

BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

SECTION G85.800.5
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AT&T Co Standard

MANILA ROPE AND BLOCKS

BLOCKS

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1. GENERAL

1.01 This section describes the use, care and maintenance of standard blocks.

2. SAFETY PRECAUTIONS

2.01 Do not use blocks if the sheaves do not run freely.

2.02 Do not oil roller bushed sheaves.

2.03 Do not use blocks with sharp edges or nicked sheaves. Inspect sheaves frequently to prevent cutting rope.

Care should be taken that the rope is in contact only with the grooved surface of the sheaves and that it does not ride on any of the fixed parts.

2.04 A hook which has begun to straighten shall immediately be discarded.

2.05 Do not use blocks with sheave holes too small to give sufficient clearance between the sheaves and the sides and top.

2.06 The safety precautions set forth in the section "Rope-General" of this group of practices shall be adhered to.

3. BLOCK TERMS

3.01 The terms used in this section pertaining to blocks are as follows:

The parts of a block are the shell, sheave, hook, becket, becket bolt, bushing, sheave pin, cotter pin, center strap, outside strap and roller bushing. (See Part 4.)

Tackle: An assemblage of rope and blocks. The rope is commonly called the fall.

Running Block: Block attached to object to be moved.

Standing Block: Block attached to the fixed support.

Overhaul Blocks: To separate or spread blocks in a tackle.

Run in Blocks: To bring blocks closer together.

Chock-a-Block: Blocks of a tackle in contact.

Standing End: End of rope fixed to the block.

Luffing a Block: Taking a purchase on the fall line of a set of blocks with another set of blocks.

Running End or Fall End: Free end of rope in the tackle.

Return: Rope between the two blocks.

Reeving Blocks: To pass rope through the aperture of the blocks and over the sheaves so as to obtain mechanical advantage.

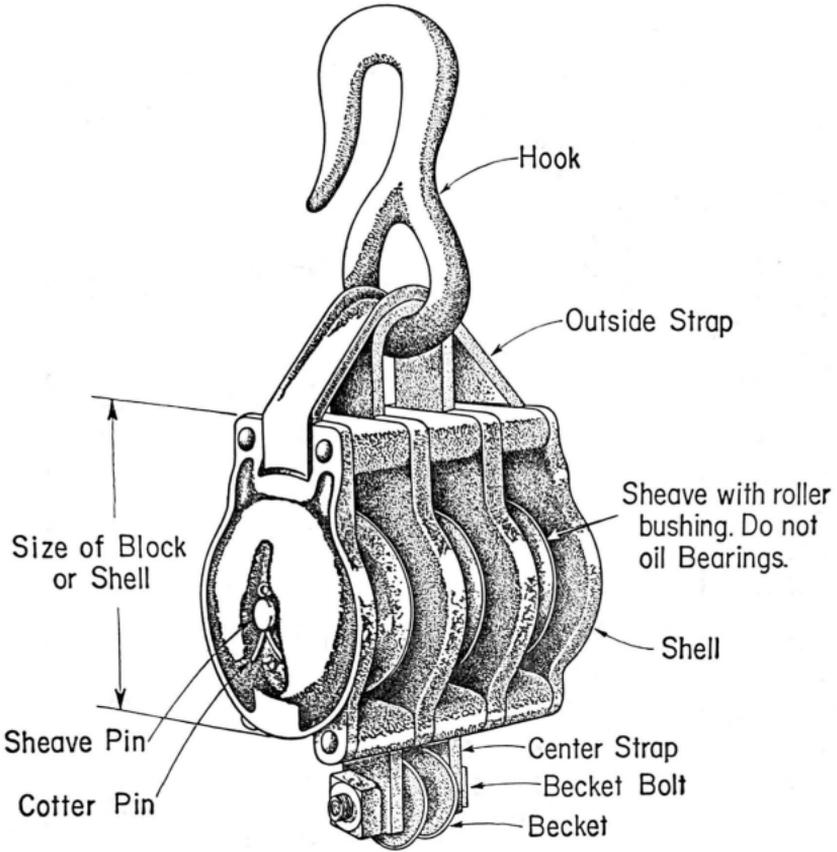
4. STANDARD BLOCKS

4.01 Standard Blocks are furnished in the following sizes and are equipped with the open type hook unless ordered with shackle. Rope Blocks are sized by the length of their shell and the number of sheaves. The following table shows the standard sizes and types of blocks, together with their working strength and size of rope to be used.

