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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

TM 11-5073
TO 31R1-2U-111

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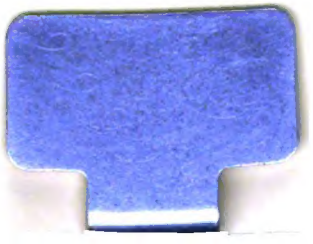
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DEPARTMENTS OF THE ARMY AND THE AIR FORCE

JUNE 1956

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TOWER AB-216/U, TOWER SECTION SET AB-298/U, GUY KIT MK-99/U, ACCESSORY KIT MK-100/U, AND GUY KIT MK-101/U

TM 11-5073
TO 31R1-2U-111
CHANGES No. 1

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D. C., *29 October 1956*

TM 11-5073/TO 31R1-2U-111, 19 June 1956, is changed as follows:

The following information changes TM 11-5073/TO 31R1-2U-111 so that the manual also applies to the following equipments.

Nomenclature	*Order No.*
Tower AB-216/U	33945-Phila-56
Guy Kit MK-99/U	43006-Phila-56
Accessory Kit MK-100/U	43006-Phila-56
Guy Kit MK-101/U	43006-Phila-56

Note. The information in the technical manual applies equally to all equipments unless otherwise specified in this change.

Front cover and page 9. Add the following warning notice on the inside of the front cover, and after the chapter heading on page 9.

Warning: The tower must be installed as far away from power lines as possible. As a guide, a distance equal to at least twice the height of the tower must be maintained between power lines and the tower. Failure to observe these precautions may result in DEATH or serious injury to personnel. Refer to TB SIG 291 for safety measures to be observed when installing the tower.

Page 4, paragraph 4. Make the following changes:

Line 1. After "MX-1382/U" add: Not supplied on Order No. 33945-Phila-56.

Line 6. Change "8 to 36" to read: **8 to 28.**

Line 10. Change "16 to 32" to read: **8 to 32.**

Page 5, paragraph 6*a*. Make the following changes in the chart.

Component column. Last item. Change "(par. 10*a*)" to read: **(par. 11*a*).**

Required No. column. Item 19. Opposite Tensiometer. Change "1" to read: **2.**

Required No. column. Item 13. Opposite Capstan E-12/U. Add: 1.

Page 5, paragraph 6*a*.

a.1. (Added) ***Tower AB-216/U, Order No. 33945-Phila-56.***

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Unit weight (lb)
Tower Support Base Plate AB-206/U	4	5¼	12	12	1
Tower Section AB-208/U	1	72	69⅜	50²⁹⁄₃₂	119
Tower Section AB-207/U	12	72	69⅜	50²⁹⁄₃₂	119
Guy MX-1201/U (75 ft)	8	⅜			8.8
Guy MX-1201/U (130 ft)	4	⅜			15.4
Guy MX-1201/U (150 ft)	4	⅜			18
Anchor plate	8	8		35	
Anchor rod	8	1		96	
Ground rod	4	⅝		72½	
Tower Erection Davit MX-1215/U	1	2½	48	163	
Antenna Support AB-296/G	2	5	60	84	
Scaffold Tower Bracket MT-1157/G	1				
Hoist line assembly (450 ft)	1	½			
Tag line assembly (250 ft)	1	½			
Snatch block	1	5	5	6	
Snatch block coupler	1	4¼	4¼	5¾	
Digging bar	1	2	2¼	106	
Tensiometer	2	1⅜	6	12	
Antenna stabilizer assembly	4				

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Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Unit weight (lb)
Guy spacers:					
18 in	8	¼		18	
30 in	4	¾		30	
48 in	4	⅜		48	
Installation kit consisting of:					
Chest CH–77	1	7¼	9¾	22½	
Socket ½ in	2			3½	
Socket 9/16 in	4			3½	
Socket ⅝ in	4			3¼	
Socket 11/16 in	4			3½	
Socket ¾ in	4			3¼	
Socket ⅞ in	4			3½	
Socket 15/16 in	2			3	
Ratchet wrench ½ in. drive	2	⅝	1	10	
Pliers	2	⅝	2½	6½	
Screw driver	2	1¾	1¼	9¾	
Level	1	2	1	18	
Hammer	1	2	5	16	
Measuring tape (100 ft)	1				
#6 AWG copper wire	50 ft			600	
Lag bolts	16	½	½	4½	
Interlock clip	8				
Lock pin	4	5/16		7¼	
Nuts ⅝–24 N. F	12				
Machine bolts ⅝–24 N. F	12	⅝		1¾	
Capstan E–12/U	1				
Auger	1				
Anchor installing bar	1				
Maul	1				
Set of running spares (par. 11a)	1				

Page 5. Par. 6*b*. Add the following note after the chart.

Note. On Order No. 43006–Phila–56, all Guys MX–1201/U are 215 feet long. The guy spacers are supplied in two lengths; four are 30 inches long and four are 48 inches long.

Page 6. Par. 6*c*. Component column. Last item. Change "(par. 10*b*)" to read: par. 11*b*.

Page 6. Par. 6*c*.

c.1. (*Added*) *Accessory Kit MK–100/U, Order No. 43006–Phila–56.*

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Unit weight (lb)
Guy MX–1201/U (240 ft)	4	5/16			28.5
Guy MX–1201/U (275 ft)	4	5/16			32.6
Anchor plate	4	8		35	
Anchor rod	4	1		96	
Tower Platform Section MT–1156/U	1	7¾	15	20½	
Guy spacer (30 in.)	4	¼		30	

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Page 6, paragraph 6*d*. Component column. Last item. Change "par. 10*c*" to read: par. 11*c*.

Page 6, paragraph 6*d*.

d.1. (Added) *Guy Kit MK–101/U, Order No. 43006–Phila–56.*

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Unit weight (lb)
Guy MX–1201/U (290 ft)	4				24.5
Anchor plate	4	8		35	
Anchor rod	4	1		96	

Page 7, paragraph 11*b*. After the last sentence add: (No running spares are supplied on Order No. 43006–Phila–56).

Page 7, paragraph 12.

a. (Superseded) *Tower AB–216/U.*

Component	Order No. 30803–Phila–52	Order No. 33006–Phila–55	Order No. 33045–Phila–55
Guy Mx–1201/U	1. Guys are 67, 75, 87, and 140 feet long. 2. Guys are wound on wooden reels.	1. Guys are 67, 75, 130, and 150 feet long. 2. Guys are rolled into coils approximately 18 inches in diameter.	1. Guys are 75, 130 and 150 feet long. 2. Guys are rolled into coils approximately 18 inches in diameter.
Antenna Support AB–296/G.	1. Antenna support does not have a platform. 2. Antenna stabilizers are made of rope.	1. Antenna support is equipped with a platform. 2. Antenna stabilizers are made of aluminum tubing.	1. Antenna support is equipped with a platform. 2. Antenna stabilizers are made of aluminum tubing.
Scaffold Tower Bracket MT–1157/G.	The diagonal braces are fixed mounted and can only be attached to the horizontal member of the tower section directly above the scaffold.	The diagonal braces are swivel mounted and may be attached to either the intermediate horisontal member above or to the intermediate horisontal member below the scaffold.	The diagonal braces are swivel mounted and may be attached to either the intermediate horisontal member above, or to the intermediate horisontal member below the scaffold.
Tower Erection Davit MX–1215/U.	1. The davit boom has a fixed arm. 2. The heavy-duty davit is mounted by two cam locks.	1. The davit boom arm is adjustable. 2. The heavy-duty davit is mounted by three cam locks.	1. The davit boom arm is adjustable. 2. The heavy-duty davit is mounted by three toggle bolts.
Guy MX–1382/U	Consists of one 15-foot length of wire rope, two rope thimbles, four wire rope clips, one turnbuckle, and two insulator clevises.	Consists of one 15-foot length of wire rope, formed at one end into a loop, one rope thimble, two wire rope clips, one turnbuckle, and two insulator clevises.	Not supplied on this order.
Tower Section AB–208/U	Has an adjustable hollow screw leg with a hole drilled through it to accommodate a screw driver, which is used to adjust the length of the leg.	Has a tee fitting welded over the adjustable hollow leg. The length of the leg is adjusted by turning the tee fitting.	Has a tee fitting welded over the adjustable hollow leg. The length of the leg is adjusted by turning the tee fitting.
Guy anchor	Screw type anchor	Screw type anchor	Two piece retrievable plate type, consisting of a rectangular anchor plate and an anchor rod.
Guy spacers	Guy spacers are 18 inches long.	Guy spacers are 18 inches long.	Guy spacers are 18, 30 and 48 inches long.
Auger, anchor installing bar and maul.	Not supplied on this order.	Not supplied on this order.	Used to install the plate type anchor.

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b. (Superseded) ***Guy Kit MK-99/U.***

Component	Order No. 22008-Phila-52	Order No. 24289-Phila-52	Order No. 28613-Phila-55	Order No. 42006-Phila-56
Guy MX-1201/U.	Guys are 150 and 167 feet long.	Guys are 167 and 215 feet long.	Guys are 167 and 215 feet long.	Guys are 215 feet long.
Guy spacers.	1. None supplied with first equipments. 2. 30 inch guy spacers supplied with remainder of order.	Guy spacers are 30 inches long.	Guy spacers are 30 inches long.	Guy spacers are 30 and 48 inches long.
Guy anchor.	Screw type.	Screw type.	Screw type.	Two piece retrievable plate type, consisting of a rectangular anchor plate and an anchor rod.

c. (Superseded) ***Accessory Kit MK-100/U.***

Component	Order No. 24289-Phila-52	Order No. 16089-Phila-55	Order No. 42006-Phila-56
Guy MX-1201/U.	Guys are 215 and 225 feet long.	Guys are 240 and 275 feet long.	Guys are 240 and 275 feet long.
Guy spacers.	Guy spacers are 18 inches long.	Guy spacers are 30 inches long.	Guy spacers are 30 inches long.
Guy MX-1382/U.	Supplied.	Supplied.	Not supplied on this order.
Guy anchor.	Screw type.	Screw type.	Two-piece retrievable plate type, consisting of a rectangular anchor plate and an anchor rod.

d. (Superseded) ***Guy Kit MK-101/U.***

Component	Order No. 26803-Phila-53	Order No. 28163-Phila-55	Order No. 16089-Phila-56	Order No. 43006-Phila-56
Guy MX-1201/U.	Contains four 240-foot and eight 290-foot guys.	Contains four 290-foot guys only.	Contains four 290-foot guys only.	Guys are 290 feet long.
Guy MX-1382/U.	Supplied.	Supplied.	Supplied.	Not supplied on this order.
Guy anchor.	Screw type.	Screw type.	Screw type.	Two-piece retrievable plate type, consisting of a rectangular anchor plate and an anchor rod.

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Page 9, paragraph 15a(1).

(1.1) (Added). *Tower AB-216/U, Order No. 33945-Phila-56.*

Crate No.	Height (in.)	Width (in.)	Depth (in.)	Volume (cu ft)	Unit weight (lb)	Contents
1	12	12	36	3	135	Anchor plates.
2	24	24	36	12	160	Guy MX-1201/U (75 ft).
3	36	36	48	36	220	Guys MX-1201/U (130 ft and 150 ft).
4	8	8	120	4	200	Digging bar, Ground Rod MX-148/G and anchor rods.
5	15	15	18	2½	50	Clevis, snatch block coupler, snatch block, and tensiometer.
6	7	9	180	6	100	Tower Erection Davit MX-1215/U.
7	11	55	76	26	150	Antenna Support AB-296/G.
8	18	24	36	9	80	Chest CH-77, and Tower Support Base Plates AB-206/U.
9 through 20	9	56	105	30	200	Tower Sections AB-207/U.
21	9	56	105	30	208	Tower Sections AB-208/U.
22	9	73	118	40	200	Scaffold Tower Bracket MT-1157/U.
23	18	24	24	6	100	Capstan E-12/U.
24	24	30	60	25	175	Hoist line assembly. Tag line assembly. Guy spacers 18", 30", and 48". Maul. Auger. Anchor installing bar.

Page 26, figure 14.

Note. (Added). On Order No. 33945-PHILA-56 the three cam locks are replaced by three toggle bolts.

Page 28, paragraph 25*b*(1). Line 1. After "locks" add: or toggle bolts. Paragraph 25*b*(4). Line 6. After "locks" add: or toggle bolts.

Page 34, paragraph 28*c*(2). Last line. Change "(C, fig. 23)" to read: *D, fig. 23.*

Page 39, paragraph 30. Add the following note below the chart:

Note. On Order No. 33945-Phila-56, 75-foot guys are supplied in place of 67-foot guys. On Order No. 42006-Phila-56, 215-foot guys are supplied in place of 167-foot guys.

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[AG 413.44 (24 Oct 56)]

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USAR: None.
For explanation of abbreviations used, see SR 320-50-1.

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TOWERS AB-216/U AND AB-216A/U, TOWER SECTION SET AB-298/U, GUY KIT MK-99/U, ACCESSORY KIT MK-100/U, AND GUY KIT MK-101/U

TM 11-5073
TO 31R1-2U-111
CHANGES No. 2

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D. C., *13 January 1958*

TM 11-5073/TO 31R1-2U-111, 19 June 1956, is changed as follows:

The following information changes TM 11-5073/TO 31R1-2U-111, so that the manual also applies to the following equipment:

Nomenclature	*Order No.*
Tower AB-216A/U	50737-Phila-57

Change the title of the manual to: **TOWERS AB-216/U AND AB-216A/U, TOWER SECTION SET AB-298/U, GUY KIT MK-99/U, ACCESSORY KIT MK-100/U, AND GUY KIT MK-101/U.**

Note. A parenthetical reference to a previous change, for example: page 1 of C1, indicates that pertinent material was published in that change.

Page 3, Chapter 1. Add the following note below the title of chapter 1.

Note. Tower AB-216A/U is similar to Tower AB-216/U. Information in this manual applies equally to both equipments unless otherwise specified.

Page 3, paragraph 4, line 5. After "Tower Section AB-208/U" add: (not supplied with the AB-216/U).

Line 6. After "12 to 33" add: (13 to 34 on the AB-216A/U).

Change "Tower Section AB-208/U" to **the lowest tower section** in the following places:

Page 14, paragraph 21*b*, line 3.
Page 17, paragraph 21*b*(5), line 8.
Page 17, paragraph 21*b*(6), line 7.
Page 29, paragraph 26, line 1.
Page 29, paragraph 26*a*, line 2.
Page 30, paragraph 27*b*(1)(*a*), line 4.
Page 32, paragraph 28*a*(1), line 3.
Page 65, paragraph 57*h*, line 1.

Page 4, paragraph 4. Line 1 (page 1, C 1). After "MX-1382/U" change "Not supplied on Order No. 33945-Phila-56" to: **Not supplied with the AB-216/U or Order No. 33945-Phila-56 or with the AB-216A/U.**

Paragraph 5, Nomenclature column. After "Tower Support Base Plate AB-206/U add: or Tower Section Base Plate AB-556/U.

Page 5, paragraph 6*a*.1 (page 1 of C 1). Change the heading to **Tower AB-216/U (Order No. 33945-Phila-56) and Tower AB-216A/U.**

Make the following changes in the chart:

Component column, items 1 and 2. After "Tower Support Base Plate AB-206/U and after "Tower Section AB-208/U add: (not supplied with the AB-216A/U).

Component column, item 9. Change "Ground rod" to: **Ground Rod MX-148/G.**

Required No. column, item 3. After "12" add: (13 required for the AB-216A/U).

After item 1 add:

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Unit weight (lb)
Tower Section Base Plate AB-556/U (AB-216A/U only)	4	18	12	12	24

Page 6, paragraph 7*a*. Add the following note:

Note. The AB-206/U is not supplied with Tower AB-216A/U.

Add subparagraph *a*.1 after *a*.

a. 1. (Added) *Tower section base plate AB-556/U* (fig. 5.1). This base plate is a square plate with a mounting hole in each side. A threaded leveling adjustment fitting extends vertically from the face of the plate; two leveling nuts are screwed onto the fitting. The AB-556/U is used instead of the AB-206/U on Tower AB-216A/U.

b. Add the following note:

Note. Tower Section AB-208/U is not supplied with Tower AB-216A/U.

c. (Superseded) *Tower Section AB-207/U* (fig. 4). This tower section is identical to Tower Section AB-208/U (*b* above) except that each vertical member includes a guy strap and is ter-

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minated at the lower end by a hollow male fitting instead of a T-shaped fitting.

Page 7, paragraph 12*a* (page 3 of C 1).

a. (Superseded) ***Towers AB–216/U and AB–216A/U.*** The differences that exist between the components of Tower AB–216/U procured under different order numbers and the differences between Tower AB–216/U and Tower AB–216A/U are outlined in the chart below.

Component	Tower AB–216/U			Tower AB–216A/U
	Order No. 32602-Phila-52	Order No. 32068-Phila-55	Order No. 32945-Phila-56	
Guy MX-1201/U	1. Guys are 67, 75, 87, and 140 feet long. 2. Guys are wound on wooden reels.	1. Guys are 67, 75, 130, and 150 feet long. 2. Guys are rolled into coils approximately 18 inches in diameter.	1. Guys are 75, 130, and 150 feet long. 2. Guys are rolled into coils approximately 18 inches in diameter.	1. Guys are 75, 130, and 150 feet long. 2. Guys are rolled into coils approximately 18 inches in diameter.
Antenna Support AB-206/G.	1. Antenna support does not have a platform. 2. Antenna stabilizers are made of rope.	1. Antenna support is equipped with a platform. 2. Antenna stabilizers are made of aluminum tubing.	1. Antenna support is equipped with a platform. 2. Antenna stabilizers are made of aluminum tubing.	1. Antenna support is equipped with a platform. 2. Antenna stabilizers are made of aluminum tubing.
Scaffold Tower Bracket MT-1157/G.	The diagonal braces are fixed mounted and can be attached only to the horizontal member of the tower section directly above the scaffold.	The diagonal braces are swivel mounted and may be attached either to the intermediate horizontal member above, or to the intermediate horizontal member below, the scaffold.	The diagonal braces are swivel mounted and may be attached either to the intermediate horizontal member above, or to the intermediate horizontal member below, the scaffold.	The diagonal braces are swivel mounted and may be attached either to the intermediate horizontal member above, or to the intermediate horizontal member below, the scaffold.
Tower Erection Davit MX-1215/U.	1. The davit boom has a fixed arm. 2. The heavy-duty davit is mounted by two cam locks.	1. The davit boom arm is adjustable. 2. The heavy-duty davit is mounted by three cam locks.	1. The davit boom arm is adjustable. 2. The heavy duty davit is mounted by three toggle bolts.	1. The davit boom arm is adjustable. 2. The heavy-duty davit is mounted by three toggle bolts.
Guy MX-1202/U	Consists of one 15-foot length of wire rope, two rope thimbles, four wire rope clips, one turnbuckle, and two insulator clevises.	Consists of one 15-foot length of wire rope formed at one end into a loop, one rope thimble, two wire rope clips, one turnbuckle, and two insulator clevises.	Not supplied on this order	Not supplied with the AB-216A/U.
Tower Section AB 208/U.	Has an adjustable hollow screw leg with a hole drilled through it to accommodate a screwdriver, which is used to adjust the length of the leg.	Has a tee fitting welded over the adjustable hollow leg. The length of the leg is adjusted by turning the tee fitting.	Has a tee fitting welded over the adjustable hollow leg. The length of the leg is adjusted by turning the tee fitting.	Not supplied with the AB-216A/U.
Tower Support Base Plate AB-208/U.	Has an unthreaded stub that is inserted into the adjustable hollow leg of Tower Section AB-208/U.	Has an unthreaded stub that is inserted into the adjustable hollow leg of Tower Section AB-208/U.	Has an unthreaded stub that is inserted into the adjustable hollow leg of Tower Section AB-208/U.	Not supplied with Tower AB-216A/U.
Tower Section Base Plate AB-506/U.	Not supplied on this order	Not supplied on this order	Not supplied on this order	Has a threaded adjustment fitting with two leveling nuts. The fitting is inserted into the hollow leg of Tower Section AB-207/U, and the tower section is leveled by adjusting the leveling nuts.
Guy anchor	Screw type anchor	Screw type anchor	Two-piece, retrievable plate type, consisting of a rectangular anchor plate and an anchor rod.	Two-piece, retrievable plate type, consisting of a rectangular anchor plate and an anchor rod.
Guy spacers	Guy spacers are 18 inches long.	Guy spacers are 18 inches long	Guy spacers are 18, 30, and 48 inches long.	Guy spacers are 18, 30, and 48 inches long.
Auger, anchor installing bar, and mast.	Not supplied on this order	Not supplied on this order	Used to install the plate type anchor.	Used to install the plate type anchor.

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Page 9, paragraph 14, line 1. Change "(par. 6a)" to: (par. 6*a* and *a*.1).

Paragraph 15*a* (page 5 of C 1). Add the following subparagraph:

(1.2) (Added) *Tower AB–216A/U.*

Crate No.	Height (in.)	Width (in.)	Depth (in.)	Volume (cu ft)	Unit weight (lb)	Contents
1	27½	19½	19½	6.0	210	Guys MX–1201/U (less takeup winches).
2	33½	23½	12½	5.8	185	Guy takeup winches.
3	101½	13½	9½	7.2	275	Anchor rods and digging bar.
4	38½	14½	9½	3.1	175	Anchor plates.
5	38½	14½	9½	3.1	175	Anchor plates.
6	75½	15½	15½	10.2	190	Ground Rods MX–148/G, guy spacers, snatch block, clevises, auger, and maul.
7	166½	15½	15½	22.4	165	Tower Erection Davit MX–1215/U, antenna stabilizer assemblies, and anchor installing bar.
8	39½	25½	13½	7.9	220	Tower Section Base Plates AB–556/U, Capstan E–12/U, hoist line assembly, and tag line.
9	39½	18½	13½	5.7	100	Chest CH–77 and contents, tensiometers, and antenna support adapter tubes.
10 through 22	9	56	105	30	200	Tower Sections AB–207/U.
23	9	73	118	40	200	Scaffold Tower Bracket MT–1157/G.
24	71½	57½	20½	49.1	285	Antenna Supports AB–296/G.

Page 11, paragraph 18. Change the heading to: **Installation of Tower Support Base Plates AB–206/U or Tower Section Plates AB–556/U.**

Subparagraph *d*. Change the second sentence to: Arrange the four base plates on the timbers so that the **center lines of the stubs (AB–206/U) or of the threaded adjustment fittings (AB–556/U) of the base plates** form the corners of a rectangle 4 feet by 6 feet.

20. Installation of Lowest Tower Section

(Superseded) (figs. 5, 5.1, and 5.2)

On Tower AB–216/U, Tower Section AB–208/U is the lowest tower section. On Tower AB–216A/U, a Tower Section AB–207/U is used as the lowest tower section.

a. Assemble Tower Section AB–208/U or one Tower Section AB–207/U (par. 19).

b. Check the spacing of the four base plates (par. 18*d*). See that the stub (AB–206/U) or the threaded adjustment fitting (AB–556/U) of each base plate is clean. If Tower Section Base Plates AB–556/U are being used, screw the leveling nuts all the way down to the plates. Do not tighten the leveling nuts against the plates.

c. Clean the hollow fitting on the lower end of each vertical member of the tower section (*a* above).

d. Place the assembled tower section on the base plates so that the hollow fittings on the ends of the vertical members of the tower section engage the stubs or threaded adjustment fittings of the four base plates.

e. Secure each base plate to the timber foundation with four lag screws.

f. Level the tower section horizontally. Check both the wide side and the narrow side of the tower section; place the level on a horizontal member as shown in figures 5 and 5.1.

(1) To level Tower Section AB–208/U (Tower AB–216/U), adjust the lengths of the vertical members by rotating the leveling tees until the tower section is level. Turn the leveling tee counterclockwise to increase and clockwise to decrease the length of a vertical member.

(2) To level Tower Section AB–207/U (Tower AB–216A/U), adjust the positions of the leveling nuts on the threaded adjustment fittings of Tower Section Base Plates AB–556/U. Turn the *upper* leveling nut counterclockwise to raise and clockwise to lower a vertical member of the tower section. Do not raise the tower section more than is necessary to level it. When the tower section is level, screw the *lower* leveling nuts up against the upper leveling nuts and jam the lower nuts to lock the upper nuts in position.

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Page 13, paragraph 21*a*. Change the first sentence to: The locations for the guy anchors must be determined as soon as **the base plates and the lowest tower section** have been installed (pars. 18 and 20).

Page 18, paragraph 22*b*. Delete the second sentence and substitute: Screw-type Guy Anchors MX–1202/U (fig. 9) are furnished with early procurements of Tower AB–216/U; plate-type anchors (fig. 13) are furnished with later procurements of Tower AB–216/U and with Tower AB–216A/U.

Page 23, paragraph 24. Change the first sentence to: The plate-type anchor supplied with some orders of Tower AB–216/U **and with Tower AB–216A/U** is more efficient than Guy Anchor MX–1202/U (par. 23), because it pulls entirely against solid, undisturbed earth.

