

BELL SYSTEM PRACTICES

**Motor Vehicles and
Construction Apparatus**

SECTION J6.406

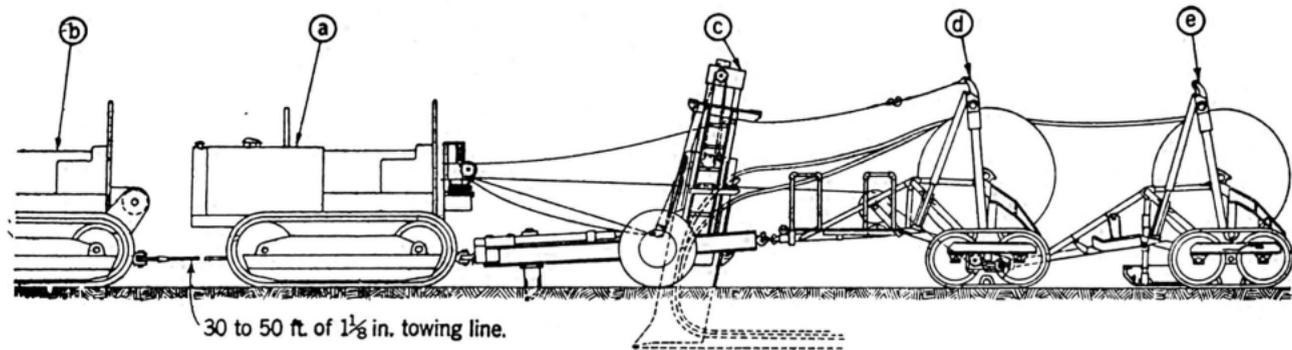
**Issue 1, January, 1944
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**BURIED CABLE
CABLE PLACING TRAIN EQUIPMENT**

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1. CABLE PLACING EQUIPMENT AND ITS ARRANGEMENT

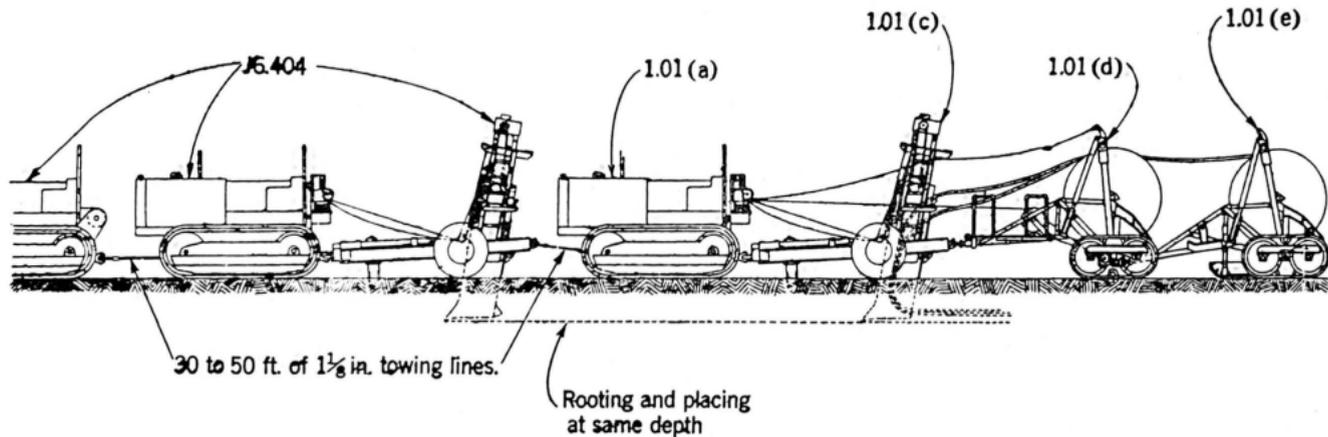
1.01 The cable laying equipment consists of two or more caterpillar type tractors, weighing about 40,000 pounds each, a C48 plow and two or more cable reel trailers. Twin cable placing outfit is shown in cut. There would be only one trailer in the train on a single cable job.



CABLE LAYING TRAIN
(Rooting has been done ahead or is not required)
Letters in circles refer to corresponding parts of this paragraph.

Accompanying this train in each case there should be an extra cable reel trailer to be used in moving reels on the job and assisting with the reel changing operations (Section J6.408), by replacing the empty reels with full ones on trailers in the train. The extra trailer may be handled by an extra auxiliary caterpillar tractor, or if the extent of the job does not warrant the extra auxiliary tractor, the extra trailer may be handled by the regular auxiliary tractor. When the train is plowing, the extra trailer if handled by the regular auxiliary tractor would be pulled behind it. The towing line or winch rope would feed through the trailer, the pull being made from tractor to tractor and not from the extra trailer to the main tractor.

