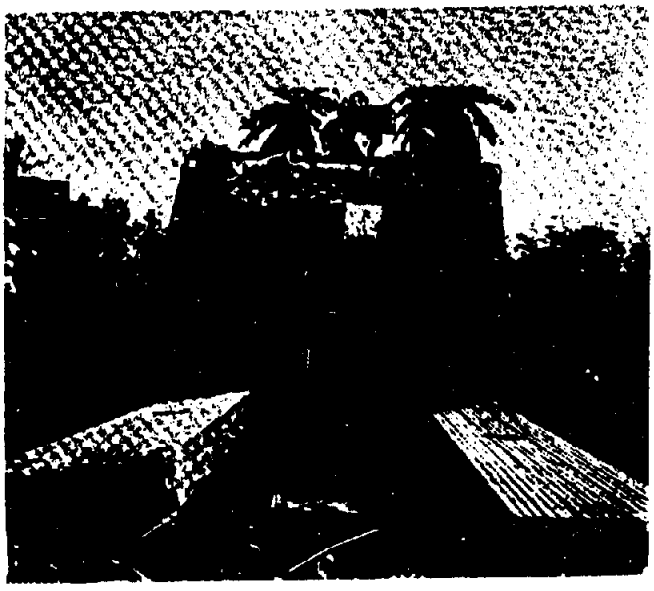


Stiffener

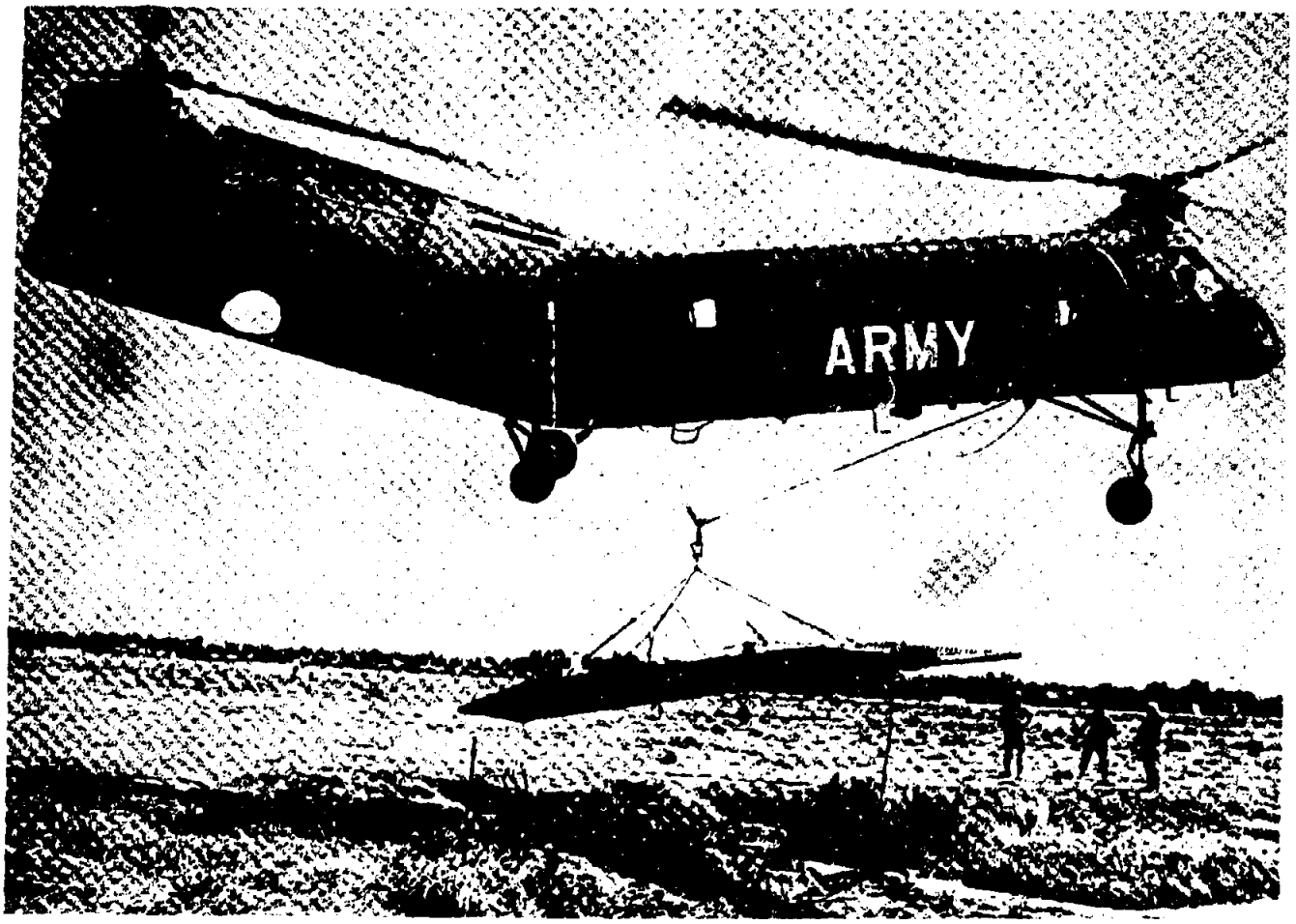
Four stiffeners of the type shown at left are used to interconnect three 15-foot and three 8-foot balks in the arrangement shown above. Pins at left attach balks to stiffeners by passing through projections on the lower surfaces of the balks (visible in photo on inclosure 3).