Page 28, figure 16. Change the caption to: **Tower AB–216/U, installation of snatch block and snatch block coupler.**

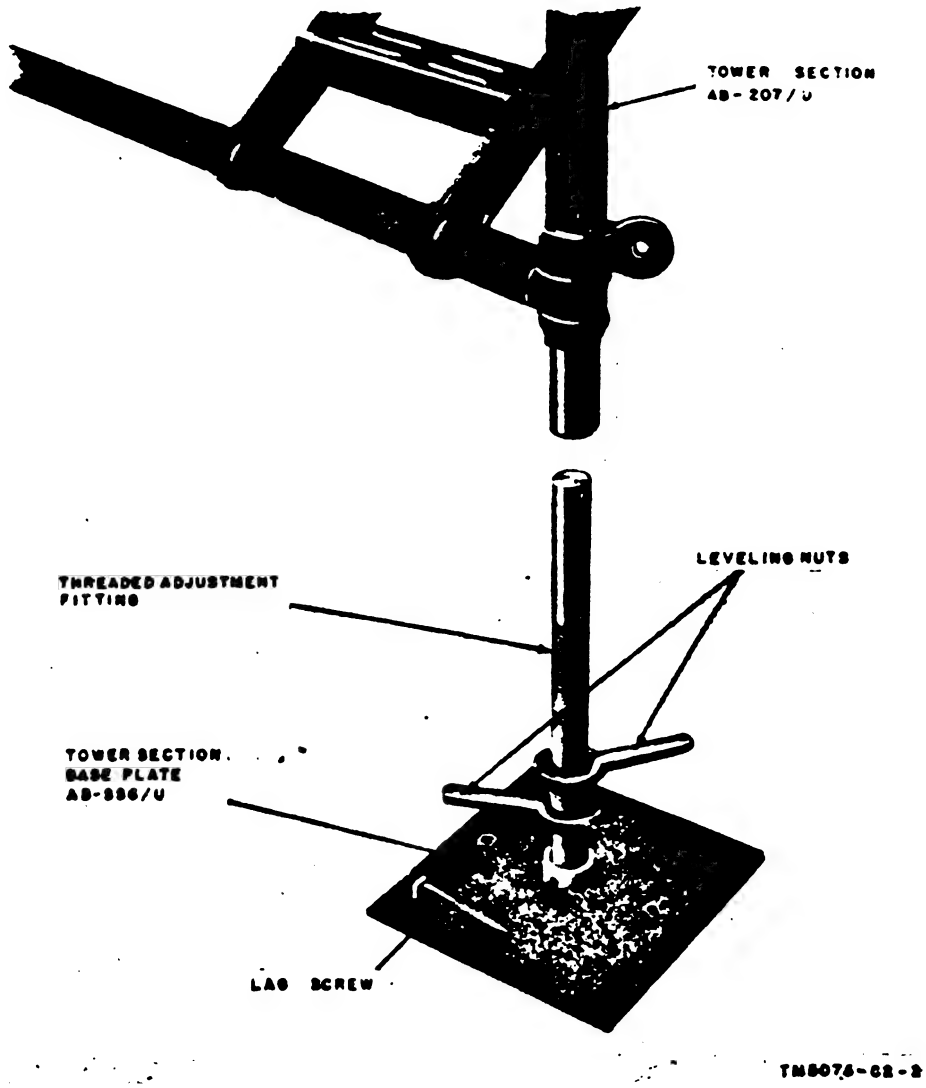


Figure 5.1 (Added) *Tower Section Base Plate AB–556/U.*

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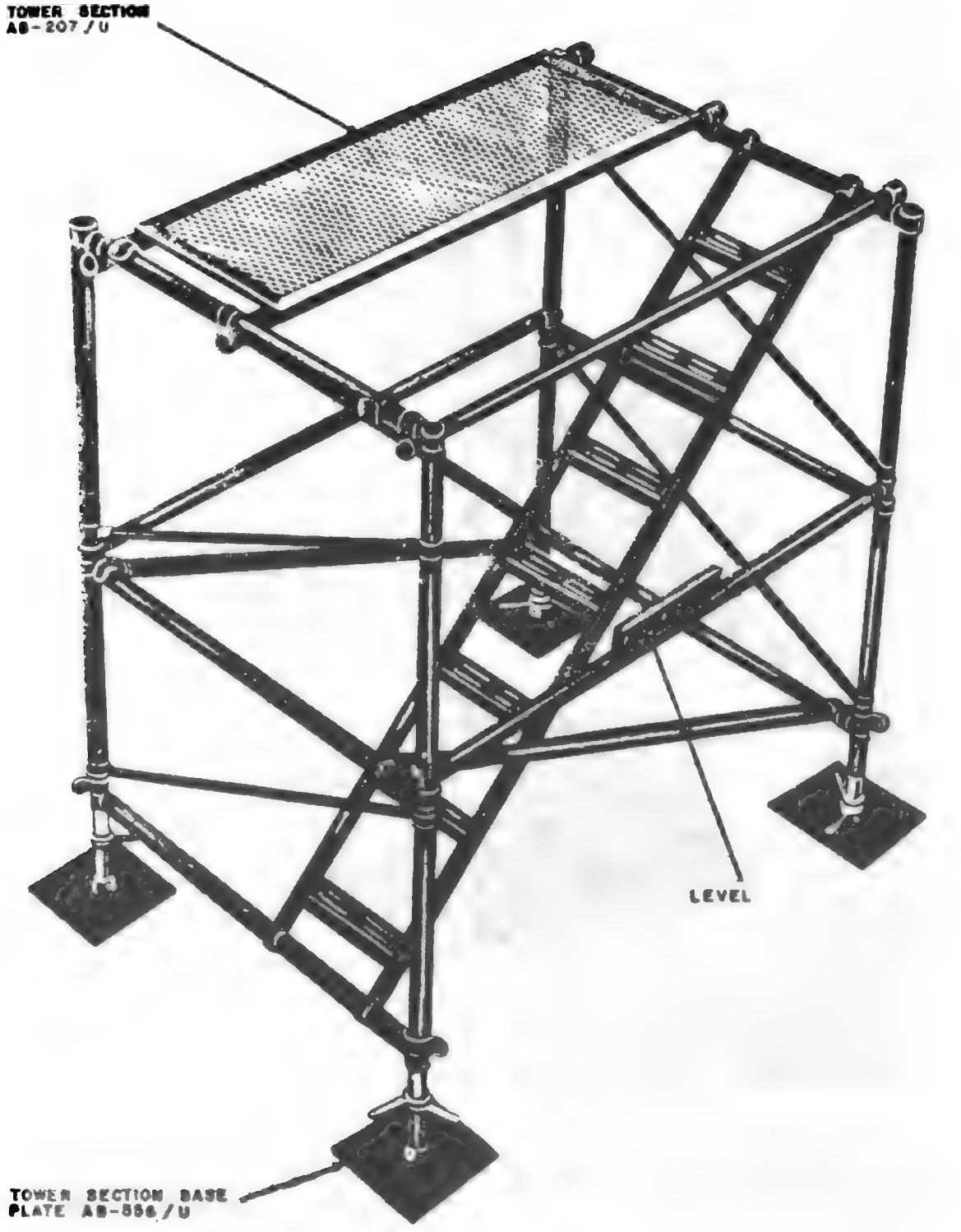


Figure 5.2 (Added) ***Tower Section AB-207/U installed on Tower Section Base Plates AB-556/U.***

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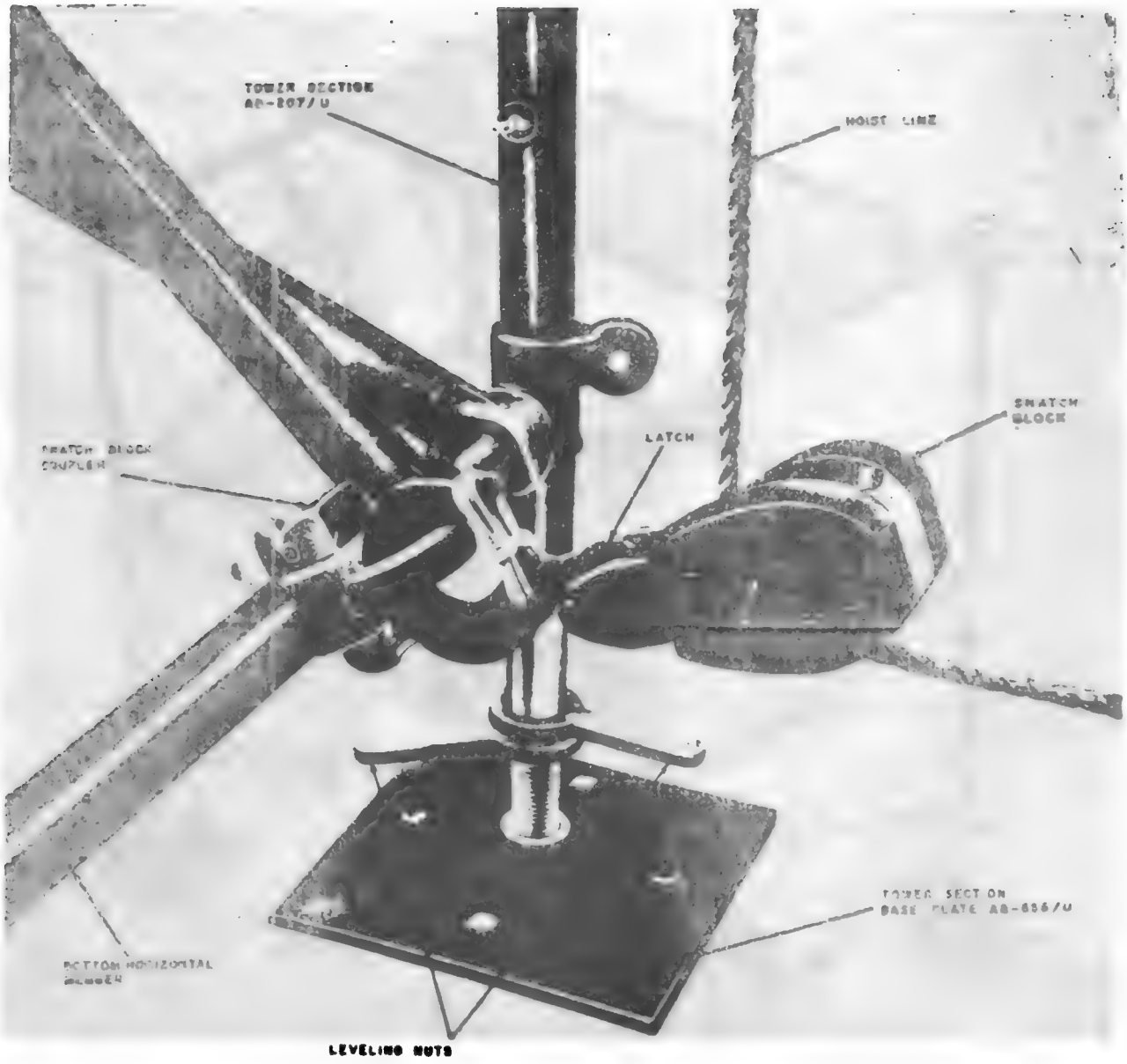


Figure 5.2. (Added) ***Tower Section AB–207/U installed on Tower Section Base Plates AB–556/U.***

Page 29, paragraph 26, heading. Change "(fig. 16)" to: **(figs. 16 and 16.1).**

Page 34, paragraph 29. Add the following note after the heading:

Note. **These instructions apply to the installation of all Tower Sections AB–207/U except the AB–207/U used as the lowest tower section of Tower AB–216A U Refer to paragraph 20 for instructions for installing Tower Section AB–207/U as the lowest tower section of Tower AB–216A/U.**

Page 39, paragraph 29*l*. Change the last sentence to: **Check the level of the lowest tower section after the first set of guys is installed and relevel the tower section (par. 20*f*), if necessary.**

36. Night Obstruction Marking

(Superseded)

In the United States, Civil Aeronautics Administration regulations require that warning

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lights be mounted on towers to provide night indication of obstructions to aerial navigation. The number and kind of warning lights and their locations on the tower depend on the height of the tower. Tower Platform Section MT–1156/U (par. 31) is supplied with Accessory Kit MK–100/U to support a beacon. Neither warning lights nor a beacon is provided with the basic tower or with any of its associated kits. Suitable obstruction marking light equipment (pars. 49.1 and 49.2) for towers of the various heights is available through normal supply channels.

Page 54. Delete figure 42.

Page 56, paragraph 40a.

(2) (Superseded) Check to see that the lowest tower section is level. Use the level supplied with the tower. If necessary, relevel the tower section (par. 20*f*).

(7) Delete the last sentence and substitute: On Tower AB–216/U, pay particular attention to the drain holes in the vertical members of Tower Section AB–208/U. On Tower AB–216A/U, carefully clean the interlock holes in the hollow fitting at the lower end of each vertical member of the lowest Tower Section AB–207/U.

CHAPTER 3.1 (Added)

AUXILIARY EQUIPMENT

49.1. Purpose of Auxiliary Equipment

Obstruction marking lights that conform with Civil Aeronautics Administration regulations must be mounted on towers installed in the continental United States to provide night indication of obstructions to aircraft. Ground Obstruction Marker Light Sets MK–221/G and MK–222/G provide suitable warning light equipment, including installation materials, to mark towers of various heights. For detailed information concerning the MK–221/G and the MK–222/G, refer to TB SIG 292, Ground Obstruction Marker Light Sets MK–221/G and MK–222/G. For information pertaining to the requisitioning of these equipments, refer to Department of the Army Supply Manuals SIG 7 & 8 MK–221/G and SIG 7 & 8 MK–222/G.

49.2. Use of Ground Obstruction Marker Light Sets MK–221/G and MK–222/G

a. Ground Obstruction Marker Light Set MK–221/G. Structures up to 150 feet in height must be marked at the top by two steadily burning red lights. Use the MK–221/G when obstruction marking lights are required on a basic (78-foot) tower or on a 120-foot tower. No switching equipment for turning the lights on and off is provided with the MK–221/G. Automatic switching equipment for use with the MK–221/G is available and may be requisitioned separately. Instructions for the installation, operation, and maintenance of the equipment included with the MK–221/G and of the associated automatic switching equipment are given in TB SIG 292.

b. Ground Obstruction Marker Light Set MK–222/G. Structures over 150 feet in height but not more than 300 feet high must be marked at the top by a red code (flashing) beacon and near the midpoint by two steadily burning red lights. Use the MK–222/G when obstruction marking lights are required on a 162-foot or a 204-foot tower. The MK–222/G includes automatic switching equipment and an automatic alarm system that indicates whether the beacon is operating properly. Instructions for the installation, operation, and maintenance of the equipment provided in the MK–222/G are given in TB SIG 292.

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USA Arctic Test Bd	Fld Comd, AFSWP	Yuma Test Sta	11–557
USCONARC	Engr Maint Cen	USA Elct PG	11–587
USARADCOM	Army Pictorial Cen		11–592
OS Maj Comd	WRAMC		11–597

NG: State AG; units—same as Active Army.
USAR: None.
For explanation of abbreviations used, see AR 320–50.

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TECHNICAL MANUAL

TOWER AB-216/U AND AB-216A/U, TOWER SECTION SET AB-298/U, GUY KIT MK-99/U, ACCESSORY KIT MK-100/U, AND GUY KIT MK-101/U

TM 11-5073
CHANGES NO 4

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *14 August 1963*

TM 11-5073 19 June 1956, is changed as follows:

Note. The parenthetical references to previous changes (example: "page 3 of C1") indicates that pertinent material was published in that changes.

Page 3. Delete paragraph 1 and substitute:

1. Scope

This manual describes Tower AB-216/U and AB-216A/U, Tower Section AB-298/U, Guy Kit MK-99/U, Accessory Kit MK-100/U, and Guy Kit MK-101/U and covers their installation and second echelon maintenance. It includes instructions for performing preventive and periodic maintenance services and repair functions to be accomplished by the organizational repairman. No maintenance is performed at first echelon level.

Add paragraph 1.1 after paragraph 1:

1.1. Index of Publications

Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to this equipment. DA Pam 310-4 is a index of current technical manuals, technical bulletins, supply bulletins, lubrication orders, and modification work orders that are available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc.) and the latest changes to and revisions of each equipment publication.

Delete paragraph 2 and substitute:

2. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38-750.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publication 378 (Navy), and AFR 71-4 (Air Force).

c. Comments on Manual. Forward all comments on this publication direct to: Commanding Officer, U.S. Army Electronics Materiel Support Agency, ATTN: SELMS-MP, Fort Monmouth, N.J. DA Form 1598 (Record of Comments on Publications), DA Form 2496 (Disposition Form), or letter may be used.

Page 11. Delete paragraph 16 and substitute:

16. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6 (par. 2).

b. Check the equipment against the master packing list. When no packing list accompanies the equipment, check the equipment against the table of components in paragraph 6. Report all discrepancies in accordance with instructions in TM 38-750 (par. 2).

Note. Shortages of a minor assembly or part that does not affect proper functioning of the equipment should not prevent use of the equipment.

c. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO). The current MWO's applicable to the equipment are listed in DA Pam 310-4 (par. 1.1).

Page 43, paragraph 30*d*, line 18. After "the guys", add: Install the first four guys and bring them up to tension as indicated in the chart below. Check the tension of the tensiometers as described in paragraph 40.1 before proceeding with the installation.

* These changes supersede C 3, 15 December 1961.

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Page 55, paragraph 40 as changed by C3. Delete subparagraph *a* and substitute:

a. Monthly Preventive Maintenance Checks and Services Chart.

Sequence No.	Item	Procedure	References
1	Publications	Check to see that the technical manual is complete and in usable condition. Check DA Pam 310–4 to determine if new applicable changes have been published.	DA Pam 310–4.
2	Support timbers and base plates	Check the area around the support timbers and base plates for proper drainage. If the soil around the support timbers is worn away, add fill dirt and tamp the earth around the timbers. Dig drainage ditches from the base of the tower.	
3	Tower	Check to see that the tower is level. If the tower is badly distorted and cannot be leveled because the base plates or support timbers have settled unevenly, dismantle the tower and reassemble it on a firmer foundation.	
4	Anchors	Check for loose anchors. If the anchors show signs of creepage, tamp the earth around the anchor rod with a tamping bar or the butt end of a 2 x 4. If the anchor is loose or shows signs of pulling out, remove the anchor, reevaluate the soil conditions, and reinstall the anchor.	Pars. 22, 23, and 24.
5	Guys and guy spacers	Check to see that each takeup winch is securely attached to the guy, guy spacer, or anchor. Check for rusted, corroded, or badly distorted clevises, missing or broken thimbles in the guy spacers and badly rusted or frayed guys. If it is necessary to replace any component part that is in series with the guys, follow the procedures outlined in paragraphs 41, 44, and 46. See that the guys are securely attached to the tower. Check to see that the bolts and nuts that attach the clevis end of the guys to the guy straps are securely fastened. Check and adjust the tension on the guys. Be sure to replace the locking pin in the takeup winch after the guys have been adjusted.	Pars. 40.1, 41, 44, and 46. Figs. 27, 28, and 33.
6	Vertical and horizontal tower members.	Check for clogged drain holes in the vertical and horizontal tower members. Use a short piece of #6 AWG copper wire and clean the drain holes in the tower members. Be sure that the drain holes above the tee fittings are clear.	
7	Snap braces	Check for bent, damaged, or missing horizontal or diagonal snap braces. If creepage is excessive (6 to 8 inches), restore the snap braces to their original position and wrap friction tape around the horizontal member to which it is attached to keep it in place. If necessary, replace any damaged snap brace.	
8	Ground rod	Check to see that the ground rods are firmly imbedded in the soil and that the grounding studs on each corner of the tower sections are free of corrosion and that the ground wire are securely attached to them.	
9	Antenna and antenna support	Check to see that the antenna, antenna support, and antenna stabilizer are securely attached to the tower. Be sure that the clamps that mount the antenna support to the tower and the fittings that attach the antenna to the antenna support are securely fastened.	

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Sequence No.	Item	Procedure	References
10	Obstruction warning lights	If obstruction warning lights are mounted on the tower, check to see that the beacon platform is securely in place and that the warning lights are securely mounted and in good working condition.	
11	Lubrication	Check to see that the equipment is properly lubricated.	Par. 40*b* and *c*.
12	Modification work orders	Check to see that all URGENT MWO's have been applied to the equipment and that all NORMAL MWO's have been scheduled.	DA Pam 310–4.

Page 58. Add paragraph 40.1 after paragraph 40:

40.1. Tensiometer Calibration

Check the calibration of the tensiometers (fig. 83) by placing two tensiometers one above the other on the same guy. Adjust the tension on the guy cable for a reading of 500 pounds on at least one tensiometer. Take the reading directly from the dial at the center of the tensiometer frame. If the readings are within 20 pounds of each other, the tensiometers are calibrated correctly. If they indicate more than 20 pounds difference, turn the knurled adjustment nut on the tensiometer that reads lower in pounds until the indicator dials are the same. Scratch a new scribe mark on the adjusted tensiometer. Adjust the guy to a new tension. The readings on the tensiometers should increase or decrease an equal amount. Use the same tension and check the readings of the tensiometers at a different portion of the guy.

Page 62. (As changed by C3). Delete paragraph 52 and substitute:

52. General

To repair tubular members (fifth echelon operation) of the tower components (except vertical leg members), cut out and replace broken lengths of aluminum tubing and weld in new lengths. When a vertical leg member is defective, replace the entire section. Replace broken or badly distorted guy straps or snap braces. These procedures are general shop practices and are covered by special instructions issued by the repair organization responsible for the work.

Page 65. (As changed by C3) Paragraph 57. Add the following caution before subparagraph *a*.

***Caution:* When raising the hauling line hook, in preparation for disassembling the tower, always attach the tag line to it and control the tag line to prevent the hook from catching on a guy or other tower members.**

Page 65. Add the following appendix after chapter 5:

APPENDIX

REFERENCES

Following is a list of appl cab e references availab e to the organizational maintenance repairman of Tower AB–216/U and AB–216A/u, Tower Section Set AB–298/U, Guy Kit MK–99/U, Accessory MK–100/U, and Guy Kit MK–101/U.

DA Pam 310–4	Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
TM 9–213	Painting Instructions for Field Use.
TM 11–2262	Outside Plant Wire; Construction and Maintenance.
TM 11–5450–200–10P	Operator's Maintenance Repair Parts and Special Tools List for Towers AB–216/U AB–216A/U, Tower Section Set AB–298/U, Guy Kits MK–99/U and Accessory Kits MK–100/U and MK–100/U, and Guy Kits MK–101/U and MK–101A/U.

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TM 11-5450-200-20P	Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Towers AB-216/U and AB-216A/U, Tower Section Set AB-298/U, Guy Kits MK-99/U and MK-99A/U, Accessory Kits MK-100/U and MK-100A/U, and Guy Kits MK-101/U and MK-101A/U.
TM 11-6230-202-15	Operator, Organizational, Field and Depot Maintenance Light Set Ground Obstruction Marker MK-221/G.
TM 38-750	The Army Equipment Record System and Procedures.

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NG: None.
USAR: None.
For explanation of abbreviations used see AR 320-50.

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TECHNICAL MANUAL
No. 11–5073
TECHNICAL ORDER
No. 31R1–2U–111

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
WASHINGTON 25, D. C., *19 June 1956*

TOWER AB–216/U, TOWER SECTION SET AB–298/U, GUY KIT MK–99/U, ACCESSORY KIT MK–100/U, GUY KIT MK–101/U

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* This manual supersedes TM 11–5073, 2 November 1953, including C 1, 6 October 1954, and C 2, 3 November 1955.

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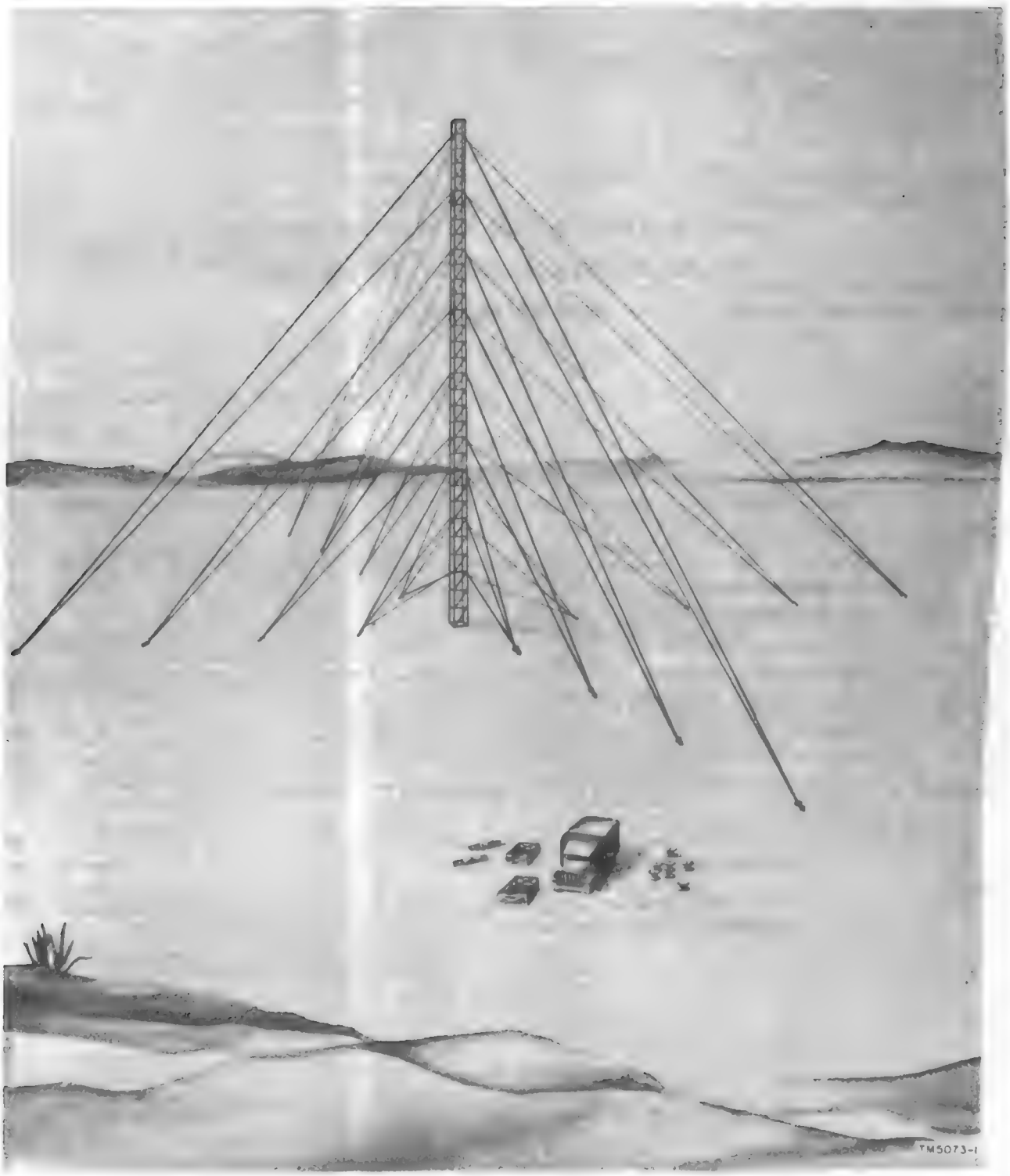


Figure 1. Tower AB–216/U, three Tower Section Sets AB–298/U, Guy Kit MK–99/U, Accessory Kit MK–100/U, and Guy Kit MK–101/U in use.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual contains information on the description, installation, maintenance and repair of Tower AB–216/U, Tower Section Set AB–298/U, Guy Kit MK–99/U, Accessory Kit MK–100/U, and Guy Kit MK–101/U (fig. 1).

b. Forward all comments on this publication directly to: The Commanding Officer, The Signal Corps Publications Agency, Fort Monmouth, N. J.

2. Forms and Records

a. Unsatisfactory Equipment Reports.

(1) DA Form 468 (Unsatisfactory Equipment Report), will be filled out and forwarded to the Office of the Chief Signal Officer, as prescribed in AR 700–38.

(2) DD Form 535 (Unsatisfactory Report), will be filled out and forwarded to Commanding General, Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio, as prescribed in AR 700–38 and AF TO 00–35D–54.

b. Damaged or Improper Shipment. DD Form 6 (Report of Damaged or Improper Shipment), will be filled out and forwarded as prescribed in AR 700–58 (Army); Navy Shipping Guide, Article 1850–4 (Navy); and AFR 71–4 (Air Force).

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Purpose. Tower AB–216/U is a general purpose tower used to support antennas. The height of Tower AB–216/U may be increased to 120, 162, or 204 feet by using various combinations of Tower Section Set AB–298/U, Guy Kit MK–99/U, Accessory Kit MK–100/U, and Guy Kit MK–101/U.

b. Use. The tower is used at semipermanent or temporary terminal or repeater stations. The number of antennas that the tower can support is limited by the size of the antennas and the height of the tower (par. 34).

4. Technical Characteristics

Height	78 to 204 ft.
Maximum compression load (all heights)	48,000 lb.
Mounting	4 Tower Support Base Plates AB–206/U.
Number of sections:	
Tower Section AB–208/U	1.
Tower Section AB–207/U	12 to 33.
Material	Aluminum.
Weight (per section)	119 lb.
Guys:	
MX–1201/U:	
Number	16 to 36.
Material	7/32-in. nylon-jacketed steel wire rope.
Breaking strength	5,500 pounds.