| Size of Blocks | Number of Sheaves | Working Strength of Hook (Pounds) | Size of Rope | Suggested Length of Rope (Ft.) | Maximum Load That May Be Applied to Fall Line (new rope) | ** No. of Men Required to Produce Maximum Load on Fall Line | |
|----------------|-------------------|-----------------------------------|--------------|--------------------------------|--|--|---|
| | | | | | | No. of Men on 4 in., 3 Sheave Luffing Blocks | |
| | | * | | | | | |
| 3 in. | 1 | 2300 | 3/8 | 50 | 370 | 3 | — |
| 3 in. | 2 | 2300 | 3/8 | 75 | 370 | 3 | — |
| 3 in. | 3 | 3900 | 3/8 | 100 | 370 | 3 | — |
| 4 in. | 3 | 4600 | 1/2 | 150 | 750 | — | 1 |
| 6 in. | 3 | 8600 | 3/4 | 200 | 1500 | — | 2 |
| 8 in. | 3 | 12000 | 1 in. | 275 | 2500 | — | 3 |

* Maximum load permitted on hooks.

** Based on a maximum pull of 130 pounds per man.

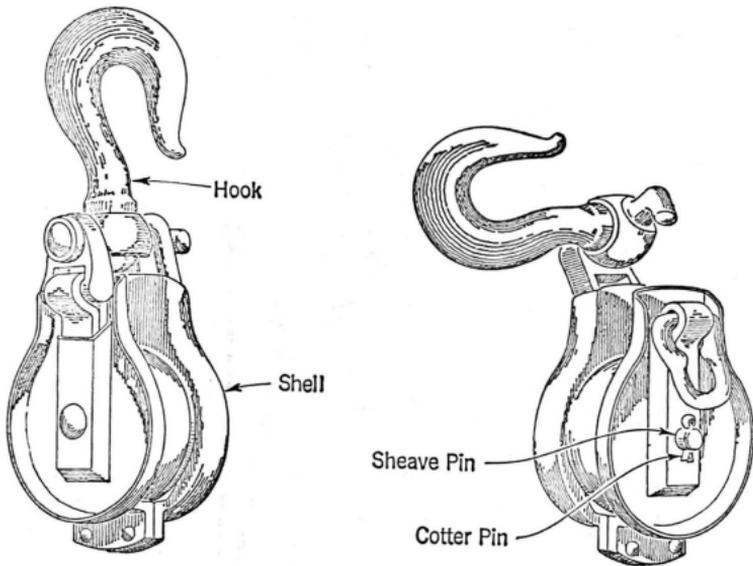


4.02 The hooks of the tackle blocks have been designed so that if a load is applied at the lowest point of curvature they will start to open at approximately 70 per cent of the maximum load they will carry; thus they act as a visible safety link to warn against overstressing before complete failure or before any other part of the block will fail. The working strengths as given in Paragraph 4.01 are the loads at which the hooks will start to open with the load applied at the lowest point of curvature. These strengths are reduced in proportion to the distance that the point of loading is applied from the lowest point of curvature. In view of this it is impracticable to give the working strengths of the hooks for all conditions that may be encountered in the plant and therefore when the blocks are in use, the hooks should be under observation to determine whether the load being applied will exceed the ultimate strength of the hook. Never place a load on the point end of the hook.

4.03 To determine size of sheave measure the diameter of the outside edge of the flange.

5. STANDARD MANILA ROPE SNATCH BLOCKS

5.01 Standard Manila Rope Snatch Blocks are furnished in either 6- or 8-inch sizes, the hooks of which have a working strength of 11,000 and 17,000 pounds, respectively, which are also 70 per cent of the maximum loads they will carry. The 6-inch block is intended for use with 3/4-inch manila rope and the 8-inch block is intended for use with 1-inch manila rope.

