

CIVIL DEFENCE ORGANISATION

SOUTH AUSTRALIA

CIVIL DEFENCE RESCUE:- DERRICKS - SHEERS - GYNS:

INTRODUCTION:

During the course of rescue work, the time may come when it is necessary for the Rescue man to lift some heavy load. This precis deals with three methods with which such lifting can be made considerably easier. It may be necessary to rig one or all of these, and all Rescue personnel should be trained in their erections.

POLES:

In choosing poles for such apparatus, it is important to ensure that they are long and strong enough to permit the load to be lifted to the required height after allowance has been made for the length of the tackle when chock-a-block plus the length of the sling or chain in use, the height of the object to be lifted, and with sheer legs and gynes, additional allowance must be made for the slope of the legs.

STANDING DERRICK: (Figure 1)

Description: A standing derrick is a single spar or pole (or two or more lashed together for strength) with the butt on the ground or on a solepiece, and the pole held vertical by three, or sometimes four, guy ropes.

The weight can be lifted and moved to the right or left and to the front, but only to a limited distance.

To support the lifting tackle and to prevent it from binding on the derrick pole, a short crosstree (or crosshead) about 18 inches long is affixed to the derrick pole by a square lashing with rope or wire bond. The crosstree should not be shouldered or bolted to the upright, as this weakens both crosstree and derrick pole. Its normal position is from 1½ to 2 feet from the top of the pole, but in all cases it is advisable to have it fixed as far down the pole as will give sufficient room to lift the weight the required distance.

With any particular pole, the shorter the length of pole bearing the load, the greater the load it can carry within the limits imposed by the type and size of pole in use.

Gyys: When using 40-ft. 1½ inch lashings for guy lines, the opposite gyys are joined together by a reef knot or double sheet bend if the ropes are wet. The ropes are attached to the top of the pole by a clove hitch.

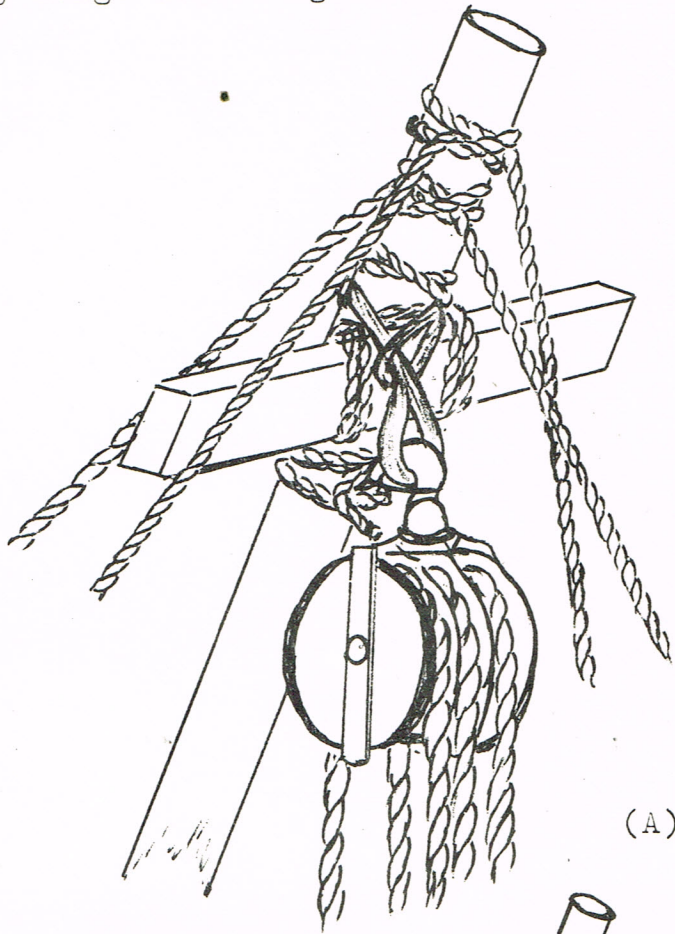
When the 200 ft. 2 inch rope is used as a fore and back guy, it should be attached to the top of the pole by a clove hitch made in the centre of the rope.