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MX–1382/U:

Number	8.
Material	¼-in. steel wire rope.
Breaking strength	7,000 pounds.
Spacers:	
Number	8 to 36.
Material	¼-in. steel wire rope.
Breaking strength	6,600 pounds.
Anchors:	
Number	16 to 32.
Material	Steel.
Types, sizes and holding power:	
Screw type:	
Area	78.5 sq. in.
Blade	10. in. dia.
Holding power:	
Single anchor	4,500 to 15,000 pounds depending on soil conditions.
Double anchor	14,000 to 20,000 pounds depending on soil conditions.
Plate type:	
Anchor plate	8 in. x 35 in.
Area	280 sq. in.
Holding power	12,500 to 35,000 pounds depending on soil conditions.

Davit:

Material	Aluminum.
Capacity:	
Light duty position	0 to 200 pounds.
Heavy duty position	0 to 500 pounds.

Antennas (not furnished):

Type	Parabolic dish-type.
Number:	
6-foot	8 to 24, depending on tower height.
8-foot	4 to 13, depending on tower height.
10-foot	3 to 9, depending on tower height.
12-foot	2 to 6, depending on tower height.
14-foot	1 to 4, depending on tower height.
16-foot	1 to 3, depending on tower height.

5. Nomenclatures and Common Names

A list of the nomenclature assignments for the components of Tower AB–216/U, Tower Section Set AB–298/U, Guy Kit MK–99/U, Accessory Kit MK–100/U, and Guy Kit MK–101/U are given below. A common usage name is indicated after each component.

Nomenclature	*Common name*
Tower AB–216/U	Tower
Tower Support Base Plate AB–206/U.	Base plate
Tower Section AB–208/U or AB–207/U.	Tower section
Guy Anchor MX–1202/U	Anchor
Ground Rod MX–148/G	Ground rod
Tower Erection Davit MX–1215/U	Davit
Capstan E–12/U	Capstan
Antenna Support AB–296/G	Antenna support
Guy MX–1201/U (67 ft)	67-foot guy
Guy MX–1201/U (75 ft)	75-foot guy
Guy MX–1201/U (130 ft)	130-foot guy
Guy MX–1201/U (150 ft)	150-foot guy
Guy MX–1201/U (167 ft)	167-foot guy
Guy MX–1201/U (215 ft)	215-foot guy
Guy MX–1201/U (240 ft)	240-foot guy
Guy MX–1201/U (275 ft)	275-foot guy
Guy MX–1382/U (15 ft)	Back guy
Hoist line assembly (450 ft)	Hoist line
Tag line assembly (250 ft)	Tag line
Scaffold Tower Bracket MT–1157/G	Scaffold
Tower Platform Section MT–1156/U	Beacon platform
Aerial Cable Roller MX–1216/U	Cable roller

6. Components

The following data is for general information only. See appropriate SIG 7 and 8 for information pertaining to requisition of spare parts.

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a. Tower AB–216/U.

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Unit weight (lb)
Tower Support Base Plate AB–206/U.	4	5¼	12	12	1
Tower Section AB–208/U	1	72	69⅝	50²⁵⁄₃₂	119
Tower Section AB–207/U	12	72	69⅝	50²⁵⁄₃₂	119
Guy MX–1382/U (15 ft)	8	¼			2
Guy MX–1201/U (67 ft)	4	5⁄16			8
Guy MX–1201/U (75 ft)	4	5⁄16			8.8
Guy MX–1201/U (130 ft)	4	5⁄16			15.4
Guy MX–1201/U (150 ft)	4	5⁄16			18
Guy Anchor MX–1202/U	16	1¼		66	
Ground rod	4	⅜		72½	
Tower Erection Davit MX–1215/U.	1	2½	49	163	
Antenna Support AB–296/G	2	5	60	84	
Capstan E–12/U		9	12	26	
Hoist line assembly (450 ft)	1	½			
Tag line assembly (250 ft)	1	½			
Snatch block	1	5	5	6	
Snatch block coupler	1	4¼	4¼	5⅝	
Digging bar	1	2	2¼	106	
Tensiometer	1	1⅜	6	12	
Guy spacer (18 in.)	8	¼		18	
Tool set consisting of:					
Chest CH–77	1	7¼	9⅜	22½	
Socket, 9⁄16 in.	4			3¼	
Socket, ⅝ in.	4			3¼	
Socket, 11⁄16 in.	4			3¼	
Socket, ¾ in.	4			3¼	
Socket, ⅞ in.	4			3½	
Socket, ²⁹⁄₃₂ in.	2			3	
Ratchet, wrench ½-in. drive	2	½	1	10	
Pliers	2	⅝	2½	6½	
Screw driver	1	1¼	1¼	9⅞	
Level	1	2	1	18	
Hammer	1	2	5	16	
Measuring tape (100 ft)	1				
#6 AWG copper wire	50 ft			50	
Lag bolts	24	½	½	4½	
Set of running spares (par. 10a)	1				

b. Guy Kit MK–99/U.

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Unit weight (lb)
Guy MX–1201/U (167 ft)	4	5⁄16			19.8
Guy MX–1201/U (215 ft)	4	5⁄16			25.5
Aerial Cable Roller MX–1216/U	4	1¼	1¼	12⅝	
Guy spacer (30 in.)	8	¼		30	

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c. Accessory Kit MK–100/U.

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Unit weight (lb)
Guy MX–1201/U (240 ft)	4	5/16			28.5
Guy MX–1201/U (275 ft)	4	5/16			32.6
Guy Anchor MX–1202/U	8	1¼	10	66	
Guy MX–1382/U (15 ft)	4	¼			2
Tower Platform Section MT–1156/U.	1	7⅞	15	20½	
Guy spacer (30 in.)	4	¼		30	
Set of running spares (par. 10b)	1				

d. Guy Kit MK–101/U.

Component	Required No.	Height (in.)	Depth (in.)	Length (in.)	Unit weight (lb)
Guy MK–1201/U (290 ft)	4	5/16			34.5
Guy MX–1382/U (15 ft)	4	¼			2
Guy Anchor MX–1202/U	8	1¼	10	66	
Set of running spares (par. 10c)	1				

e. Tower Section Set AB–298/U. Consists of seven Tower Sections AB–207/U which have the same dimensions and weight as those in *a* above.

7. Description of Tower AB–216/U

Tower AB–216/U is a sectionalized, guyed tower consisting of interlocking tower sections mounted on base plates. The tower is supported by guys and anchors. Antenna supports secure the antennas to the tower.

a. Tower Support Base Plate AB–206/U (fig. 5). The base plate is a square plate with a stub that extends from the center of one face. A mounting hole is drilled in each side.

b. Tower Section AB–208/U (fig. 5). This tower section is a folding frame assembly made up of two end frames hinged to a platform support frame. A platform is bolted to the platform frame, and a ladder is hinged to the top bar of one end frame. Removable horizontal and diagonal snap braces, snap on the tubular members of the basic frame. The lower end of each vertical member is terminated in an adjustable T-shaped fitting; the upper end is open. A bolt, wingnut and interlock clip is attached to each vertical member.

c. Tower Section AB–207/U (fig. 4). This tower section is identical to Tower Section AB–208/U (*b* above) except that the T-shaped fitting is replaced by a male fitting and a guy strap is attached to each vertical member.

d. Guy MX–1201/U (fig. 31). Guy MX–1201/U consists of a length of wire rope with a clevis swaged on one end, a take-up winch, and an insulator clevis.

e. Guy MX–1382/U. Guy MX–1382/U consists of a length of wire rope with a fixed thimble-eye loop at one end, one rope thimble, two cable clips, one turnbuckle and two insulator clevises.

f. Guy Anchor MX–1202/U (fig. 12). Guy Anchor MX–1202/U is a screw-type anchor with an oval eye at the upper end and a helical screw blade at the other end.

g. Guy Spacer (fig. 30). The guy spacer is a length of wire rope with a formed loop at each end. It consists of two wire rope clips, two split-oval wire rope thimbles, and two insulator clevises.

h. Antenna Support AB–296/U (fig. 35). The antenna support consists of two diagonally braced rectangular support frames, each hinged at one edge to a common tube and fitted on the other edge with a cam lock clamp. A telescoping tube assembly and an adapter tube is clamped to the support frame. Four antenna

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stabilizers and two triangular antenna platforms are also provided.

i. Tower Erection Davit MX–1215/U (fig. 14 and 15). The davit is a crane-type device that consists of a vertical double tube assembly and a boom arm assembly. The vertical double tube assembly has two mounting hooks and an operating handle. The boom arm assembly has an adjustable telescoping arm supported by a cable. The boom arm assembly is fastened to the vertical double tube assembly by three cam lock clamps.

j. Scaffold Tower Bracket MT–1157/G (fig. 41). The scaffold is an outrigger platform assembly that consists of three platforms side by side and a guard rail. Removable snap braces secure the scaffold to the tower.

k. Tower Section Set AB–298/U. Tower Section Set AB–298/U consists of seven Tower Sections AB–207/U (*c* above). Each section is identical and interchangeable with the 12 upper sections of Tower AB–216/U.

8. Description of Guy Kit MK–99/U

The components of Guy Kit MK–99/U are listed in paragraph 6*b*. Except for the length of the guys and the addition of Aerial Cable Roller MX–1216/U (fig. 29), the components of this kit are identical with the same nomenclatured components of Tower AB–216/U (par. 7).

9. Description of Accessory Kit MK–100/U

The components of Accessory Kit MK–100/U are listed in paragraph 6*c*. Except for the length of the guys and the addition of Tower Platform Section MT–1156/U (fig. 34), the components of this kit are identical with the same nomenclatured components of Tower AB–216/U (par. 7).

10. Description of Guy Kit MK–101/U

The components of Guy Kit MK–101/U are listed in paragraph 6*d*. Except for the length of the guys, the components of this kit are identical with the same nomenclatured components of Tower AB–216/U (par. 7).

11. Running Spares

The running spares supplied with Tower AB–216/U, Accessory Kit MK–100/U and Guy Kit MK–101/U are as follows:

a. Tower AB–216/U.

8 interlock clips
2 ground rods
4 insulator clevises
8 lag bolts
4 locking pins
12 machine bolts

b. Accessory Kit MK–100/U and Guy Kit MK–101/U. Four Guy Anchors MX–1202/U are supplied with each of these kits.

12. Differences in Models

Tower AB–216/U, Guy Kit MK–99/U, Accessory Kit MK–100/U, and Guy Kit MK–101/U have been procured under various order numbers. Slight differences exist between components procured on different order numbers. The charts below list these differences.

a. Tower AB–216/U.

Component	Order No. 39802-Phila-52	Order No. 52096-Phila-55
Guy MX–1201/U	1. Guys are 67, 75, 87, and 140 feet long. 2. Guys are wound on wooden reels.	1. Guys are 67, 75, 130, and 150 feet long. 2. Guys are rolled into coils approximately 18 inches in diameter.
Antenna Support AB–296/G.	1. Antenna support does not have a platform. 2. Antenna stabilizers are made of rope.	1. Antenna support is equipped with a platform. 2. Antenna stabilizers are made of aluminum tubing.
Scaffold Tower Bracket MT–1157/G.	The diagonal braces are fixed mounted and can only be attached to the horizontal member of the tower section directly above the scaffold.	The diagonal braces are swivel mounted and may be attached to either the intermediate horizontal member above or to the intermediate horizontal member below the scaffold.
Tower Erection Davit MX–1215/U.	1. The davit boom has a fixed arm. 2. The heavy-duty davit is mounted by two cam locks.	1. The davit boom arm is adjustable. 2. The heavy-duty davit is mounted by three cam locks.

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Component	Order No. 29602-Phila-52	Order No. 32606-Phila-55
Guy MX-1382/U	Consists of one 15-foot length of wire rope, tow rope thimbles, four wire rope clips, one turnbuckle, and two insulator clevises.	Consists of one 15-foot length of wire rope, preformed at one end into a loop, one rope thimble, two wire rope clips, one turnbuckle, and two insulator clevises.
Tower Section AB-208/U.	Has an adjustable hollow screw leg with a hole drilled through it to accommodate a screw driver, which is used to adjust the length of the leg.	Has a tee fitting welded over the adjustable hollow leg. The length of the leg is adjusted by turning the tee fitting.

b. Guy Kit MK-99/U.

Component	Order No. 29602-Phila-52	Order No. 34209-Phila-53	Order No. 29612-Phila-55
Guy MX-1201/U	Guys are 150 and 167 feet long.	Guys are 167 and 215 feet long.	Guys are 167 and 215 feet long.
Guy spacers	1. None supplied with first equipments. 2. 30 inch guy spacers supplied with remainder of order.	Guy spacers are 30-inches long.	Guy spacers are 30-inches long.

c. Accessory Kit MK-100/U.

Component	Order No. 29602-Phila-52	Order No. 10650-Phila-55
Guy MX-1201/U	Guys are 215 and 225 feet long.	Guys are 240 and 275 feet long.
Guy spacers	Guy spacers are 18 inches long.	Guy spacers are 30 inches long.

d. Guy Kit MK-101/U.

Component	Order No. 29602-Phila-52	Order No. 33163-Phila-52	Order No. 10650-Phila-55
Guy MX-1201/U	Contains four-240-foot and eight 290-foot guys.	Contains four-290-foot guys only.	Contains four-290-foot guys only.
Guy spacers	Guy spacers are 18 inches long.	Guy spacers are 30 inches long.	Guy spacers are 30 inches long.

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CHAPTER 2
INSTALLATION

Section I. GENERAL

13. Siting

The site for the tower depends on the height of the tower to be erected and on the requirements of the associated equipment. The soil must be well-drained and firm enough to support the weight of the tower and the forces exerted upon it and must afford reasonably good anchorage. Avoid soft or marshy ground. The chart below gives the weight and area rquired for towers of various heights.

Tower height (ft)	Weight (lb)	Minimum ground area (ft)
78	4,758	190 x 175
120	9,126	190 x 175
162	13,432	250 x 162
204	16,976	315 x 300

14. Equipment Requirements

One Tower AB–216/U (par. 6*a*) is required to erect a 78-foot tower. The equipment required to erect towers of 120, 162, and 204 feet is listed below.

a. 120-foot Tower.

1 Tower AB-216/U
1 Tower Section Set AB–298/U
1 Guy Kit MK–99/U

b. 162-foot Tower.

1 Tower AB-216/U
2 Tower Section Sets AB–298/U
1 Guy Kit MK–99/U
1 Accessory Kit MK–100/U

c. 204-foot Tower.

1 Tower AB-216/U
3 Tower Section Sets AB–298/U
1 Guy Kit MK–99/U
1 Accessory Kit MK–100/U
1 Guy Kit MK–101/U

15. Unpacking

a. Packaging Data. When packed for shipment, the components of Tower AB–216/U, Tower Section Set AB–298/U, Guy Kit MK–99/U, Accessory Kit MK–100/U, and Guy Kit MK–101/U are shipped in crates as indicated in (1) through (5) below.

(1) *Tower AB–216/U.*

Crate No.	Height (in.)	Width (in.)	Depth (in.)	Volume (cu ft)	Unit weight (lb)	Contents
1	37	31	22	14.6	376	Tower Support Base Plate AB–206/U Guy MX–1382/U Tag line assembly Hoist line assembly Chest CH-77 Capstan E–12/U Snatch block assembly Tensiometer
2	116	57	10	38.2	325	Tower Section AB–208/U
3 through 14	109	57	11	39.5	300	Tower Section AB–207/U
15	168	14	11	14.9	180	Tower Erection Davit MX–1215/U
16 and 17	77	31	14	19.3	422	Guy Anchor MX–1202/U
18	72	57	13	30.8	295	Antenna Support AB–296/G Antenna Support platform.

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Crate No.	Height (in.)	Width (in.)	Depth (in.)	Volume (cu ft)	Unit weight (lb)	Contents
19	124	75	12	64.5	450	Scaffold Tower Bracket MT–1157/U
20	75	7	7	2.1	98	Digging bar Ground Rod MX–148/G
21						Guy MX–1201/U (67 ft) Guy MX–1201/U (75 ft) Guy MX–1201/U (130 ft) Guy MX–1201/U (150 ft) Guy spacers

(2) *Tower Section Set AB–298/U.* Tower Section Set AB–298/U is packed in seven crates, numbered 1A through 7A. Each crate contains one Tower Section AB–207/U. The dimensions, weight, and volume are the same as those given in (1) above.

(3) *Guy Kit MK–99/U.* This kit is packed in crate number 1D, which is 47-inches high, 38-inches wide and 21-inches deep and has a volume of 21.7 cu ft. It weighs 520-pounds and contains Guy MX–1202/U (167 ft), Guy MX–1202/U (215 ft), Aerial Cable Roller MX–1216/U, and guy spacer (30 in.).

(4) *Accessory Kit MK–100/U.*

Crate No.	Height (in.)	Width (in.)	Depth (in.)	Volume (cu ft)	Unit weight (lb)	Contents
1C	41	38	30	27.0	651	Guy MX–1382/U (15 ft) Guy MX–1201/U (240 ft) Guy MX–1201/U (275 ft) Guy spacer
2C	26	17	10	2.5	44	Tower Platform Section MT–1156/U.
3C	77	31	14	19.3	422	Guy Anchor MX–1202/U

(5) *Guy Kit MK–101/U.*

Crate No.	Height (in.)	Width (in.)	Depth (in.)	Volume (cu. ft.)	Unit weight (lb)	Contents
1B	55	29	21	19.4	415	Guy MX–1201/U (290 ft) Guy MX–1382/U (15 ft)
2B	77	31	14	19.3	422	Guy Anchor MX–1202/U

b. Removing Contents. Unpack the equipment at a location convenient to the place where the tower will be installed. To unpack the equipment follow the instructions in (1) through (4) below.

(1) Cut the steel straps that secure the tower sections.

(2) Cut the metal straps that bind the crates or boxes, remove the nails with a nail puller, and lift off the tops of the containers.

(3) Slit open any interior packaging and remove any protective padding and packing.

(4) Remove the larger items from the crates and lay them on the ground near the place where the tower will be installed. Leave the smaller items in

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their boxes so that they will not be mislaid.

16. Checking

a. Check the contents of the boxes and crates against the master packing lists.

b. Examine each component to be sure that it is complete, in good condition, and has not been damaged during shipment.

c. If the equipment does not check with the packing lists, or if any damage is noted, fill out and forward DD Form 6 according to the instructions in paragraph 2*b*.

Section II. ERECTING TOWER

Note. When in the United States it is mandatory that the Civil Aeronautics Administration be notified before the erection or modification of the tower. Before construction is begun, fill out Form ACA-117[1], Notice of Construction or Alteration of Structures, and forward it to the nearest office of the Civil Aeronautics Administration.

17. Daylight Obstruction Marking

Civil Aeronautics Administration regulations require that in the United States the tower be painted in bands of international orange and white, with the top and bottom band painted international orange. The bands should be equal in length and should be approximately one-seventh the total length of the tower. To comply with these regulations, some of the white tower sections must be painted international orange before the tower is erected. Figure 2 shows the order in which the tower sections must be installed. On later procurements of Tower AB–216/U, the tower sections are already painted when delivered by the manufacturer.

18. Installation of Tower Support Base Plates AB–206/U

Before the installation of the base plates is begun, determine the direction in which the wide side (6 ft) of the tower is to face. Then proceed as follows:

a. At the center of the selected site, level and tamp down firmly an area approximately 5 feet by 7 feet. This area must be level and as solid as possible to provide a good mounting surface for the tower.

b. Obtain two pieces of timber 12 inches wide by 4 inches thick by 7 feet long or four pieces of timber 12 inches wide by 4 inches thick by 4 feet long and use them as a foundation for the base plates. Treat the timber thoroughly with creosote or asphaltum to retard deterioration.

c. If two 7-foot timbers are used, place them so that they will be under either the wide or narrow side of the tower section when it is installed (fig. 5). If four 4-foot timbers are used, position them diagonally so that they will bisect the angle formed by the junction of the wide and narrow sides of the tower section when it is installed.

d. Place the timbers approximately 2 inches below the ground surface. Arrange the four base plates on the timbers so that the stubs of the base plates form the corners of a rectangle 4 feet by 6 feet. *Do not* secure the base plates at this time.

19. Assembly of Tower Sections AB–208/U and AB–207/U (Figs. 3 and 4)

The instructions below apply to Tower Section AB–208/U and all Tower Sections AB–207/U. Assemble the tower sections as follows:

a. Place a folded section flat on the ground, with the upper surface of the platform up.

b. Grasp the unattached end of end frame A (A, fig. 3) and rotate this frame 180° so that it lies flat on the ground as indicated in A, figure 3.

c. Raise the end of the platform frame that is attached to end frame A until it is at a right angle to the platform frame (B, fig. 3) and secure the ladder to the lowest member of end frame A. Place the snap hook on the free end of the outer tube of the ladder between the two locating pins on the horizontal member of the end frame (D, fig. 3).

d. Raise the other end of the platform frame so that both end frames are vertical; support

[1] Available through the Civil Aeronautics Administration, Washington, D. C., or any of its regional or district offices.

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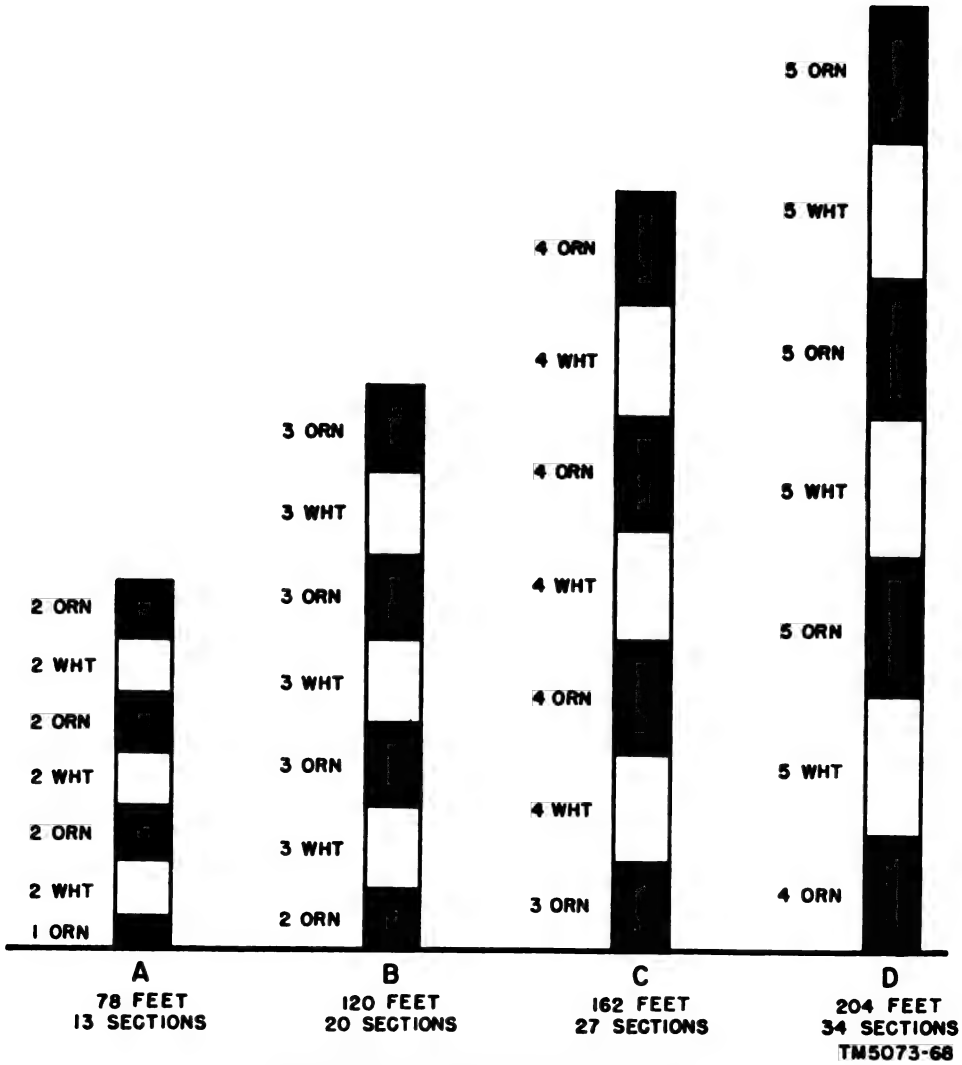


Figure 2. Daylight obstruction marking.

the platform frame in a horizontal position (C, fig. 3).

e. Install the long diagonal snap brace (fig. 4). Secure this brace at one end to the top horizontal member of one end frame and at the other end to the bottom horizontal member of the opposite end frame. Locating pins are provided on the horizontal members; the open side of each hook of the snap brace must be down.

Note. All diagonal snap braces run on diagonals opposite to the ladder.

f. Install the two short diagonal snap braces (fig. 4). Secure these at one end to the center horizontal member of one end frame and at the other end to the bottom horizontal member of the opposite end frame. Place each hook with the open side down.

g. Install the two horizontal snap braces (fig. 4). Attach them, one at each side, to the vertical members of opposite end frames. Place the closed part of each hook on the inside of the vertical member, just above the attachment point of the center horizontal member of the end frame.

20. Installation of Tower Section AB–208/U (Fig. 5)

Tower Section AB–208/U is the lowest tower section. Assemble it (par. 19) and install it as follows:

a. Check the spacing of the four base plates and see that the stub of each base plate is clean.

b. Clean the hollow tee fitting on the lower end of each vertical member of Tower Section

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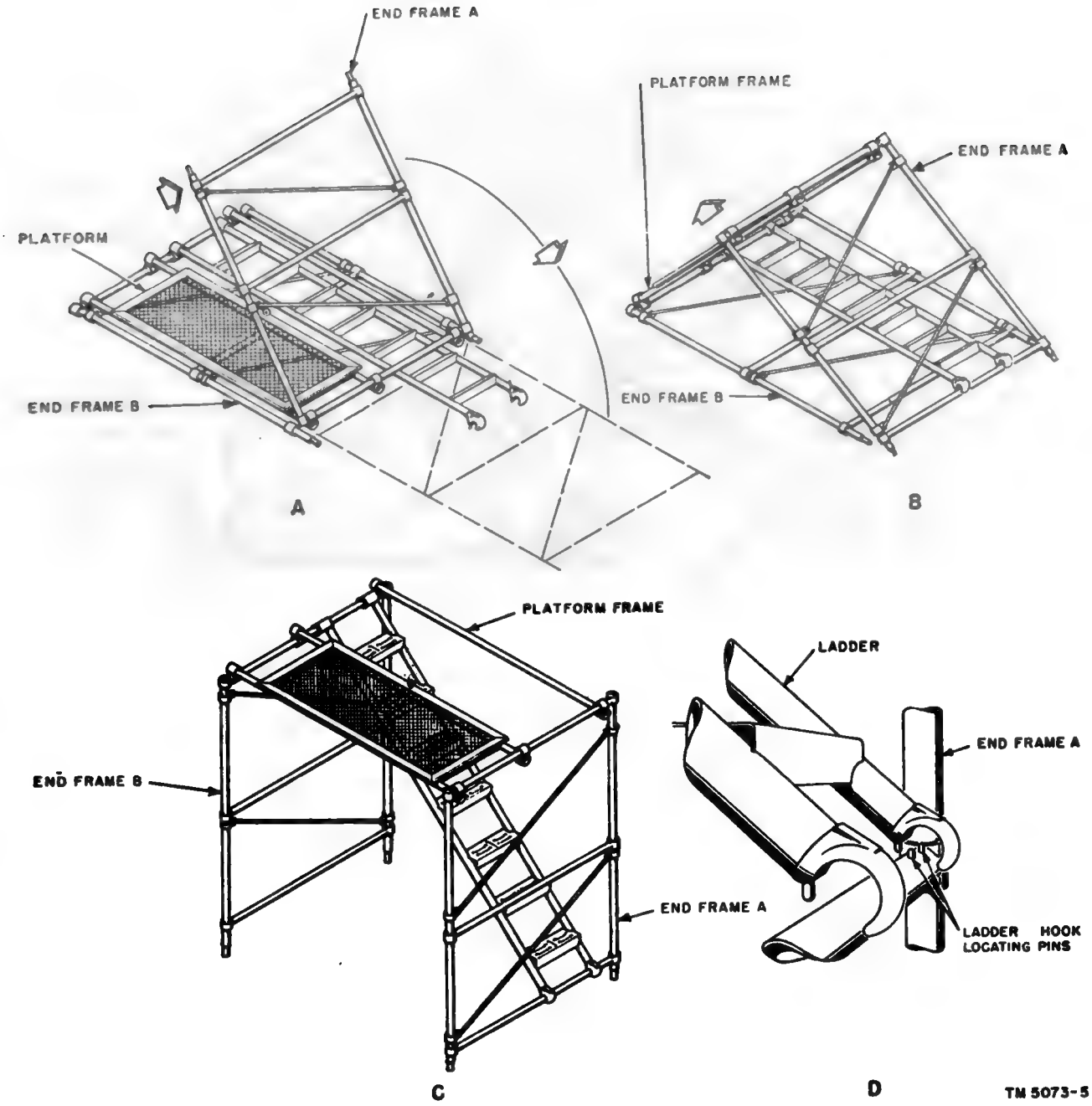


Figure 3. Unfolding Tower Section AB–208/U or AB–207/U.