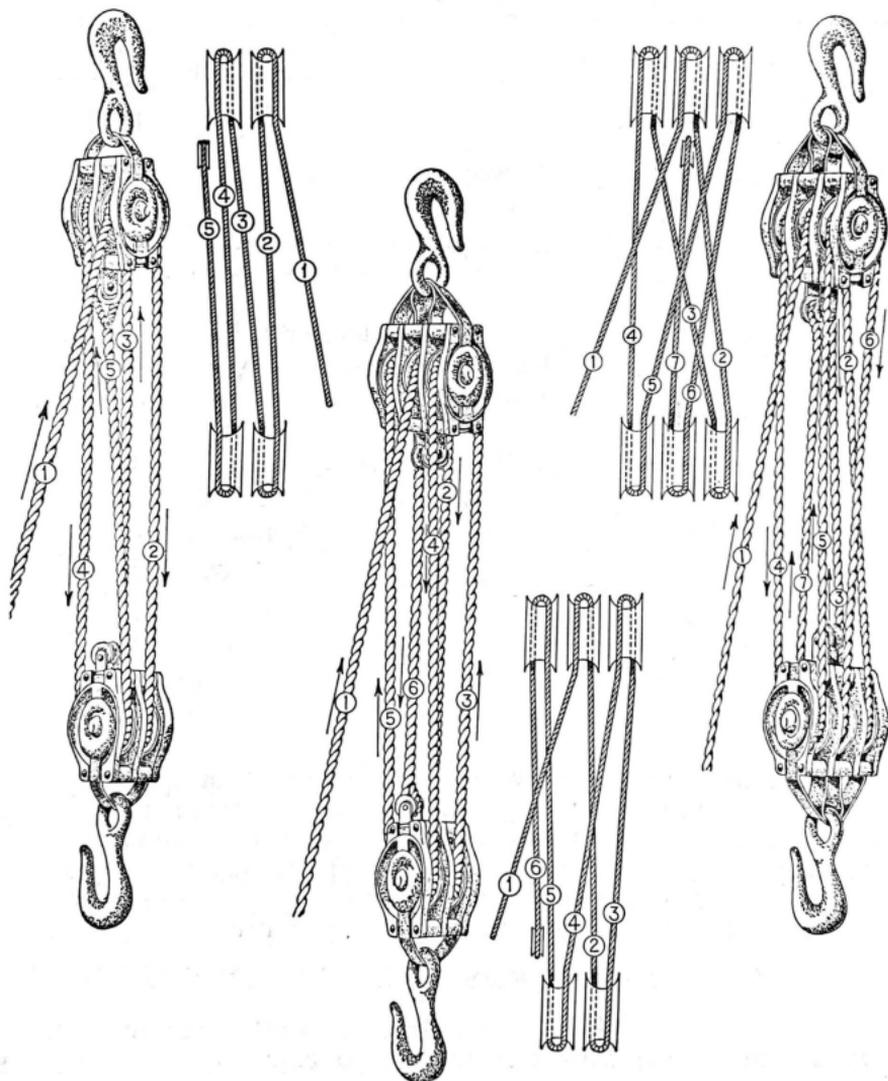


6. REEVING BLOCKS

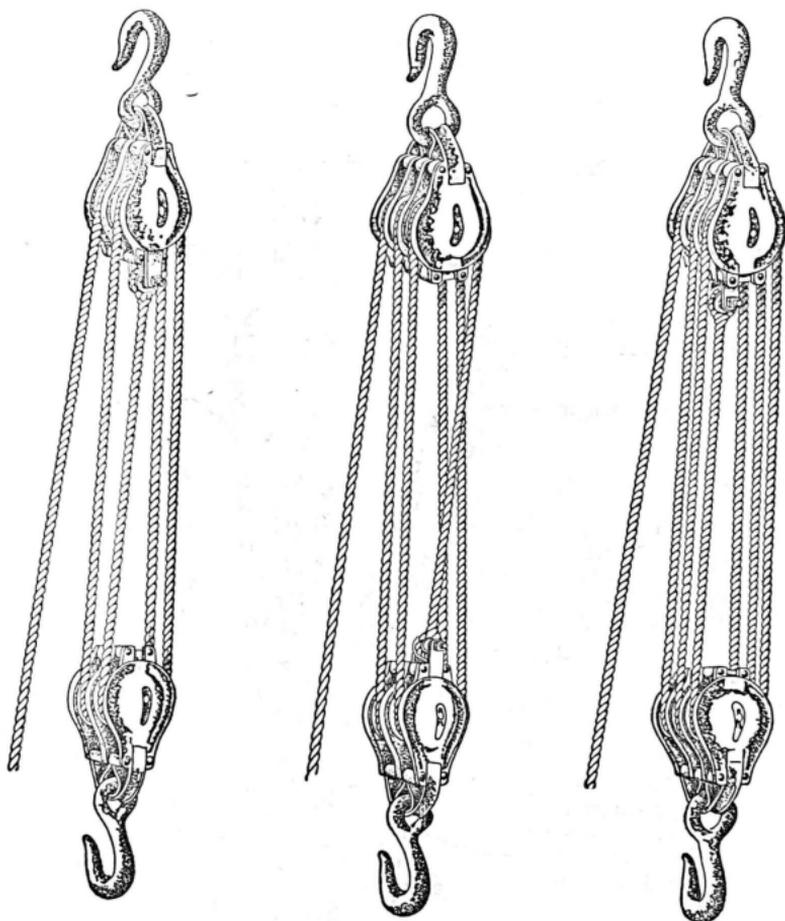
6.01 It is important that blocks be properly reeved in order to have them operate to the best advantage and to avoid jamming of the tackle while under strain with the resultant loss of time and possibility of accident. Two or three sheave blocks or a combination of two blocks shall be reeved in either of the following ways. The numbers are shown to facilitate following the reeving illustrated.

6.02 Before using new rope to reeve blocks, place the rope under slight tension. This will facilitate handling of the rope.

6.03 The following are the preferred methods for reeving a pair of tackle blocks. When the block has three sheaves, the fall line