End of treadway is used as shown with earth ramp optional. Stiffener serves as bearing surface on canal bank; timber or log reinforcement may be required on soft banks.



Two 23-foot treadways are used above to cross a 20-foot canal. Note that spacing is too narrow, and left treadway is rotating under carrier weight.



HELICOPTER DELIVERYING ASSEMBLED TREADWAY

Treadway shown above is assembled from Light Tactical Raft. Aluminum balk can be handled in same fashion. Photograph shows delivery during a test of this technique.

Inclosure 9

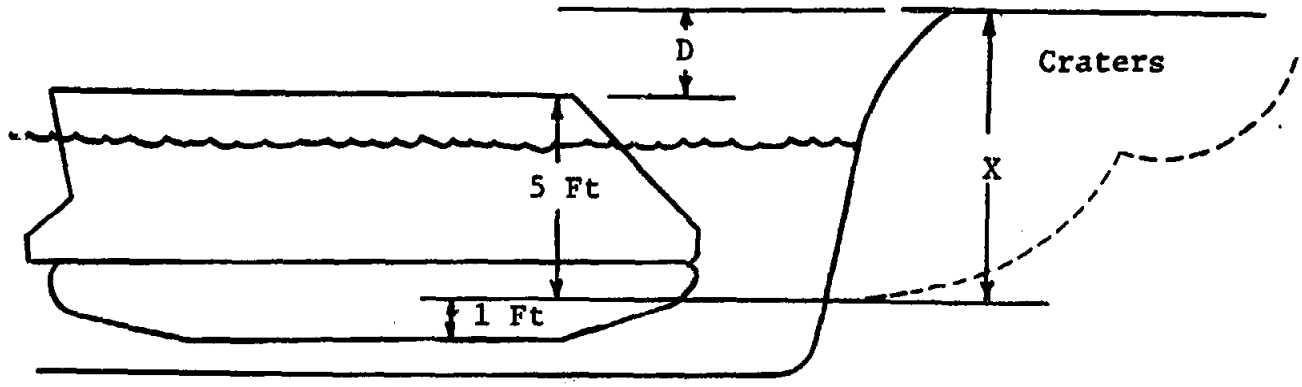
DEMOLITION TECHNIQUES IN THE REDUCTION OF TERRAIN OBSTACLES

1. General. The purpose of this inclosure is to describe two demolition techniques which have been used to reduce terrain obstacles to M113 vehicles in the delta area. This description is limited to placement of charges and amounts of explosive required. Detailed techniques of charge preparation, fusing, and firing are adequately covered in FM 5-25, FM 5-34, and GTA 5-14; in this regard, however, within prescribed safety limits, maximum prepackaging of charges should be accomplished, so that obstacles can be reduced in minimum time. In both situations TNT or C4 have been assumed as the type explosive to be used.