AB–208/U. Place the assembled tower section on the base plates so that the hollow vertical members are in engagement with the stubs on the base plates.

c. Secure each base plate to the timber foundation with four lag screws.

d. Adjust the length of the leveling tee in each vertical member until the tower section is level horizontally. Place the level on the horizontal braces as shown in figure 5. Check both the wide and narrow side of the tower section. Turn the leveling tee clockwise to decrease or counterclockwise to increase the length of the vertical member.

21. Location at Guy Anchors (Figs. 6, 7, and 8)

a. The locations for the guy anchors must be

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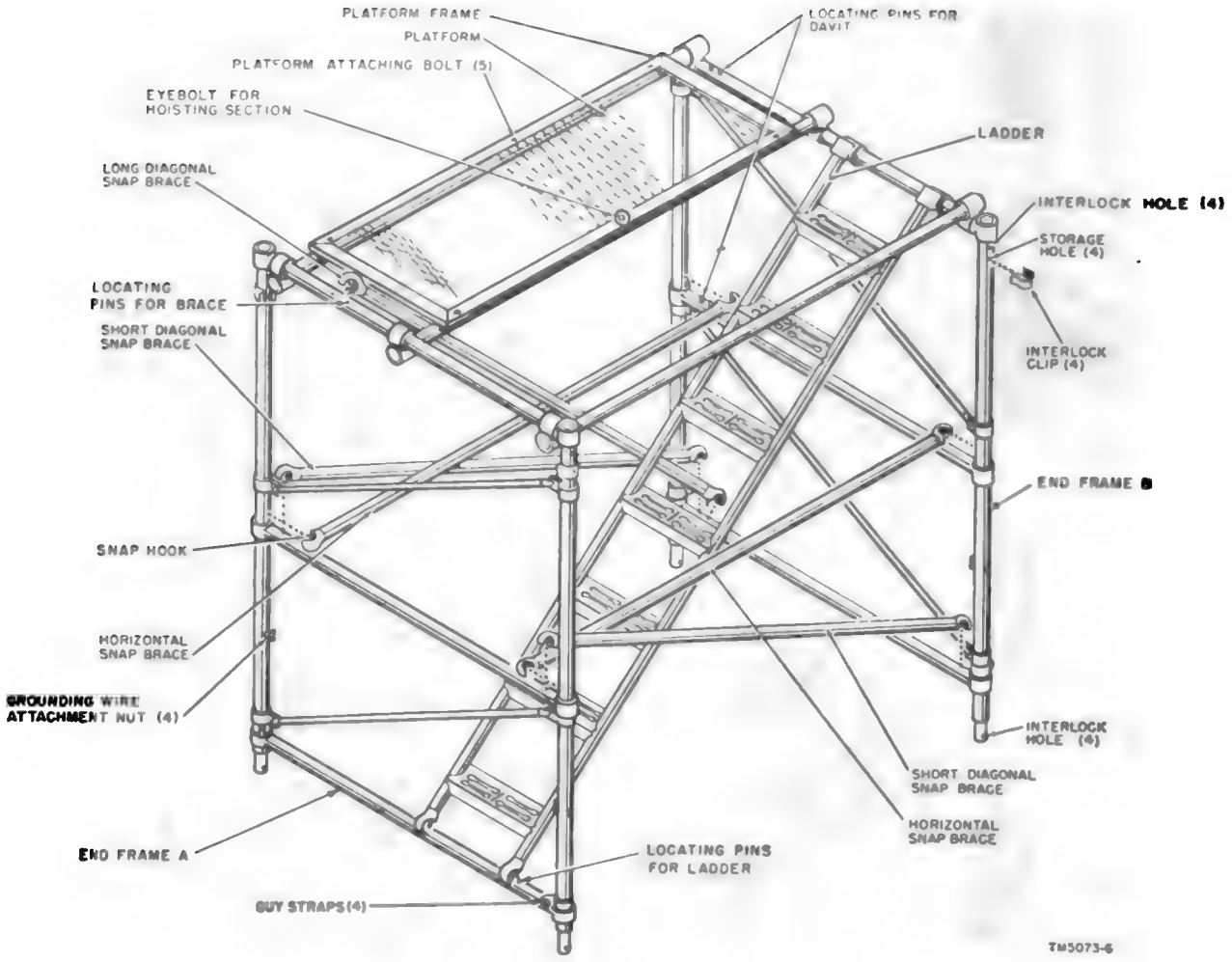


Figure 4. Assembling Tower AB–208/U or AB–207/U.

determined as soon as Tower Support Base Plates AB–206/U and Tower Section AB–208/U have been installed. The number of guy anchors that must be installed depends on the height of the tower being erected. The 78-foot tower and the 120-foot tower each require 8 anchors; the 162-foot tower requires 12 anchors; and the 204-foot tower requires 16 anchors.

b. The method of determining the location of the guy anchors is to attach a triangular frame (fig. 6) to Tower Section AB–208/U for use as a sighting service. The frame consists of three long diagonal snap braces (101$\frac{5}{16}$ inches) and two horizontal snap braces (72$\frac{5}{8}$ inches) obtained from unassembled Tower Sections AB–207/U. When the frame is attached, the base of the triangle thus formed is used as a sighting device to locate the guy anchors. Assemble the frame and locate the anchors as follows:

(1) Attach one end of a horizontal snap brace to vertical member B (fig. 6) just above the lowest welded joint and attach one end of a second horizontal snap brace to the same vertical member just above the intermediate welded joint.

(2) Attach the free ends of both horizontal braces to a long diagonal snap brace placed in a vertical position. Keep the two horizontal snap braces parallel to each other and at right angles to tower member B and to the upright long diagonal snap brace.

(3) Attach one end of another long diagonal snap brace to vertical member A

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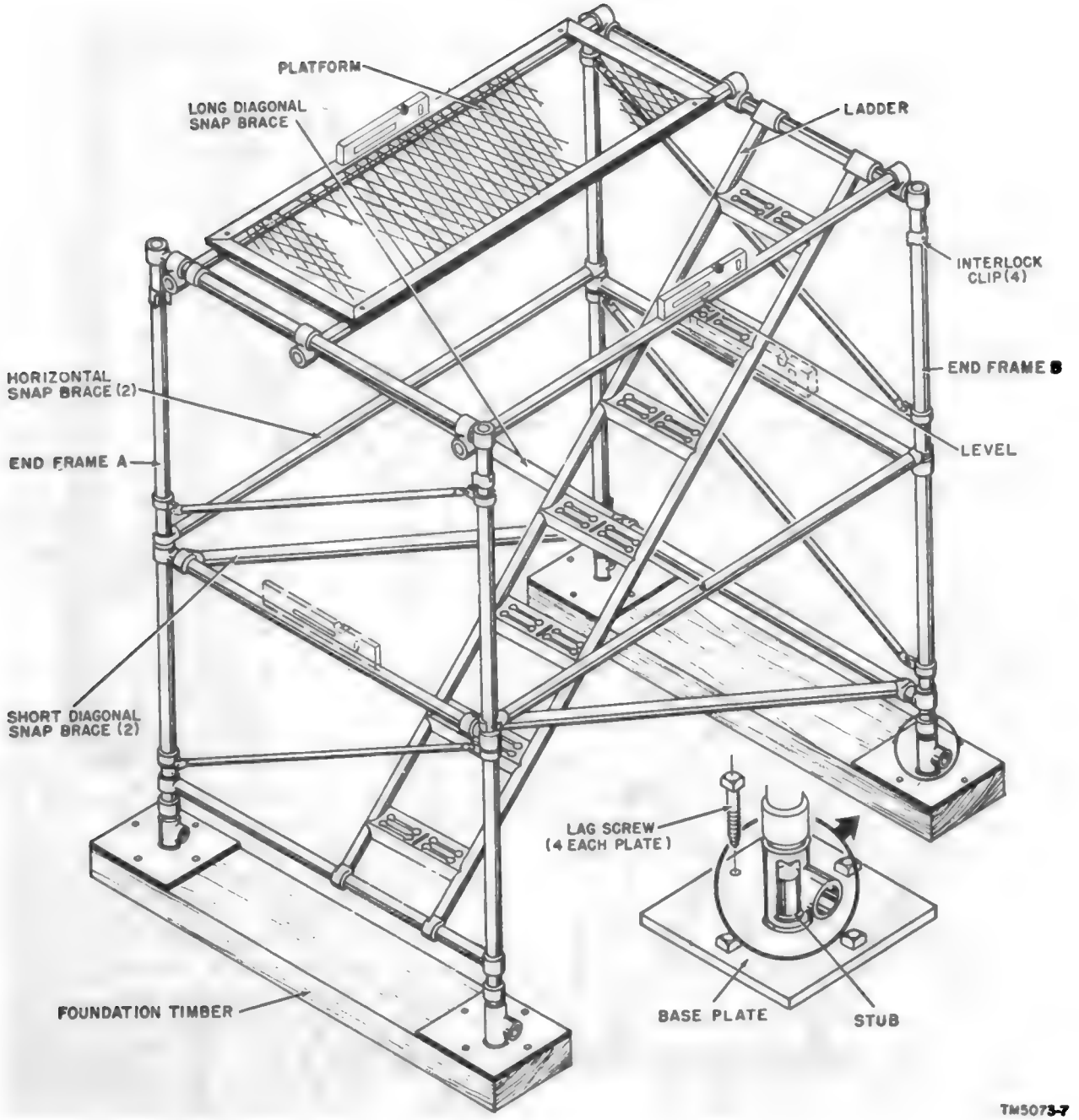


Figure 5. Installation of Tower Support Base Plate AB–206/U and Tower Section AB–208/U.

just above the lowest welded joint and attach the other end to the upright long diagonal snap brace just above the lower horizontal snap brace. Similarly, attach one end of a second long diagonal snap brace to vertical member A just below the intermediate welded joint and attach the other end to the upright long diagonal snap brace just above the upper horizontal snap brace. Keep the two long diagonal snap braces parallel to each other; the angles BA^1A and BAA^1 are both 45°.

(4) Attach the tag line to vertical tower member A as close to the ground as

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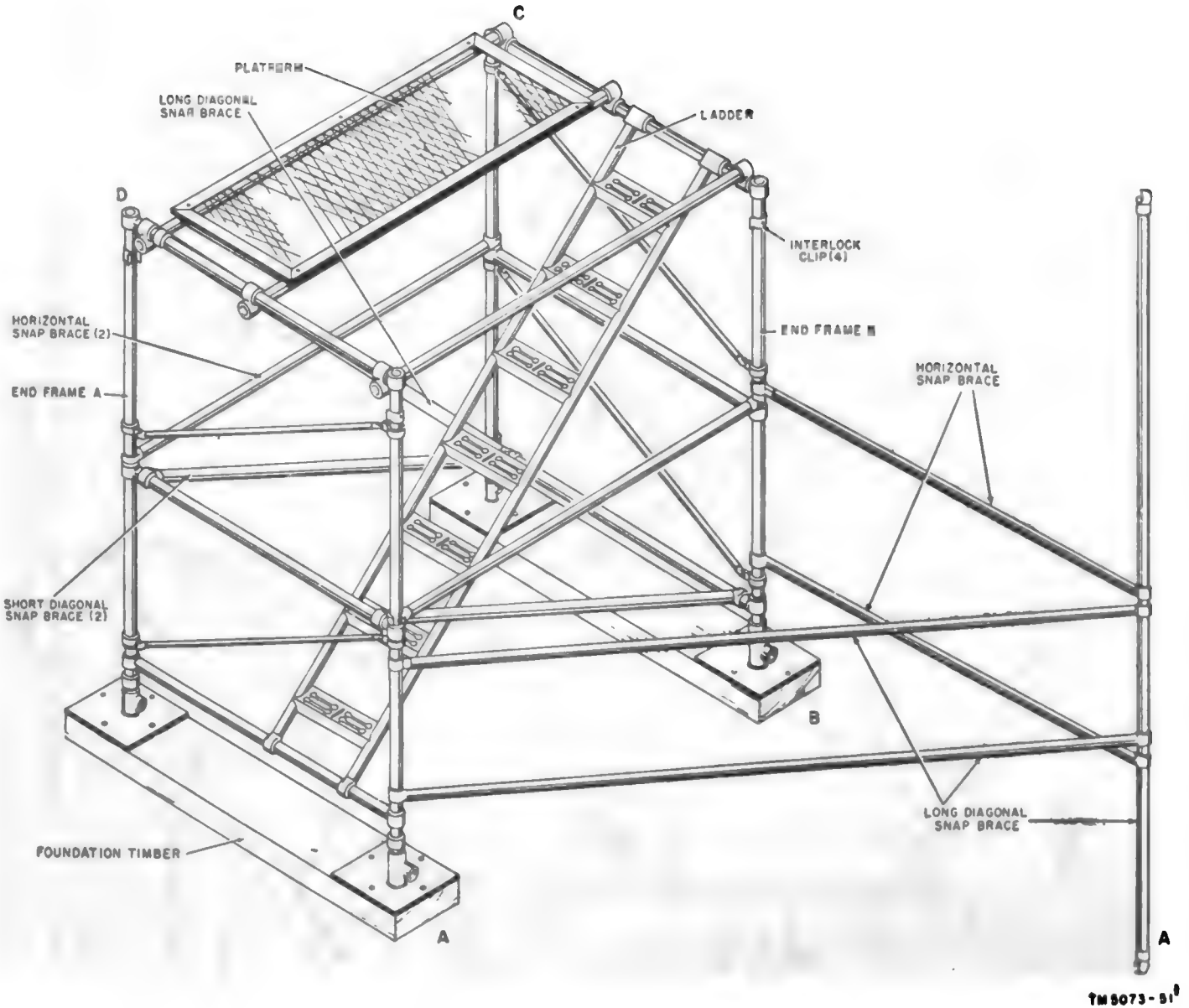


Figure 6. Tower Section AB-208/U with triangular frame attached.

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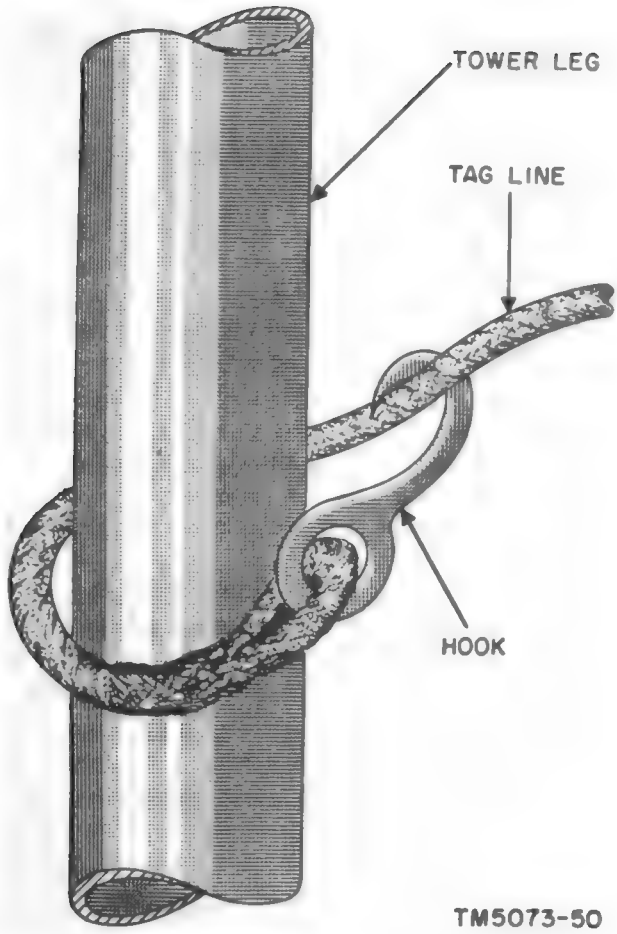


Figure 7. Method of attaching tag line to tower leg when laying out anchor locations.

possible. Pass the hook end of the line around the vertical member and hook the line to itself (fig. 7).

(5) Stretch the tag line along the ground, away from point A, in a straight line that continues line A¹A (fig. 8). Sight along the long diagonal snap brace A¹A (fig. 6) and position the tag line until it is exactly in line with diagonal A¹A. The angle formed by the tag line and side AD of Tower Section AB–208/U will be 45°.

(6) With the 100-foot steel tape, measure along the tag line from point A. At the locations indicated in the chart below, drive stakes (not supplied) to mark the anchor locations. Figure 8 shows the relative position of all the anchors with respect to Tower Section AB–208/U.

Tower height (ft)	1st anchor group	2d anchor group	3d anchor group	4th anchor group
204	54 ft	108 ft		
78 or 120	54 ft	108 ft	162 ft	
162	54 ft	108 ft	162 ft	198 ft

(7) Disassemble the triangular frame and repeat the procedures described in (1) through (6) above, except: attach the horizontal snap braces to vertical member A and attach the long diagonal snap braces to vertical member B. Attach the tag line to vertical member B as shown in figure 7. Sight along diagonal snap brace B¹B and position the tag line until it is exactly in line with diagonal B¹B (fig. 8). Measure along the tag line away from point B and drive stakes at the anchor locations indicated in the chart in (6) above.

(8) Disassemble the triangular frame and repeat the procedures described in (1) through (6) above, except: attach the horizontal snap braces to vertical member C and attach the long diagonal snap braces to vertical member D. Attach the tag line to vertical member D as shown in figure 7. Sight along diagonal snap brace D¹D and position the tag line until it is exactly in line with diagonal D¹D (fig. 8). Measure along the tag line away from point D and drive stakes at the anchor locations indicated in the chart in (6) above.

(9) Disassemble the triangular frame and repeat the procedures described in (1) through (6) above, except: attach the horizontal snap braces to vertical member D and attach the long diagonal snap braces to vertical member C. Attach the tag line to vertical member C as shown in figure 7. Sight along diagonal snap brace C¹C and position the tag line until it is exactly in line with diagonal C¹C (fig. 8). Measure along the tag line away from point C and drive stakes at the anchor locations indicated in the chart in (6) above.

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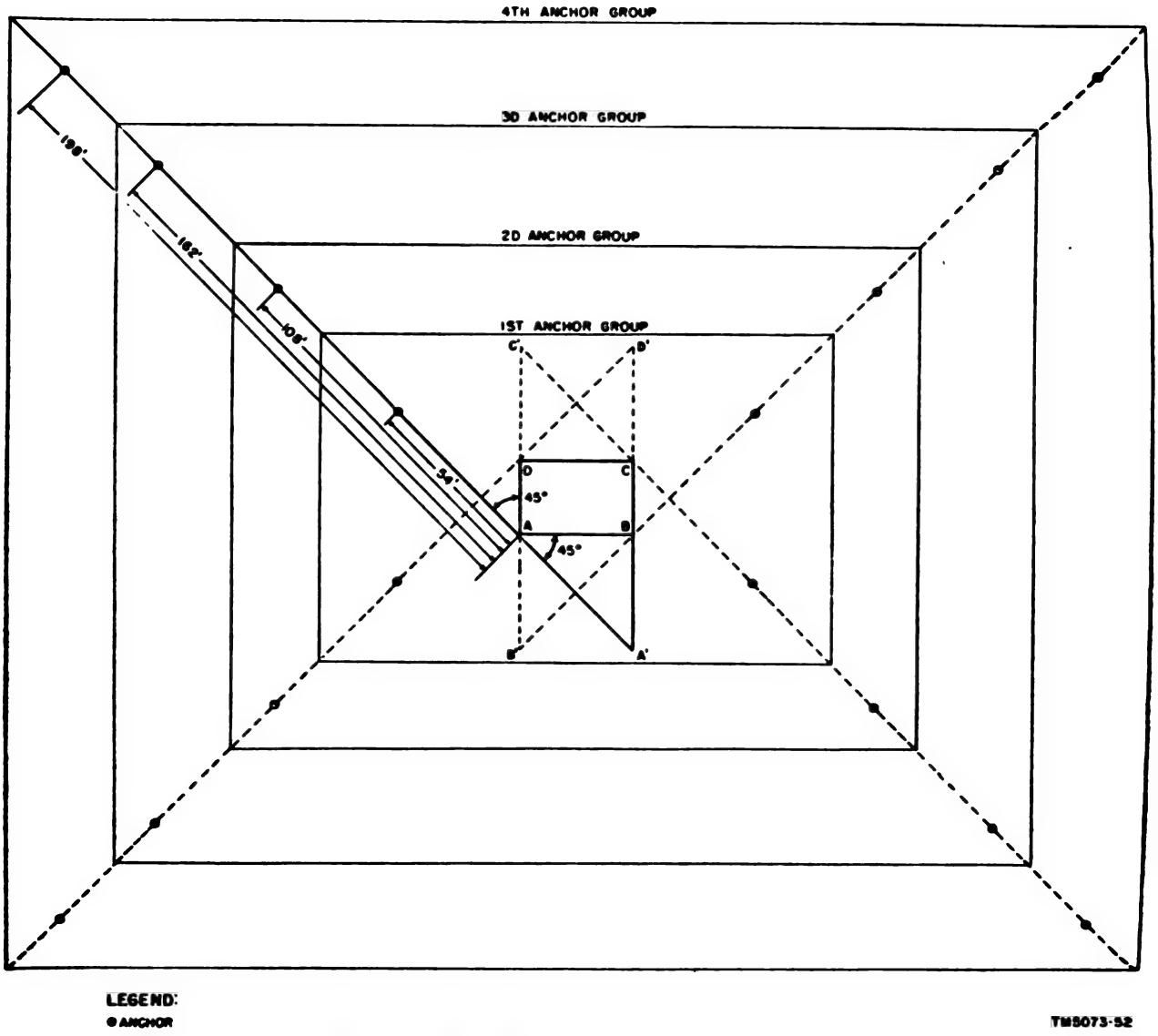


Figure 8. Determining locations for guy anchors.

22. Anchor Considerations

a. The success or failure of the tower installation depends to a large extent upon the effectiveness of the anchoring arrangement used. A slipshod or careless anchor installation can cause complete loss of the tower, serious injury to personnel, and loss of the equipment mounted on the tower. The holding power of an anchor is determined by the strength of the anchor material and by the type and condition of the soil in which it is installed. Since the physical strength of the anchor material far exceeds the maximum load that will be placed upon it by the tower, the effectiveness of the anchor arrangement is limited only by the type and condition of the soil. Each tower installation requires an anchoring arrangement that is tailored to the particular soil condition encountered in its area.

b. Two types of anchors are supplied with Tower AB–216/U and its associated kits. Early orders contain screw-type Guy Anchor MX–1202/U (fig. 9), later orders contain a plate-type anchor (fig. 13). If the screw-type anchor is used, one anchor at each anchor location will give sufficient holding power to secure the tower in Class 3 or 4 soils (*c*(1) below). Installations in Class 5, 6 or 7 soils require the use of two

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screw-type anchors at each anchoring location. If the plate-type anchor is used, one anchor will give sufficient holding power in Classes 3 through 7 soils. Installations in Class 1, 2, or 8 soils are to be avoided as they require the use of special tools, equipment and procedures that are beyond the scope of this manual.

c. To determine the type of soil present in a particular area, use a shovel or a power digger and dig at least one test hole in the vicinity of the outermost anchor in each anchor lane to a depth of approximately 6 feet. Examine the subsoil and classify it according to the description given in the chart below. If the tower is being installed in an area subject to radical changes in weather that will affect the soil, be sure to consider this when planning the anchor installation. Use the anchor arrangement indicated in the chart opposite the soil classification for all anchors installed in that lane.

(1) The following chart lists the soil classifications:

Class	Type	Description	Anchor arrangement
1	Solid hard rock--		Special anchoring required. Refer to TM 11-2262, Open Wire Pole Line Construction and Maintenance.
2	Shale, sandstone, or soft rock (solid or in layers).		Special anchoring required. Refer to TM 11-2262, Open Wire Pole Line Construction and Maintenance.
3	Hard pan-------	Hard and dry, requires the use of a digging bar or pick mattock to break the ground.	One screw or plate type anchor at each anchor location (par. 23*a*(1) or par. 24).
4	Crumbling, damp	Consists principally of clay, in a state that will crumble when an attempt is made to squeeze it into a ball with the hand.	One screw or plate type anchor at each anchor location (par. 23*a*(1) or par. 24).
5	Firm, moist-----	In many cases, clay is predominent although the coil may contain small stones, gravel, or sand and when squeezed with the hand, it will form a firm ball. Most soils in well-drained areas, other than hillsides, fall into this classification.	Two screw or one plate type anchor at each anchor location (par. 23*a*(2) or par. 24).
6	Plastic, wet-----	In most cases, this soil is predominantly clay as in Class 5. Because of unfavorable moisture conditions, such as areas subjected to heavy seasonal rainfall, sufficient water is present to penetrate the soil to a considerable depth, even though the area may be fairly well drained. During such seasons the soil becomes "plastic" and, when squeezed in the hand will readily assume any shape into which it is molded. This soil is frequently found in flat terrains, or near rivers and marshes.	Two screw anchors at each anchor location (par. 23*a* (2)) or one plate type (par. 24).
7	Loose, dry------	Usually found in arid regions where sand or gravel predominate. Filled-in or built-up areas in dry regions, or during very dry seasons, fall into this classification. Lack of bonding material to hold the particles together causes the soil to remain very loose.	Two screw anchors at each anchor location (par. 23*a*-(2)) or one plate type (par. 24).
	Loose, wet------	Same as loose dry for holding power, although it contains considerable sand, gravel, loam, silt, or very wet clay. In general, this soil resembles mud, and free water will usually drain into an anchor hole while it is being dug. Holding power in favorable seasons may approach Class 5 but, due to the porosity of the soil, it absorbs excessive moisture during rainy seasons, or high tides, with a resultant loss of holding power. This soil is found extensively in poorly drained areas, and in areas where there is no drainage although the subsoil may be entirely of clay. This class also includes very soft, wet clay.	Two screw anchors at each anchor location (par. 23*a* (2)) or one plate type (par. 24).