If it is impossible under certain circumstances to use a guy rope, a "lazy leg" may be used. This is done by lashing another pole to the pole of the derrick, using the diagonal lashing.

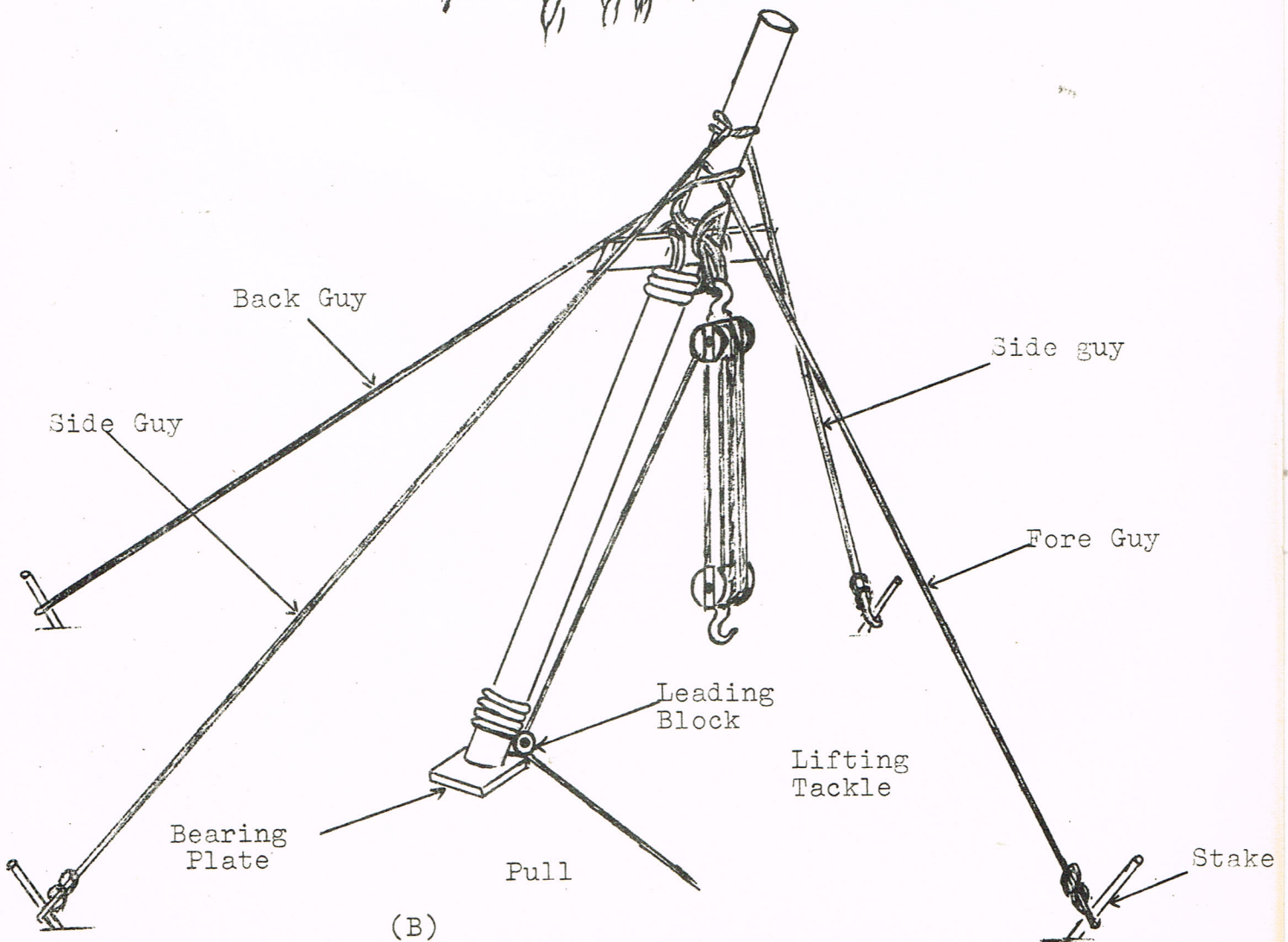
Pickets: The distance of the guy pickets from the foot of the derrick should be equal to twice the height of the derrick if possible, but never less than the height of the derrick. Where conditions are unsuitable for the use of pickets, improvised holdfasts may be used.