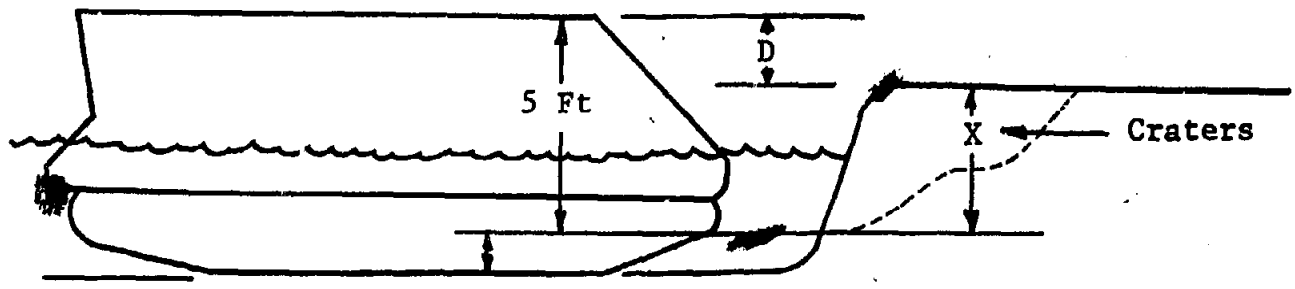
2. Reduction of Slope of Canal or River Bank. A frequent obatacle is an exit bank from a canal or river which is too steep for the carrier to climb. Many variations are encountered in this situation: The carrier may be swimming, or it may have firm contact with the bottom; The crest of the bank may be above or below the top of the carrier; the bank may be vertical, or it may be sloped. To simplify the calculations required for slope reduction by demolitions, a single distance "X" in feet has been selected, with charge sizes and locations expressed in terms of this X distance. Figure 1 illustrates and explains how this distance is calculated and shows the depths at which charges must be buried; figure 2 shows charge placement and specifies charge size.

3. Breeching of Paddy Dikes. The dikes which separate rice paddies can often be breeched by the carriers themselves by impact at a reasonable speed. Frequently, however, these dikes are large or, in the dry season, sun-baked and cannot be breeched by unassisted carriers. Use of demolitions with standard breeching techniques can breech or weaken these dikes so that the carriers can proceed. Figure 3 illustrates charge placements and tabulates charge sizes.

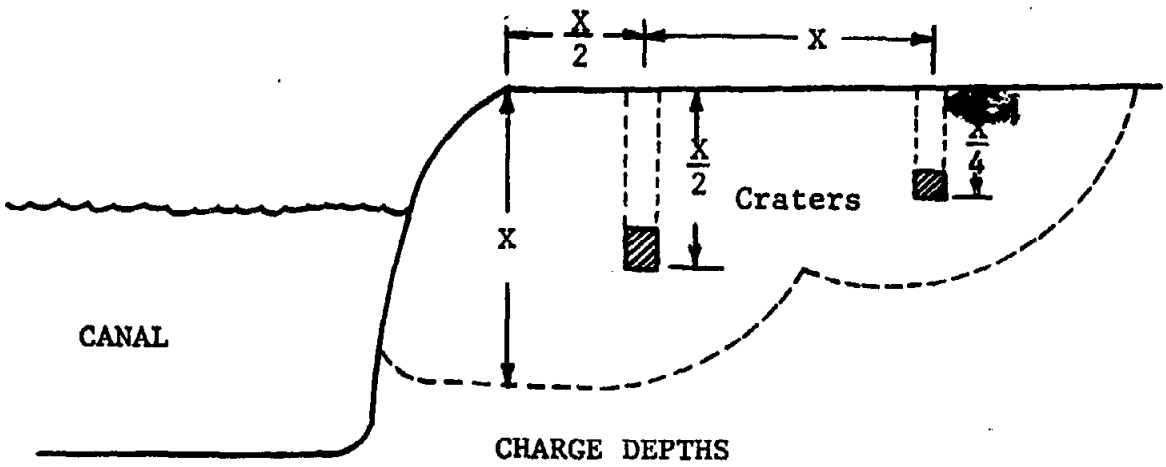
USE OF DEMOLITIONS IN SLOPE REDUCTION



Case I: (Top surface of carrier is lower than crest of bank).
Distance X in feet = 5 + distance D in feet.



Case II. (Top surface of carrier is higher than crest of bank).
Distance X in feet = 5 - distance D in feet.