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Class	Type	Description	Anchor arrangement
8	Swamps and marshes.		Special anchoring required. Refer to TM 11-2262.

(2) The following chart lists the anchor holding strength for screw and plate type anchors. The values are based on the anchor being installed so that not more than 6 inches of the anchor rod is exposed.

Anchor	Anchor size (in.)	Area (sq in.)	Rod size (in.)	Length (in.)	Class 3	Class 4	Class 5	Class 6	Class 7
Screw type (single anchor).	10	78.5	1¼	66	15,000	10,000	Use double anchor	Use double anchor	Use double anchor
Screw type (double anchor).	10	157	1¼	66	Use single anchor	Use single anchor	20,000	16,000	14,000
Plate type----	8 x 35	280	1	96	35,000	30,000	23,000	18,000	12,500

23. Installation of Guy Anchor MX-1202/U

The screw-type guy anchor supplied with the tower may be installed manually or by use of the power digging equipment mounted on Truck V-18A/MTQ. When only one anchor is to be installed at an anchor location, the eye of the anchor should point toward the vertical member of the tower section that is to receive the guys that will be attached to the anchor. When two anchors are to be installed at an anchor location (fig. 10), the apex of the angle formed by the converging anchor eyes should point toward the vertical member of the tower section that is to receive the guys that will be attached to the anchor. Install the anchors as follows:

a. Manually (fig. 9).

(1) *Single anchor.*

(*a*) Remove the stake that marks the anchor location (par. 21).

(*b*) With the digging bar or shovel, dig a pilot hole about 6 inches deep and 12 inches in diameter, to aid in starting the anchor (A, fig. 9).

(*c*) Start the anchor into the ground at the point where the stake was in the ground (B, fig. 9).

(*d*) Insert the digging bar through the eye of the anchor rod and rotate the anchor clockwise; start the anchor into the ground in a near vertical position. As the anchor begins to bite into the earth, it should be gradually leaned until the rod is at a 45° angle to the ground surface (C, fig. 9).

(*e*) Screw the anchor into the ground until the top of the eye is not more than 4 inches above the ground surface (D, fig. 9).

(2) *Double anchor.*

(*a*) Remove the stake that marks the anchor location (par. 21).

(*b*) With the digging bar or shovel, dig a pilot hole about 6 inches deep and about 12 inches in diameter to start the anchors into the ground (A, fig. 9).

(*c*) Start one anchor into the ground at the point where the stake was in the ground (B, fig. 9).

(*d*) Insert the digging bar through the eye of the anchor rod and rotate the anchor clockwise; start the anchor into the ground in a near vertical position (B, fig. 9). As the anchor begins to bite into the ground, continue turning the anchor rod and gradually lean the rod until it is en-

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tering the ground at an angle of 15° to the row of anchor locating stakes and at an angle of 45° to the ground surface (fig. 10).

(*e*) Screw the anchor into the ground until the top of the eye is about 6 inches above the ground surface (fig. 10).

(*f*) To install the second anchor, repeat the steps in (*c*) through (*e*) above. Be sure that the eyes of both anchors converge over the point where the anchor locating stake was installed and that the second anchor is at a 30° angle to the first (fig. 10).

(*g*) Use an insulator clevis and connect both anchor eyes together. If the anchor eyes lack a few inches of being close enough to be fastened together by an insulator clevis, use Guy MX–1382/U or the digging bar and force the anchors together. If the distance between the anchor eyes is such that forcing them together would bend the anchor rod, remove one anchor and reinstall it, so that the eyes are closer together.

(*h*) Tamp the earth around the anchor rods.

b. Using Truck V–18A/MTQ. The earth boring equipment on Truck V-18A/MTQ can be adapted and used to install screw-type anchors. Figure 11 shows the anchor rod adapter attached to the rack shaft of Truck V-18A/MTQ. Figure 12 shows the anchor being installed with the anchor rod adapter and the boring equipment. To install the anchors, proceed as follows:

(1) *Single anchor.*

(*a*) Remove the stake that marks the anchor location (par. 21).

(*b*) To aid in starting the anchor (A, fig. 9), dig a pilot hole about 6 inches deep and 12 inches in diameter with the digging bar or shovel.

(*c*) Install the anchor rod adapter on the rack shaft of the truck and insert the end of the anchor rod into the adapter (app. I, TM 11–2262).

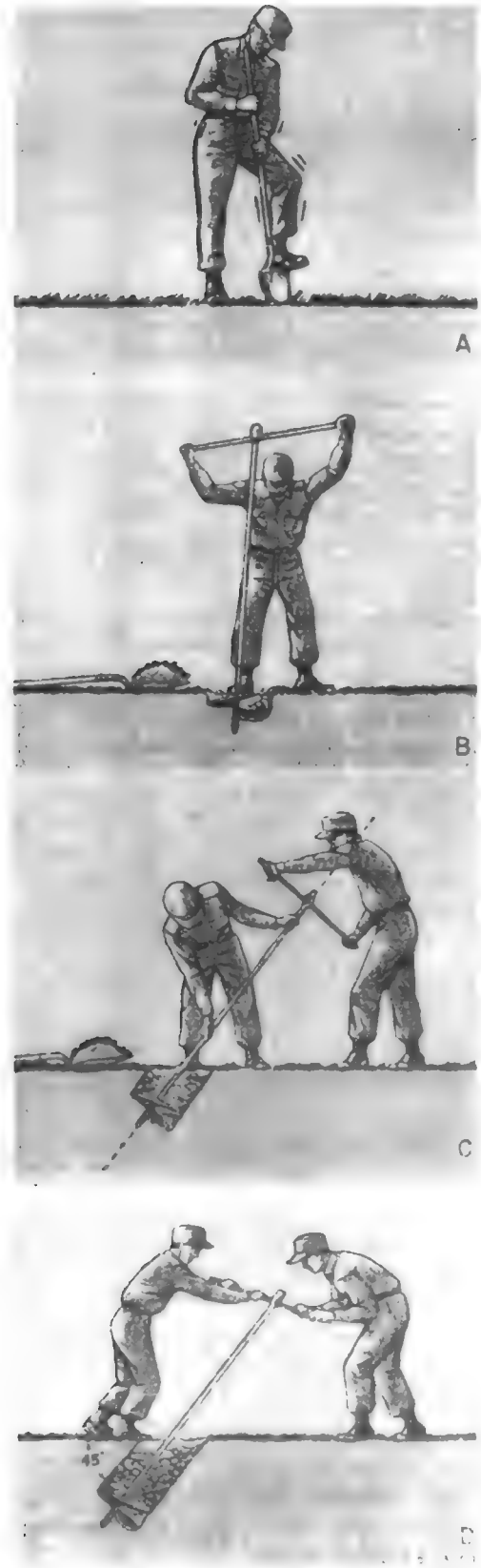


Figure 9. Manual installation of Guy Anchor MX–1202/U.

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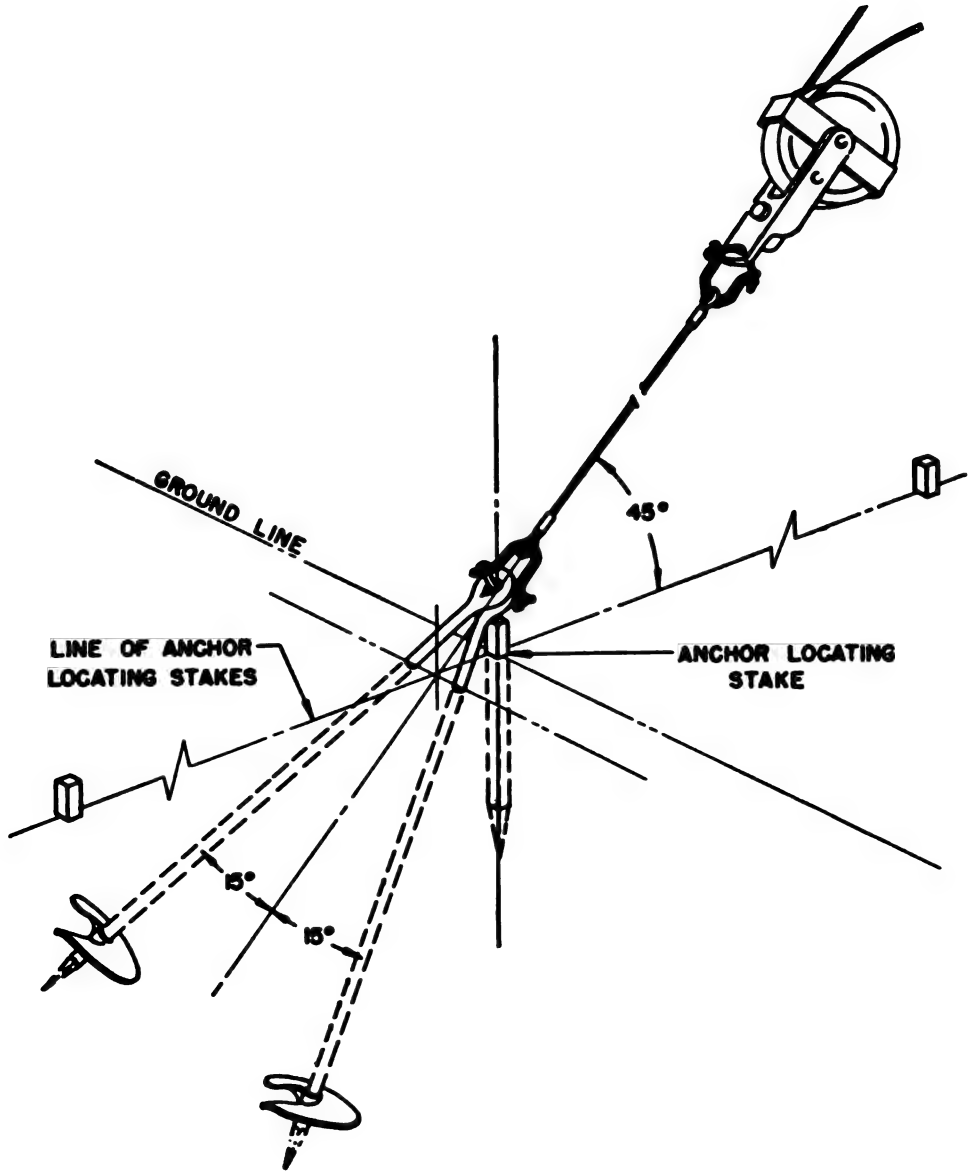


Figure 10. Installation of two screw-type anchors.

(*d*) Position the derrick on the truck so that the anchor rod forms an angle of 45° with the ground surface (app. I, TM 11–2262).

(*e*) Position the truck so that the tip of the anchor points at the exact place that the anchor is to be installed. Be sure that the eye of the anchor points toward the vertical members of the tower section that is to receive the guy that will be attached to the anchor.

(*f*) Screw the anchor into the ground (app. I, TM 11–2262) until the anchor eye is not more than 4 inches above the ground surface.

(*g*) Remove the anchor rod from the anchor rod adapter (app. I, TM 11–2262).

(*h*) Tamp the earth around the anchor rod.

(2) *Double anchor* (fig. 10).

(*a*) Install the anchor rod adapter (fig. 11) on the rack shaft of Truck V–

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18A/MTQ and insert the end of the anchor rod into the adapter (app. I, TM 11–2262).

(*b*) Position the derrick (app. I, TM 11–2262) until the anchor forms an angle of 45° with the ground surface.

(*c*) Position the truck so that the anchor rod forms an angle of 15° with the row of anchor locating stakes (fig. 10).

(*d*) With the digging bar or shovel, dig a pilot hole about 6 inches deep and about 12 inches in diameter at the point where the anchor will enter the ground.

(*e*) Screw the anchor into the ground until the anchor eye is just over the place where the anchor locating stake was located.

(*f*) Repeat (*b*) through (*e*) above and install the second anchor at a 30° angle to the first. Be sure that the eyes of both anchor rods converge over the point where the anchor locating stake was installed.

(*g*) Use an insulator clevis and connect both anchor eyes together. If the anchor eyes lack a few inches of being close enough to be fastened together by an insulator clevis, use Guy MX–1382/U or the digging bar and force the anchors together. If the distance between the anchor eyes is such that forcing them together would bend the anchor rod, remove one anchor and reinstall it, so that the eyes are closer together.

(*h*) Tamp the earth around the anchor rods.

24. Installation of Plate-Type Anchor (Fig. 13)

The plate-type anchor supplied with some orders of Tower AB–216/U is more efficient than Guy Anchor MX–1202/U (par. 23), because it pulls entirely against solid, undisturbed

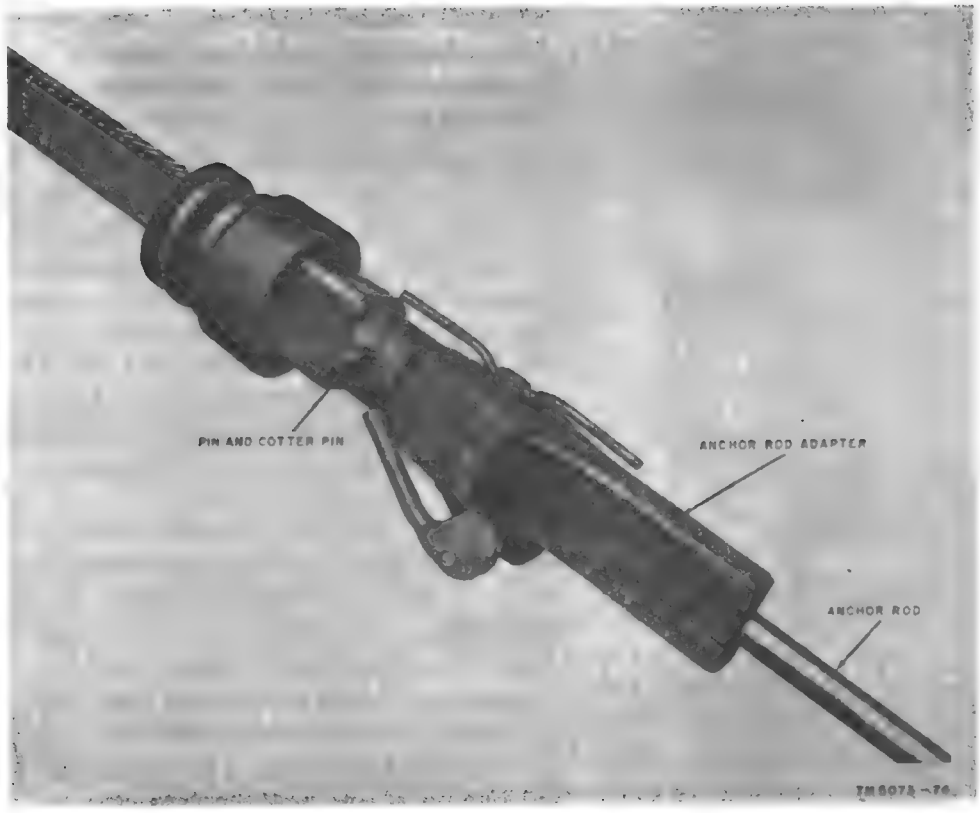


Figure 11. Anchor rod adapter attached to rack shaft, Truck V–18A/MTQ.

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earth. One plate-type anchor provides satisfactory holding power for anchor installations in Classes 3 through 7 soils (par. 22). Install the plate-type anchor as follows:

a. Measure back from the anchor locating stake (fig. 8) on the line of anchor locating stakes 1¼ times the anchor rod length (10 feet) (A, fig. 13). This will locate the near edge of the hole.

b. Use the power digging equipment on Truck V–18/MTQ or the hand auger supplied with the anchors and bore a hole approximately 12 inches in diameter to a depth of 10 feet (A, fig. 13).

c. Drop the installing bar into the hole to serve as a marker for locating the anchor rod (B, fig. 13).

d. Remove the anchor locating stake and position the anchor rod so that it forms an angle of 45° with the ground surface and points toward the vertical member of the tower section that is to receive the guy that is to be attached to it. Use the maul and drive the anchor rod into the ground until the pointed end protrudes through the side of the hole (B, fig. 13).

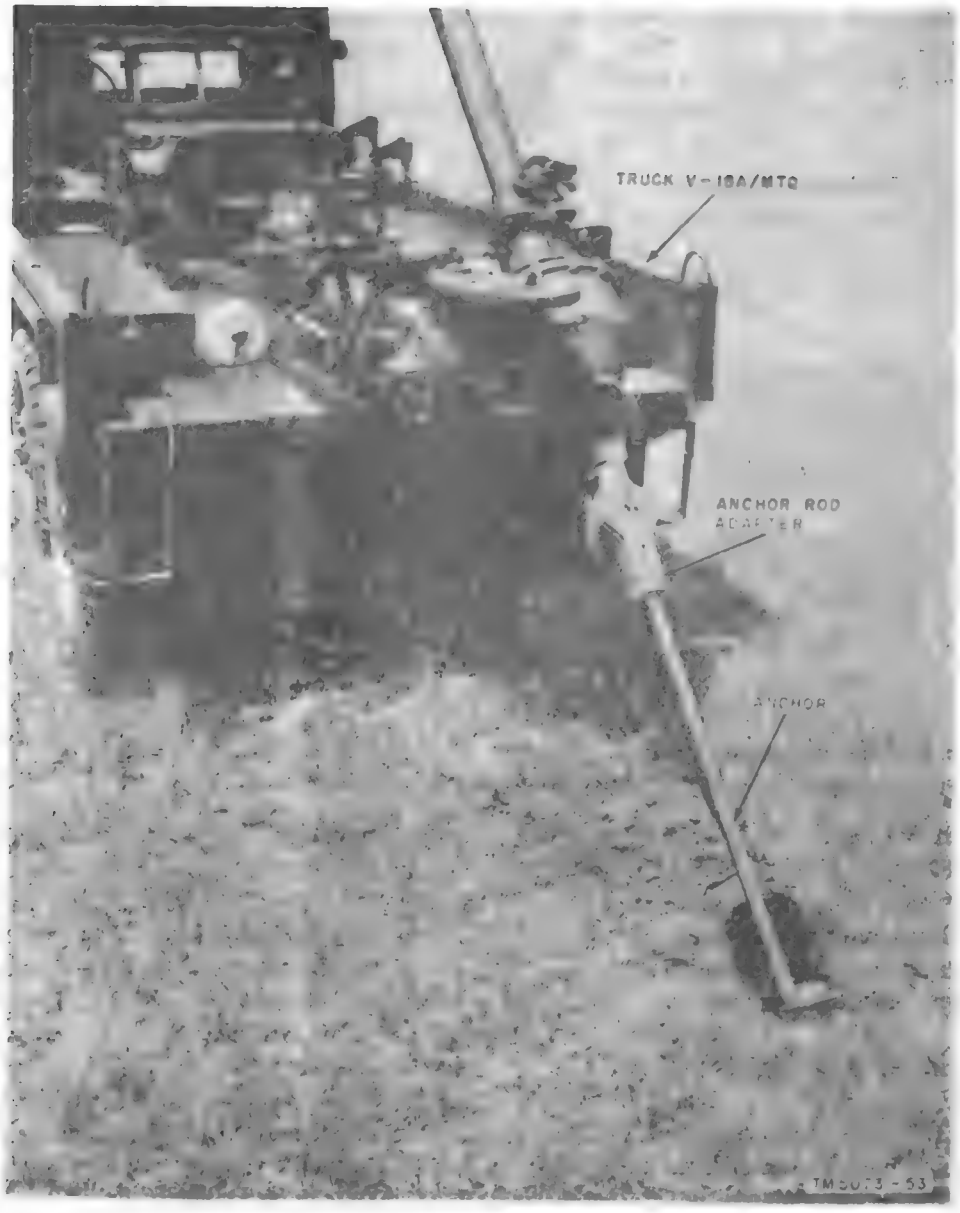


Figure 12. Truck V–18A/MTQ, using boring machine to set anchor.

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e. Use the installing bar and hang the anchor plate on the end of the anchor rod so that the spearhead of the anchor rod is fully seated in the rod lock socket of the anchor plate (C, fig. 13). Remove the installing bar.

f. Attach a cable or guy rope to the anchor rod and pull the anchor rod until the anchor plate is against the top face of the hole (D, fig. 13).

g. Pull the end of the retrieving cable up out of the hole and fill the hole (E, fig. 13). Bury the end of the retrieving cable just below the surface of the ground.

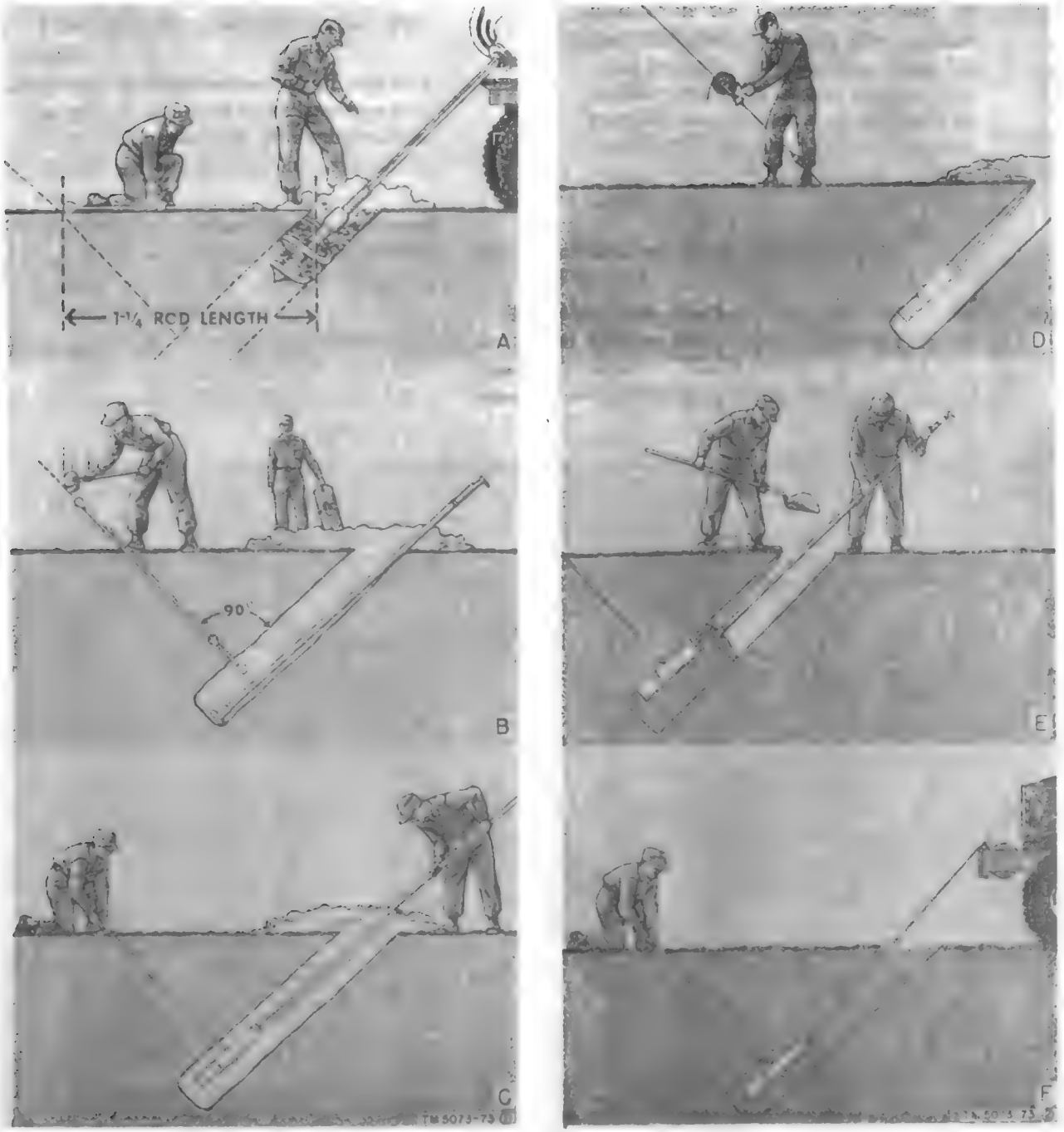


Figure 13. Installation of plate-type anchor.

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25. Assembly and Installation of Tower Erection Davit MX–1215/U

Tower Erection Davit MX–1215/U can be adapted either for normal lifting operations (0 to 200 pounds) or for heavy-duty lifting operations (200 to 500 pounds). The assembly and installation procedures for normal lifting operations are described in *a* below. The assembly and installation procedures for heavy-duty lifting operations are described in *b* below.

a. Normal Lifting (0 to 200 Pounds). Assemble and install Tower Erection Davit MX–1215/U for normal lifting as follows:

(1) *Assembly* (fig. 14).

(*a*) Raise the boom arm until it is perpendicular to the double support tube.

(*b*) Secure the boom arm cable to the top of the double tube assembly.

(*c*) Remove the interlock clip in the boom arm assembly and adjust the boom arm to the outer position. Replace the interlock clip.

(*d*) Insert the hoist line in the three rope guides of the davit so that the hook at the end of the line is suspended from the outer end of the boom arm.

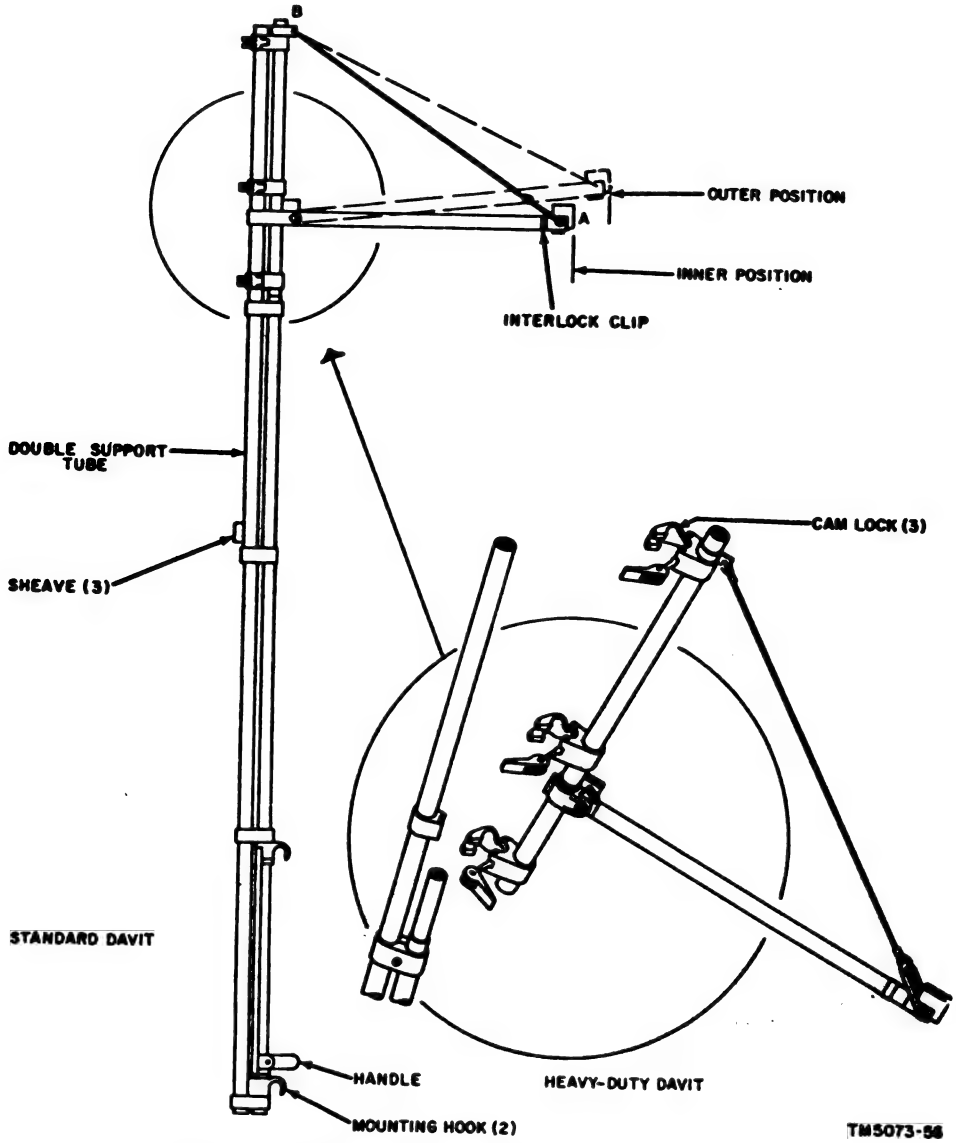


Figure 14. Assembly of Tower Erection Davit MX–1215/U.