should lead from the center sheave of the upper blocks as shown. When so reeved, the hoisting strain comes on the center of the blocks and they are prevented from turning with consequent injury to the rope by cutting across the edges of the block shell. In order to reeve by this method, the two blocks should be placed so that the sheaves in the upper block are at right angles to those in the lower one.



6.04 Where there is a likelihood of the rope being tangled when following the reeving suggested above the blocks may be reeved left over right as shown.



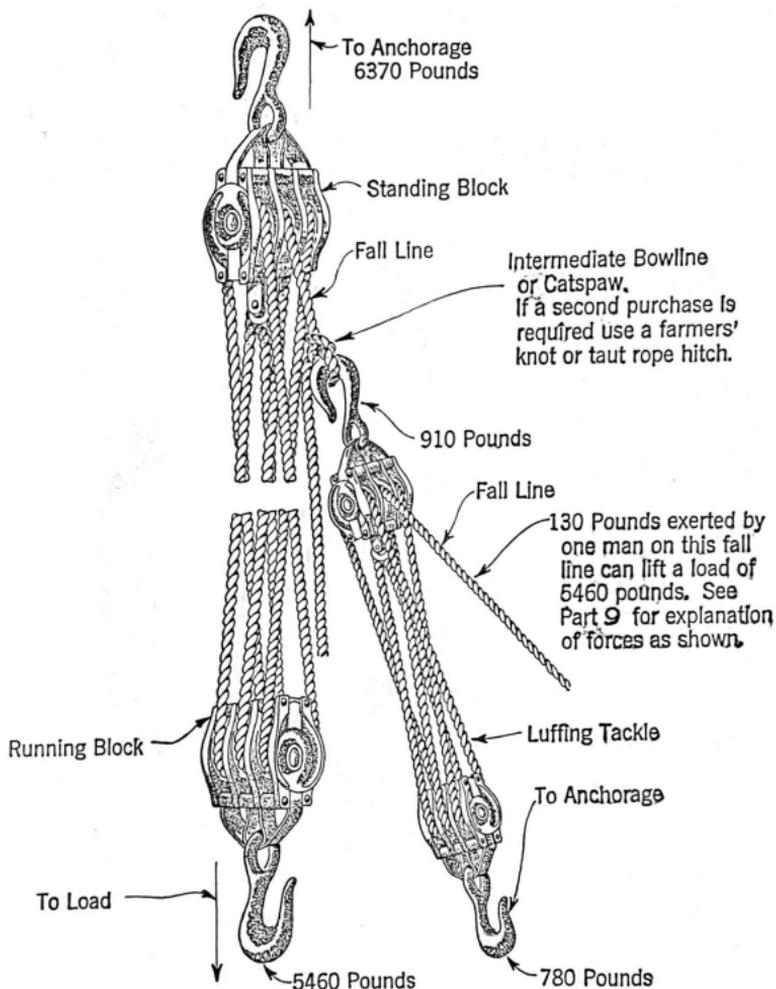
6.05 After blocks have been reeved, chock-a-block and coil rope in accordance with Part 12 in the section "Rope—General" of this group of practices.