CHARGE DEPTHS

FIGURE 1

Inclosure 10

USE OF DEMOLITIONS IN SLOPE REDUCTION

NOTE: The weight in pounds of TNT or C4 to be placed in each hole is equal to twice the depth of the hole in feet; for example, if the hole is two feet deep, four pounds of explosive should be placed in it. Holes should be filled and tamped after charge placement.

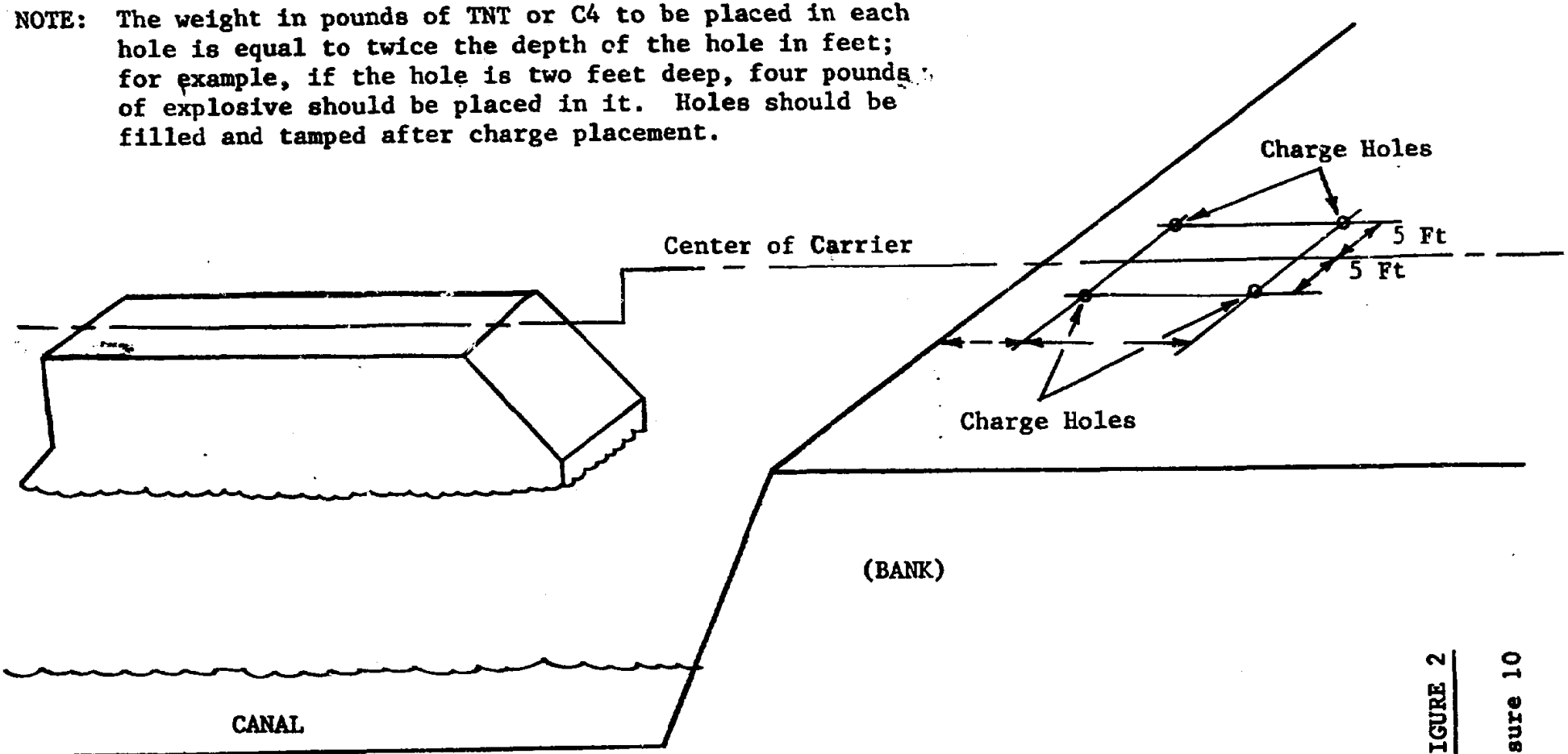
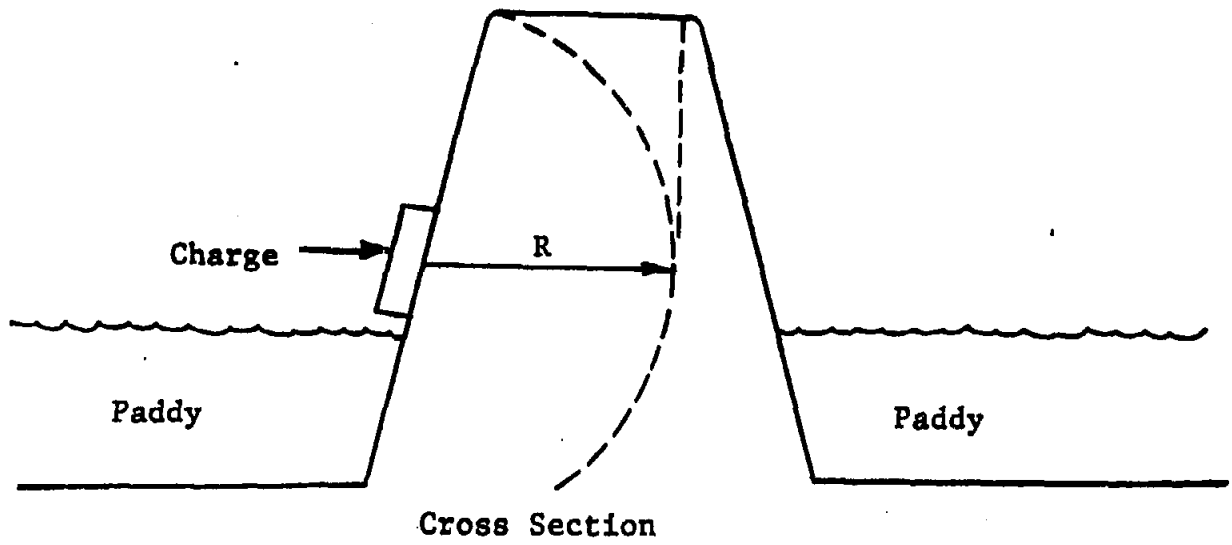