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(e) Pull the rope through the guides until the hook overhangs the rope guide at the outer end of the boom arm by approximately 12 feet.

(2) *Installation.* Install the davit on the top and intermediate horizontal members of the end frame, behind and to the left of the ladder (fig. 15).

(a) Lean the assembled davit against the tower section in a near vertical position, close to where it is to be mounted.

(b) While one man steadies the davit, a second man positions himself on the platform of the tower section facing the davit.

(c) When both men are in position, lift the davit assembly and aline it, so that, the upper and lower mounting hooks of the davit are above the two locating pins on the top and intermediate horizontal members of the end frame (fig. 15).

(d) Lower the davit until the mounting hooks engage the horizontal members between the locating pins as shown in figure 15, and D, figure 25.

b. Heavy-Duty Lifting (200 to 500 Pounds).

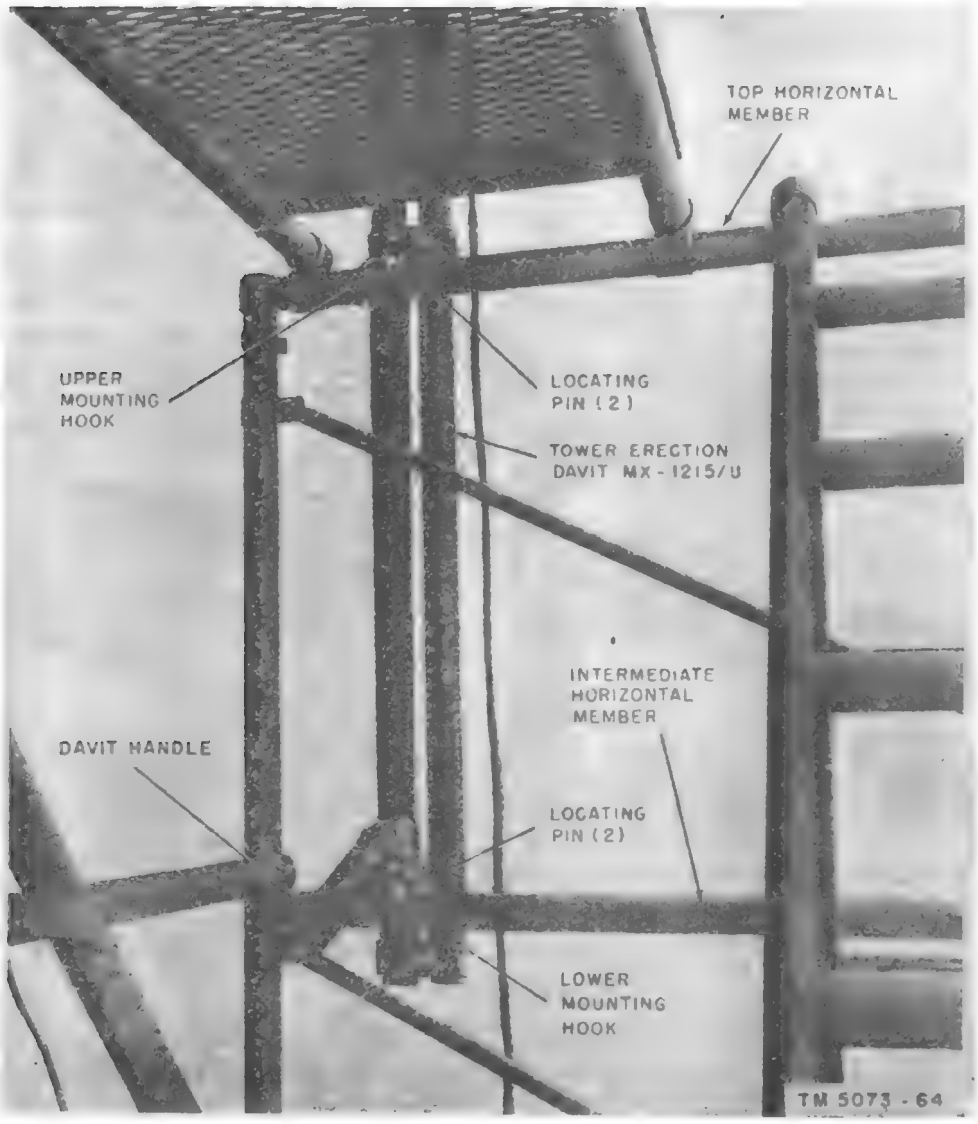


Figure 15. Normal davit installation, showing mounting hooks and locating pins.

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To adapt the normal davit installation for heavy-duty operation, proceed as follows:

(1) Release the three cam locks (fig. 14) that attach the tube supporting the boom arm to the remainder of the davit.

(2) Remove the hoist line from the rope guide on the lower portion of the davit.

(3) Remove the interlock clip in the boom arm assembly and adjust the boom arm to the inner position. Replace the interlock clip.

(4) Clamp the upper portion of the davit to the vertical member of the tower section closest to the top of the ladder (fig. 22) or to the vertical member diagonally opposite. Be sure that one of the cam locks is placed directly above a welded fitting to prevent the

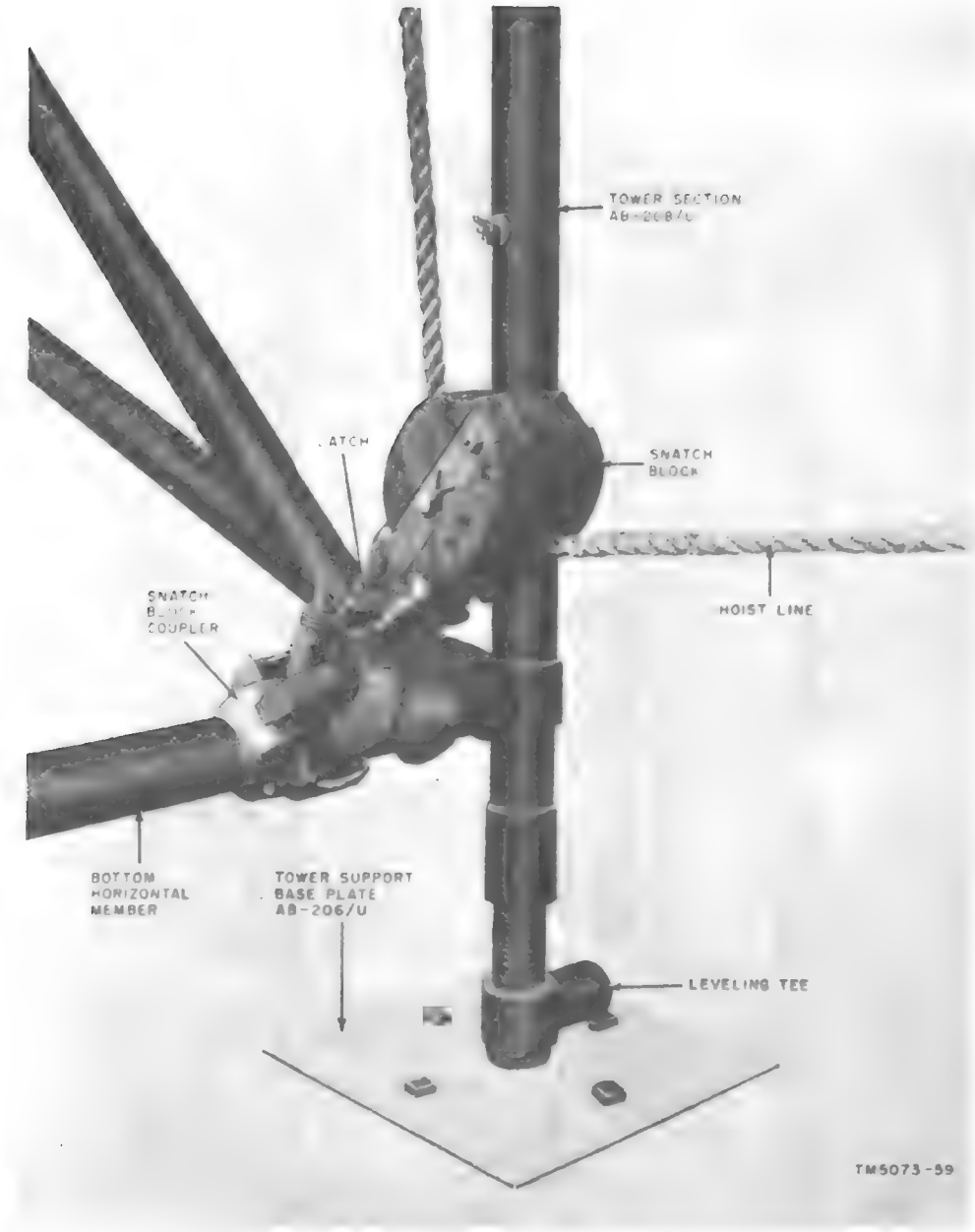


Figure 16. Installation of snatch block and snatch block coupler.

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davit from slipping when the load is attached.

26. Installation of Snatch Block and Coupler (Fig. 16)

Install the snatch block and coupler on Tower Section AB–208/U as follows:

a. Place the snatch block coupler on the bottom horizontal member of Tower Section AB–208/U. *Do not* tighten the clamping nut.

b. Insert the hook of the snatch block into the coupler and slide the assembly along the bottom horizontal member until it is directly beneath the davit (fig. 18).

c. Release the latch on the side of the snatch block, and place the hoist line on the sheave. Restore the latch.

d. Pull the hoist line in the direction and at the angle that will be used when the tower sections are being raised. This will cause the coupler to shift position until it aligns itself with the snatch block.

e. Tighten the clamping nut on the coupler.

f. As a safety measure, the hook of the snatch block should be *moused* to prevent the hook from falling off the coupler. To mouse the hook, wrap 8 to 10 turns of wire or heavy twine around the two sides of the hook (A, fig. 17). Finish off the mousing by wrapping several turns around the sides of the mousing and tie the ends securely (B, fig. 17).

27. Recommended Methods of Raising Tower Sections

The method used to raise tower sections or other loads depends on the number of personnel and the equipment available at the installation site. Two recommended methods (*a* and *b* below) and an alternate method (par. 28) are described.

a. Manually (fig. 18). This method requires an installation crew of from seven to nine men depending on the number required to pull the hoist line. The crew should be employed as follows: two men to work in the tower positioning and securing tower sections; four to six men to pull the hoist line to raise the tower sections; and one man to work the tag line. After a tower section is raised and positioned, the men used to pull the hoist line assist in assembling tower sections and attaching and tensioning guys as required.

b. Using Vehicle. The most efficient means of raising the tower sections is to use a vehicle. When a vehicle is used, an installation crew of at least five men is required. The crew should be employed as follows: two men to work in the tower positioning and securing tower sections; one man to work the tag line; one man to operate the truck controls; and one man to guide the truck. After a tower section is raised and positioned, the men working on the ground assemble tower sections and attach and tension guys as required.

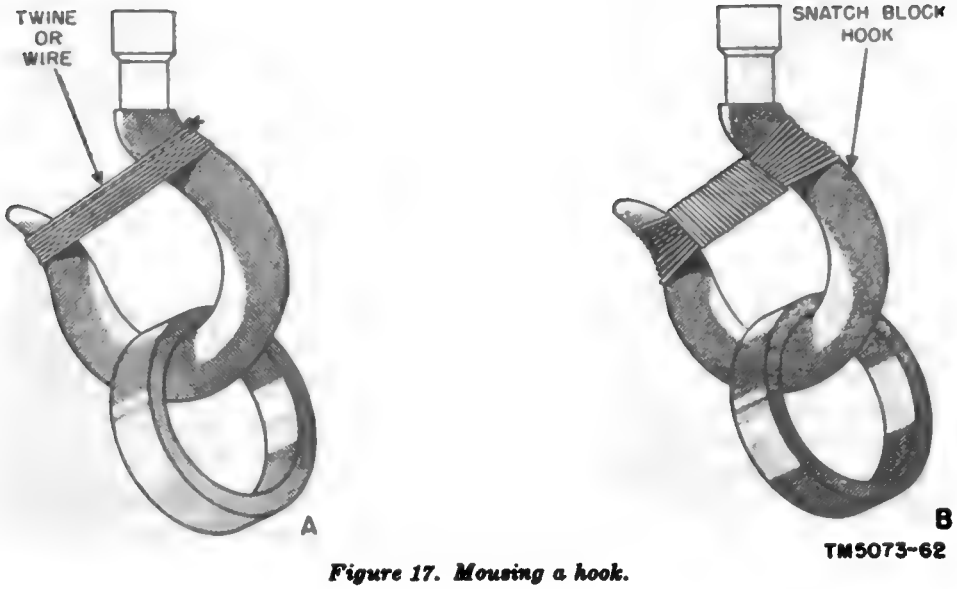


Figure 17. Mousing a hook.

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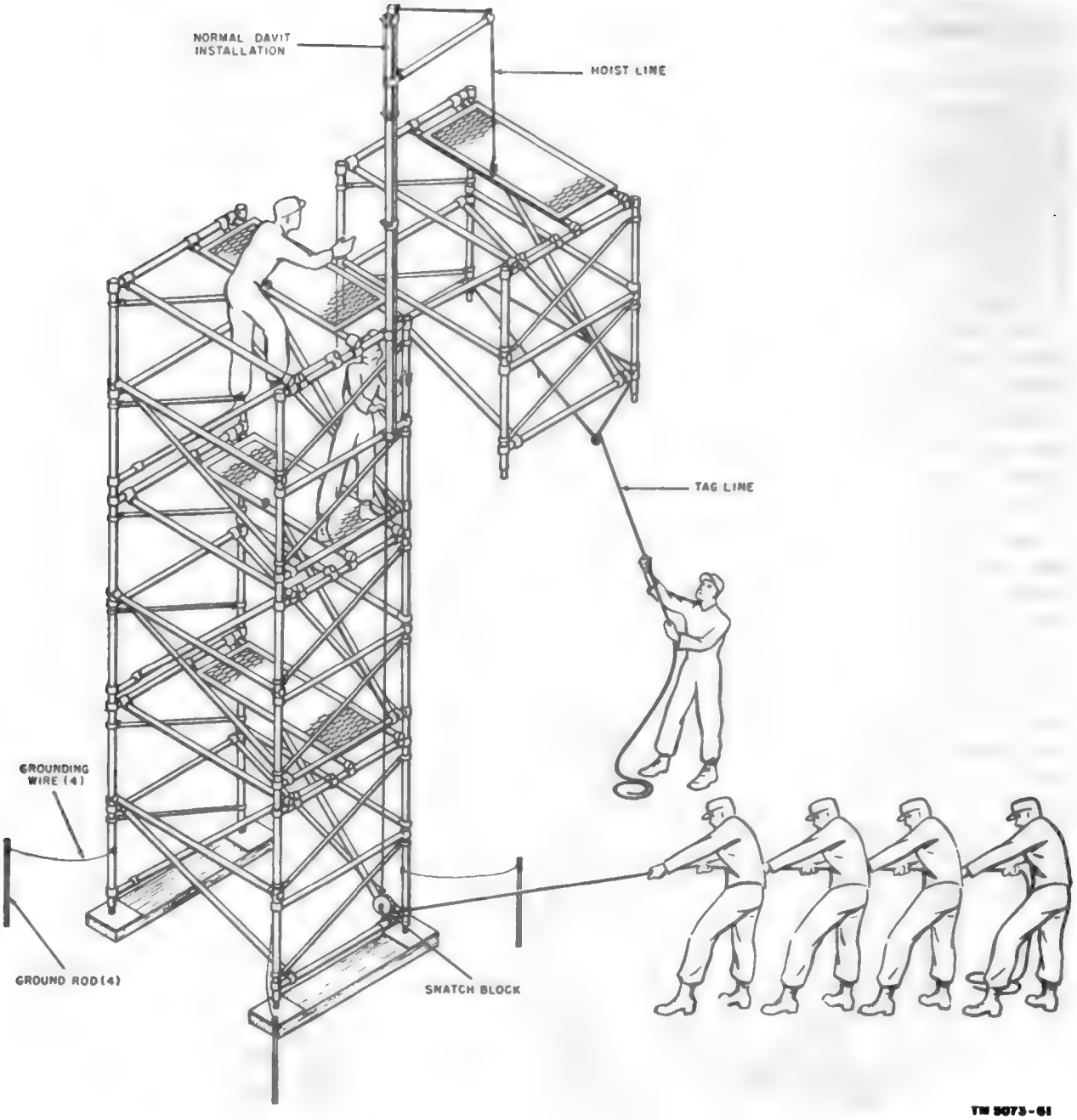


Figure 18. Raising tower sections manually.

(1) *Using towing rings on 2½, ¾ or ¼ ton trucks.*

(*a*) Position the vehicle so that one of the towing rings on the bumper is in line with the snatch block mounted on Tower Section AB–208/U.

(*b*) Tie the free end of the hoist line as it comes from the snatch block to the towing rings on the bumper of the truck. Use a round turn and two half hitches (fig. 19).

(*c*) Attach the hook end of the hoist line to the load and move the truck forward or backward to raise or lower the load.

(2) *Using power reel or capstan of Truck*

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Figure 19. Hoist line tied to towering rings on truck.

V–18A/MTQ or Truck V–17A/MTQ. (fig. 20).

Note. Although the procedures described below refer specifically to the power reel, the procedures for the use of the capstan are the same except as noted.

(*a*) Remove the power reel from its mounting on the truck (App. I and II, TM 11–2262).

(*b*) Slide the hub of the power reel over the end of the power reel shaft; rotate the power reel counterclockwise until the pin in the power reel shaft engages the notch at the end of the L-shaped keyway in the reel hub.

(*c*) Position the truck so that the power reel is in line with the hoist line as it leaves the snatch block.

(*d*) Place the TRANSFER CASE lever in the NEUTRAL position and operate the truck engine at idling speed.

(*e*) Disengage the truck clutch and place the POWER TAKEOFF lever in the ENGAGED position; place the REAR WINCH clutch lever in NEUTRAL position; and place the POWER DIVIDER lever in the REAR WINCH FOR. position (Truck V–18A/MTQ only). The power reel should revolve in a clockwise direction as viewed from a position facing the end of the power reel shaft. *Never attempt to reverse the direction of the power reel.*

(*f*) Wrap sufficient turns of the hoist line in a clockwise direction around the power reel or capstan to provide the necessary friction to raise the load (fig. 20). Have one man apply a steady tension on the free end of the hoist line as it comes off the power reel. The window on the curbside of the truck should be open so that the man applying tension to the hoist line may give directions to the truck driver.

(*g*) When the load is ready to be moved, depress the truck clutch; place the TRANSMISSION lever in second speed forward position when the

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power reel is used or in fifth speed when the capstan is used. Slowly engage the truck clutch.

(*h*) The power reel must be stopped instantly when the tower section is just high enough to be moved horizontally into position. To stop the power reel, the driver must disengage the truck clutch and move the TRANSMISSION LEVER to the NEUTRAL position. The driver of the truck must be alert during the lifting operation to do this quickly.

(*i*) After the tower section is raised and positioned over the previously installed tower section, the man applying tension to the hoist line, slowly slacks off on the hoist line and using the power reel as a snubber, allows the load to slip until the vertical members of the tower sections can be engaged.

Warning: Keep feet free of hoist line at all times when lowering loads with the capstan or power reel.

(*j*) After the tower section is secured in place, remove the turns of hoist line that are wrapped around the power reel. Have one of the men in the tower attach the hook end of the line to the tag line and pull the hook end of the hoist line down to ground level.

28. Alternate Method of Raising Tower Sections

When it is not possible to use either of the recommended methods (par. 27) because of shortages of equipment or personnel, Capstan E–12/U may be used to raise tower sections or antennas. To use the capstan, proceed as follows:

a. Installation of Capstan E–12/U.

(1) Position the capstan (fig. 21) on the vertical member of the end frame of Tower Section AB–208/U behind the ladder. The capstan drum should face away from the narrow side of the tower section (fig. 22) and the clamps should straddle the welded fittings that secure the intermediate horizontal and the short diagonal members of the end frame (A, fig. 23). The horizontal snap brace on the wide side of the tower section adjacent to it must be raised approximately 4 inches.

(2) Use the ratchet wrench and tighten the clamping nuts.

b. Raising Loads. The capstan may be used to raise loads ranging from 0 to 500 pounds in three gear ranges. The lower stud on the capstan (fig. 21) is for the high gear ratio (0 to 100 pounds), the middle stud is for the intermediate gear ratio (100 to 250 pounds), and the top gear stud is for the low gear ratio (250 to 500 pounds). To raise loads with the capstan, proceed as follows:

(1) Take the hoist line as it comes from the davit and wrap 4 to 6 turns around the drum of the capstan.

(2) Place the handle on the appropriate gear stud and while turning the handle, force the free end of the hoist line between the drag rollers (fig. 23).

(3) Attach the load to the hoist line and turn the handle in a direction to raise the load.

Warning: Never reverse the direction of rotation of the capstan drum.

c. Lowering Loads. The operator must be very careful when lowering loads with the capstan. NEVER REVERSE THE DIRECTION OF ROTATION OF THE CAPSTAN DRUM. The angle of the capstan drum is such that if the direction of rotation is reversed, the hoist line will be forced off the drum and the operator will lose control of the load. To lower loads using the capstan, proceed as follows:

(1) Grasp the free end of the hoist line just below the drag rollers (A, fig. 23); Keep it taut and pull the hoist line free from the drag rollers (B, fig. 23).

Warning: Keep feet free of hoist line at all times when lowering loads with the capstan.

(2) Clamp the right hand tightly around the turns of hoist line on the capstan drum (C, fig. 23). With the left hand,

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Figure 20. Raising tower sections with Truck V-17A/MTQ.

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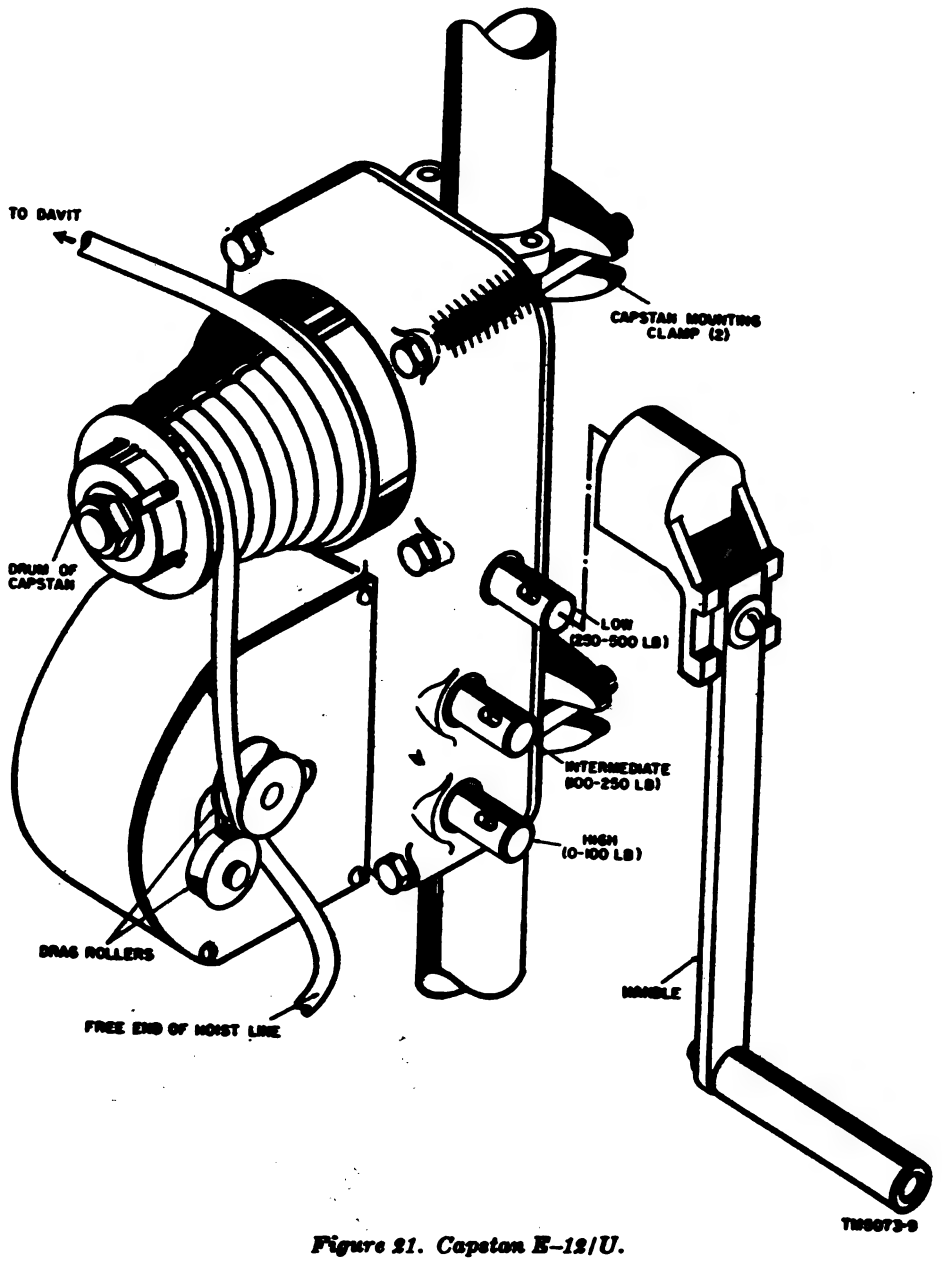


Figure 21. Capstan E–12/U.

remove one turn of rope from the capstan drum (C, fig. 23).

(3) Hold the free end of the rope with both hands and cautiously slack off on the hoist line to see if the line slips on the capstan drum. It it does not slip, repeat the procedure in (2) above and remove additional turns from the capstan drum. Check for slippage after each turn is removed.

(4) When the load begins to slip, slowly pay out the hoist line. When paying out the hoist line, angle the free end toward the tower section (E, fig. 23), to prevent the hoist line from being forced off the end of the capstan drum.