Tackle: The block with the greater number of sheaves is used as the upper block and is attached above the crosstree by a wire bond, sling or chain, and the square lashing protected from harm by sacking, etc. The hook of the block must be moused.

Footing: The ground on which the derrick will stand must be firm, or steps must be taken to make it so. It is advisable to form a shallow hole into which the butt will be placed. If the ground is too soft to withstand the pressure of the butt, a footing of baulks of timber may be necessary, so constructed as to spread the load over a sufficiently large area of ground.



(A)



(B)

FIGURE. 1. THE STANDING DERRICK.

LAYOUT AND PREPARATION:

Having chosen the position for the foot of the derrick, allowing for any necessary luffing, the points at which guy pickets will be driven in should be selected. After preparing the derrick, the tackle should be overhauled to the required length and the lower block temporarily lashed to the pole to prevent swinging, during erection.

RAISING:

The initial raising is done by hand under the leader's direction.

The guy at each picket is controlled by a man and, as the pole is raised the slack on the fore guy is taken in. During erection, the guys are temporarily controlled with a round turn on the pickets and finally made fast with a round turn and two half hitches.

LUFFING:

When raising a stretcher or weight over an obstruction, such as a wall, it is usually necessary to luff the pole slightly. When this is being done, each guy line must be controlled under the direction of the leader. Since the men must work in unison, the leader must give precise directions to haul or slacken, and must not leave the men to exercise their own judgement, otherwise misunderstandings may occur and lead to an accident.

The initial luff should not exceed one-fifth of the effective height of the derrick to allow for stretch in the guy lines when the derrick is first loaded. The maximum luff at any time the derrick is in use thereafter must not exceed one-third of the height of the derrick. The limit of incline fixes the distance at which a weight can be picked up.

SHEER LEGS: (Figure 2)

Description: Sheer legs consist of two poles with their butts on the ground and their tops lashed together and held in the air by a fore and back guy, forming an inverted "V".

Sheer legs can sometimes be employed where the use of a derrick would be impracticable, but can only be used to move the weight in a straight line by swinging the load between the legs. For a given load, the two spars may each be lighter than the one required for a standing derrick.

LAYOUT AND PREPARATION:

Two poles should be selected as nearly of equal length as possible, and laid with their butts flush together on the ground the tips being raised to a convenient height for working. Spacing pieces 2 inches to 3 inches thick should be inserted between the poles and lashed with a round lashing. The butts of the poles should be opened up until their distance apart is about one-third of the length from butt to lashing. To prevent the butts from splaying, a ledger should be lashed on near the butts, or as an alternative a 40ft. lashing can be used, fastening it to each leg by a round turn and two half hitches, or holdfasts can be driven in and fastened to each leg. A sling or strop (i.e. a short length of heavy rope or chain) should be passed over the fork or crutch so that it will rest across the poles and not on the lashing between them. The lifting tackle is prepared and hooked into the sling, the lashing being suitably protected. The hook must be moused.

Guys: The guys are similar to those required for a derrick but consist of two only, a fore and back guy. They should be made fast above the round lashing by clove hitches in such a way that they will draw the spars together when the stress comes on to them, i.e. the fore guy to the rear pole and the back guy to the front pole. The length of the guys is similar to those used with a derrick. In certain circumstances a "Lazy-leg" can be used instead of a guy.