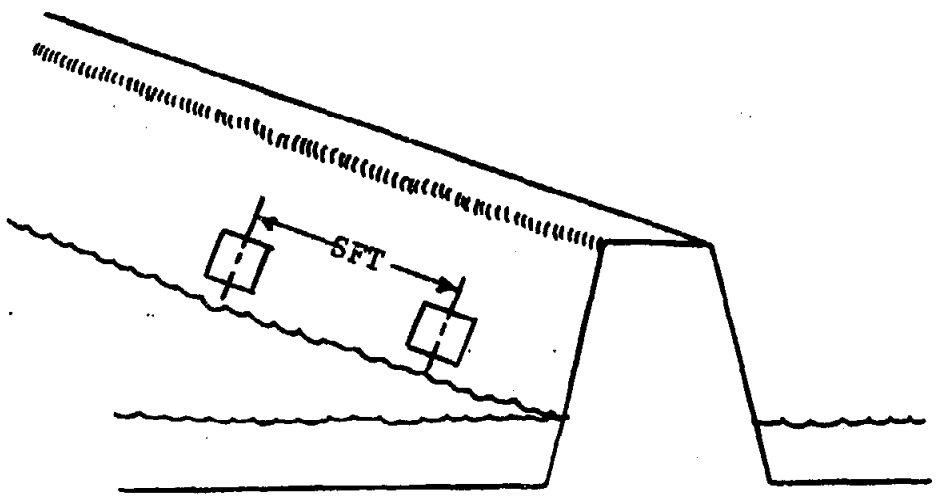
FIGURE 2

Inclosure 10

USE OF DEMOLITIONS IN BREECHING DIKES



Cross Section



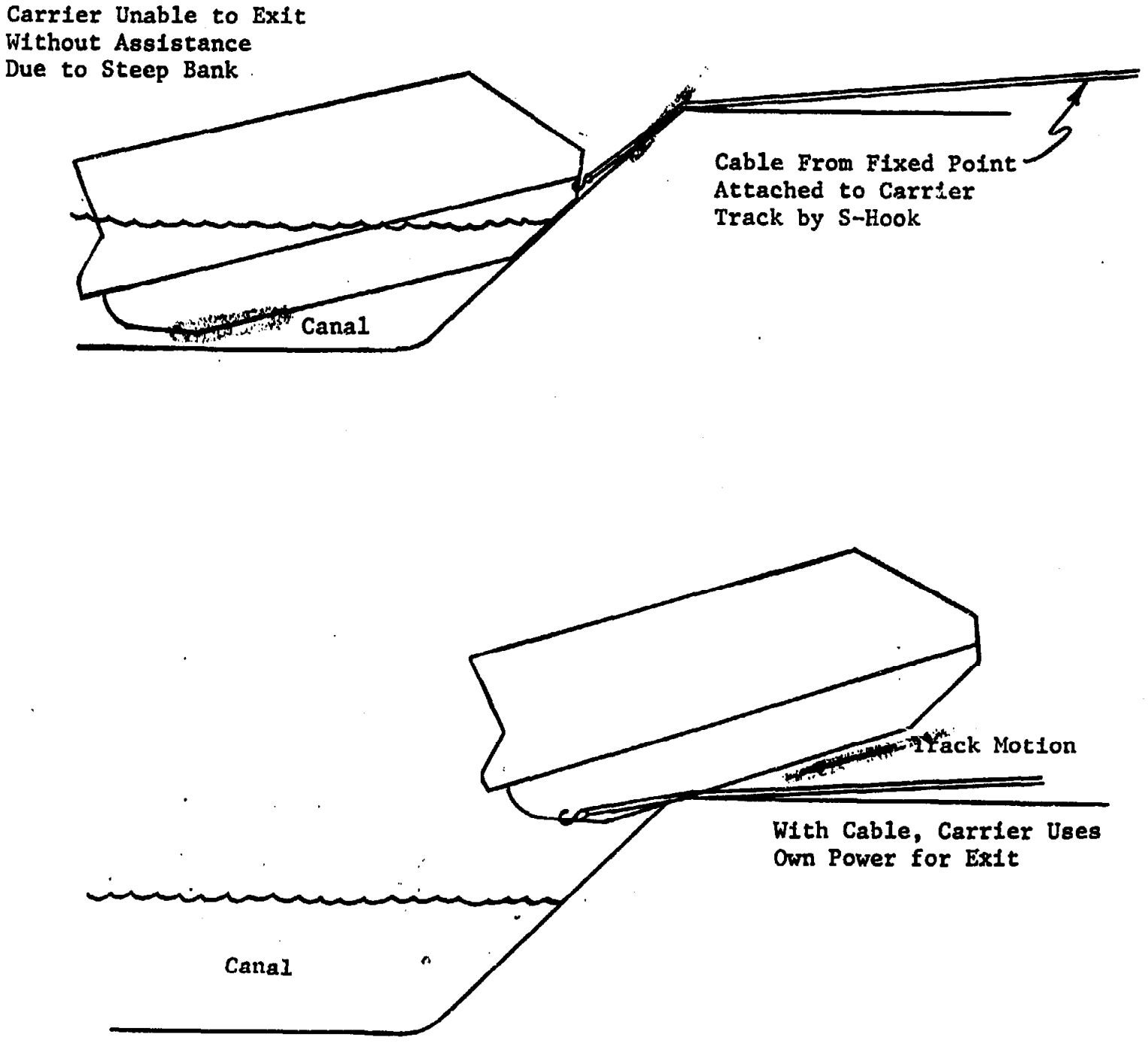
Radius in Feet (R)	Pounds Per Charge
2	2
3	5
4	12
5	22

NOTES:
1. Radius R must be selected based on dimensions and hardness of dike; if breech is not complete, often carrier can break down remaining earth.
2. Two charges are used in each case; where lighter charges are used against softer dikes, spacing should be increased from 5 feet.
3. Charges should not be placed under water, in as much as tamping action of water is negligible, and considerable waterproofing of the charges would be required thereby.