7. RIGGING

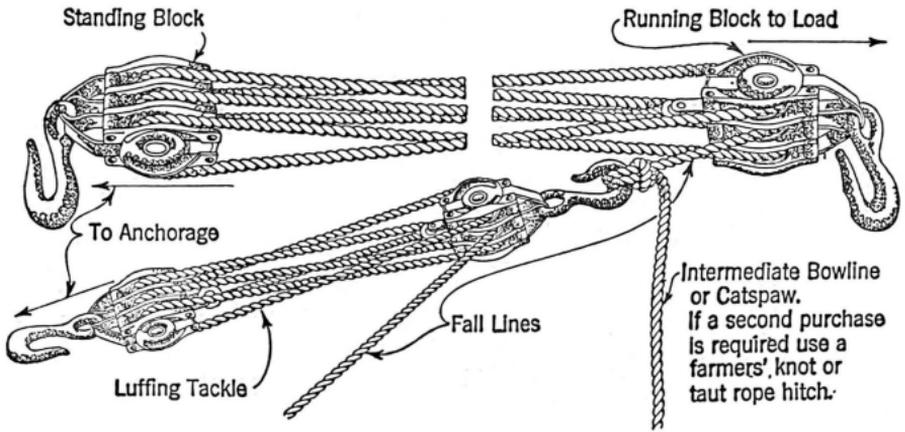
7.01 The first important part in rigging is to know the approximate weight of the load to be hauled, lifted or held. This and the number of men or other power available for use on the fall line will determine the rigging to be used. (See Parts 8 and 9.) Select a system of simple rigging to adequately perform the work efficiently and safely.