29. Installation of Tower Section AB–207/U

a. Attach the hook on the hoist line to the eyebolt on the platform of an assembled tower section.

b. Loop the tag line around two vertical members on the platform side of the section; place the rope above the first welded fitting and hook

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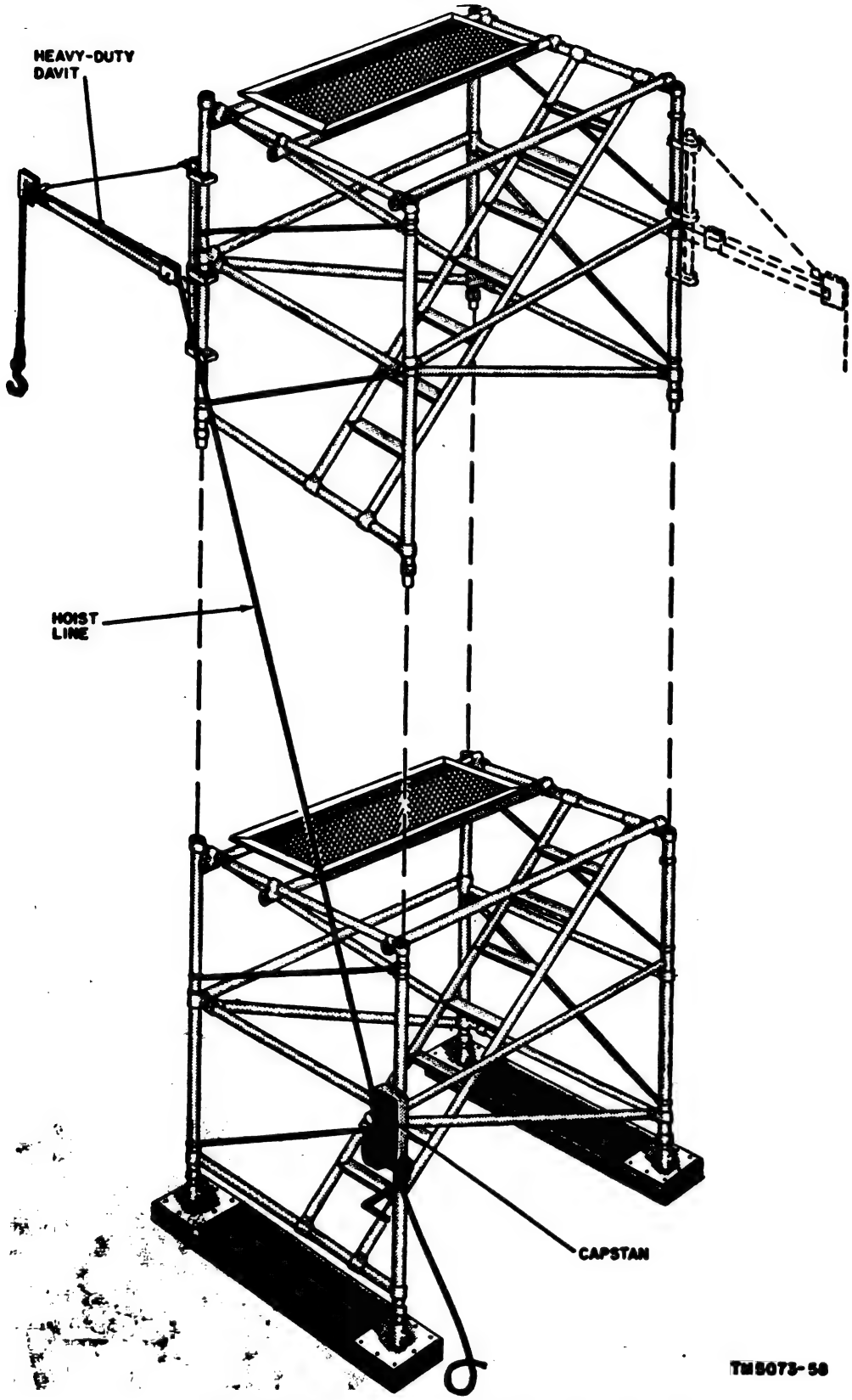


Figure 22. Capstan being used with heavy duty davit.

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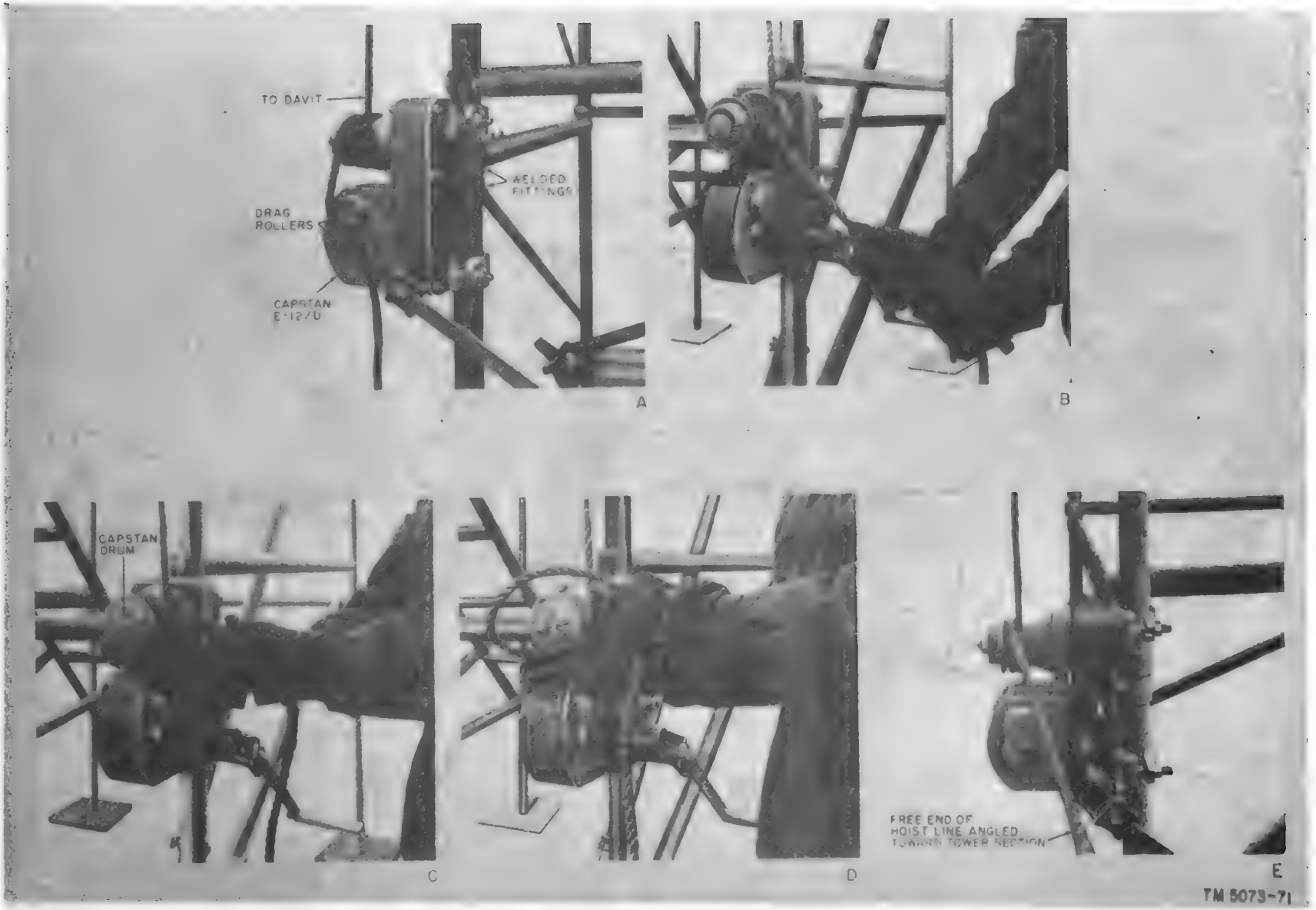


Figure 23. Using Capstan E-12/U to lower loads.

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the line to itself. Use the tag line to control the swinging motion of the tower section as it is being raised (fig. 18).

Caution: Avoid putting more tension on the tag line than is necessary to guide the tower section. Excessive strain on the tag line may cause the davit to fail.

c. Use one of the methods described in paragraph 27 and raise the tower section until it is a few feet above the ground. Thoroughly clean the male fitting on the lower end of each vertical member.

d. Hoist the tower section until it is about 6 inches higher than the previously installed tower section.

Caution: Be careful not to raise the section too high or the hook of the hoist line will jam in the outer sheave of the davit boom arm, and the load will fall.

e. Raise the davit handle to unlock it and slowly and carefully swing the tower section directly over the previously installed tower section. Be sure that the male fittings of the vertical members are in line with the female fittings of the lower section.

f. Lower the tower section. Keep the section level to prevent the male and female fittings on the ends of the vertical members from jamming when they engage.

g. When the tower section is in place, remove the interlock clip (fig. 24) from the storage hole and insert it so that the pin engages the mating holes at the joint formed by the vertical members. The spring collar of the interlock clip will snap onto the vertical member and hold the pin in place.

h. To prevent the tower from toppling over before the first permanent guys are installed, install a temporary rope guy on each corner of the tower.

i. The two men working up in the tower must transfer the davit each time a tower section is installed. To transfer the davit to the next higher section, proceed as follows:

(1) To reduce the weight on the davit while it is being transferred, tie the hook end of the hoist line back to a section of the hoist line that goes up the side of the davit, so that a loop approximately 20 feet long is formed.

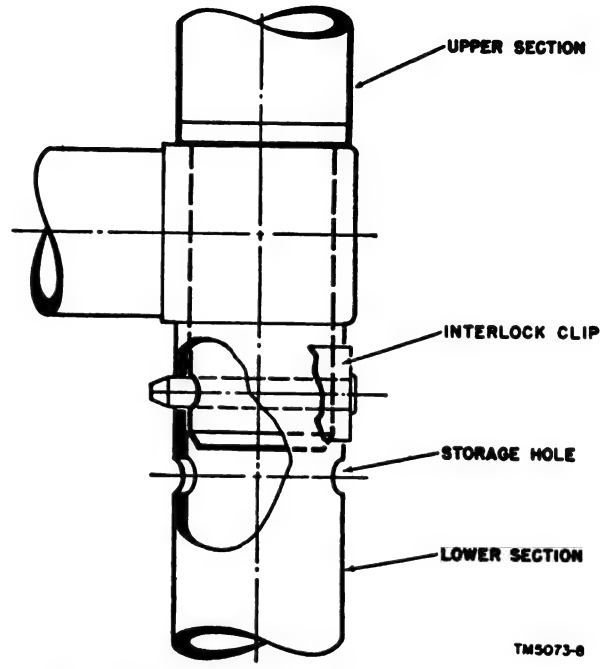


Figure 24. Detail of joint showing interlock clip in place.

Tie the end of the loop to the vertical member of the tower section nearest the davit, just above the intermediate horizontal member, as shown in A of figure 25. Place the davit handle in the up position.

(2) Have one man sit astride the platform of the top tower section facing the davit, with his left foot locked around the vertical member and his right foot locked under the small diagonal on the end frame (A, fig. 25).

(3) Have the other man stand on the platform of the tower section immediately below the top section, also facing the davit.

(4) When both men are in position in the tower, they grasp the davit and raise it hand-over-hand (B and C, fig. 25) until the mounting hooks on the davit are opposite the top and intermediate horizontal members of the top tower section (fig. 15). Position the davit so that the mounting hooks rest between the locating pins on the top and intermediate horizontal members of the end frame (D, fig. 25).

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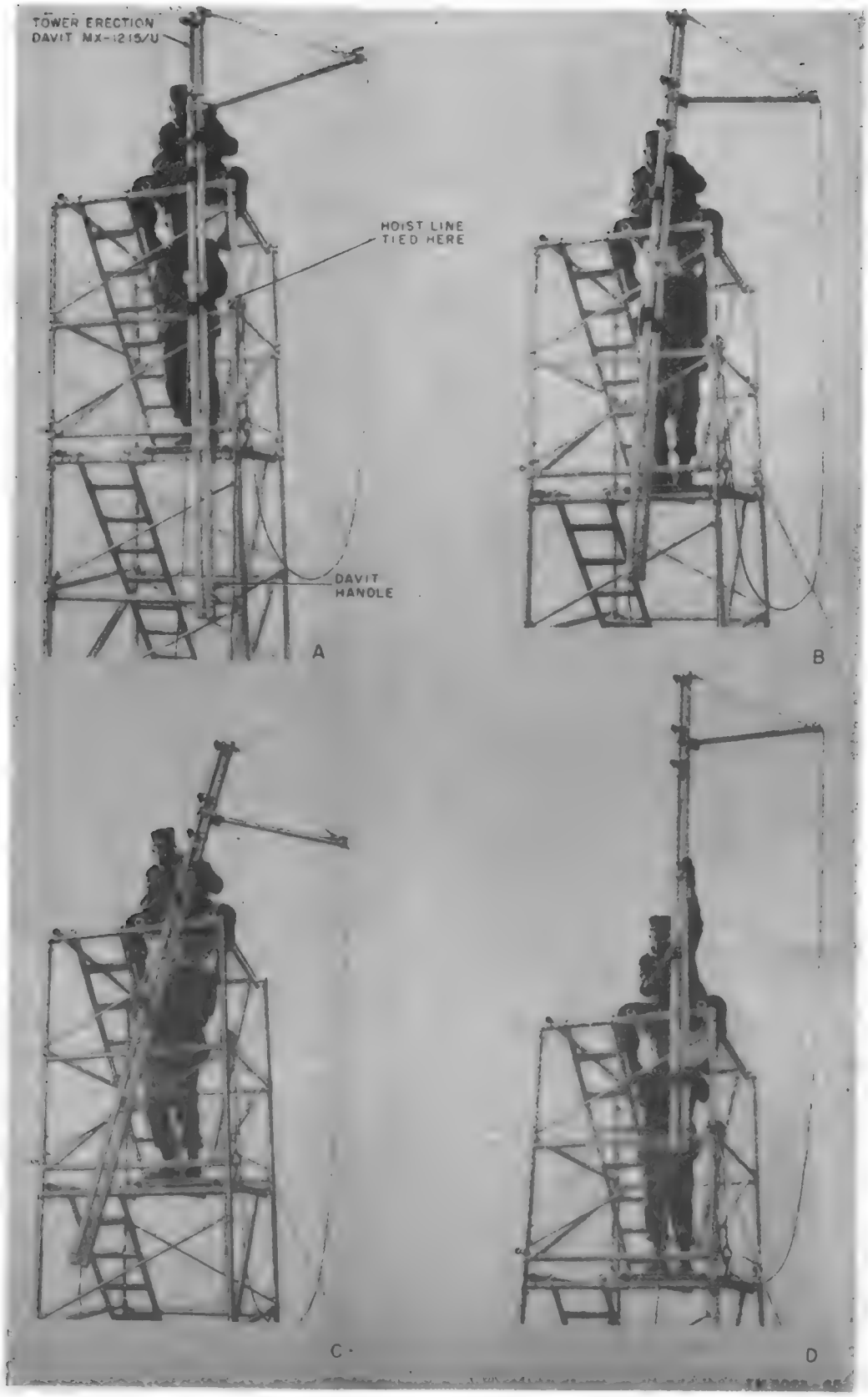


Figure 25. Transferring davit.

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j. Untie the hoist line from the vertical member of the lower section and attach the hook end to the tag line. Pull on the tag line and lower the hoist line to the ground.

k. Install the guys (par. 30).

l. Repeat the operations described in *a* through *k* above until all the tower sections have been installed. *Be sure to install the guys at the proper levels as the tower sections are installed.* Recheck the level of Tower Section AB–208/U after the first set of guys are installed and readjust the leveling tee, if necessary.

30. Installation of Guy MX–1201/U (Fig. 26)

The guy attachment levels and the anchors to which guy are attached, differ for towers of different heights. Install the guys at the proper level as soon as the appropriate tower section has been added to the tower. The table below shows the guy attachment points and the length of the guys to be installed at each level for towers of various heights. *Never use turnbuckles in series with the guys.*

Attachment point		Guy lengths (ft)			
Level (ft)	Number of sections	78-ft tower	120-ft tower	162-ft tower	204-ft tower
18	4	67	67	67	67
36	7	75	75	75	75
54	10	130	130	130	130
72	13	150	150	150	
78	14				150
90	16		167	167	
102	18				167
108	19			215	
114	20		215		
126	22				215
132	23			240	
150	26				240
156	27			275	
174	30				275
198	34				290

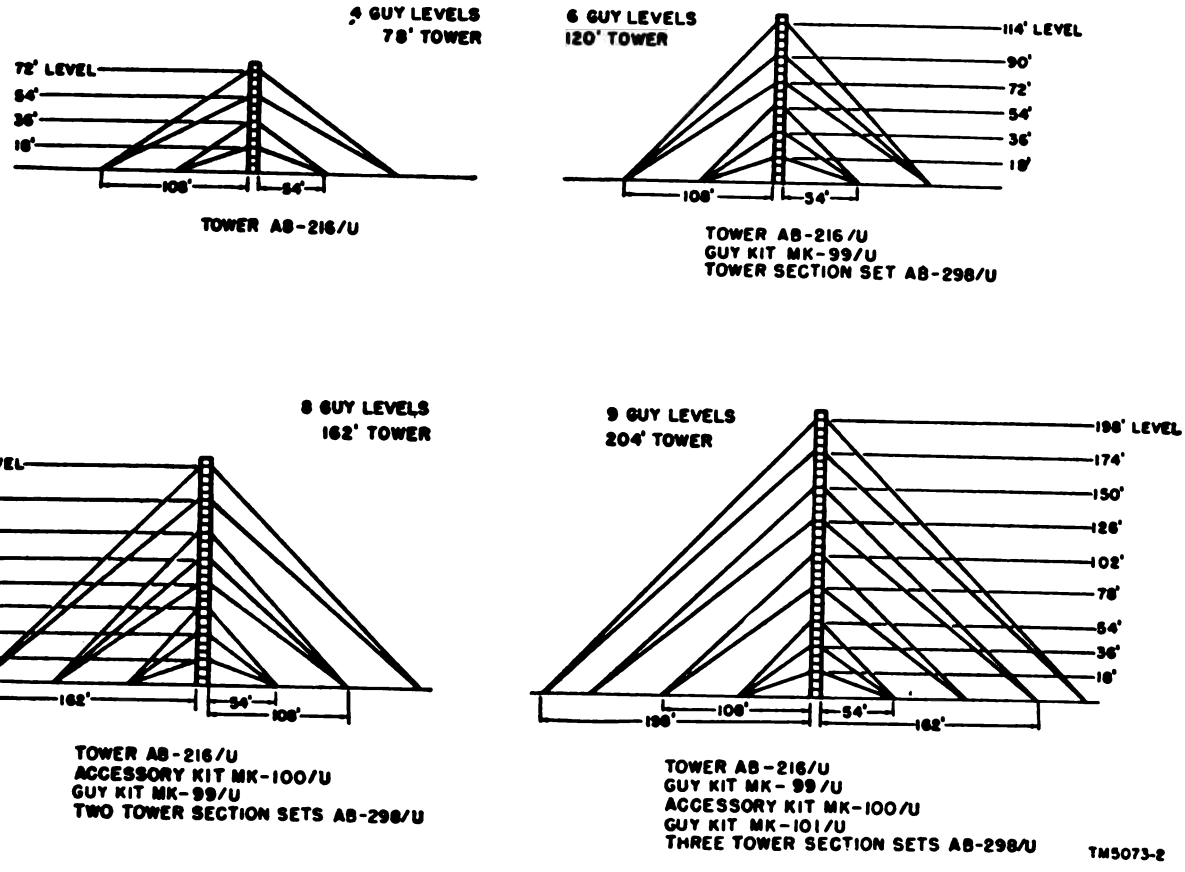


Figure 26. Guy attachment levels, anchor locations, and required equipment.

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a. Attaching Guy to Tower.

(1) Use the davit to raise the four coiled guys to the platform of the tower section to which the guys are to be attached.

(2) Attach the clevis end of each guy to a strap (fig. 27) on the tower section. Guy straps are located just above the lowest welded fitting of each vertical member of the tower section.

(3) The guys must be crossed on the narrow side of the tower (fig. 27 and 28). If antennas are to be mounted on the narrow side of the tower at the guy attachment level, cross the guys on the inside of the tower (fig. 28). If antennas are not to be mounted on the narrow side of the tower at the guy attachment level, cross the guys on the outside of the tower (fig. 27).

(4) Unwind the coiled guy and allow the free end of the guy to descend from the tower on the side where it is to be attached to the anchor.

(5) When the end of the guy can be reached by the personnel on the ground, grasp the end of the guy and walk it to the anchor to which it will be attached (fig. 26). If high brush or other ground obstructions make it difficult to walk each guy from the base of the tower out to its anchor location, Aerial Cable Roller MX–1216/U (fig. 29) may be attached to a previously installed guy and used to trolley the guy to its anchor location as follows:

(*a*) Make available at the platform of the tower section where the guy is to be attached, one aerial cable roller, one take-up winch, and one insulator clevis for each guy to be installed in this manner.

(*b*) Remove the locking pin in the take-up winch and pull about 4 feet of the guy through the snubbing slot in the take-up winch (A, fig. 32). Using a ⅞-inch socket and ratchet wrench, turn the stud on the take-up winch until the guy is securely seated in the take-up winch (B, fig. 32). Replace the locking pin (C, fig. 32).

(*c*) Attach the insulator clevis to the take-up winch and place the complete assembly on the hook of the aerial cable roller (fig. 29).

(*d*) Place the sheave of the cable roller on the previously installed guy directly below. Pay out the guy evenly and smoothly and allow the guy to trolley to the ground.

(*e*) Remove the guy from the take-up winch and walk it to the anchor to which it is to be attached.

b. Installation of Guy Spacers and Take-Up Winches (figs. 30 and 31).

(1) Determine the number of guys that are to be attached to the anchors (fig. 26) for the tower being erected.

(2) When two guys are to be attached to the same anchor (A, fig. 30), attach the take-up winch of the longer guy directly to the anchor and insert an 18-inch guy spacer (30-inch for all guys longer than 167 feet) between the anchor and the take-up winch of the shorter guy. Use insulator clevises to attach the guy spacers to the anchor and to the take-up winch.

(3) When three guys are to be attached to the same anchor (B, fig. 30), attach the take-up winch of the longest guy directly to the anchor; insert an 18-inch guy spacer between the anchor and the take-up winch of the next shorter guy; and insert a 30-inch guy spacer between the anchor and the take-up winch of the shortest guy. Use insulator clevises to attach the guy spacers to the anchor and to the take-up winch.

(4) On later procurements, 18-, 30- and 48-inch guy spacers are supplied and should be installed as shown in C, of figure 30. Use insulator clevises (fig. 31) to attach the guy spacers to the anchor and take-up winch.

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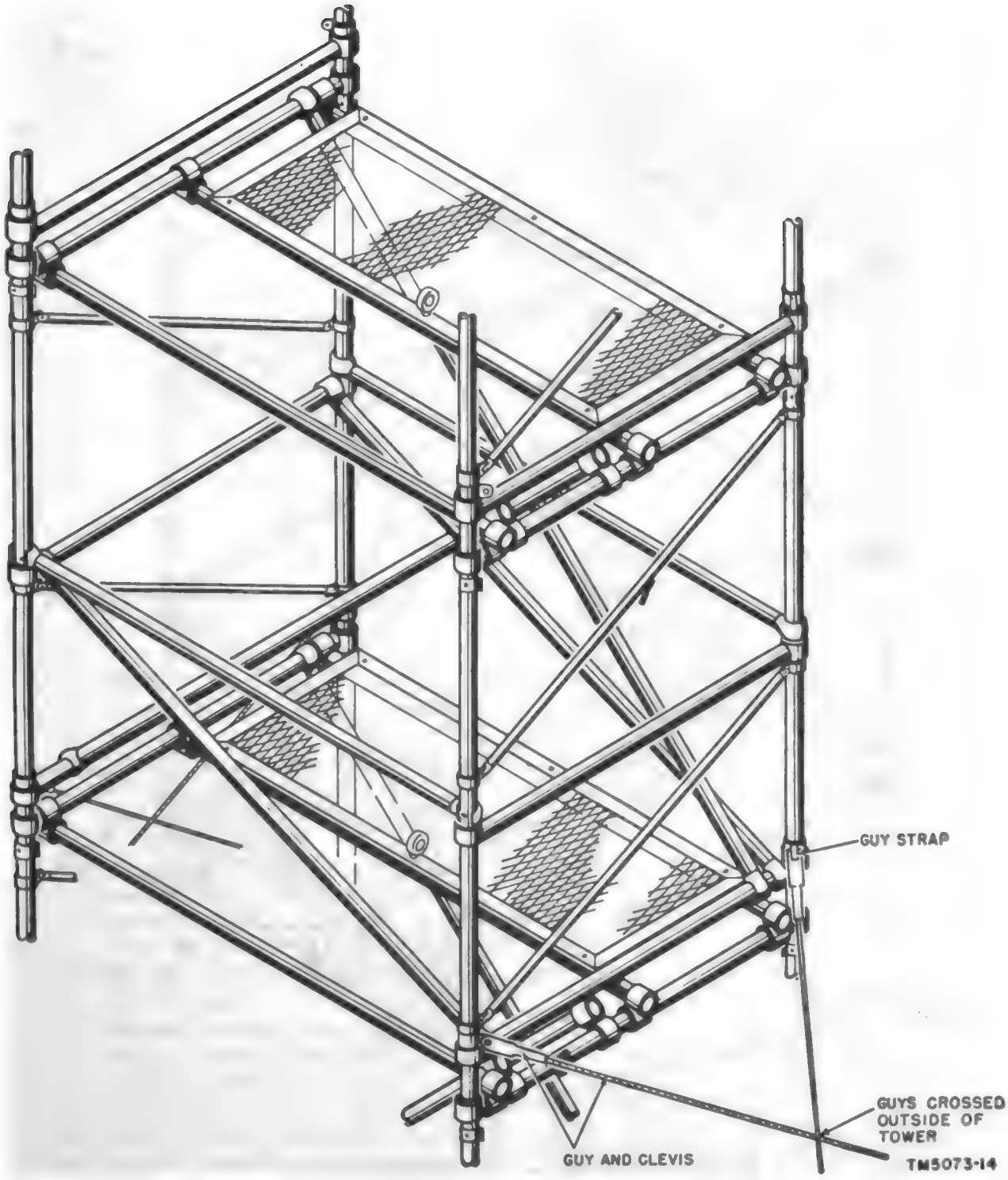


Figure 27. Guy attachment, guys crossed outside tower.