If the rooting train is directly connected to the placing section of train, only one tractor is used in the latter although two or even three tractors might be required ahead in the rooting section.



COMBINED ROOTING AND PLOWING TRAIN

Reference numbers above units indicate section or paragraph of this section containing detailed information.

(a) **The equipment required for the main tractor** is same as outlined in Section J6.404 except that a four-drum control winch is essential in cable placing train with any plow having more than 2 to 1 pulley arrangement for raising and lowering plowshare. This tractor should carry standard set of tools for C48 plow and WL trailer. See Paragraph 1.01 (d) and Section J6.404.

(b) The equipment required for the auxiliary tractor or tractors is the same as outlined in Section J6.404 which is the equipment required for rooting. Particularly in level territory it may be advantageous to change reels by lifting and carrying the reel with a special framework and winch operated sling at the rear of the auxiliary tractor; rather than to use the cable reel trailer.

(c) **The equipment required for the C48 plow for placing cable is:**

(1) Standard cable placing share

(2) Two extra plow points (Drawing 211-A-53)

(3) 24 extra shear pins (Drawing 111-S-8 for 3/4" pin, 117-S-61 for 1" pin); also 2 special drawbar bolts, (if plow is equipped with supplemental drawbar connection for use only when plowing **not when rooting**). Drawbar bolts should be used to supplement but not to take the place of shear pin.

(4) Towing hook at rear

(5) Lubricating equipment consisting of

(a) DeVilbiss gun CL501 with 100 F cap and tip, special 10-gallon DeVilbiss QM pressure feed tank, HFS regulator and accessory equipment as per DeVilbiss kit No. QM 6011.

(b) Source of gas pressure. This may be either a nitrogen tank, an integral engine-compressor unit or a connection to a compressor unit on tractor.

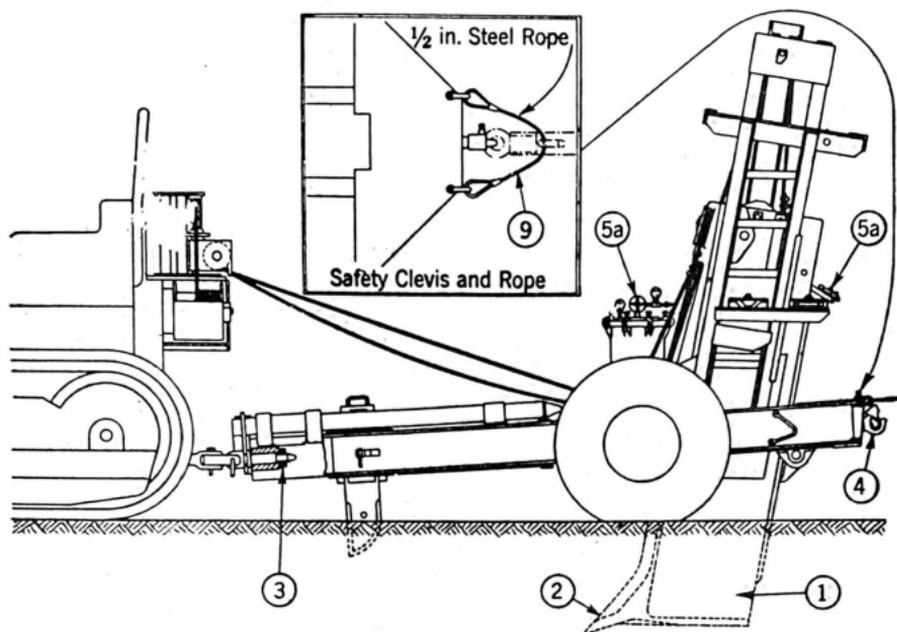
(6) Cable slot shims for sizes of cable being placed

(7) Equipment for placing shield wires.

(8) Wrenches (See Section J6.404).

(9) Safety clevises and steel rope connection to front trailer tongue.