7.02 The following are two methods of arranging blocks, one lifting a load the other hauling a load.

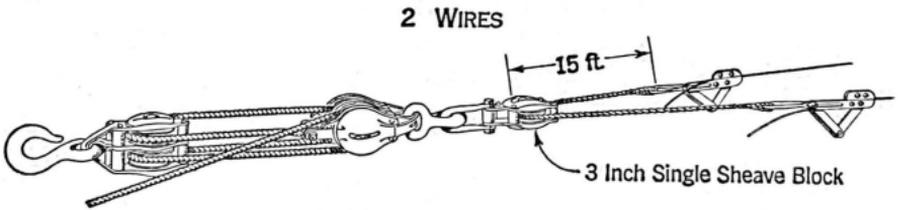
LIFTING A LOAD

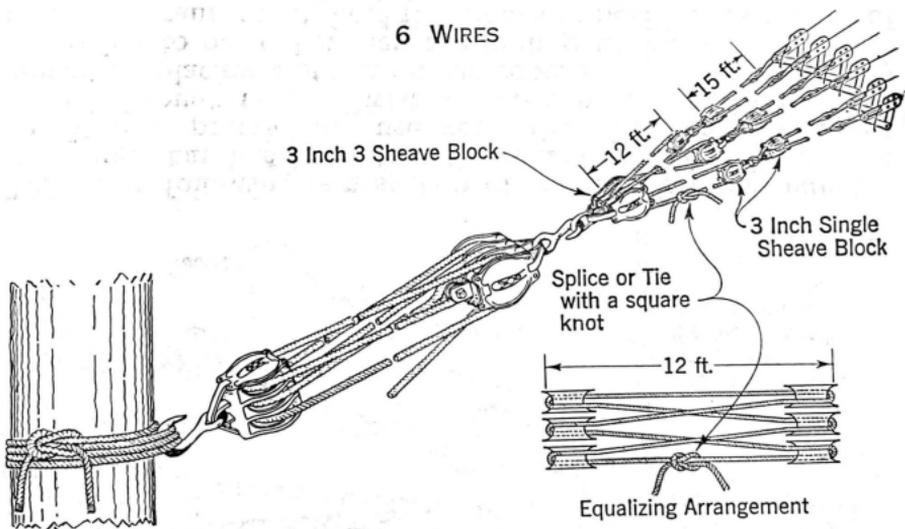
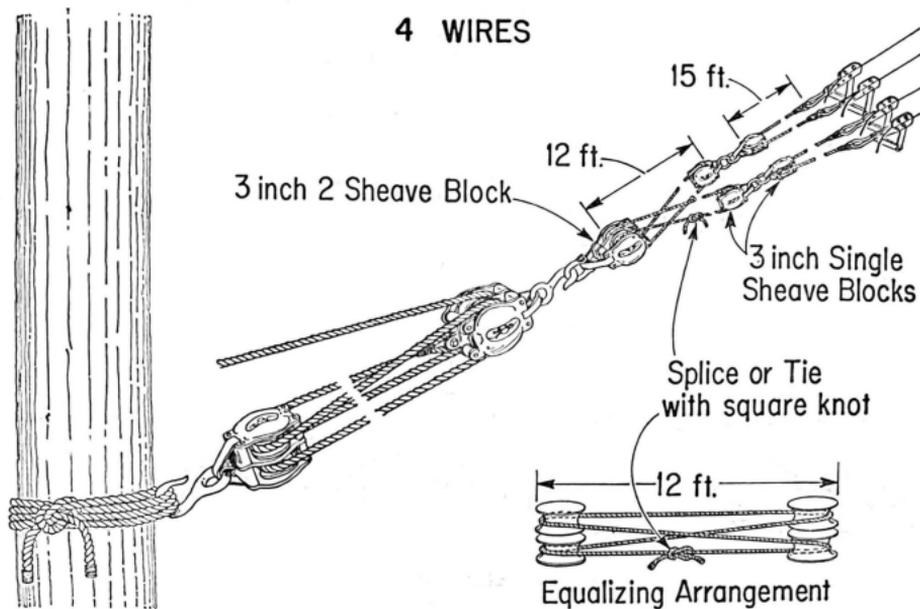


HAULING A LOAD

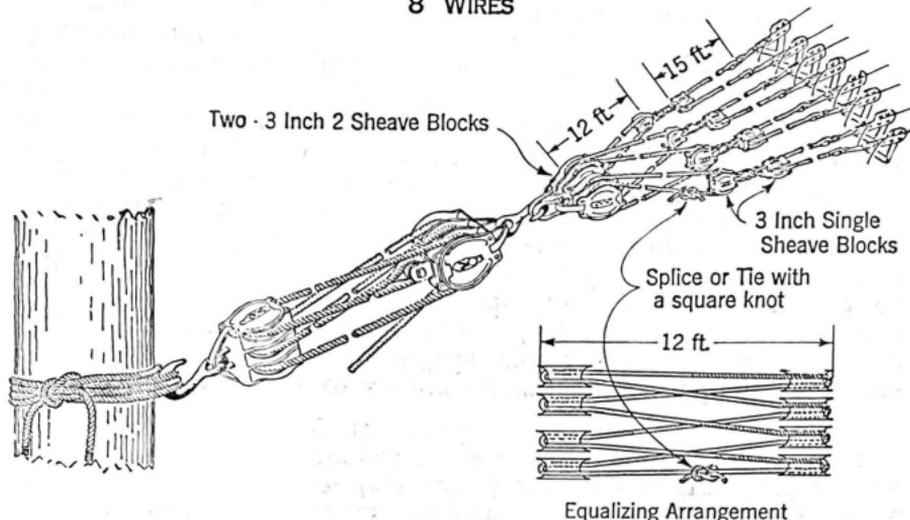


7.03 The following is a system of rigging or strain equalizing that has been found satisfactory for pulling open wire. Where practicable, use rope that has had the twist removed through usage. Twist in new rope can, in general, be removed by placing a strain on the rope. If there is a tendency for twisting to occur between the pulling up blocks and strain equalizing arrangement, hold the blocks in position by means of a bar placed in the hook of the block.