Tackle: A sling or strop is passed over the crutch to take the hook of the upper block of the lifting tackle. The hook must be moused. The tackle is prepared to the required length and the lower block is temporarily lashed to one of the poles to prevent swinging during erection.

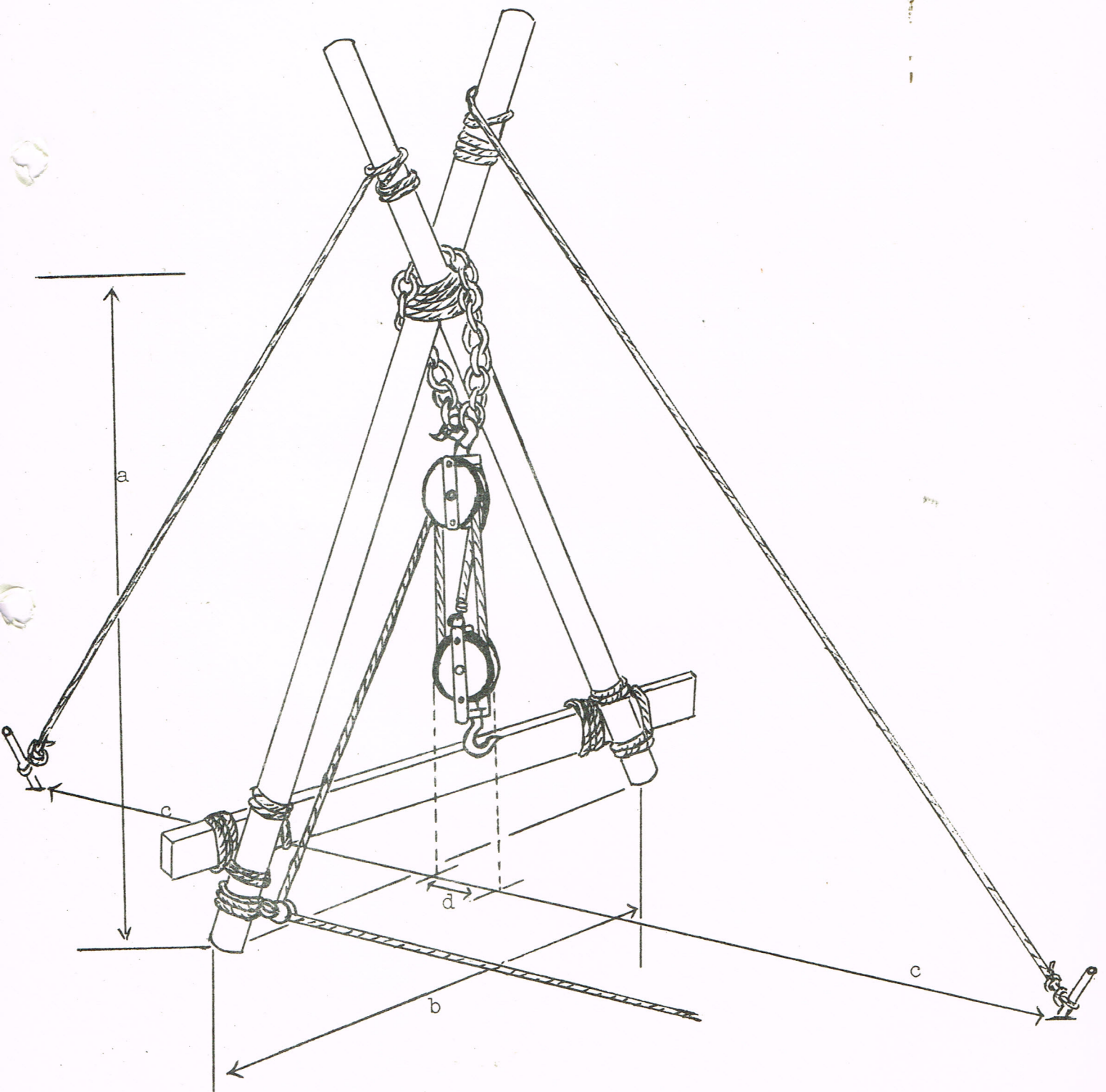


FIGURE. 2. SHEER LEGS.