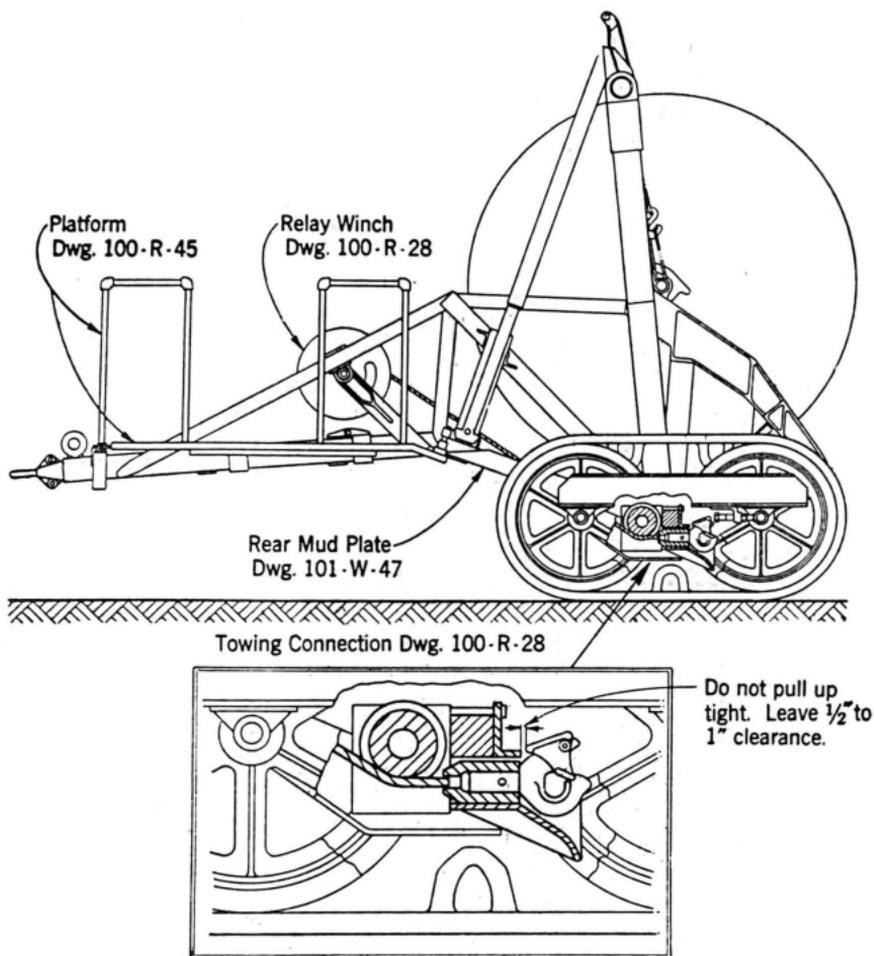
Note: Items (3) and (8) to be carried on main tractor.



C48 PLOW EQUIPPED FOR CABLE LAYING

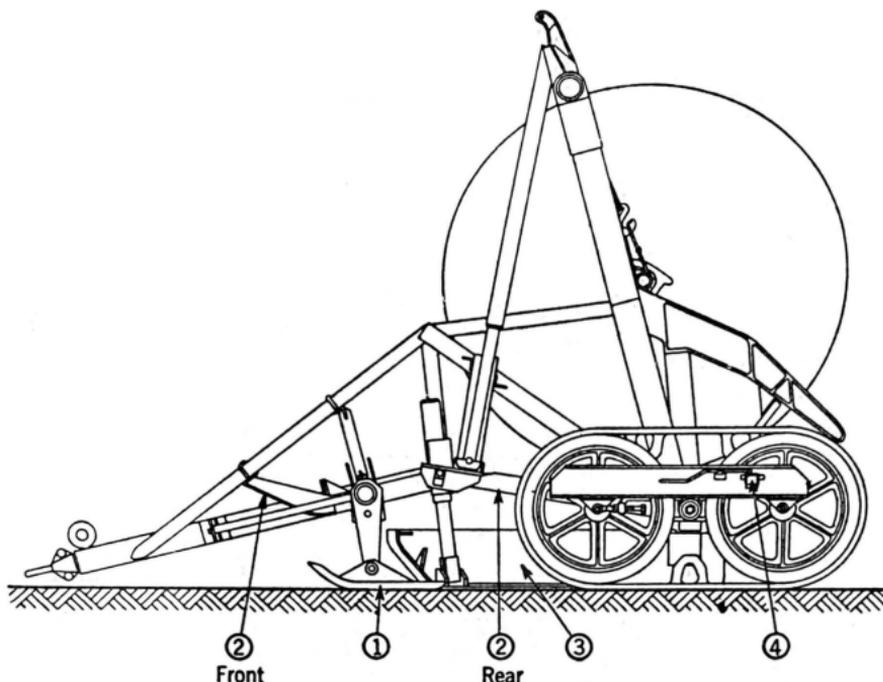
Numbers in circles refer to corresponding parts of paragraph 1.01 (c)