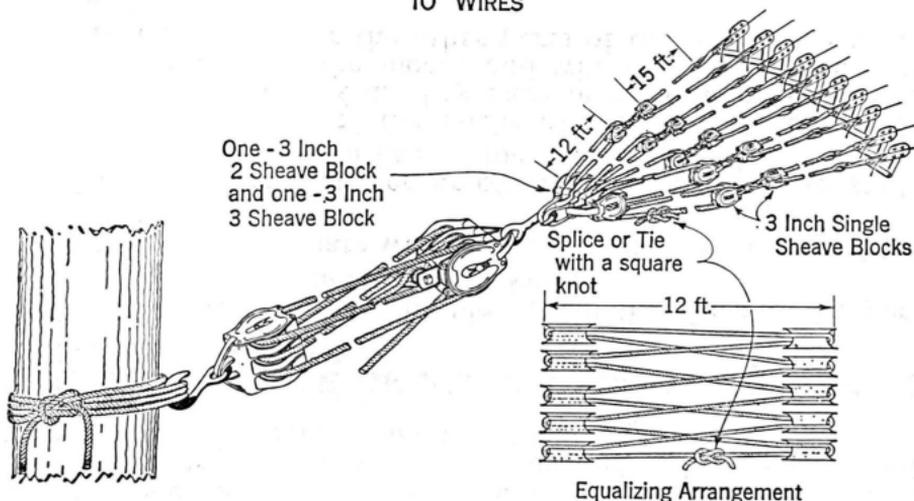




8 WIRES



10 WIRES



7.04 Where more than 10 wires are to be pulled use a combination of the arrangements shown above.

8. USE OF BLOCKS

8.01 When the load to be held, hauled or raised is greater than that which can safely be handled by the workmen directly and no power equipment to do the work is available,

a combination of block and ropes known as block and tackle may be used to gain a mechanical advantage. For practical purposes the weight capable of being lifted is equal to the applied force multiplied by the number of ropes supporting the lower or running block. If for example a man can exert a pull of 130 pounds on the fall line of a pair of three sheave blocks he will be capable of lifting approximately 6×130 or 780 pounds with three sheave blocks and tackle. This assumes that the fall line leaves the standing block. If the fall line leaves the running block as in the case of hauling a load (see Part 7) a man can exert a pull of 780 pounds and 130 pounds or 910 pounds which is seven times the applied force.

9. SELECTING SIZE OF BLOCKS FOR THE WORK TO BE PERFORMED

9.01 To select the size of blocks for the work to be performed it is necessary to know:

- (a) The approximate weight of the load to be hauled, lifted or held.
- (b) The number of men or other power available to apply force on the fall line of the blocks.
- (c) The strength of the hooks of the standard blocks as given in Part 4 as they have been designed to be the weakest part of the blocks and will start to open before either new rope or the other parts of the blocks are overloaded.

9.02 Knowing the load (a) and the force (b) calculate the number of sheaves required by dividing (a) by twice (b). If this figure is 3 or less select one of the standard blocks with the number of sheaves as calculated and a hook that is capable of withstanding the load.

9.03 If the number of sheaves required for a load as calculated by Paragraph 9.02 is over 3 it will be necessary to select a system of rigging (see Paragraph 7.02) from the standard blocks available. This rigging requires the use of luffing tackle, which, in general, should be a three sheave arrangement. When using three sheave luffing blocks remember that for practicable purposes the stress in the fall line of the tackle attached to the load is equal to the force applied to the fall line of the luffing tackle times the number of ropes leaving the running block of the luff which is 6 or 7. Since in general, the fall line of the luff leaves the running block, the force applied to the fall line of the tackle attached to the load is 7 times that applied to the luff fall line. After determining the number of sheaves required, select the block with a hook

that is capable of withstanding the load. Be sure the force that it will be necessary to apply to the fall line of the tackle will not be greater than that specified for the size of rope being used. (See the section "Rope—General.")