RAISING: The initial raising is done by hand under the leader's direction. The guy at each picket is controlled by a man, and, as the sheer legs are raised, the slack on the fore guy is taken in. During erection the guys are temporarily controlled with a round turn on the pickets and finally made fast with a round turn and two half hitches. The butt must be placed sufficiently far from any obstruction to permit the top of the sheer legs to be luffed over it.

LUFFING: A sheer leg is luffed by carefully paying out on one guy and taking in on the other. All men must work in unison under the leader's direction to ensure sound operation and prevent accidents. The amount of luff permissible is similar to that allowed in derricks, i.e., initial luff one-fifth, thereafter one-third maximum.

GYNS OR TRIPODS: (Figure 3).

Description: A gyn or tripod consists of three poles lashed together near the tips and with the butts forming an equilateral triangle on the ground. No guys are required and the space occupied is small, but only a vertical lift is possible. The lifting tackle is suspended from a sling passed over the crook formed by the tips of the spars. The poles used should preferably be of equal length and strength.

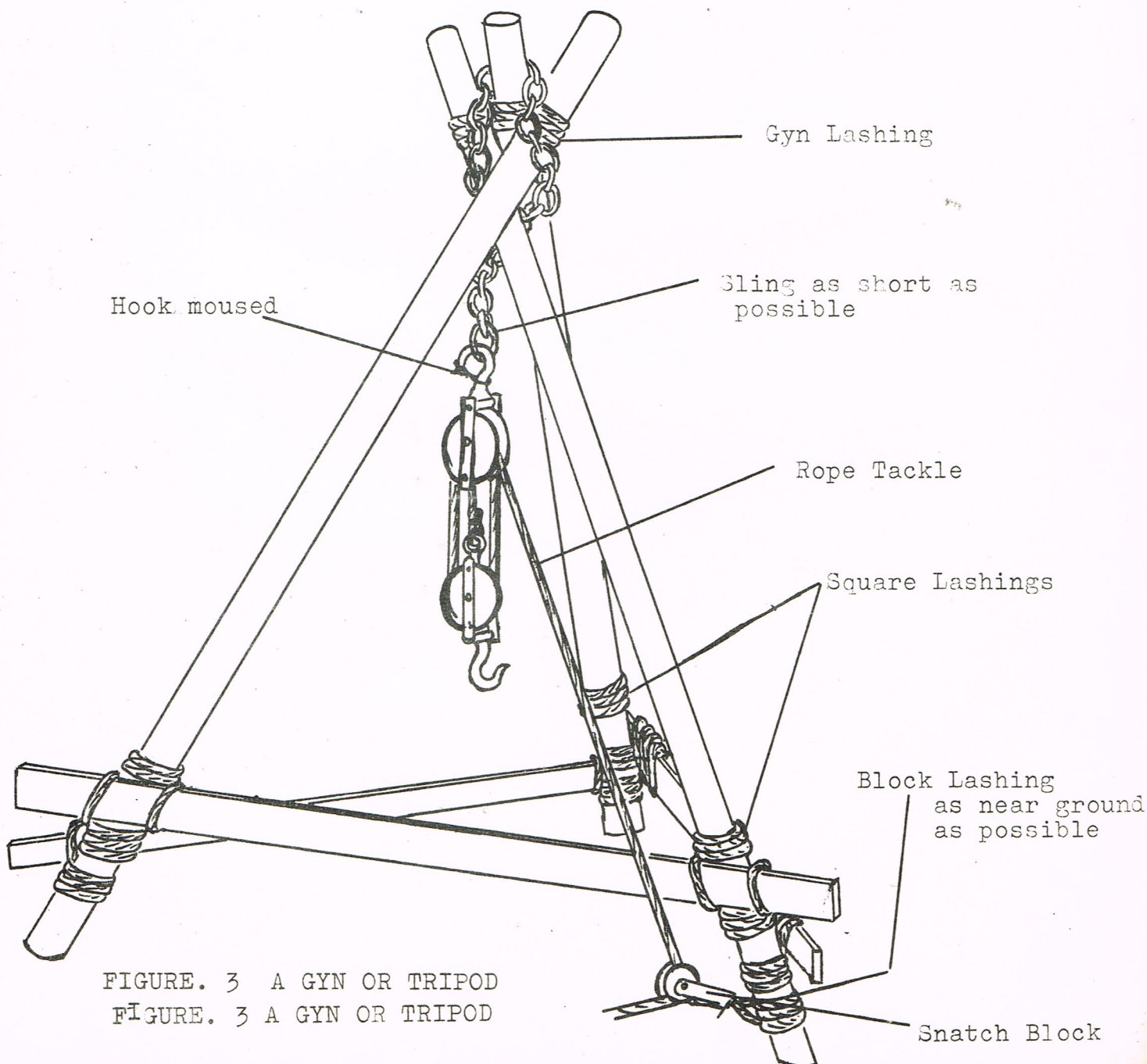


FIGURE. 3 A GYN OR TRIPOD

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LAYOUT AND PREPARATION:

The three poles should be laid out, side by side, the butts flush on the ground and the tops raised on a trestle or box. Having placed them, they should be marked about 3 feet down from the tip of the shortest pole to show the position of the centre of the lashing. The centre pole should now be removed and reversed with its butt on the ground on the opposite side of the trestle.

All three marks should be in line. Spacing pieces, i.e., 2 inch or 3 inch thick, according to the diameter of the poles, should be inserted between the poles, after which they are lashed together with a figure-of-eight lashing.

The two outer poles are crossed until their butts are at a distance apart, equal to about half the effective length of the poles, the top of the centre pole to rest in the crook of the other two.