- (d) **The equipment required for the cable reel trailer attached to plow is:**
- (1) Platform (Drawing 100-R-45).
 - (2) Double drum relay winch (Drawing 100-R-28). (If two cables are to be placed in trench.)
 - (3) Mud bearing plate (Drawing 101-W-47).
 - (4) Towing connection for second trailer (if used). (Drawing 100-R-28.)
 - (5) Shield wire handling equipment, if used. (Section J6.408.)
 - (6) Wrenches provided with C48 plow.



(e) **The equipment required for the second cable reel trailer in the train (if used) is:**

- (1) Tongue skids (Drawing PR-263).
- (2) Mud bearing plate (front and rear). Drawings 101-W-47 and PR-314.
- (3) Backfiller.
- (4) Tracklock (Drawing 216-A-12).



Skids not necessary if backfiller
with front support is used

Numbers in circles refer to corresponding
parts of paragraph 1.01 (e)

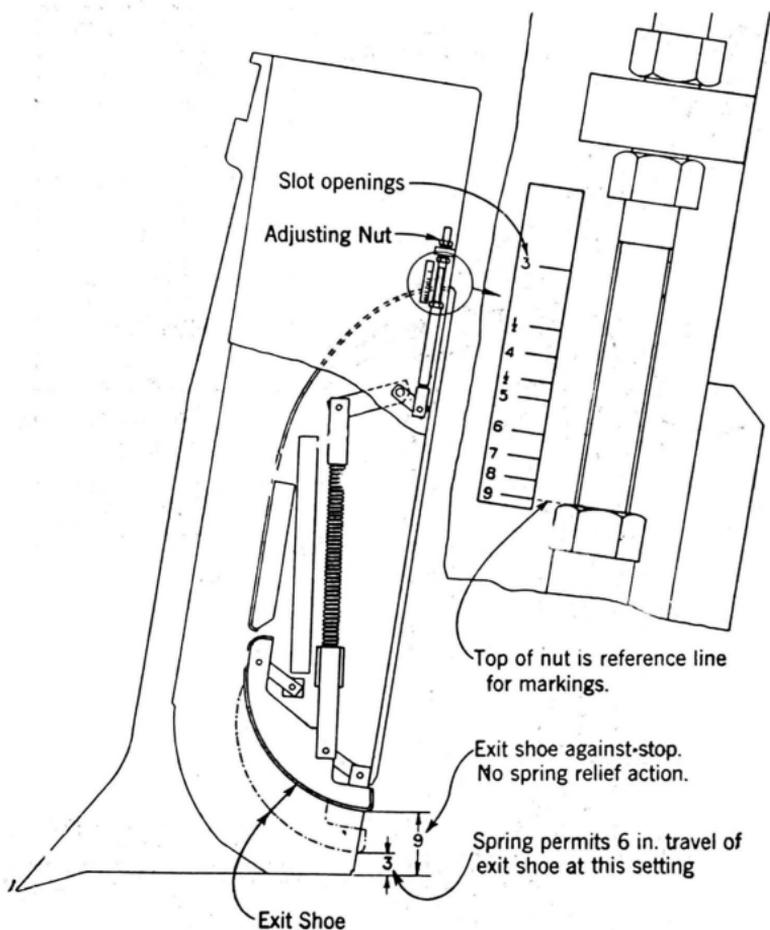
2. DEPTH OF PLOWING

2.01 Considerations similar to those outlined in Section J6.404 shall apply. The detail plans, with modifications based on the rooting results, should indicate the desired depth. The coverage depth of the top cable will approximately equal the depth to bottom of share minus the slot opening dimension. (Paragraph 3.01 and Section J6.404.)