Example: Load to be lifted by one man 5400 pounds

$$\text{Number of sheaves required } \frac{5400}{2 \times 130} = 20+$$

Greater than 3, therefore a luffing block is required. Man is capable of exerting with three sheave block and tackle, a load of 7×130 pounds = 910 pounds.

$$\frac{\text{Number of sheaves required in block attached to load } 5400}{2 \times 910} = 2+ \text{ or } 3 \text{ sheaves.}$$

Load on hook of fixed block $5400 + 910 = 6310$.

A 6-inch 3 sheave block required as the hook has a strength of 8600 pounds.

9.04 In general, where the requirements (a) and (b) are known, the size of blocks can be selected from the table contained in Part 4.

9.05 In connection with telephone work the following sizes of blocks have been found satisfactory for the uses specified and are the sizes in general being used by the construction forces for this type of work.

| Blocks | Uses |
|------------------|--|
| 3-Inch 1 Sheave: | Intended for use in connection with strain equalizing blocks, raising cables in place in cable vaults, and with block and house cable work. |
| 3-Inch 2 Sheave: | Intended for use in connection with strain equalizing blocks, cutting in or out transpositions, dead ends and pulling up 1 or 2 pair of open wires. |
| 3-Inch 3 Sheave: | Intended for use of block and house cable crews in connection with pulling up 2200 pound strand and in making up strain equalizing blocks. (See Part 7.) |

4-Inch 3 Sheave : *Intended for use in connection with pulling up unloaded 6M suspension strand, and guys where suspension strand has not been placed. Also for pulling 10 wires with equalizing blocks. (See Part 7.) Raising loading coil cases. Pulling slack in strand and general rigging where the load will not exceed 4600 pounds. If a sufficient number of men is not available for lifting or holding the load, luff it with a set of 4-inch 3 sheave tackle.

6-Inch 3 Sheave : *Intended for use in connection with raising riser cable, 35 ft. or smaller poles, pulling loaded 6M and 10M suspension strand and guys and unloaded 16M suspension strand and guys and for general rigging where the load will not exceed 8600 pounds. If a sufficient number of men is not available for lifting or holding the load luff it with a 4-inch 3 sheave tackle block.

8-Inch 3 Sheave : *Intended for use in connection with unloading poles, raising poles over 35 ft. in length, pulling loaded 16M suspension strand, unloaded 25M suspension strand and guys, pulling slack in strand and general rigging where the load will not exceed 12,000 pounds. If a sufficient number of men is not available for lifting or holding the load luff it with a set of 4-inch 3 sheave tackle.

6-Inch Manila Rope: Snatch Block Intended for use in changing the direction of a 5/8- or 3/4-inch pulling line and where the load will not exceed 11,000 pounds.

8-Inch Manila Rope: Snatch Block Intended for use in connection with raising poles, pulling cable and similar work where the load will not exceed 17,000 pounds.

*Block and tackle shall be used for pulling suspension strand, erecting poles, placing riser cable, etc., only where there is no power equipment available to do the work.

10. INSPECTION OF BLOCKS

10.01 Blocks should be examined to determine their conditions as suggested below. In connection with the inspection of blocks the important conditions to look for are:

- (a) Bent, cracked or broken shell.
- (b) Cracked or broken sheave.
- (c) Cracked or broken straps.
- (d) Bent hook.
- (e) Cotter pin missing.
- (f) Roller bushing not functioning.
- (g) Cracked or broken becket.

10.02 If the condition of the block is such that there is any doubt as to its safety, it should be exchanged at once for one in good condition in accordance with the Company's established routine.

11. MAINTAINING BLOCKS IN THE FIELD

11.01 Keep blocks clear of oil and dirt. The sheaves of the standard blocks are roller bushed and operate better without oil which tends to collect dirt and packs thus causing the rollers to bind. Never oil the sheaves of the standard block; if they do not function properly remove the sheaves and jar the dirt from the rollers by lightly tapping the sides of the sheave.