Tackle: A sling or strop, i.e., a short loop of heavy rope or chain is placed in the crutch in such a manner as to bind the poles together when the weight is taken, the lashing being suitably protected. The hook of the upper block is hooked into the sling and moused. The tackle is prepared and overhauled to the required length. The lower block is temporarily lashed to one of the legs to prevent swinging during erection.

RAISING:

The head of the gyn should be lifted as far as possible by hand and the centre pole brought up to form an equilateral triangle. The butts should be evenly spaced at a distance apart, equal to about half the height from the butt to the lashing; they must all be on the same level or the weight will be distributed unevenly, and the gyn must be placed so that its head is nearly as possible over the centre of gravity of the load.

Note: Whether a weight is suspended or not, the gyn should not be left standing unless the butts are secured against slipping by one of the methods used in the sheer legs.

IMPROVISATIONS:

The equipment supplied to Rescue Parties has been kept as simple and as straight forward as possible, but by careful adaption and skilful improvisation the items can be used in a large number of ways in difficult circumstances.

With a little ingenuity, much time and effort can be saved and a higher degree of safety achieved for both personnel and those to be rescued.

No member of the Rescue Service should, however, become gadget conscious. In the course of training, much time and effort may have to be applied to the erection of lifting devices, mainly with a view to providing exercises and instruction for the personnel. The number of rescue operations in which such devices can be efficiently and economically used is limited, and it should be clearly understood that no involved technical method should be taught or used when a simple straight method will do.

CONCLUDING SUMMARY:

The object of this paper has been to outline the principles and application of derricks, sheers and gyns for lifting purposes.