3. ADJUSTMENT OF PLOWSHARE CABLE SLOT SIZE

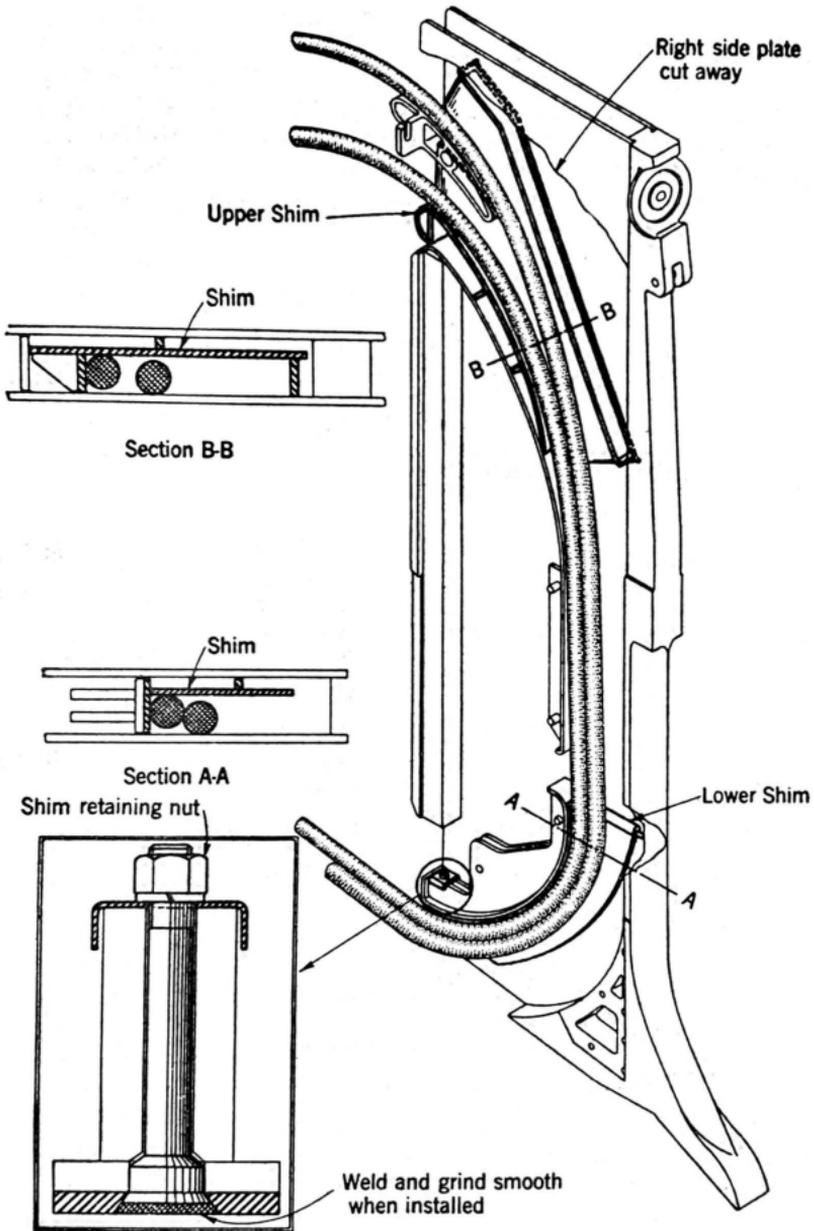
3.01 The cable hole or slot through the plowshare has maximum opening of 9 inches by 2-3/4 inches wide. The opening adjustments are made by moving the exit shoe up or down and by use of shims in the side of the slot. Exit shoe adjustment is accomplished by means of a wrench-operated mechanism at the rear of the plowshare. Clockwise turning of the adjusting nut lessens depth of slot to a minimum of 3 inches. Counter-clockwise turning of the nut increases depth of slot to a maximum of 9 inches. When placing one cable, use an

opening of twice the cable diameter. When placing two cables, use an opening of twice the sum of the diameters of the two cables. These adjustments permit overlapped ends to pass through the share at splice points.



3.02 Slot Width Adjustment

(a) **Method.** Slot width adjustment is accomplished by means of shims inserted at the top and bottom of the cable slot. The top shim is held in place by gravity. The bottom shim is held by means of the shim retaining nut placed on the stud projecting through the exit shoe after the shim is in position.



(b) **Shim size for 2 cables totaling 2.4 inches or less.** When placing two cables or two overlapped ends having a combined diameter of 2.4 inches or less, the cables can be plowed in side by side without using shims.

(c) If the sum of the diameters of 2 cables or 2 overlapped ends is greater than 2.4, the slot in most cases must be narrowed in order to keep the tension in the cable at a minimum. Tension develops because of a wedging action occurring if these cables approach a side-by-side position, but cannot lie side by side because together they are wider than the slot. When the two cables contact each other as well as the opposite side walls of the cable slot, a line connecting the centers of the two cables should, if possible, make an angle of 52° or more with the back of the cable slot.