FIGURE 3

Inclosure 10

USE OF CABLE - TO - TRACK ATTACHMENT



Inclosure 11

RIGGING TECHNIQUES

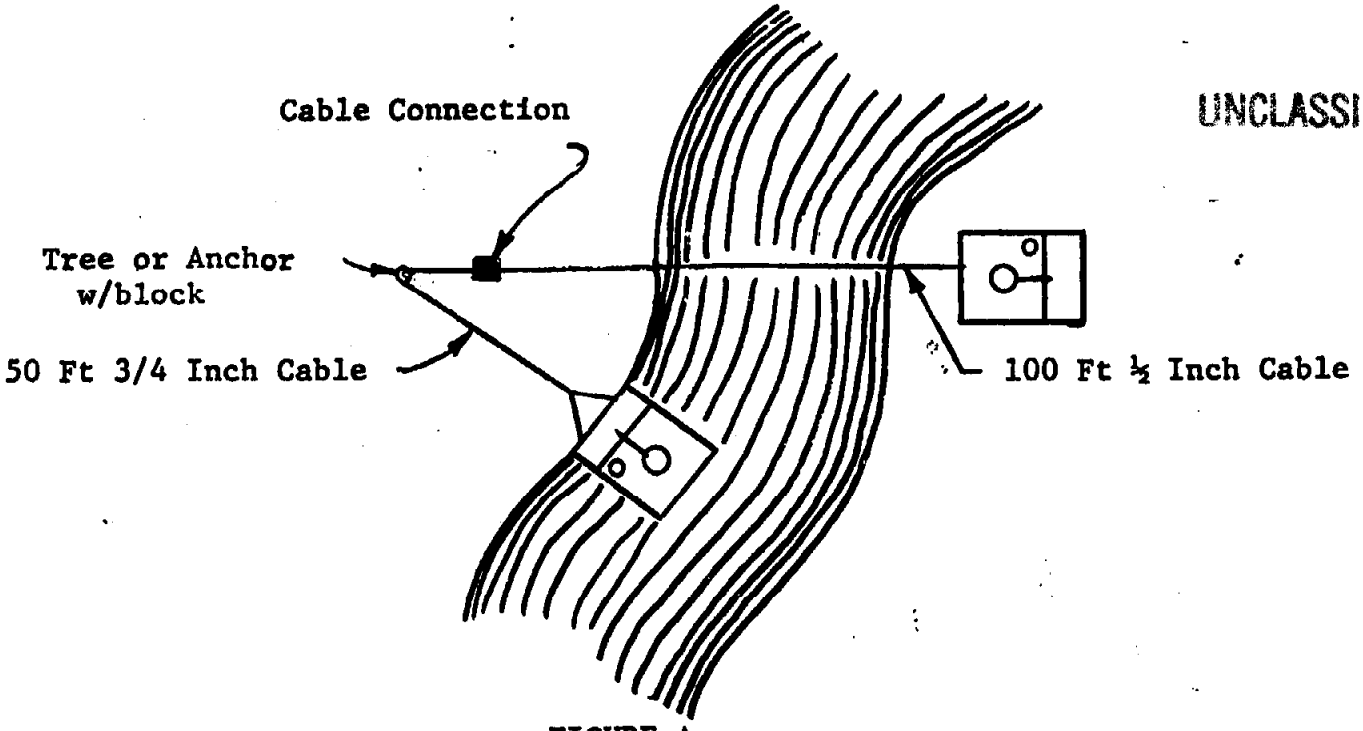


FIGURE A

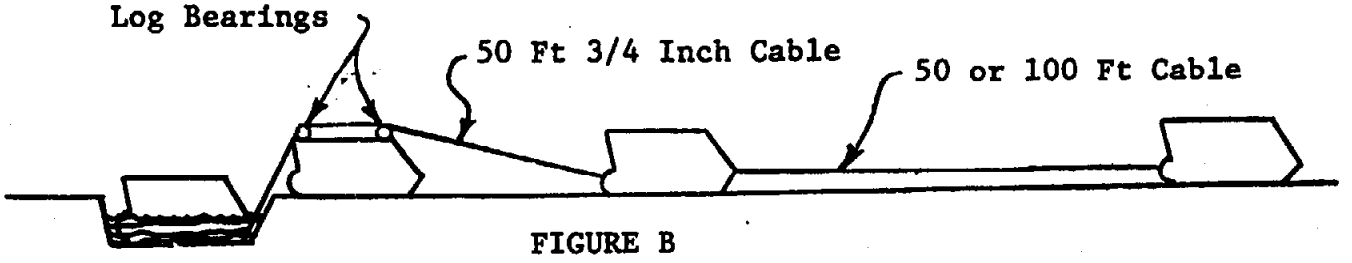
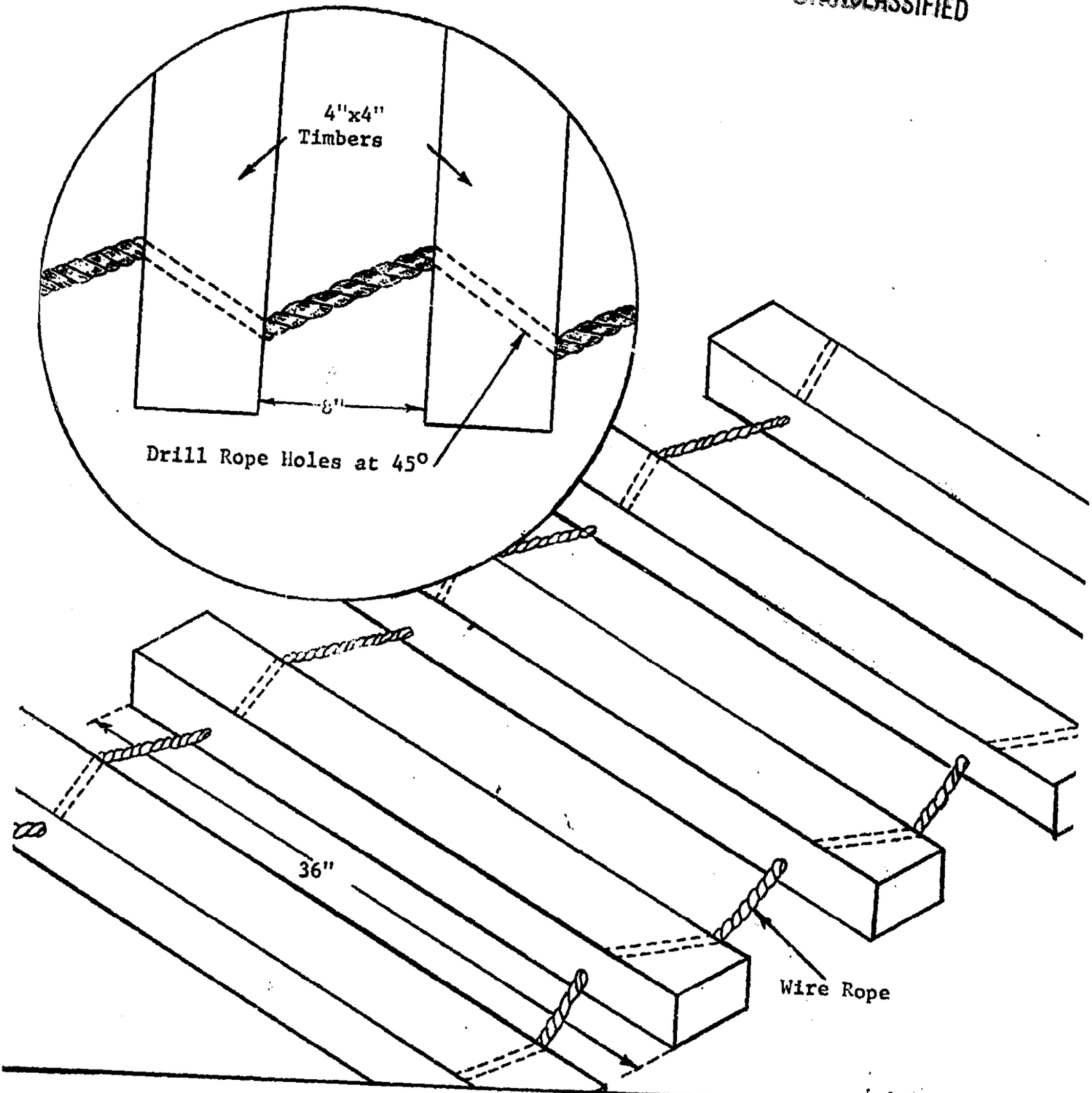


FIGURE B

Inclosure 12



Inclosure 13