In Table 1 below all combinations indicated by capital letters give a limiting angle of 52° or more. The few cases represented by lower case letters (a, b, c, d, e, f) permit angles down to 40° , and these latter combinations of cables **must** always enter the plow with the larger cable in the lower position.

In Table 2 below are shown the shim sizes for use with the combinations of cable sizes shown in Table 1. This applies both to two cables as they are plowed in and to any pair of overlapped ends, as in starting a new length of cable through the plow. In general, it is preferable to place the larger cable in the bottom position, at the slot entrance unless the detail plans specify the upper position for special reasons.

TABLE 1 LARGE CABLE DIAMETER

	2.5	2.4	2.3	2.2	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.0	.9	.8	.7	.6	.5	
.5						A	A	A	A	G	N	N	V	V	X	X	X	X	X	X	X	X
.6							A	A	A	A	G	N	S	V	V	X	X	X	X	X	X	
.7							D	H	A	J	A	G	N	S	V	V	X	X	X			
.8					B	C	D	M	H	J	J	A	G	N	S	V	V	X				
.9	A				B	K	L	M	M	H	A	A	A	G	N	S	V					
1.0	A	A	a	B	B	K	K	C	D	D	A	A	A	A	G	N						
1.1	A	A	A	B	B	B	B	B	b	f	f	A	A	A	A							
1.2	A	A	A	A	a	a	d	e	F	F	F	F	J	J								
1.3	A	A	A	A	A	a	D	M	M	R	R	R	R									
1.4				b	b	C	L	Q	Q	U	U	U										
1.5				B	B	K	P	T	T	W	W											
1.6	a	a	a	B	B	K	P	T	T	W												
1.7	A	A	A	A	G	N	S	V	V													
1.8	A	A	A	A	G	N	S	V														
1.9	A*	A	A	A	G	N	S															
2.0	A*	A*	A	A	G	N																
2.1	A*	A*	A*	A	G																	
2.2	A*	A*	A*	A*																		
2.3	A*	A*	A*																			
2.4	A*	A*																				
2.5	A*																					

TABLE 2 SHIM WIDTH Any size listed can be used

KEY LETTER	SHIM WIDTH	
a	A	0
b	B	3/8
c	C	1/2
d	D	5/8
e	E	3/4
f	F	7/8
G		0, 3/8
H		0, 3/4
J		0, 7/8
K		3/8, 1/2
L		1/2, 5/8
M		5/8, 3/4
N		0, 3/8, 1/2
P		3/8, 1/2, 5/8
Q		1/2, 5/8, 3/4
R		5/8, 3/4, 7/8
S		0, 3/8, 1/2, 5/8
T		3/8, 1/2, 5/8, 3/4
U		1/2, 5/8, 3/4, 7/8
V		0, 3/8, 1/2, 5/8, 3/4
W		3/8, 1/2, 5/8, 3/4, 7/8
X		0, 3/8, 1/2, 5/8, 3/4, 7/8

A*; Can be used for Dual cable only if splices are staggered so not more than three cables enter share together. All other combinations satisfactory for dual cables with splices located together.

Small letters indicate that the large cable must be placed on bottom at slot entrance.

For intermediate cable sizes:

From .00 to .03 use lower tenth size.

From .04 to .09 use higher tenth size.

Examples: For 1.63 diameter use 1.6 in table.

For 1.64 diameter use 1.7 in table

3/8, 3/4 and 7/8 Shim sizes now available;

1/2 and 5/8 sizes can be made available.

Because of the wide variation possible in combinations of cable sizes in dual cable jobs, it is desirable to consider each project and determine the shim size. When placing a single cable the above considerations also apply because of the overlap of the ends in placing at the splice point. The detail plans should specify the shim size for each cable combination in the project, and care should be taken in the choice of shim sizes that they do not need to be changed oftener than necessary when cable sizes change.

The cable slot through the plowshare is $2\text{-}3/4$ x 9 inches when wide open. When placing two cables at a time, the sum of their diameters cannot exceed $4\text{-}3/8$ ". For instance, if two $2\text{-}1/2$ inch cables were tried, they would pass satisfactorily in width, but the four diameters piled one on another would jam in the share slot when passing the overlapped ends all at one time. A single $2\text{-}1/2$ inch cable can be placed. Two $2\text{-}1/2$ inch cables can be plowed at one time if splice points are staggered so only 3 cables pass through share at one time.

(d) If no shims are used it is necessary to employ a cable feeding seat (Drawing 270-B-65) for the lower cable in order to properly position it for lubrication.