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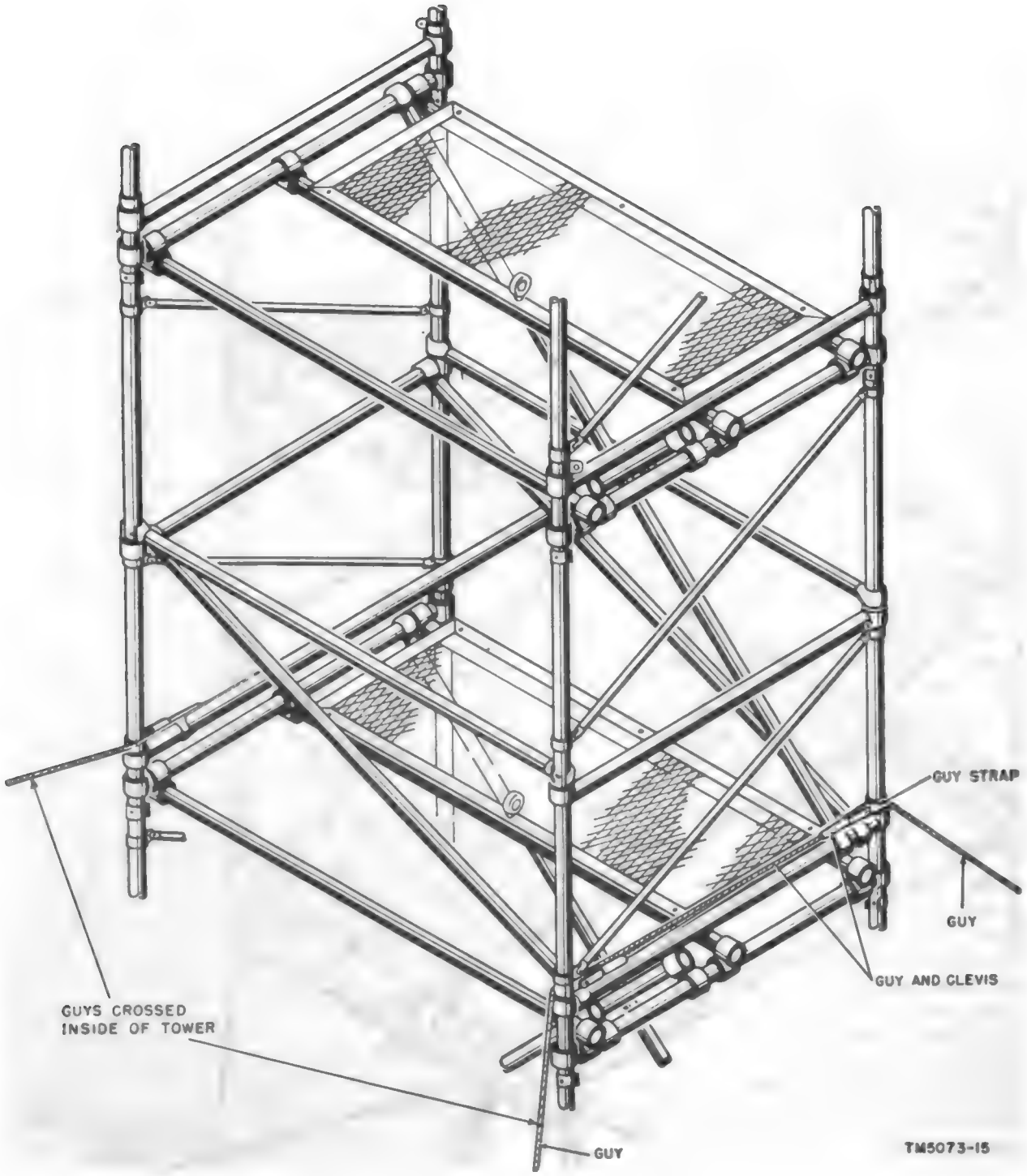


Figure 28. Guy attachment, guys crossed inside tower.

c. Attaching Take-Up Winch to Guy MX–1201/U. Attach the free end of each guy to a take-up winch as follows:

(1) Carry the free end of the guy to the anchor to which it is to be attached (fig. 26).

(2) Hold the loose end of the guy in the left hand and pass it through the snubbing slot in the take-up winch (A, fig. 32). Pull the guy through the snubbing slot. Leave enough slack in the guy cable to allow at least 1½

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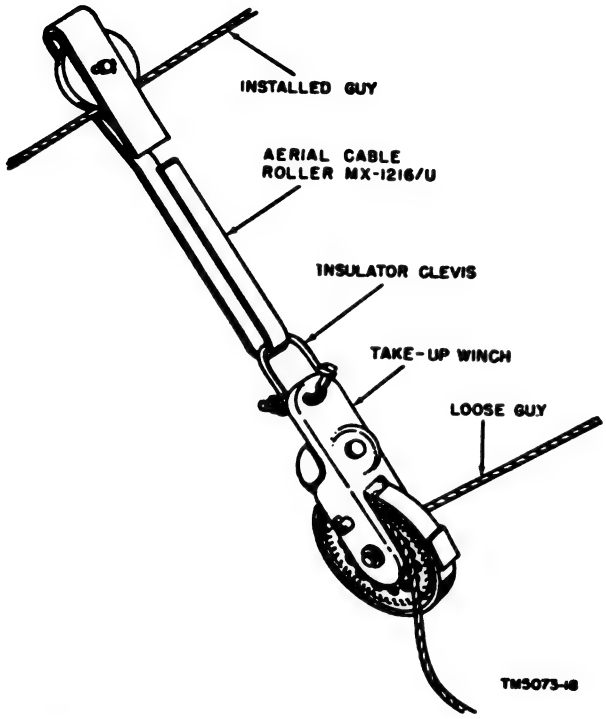


Figure 29. Trolleying guy to ground using Aerial Cable Roller MX–1216/U.

turns to be wound on the take-up winch before the proper tension is reached.

(3) Position the insulator clevis in the slot of the take-up winch so that it is in line with the guy as it comes from the tower (D, fig. 32).

(4) Pass the free end of the guy to the left hand and hold the guy in the snubbing slot of the take-up winch (B, fig. 32). Place the latch of the locking pin in the open position (fig. 31) and remove the locking pin.

(5) Operate the take-up winch until the slack is removed from the guy. Use a 7/8-inch socket and a ratchet wrench (B, fig. 32). *Do not place the guy under too much tension until all four guys of a given set are attached to their take-up winches.*

(6) Insert the locking pin (C, fig. 32) and place the latch in the closed position.

d. Adjustment of Guy Tension. After all four guys of a given set have been attached at both ends, bring the guys to the correct tension. Tension must be applied at a uniform rate to prevent twisting the tower. When sufficient personnel are available, station one man at each of the four take-up winches and tighten all four guys simultaneously. If only two men are available to adjust the guy tension, tighten two guys simultaneously, first on one wide side of the tower and then on the other wide side of the tower, alternately. When two guys are being tightened at a time, *never tighten diagonally opposite guys simultaneously;* this will twist the tower. Increase the tension gradually and evenly until the guys are brought under proper tension. *Never use turnbuckles in series with the guys.* The following table gives the correct tension for the set of guys installed at each attachment level.

Attachment point		Guy tension (pounds)			
Level (ft)	Number of sections	78-ft tower	120-ft tower	162-ft tower	204-ft tower
18	4	425 to 475	425 to 475	425 to 475	425 to 475
36	7	325 to 375	325 to 375	325 to 375	325 to 375
54	10	425 to 475	225 to 275	225 to 275	225 to 275
72	13	375 to 425	625 to 675	625 to 675	
78	14				575 to 625
90	16		555 to 605	555 to 605	
102	18				525 to 575
108	19			425 to 475	
114	20		475 to 525		
126	22				625 to 675
132	23			675 to 725	
150	26				575 to 625
156	27			575 to 625	
174	30				725 to 775
198	34				675 to 725

Note. Do not increase the tension on any guy to a value exceeding 775 pounds.

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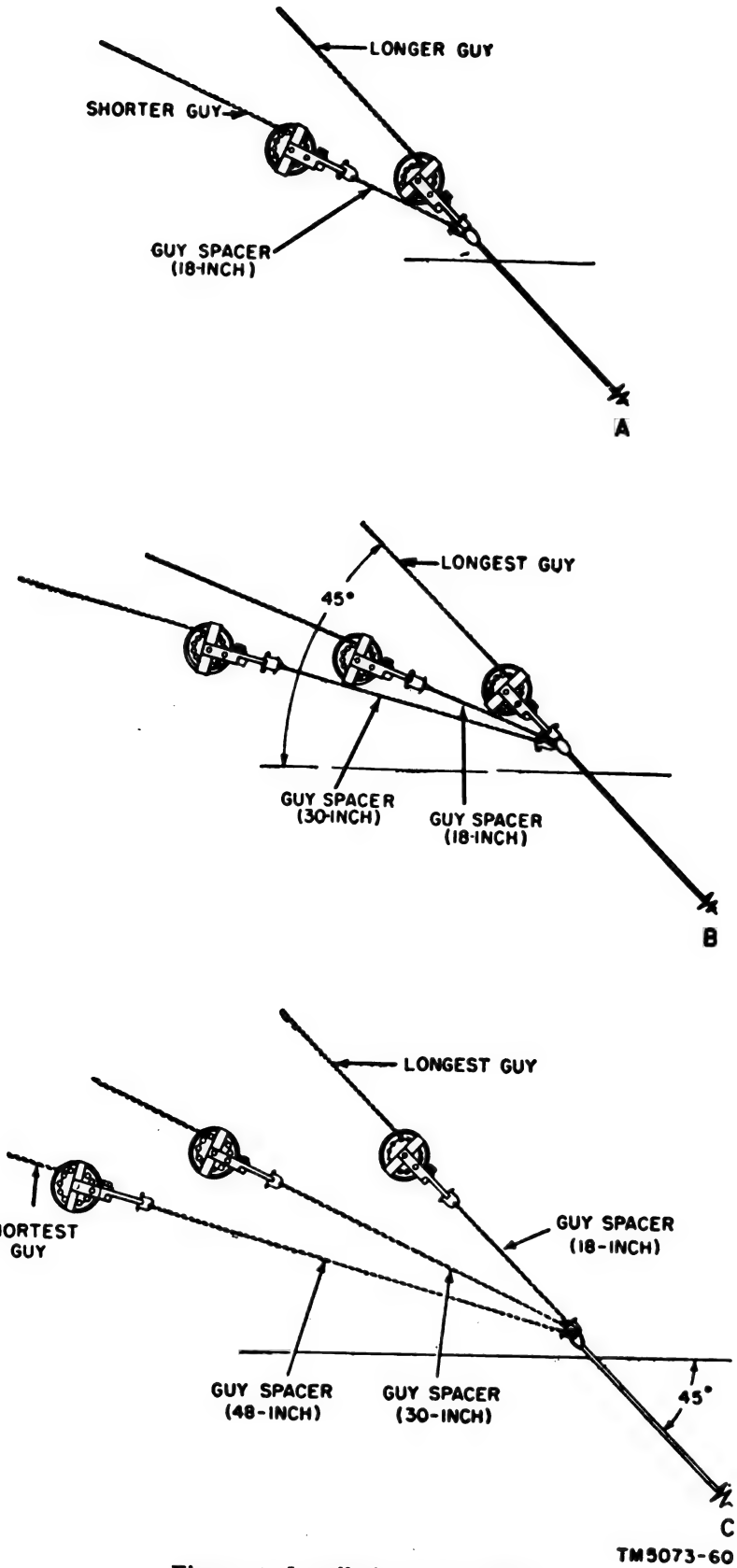


Figure 30. Installation of guy spacers.

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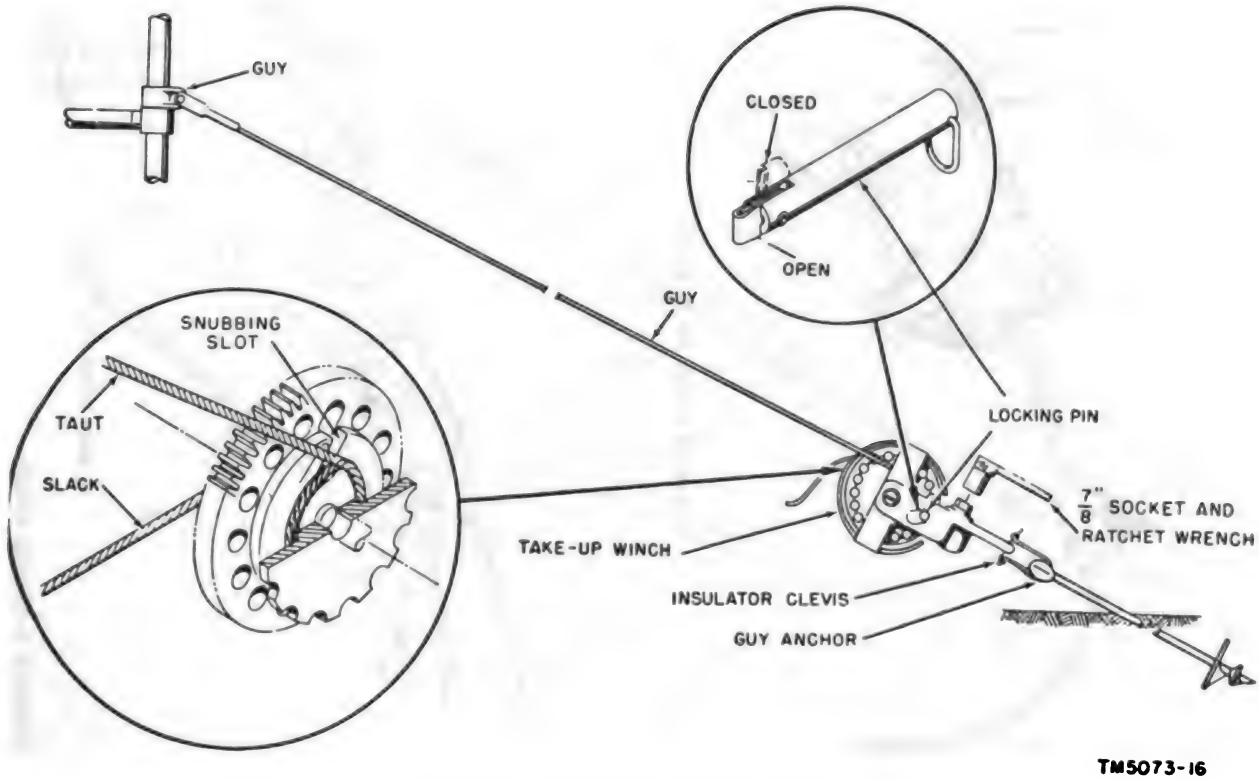


Figure 31. Installation of take-up winch.

(1) Remove the locking pin from the take-up winch of each guy that is to be tightened. Use the sockets and ratchet wrenches provided to operate the take-up winches, and slowly and evenly increase the tension on the guys.

(2) When all four guys are tightened simultaneously, tighten each guy approximately the same amount until it is estimated that the proper tension is being approached. Reinsert the locking pins and measure the tension on each guy ((4) below). Equalize the tension on the four guys and then bring them to full tension.

Caution: After each increase, be sure to reinsert the locking pin while the tension is being measured. When there is considerable tension on the guy, be careful, when the locking pin is removed, to prevent the winch from slipping and releasing the tension on the guy.

(3) When the guys are tightened two at a time, increase the tension on each pair alternately, in steps of approximately 50 pounds, until both pairs are under approximately three-fourths of the tension required. Measure the tension after each increase ((4) below) and keep the tension on each side of the tower as equal as possible. When all four guys have been brought gradually to three-fourths of the required tension, bring each pair to full tension.

(4) Use the tensiometers (fig. 33) supplied with the equipment to measure the tension on the guys. Place the guy cable in the tensiometer as shown in figure 33. Turn the knurled adjusting nut until the small calibrating hand comes in line with the mark scribed on the tensiometer frame at the upper left-hand side. The tension on the guy cable can be read in pounds directly from the scale at the center of the tensiometer frame.

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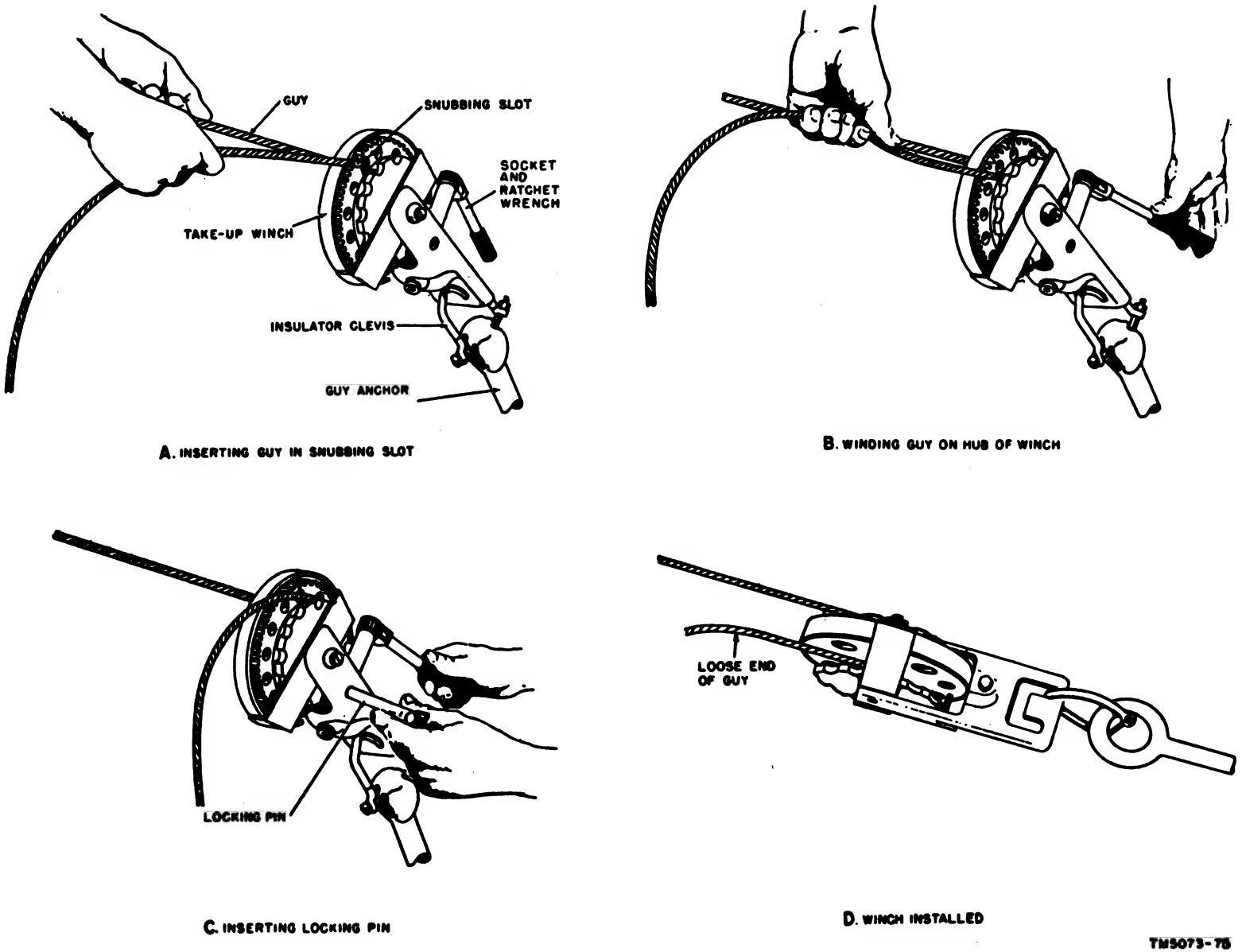


Figure 33. Guy MX-1201/U, attaching to take-up winch.

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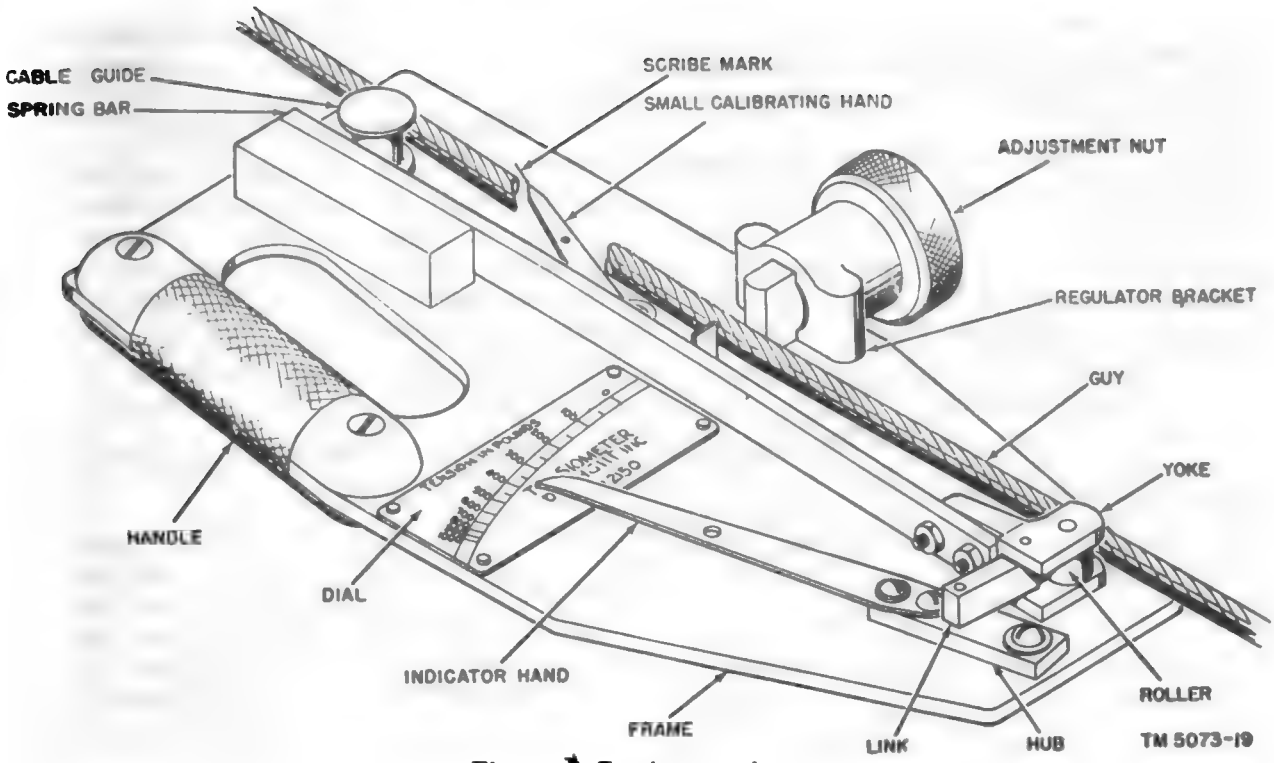


Figure 33. Tensionmeter in use.

31. Installation of Tower Platform Section MT–1156/U (Fig. 34)

If the overall height of the completed tower is in excess of 150 feet (26 or more sections), a platform mount for an electric code beacon must be installed. Proceed as follows:

a. Remove the six bolts (5 carriage bolts and 1 eyebolt) and nuts that secure the grilled platform to the horizontal members of the top tower section and remove the grilled platform.

b. Replace the eyebolt and nut on the horizontal member after the grilled platform is removed.

c. Use the hoist line and the davit and raise the MT–1156/U to the top tower section. Position the MT–1156/U on the same horizontal members that previously supported the grilled platform and position it so that the snap hooks on the ladder side of the tower platform section straddle the eyebolt. Engage the snap hooks with the top horizontal members.

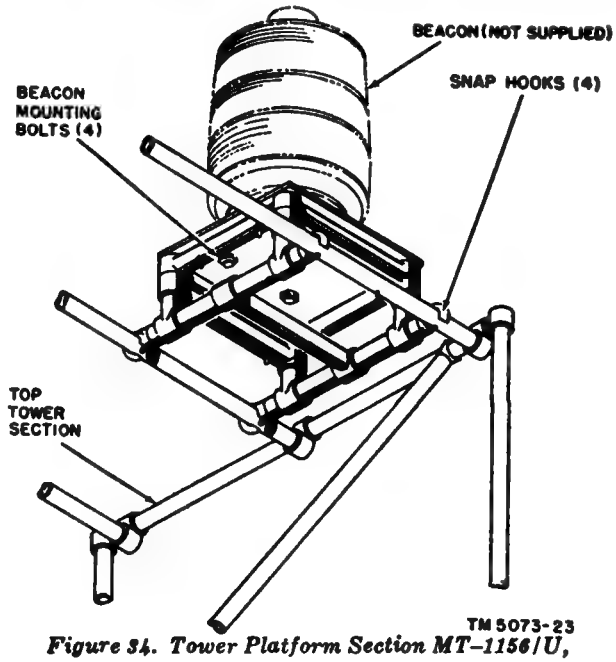


Figure 34. Tower Platform Section MT–1156/U, installed.

32. Installation of Grounding Equipment

Four ground rods and 50 feet of No. 6 AWG copper wire are furnished with Tower AB–216/U. It is mandatory to ground all tower installations to safeguard operating personnel from injury that might be caused by lightning. *Do not work on the tower during electrical storms.*

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a. Drive a 6-foot ground rod into the earth near each corner of the lowest tower section (fig. 18) until about 8 to 10 inches of the rod remains exposed.

b. Securely attach one end of a 4- to 6-foot length to No. 6 AWG wire to the thumbscrew on the exposed end of each ground rod.

c. Secure the other end of each ground wire to the adjacent vertical member of the lowest tower section. A bolt, lockwasher, and wing nut are provided on each vertical member of the tower for this purpose.

d. If static generated by the tower interferes with the operation of near-by radio equipment, interconnect all the grounding studs on one corner of the tower with a continuous ground wire. The additional wire required for this operation is not supplied with the tower.

33. Installation of Antenna Support AB–296/G

Antenna Support AB–296/G (fig. 35) must be installed at each location on the tower where an antenna is required. The antenna support may be mounted in a vertical position on either the wide or narrow side of the tower or in a horizontal position on the wide side of the tower. A telescoping-tube antenna mast is clamped to the center tube of the antenna support and will accommodate antenna with 4½-, 3½-, 3-, 2½-, 1⅞-, or 1⅜-inch diameter fittings. Two antenna supports are supplied with each Tower AB–216/U; additional antenna supports, if needed, may be requisitioned through normal supply channels. Antennas are not supplied with Tower AB–216/U. Instructions for assembling and installing specific types of antennas on the tower will be found in technical manuals covering the radio or antenna equipment used with the tower. Install the antenna support as follows:

a. Install the davit for heavy duty operation (par. 25*b*).

b. Unfold the antenna support and attach the hoist line to the center tube. Use one of the methods described in paragraph 27 and raise the antenna support to the level of the tower section to which it is be attached. Use the tag line to keep the antenna support from swinging and bumping the tower.

c. When the antenna support is opposite the attachment point, swing the davit boom arm toward the tower. Position the antenna support (fig. 35) and fasten the four cam locks to the vertical members of the tower.

d. After the antenna support has been installed, place the antenna support platform on the antenna support as shown in figure 35. Clamp the antenna support platform to the higher of the two tubes at the bottom of the antenna support, with the protruding tube of the antenna support platform resting on the lower tube of the antenna support frame.

34. Determining Safe Antenna Load for Various Tower Heights

The number of antennas that may be mounted on the tower is limited by the height of the tower, the size of the antenna, and the position of the antennas on the tower. As the height of the tower is increased, the number of antennas it may safely support is decreased. Antennas may be installed on the tower section immediately above, on the tower section immediately below or spanning the junction of two tower sections at a guy attachment level. The following tables and computations are provided to aid in determining the location and number of antennas that may safely be placed on the tower. For each tower, there are three factors to be considered: the total number of antennas the tower will safely support; the total number of antennas that may be mounted at any one guy attachment level; and the total number of antennas that may be mounted on parallel sides of the tower. Typical antenna installations are shown in figures 36, 37, 38, 39, and 40.

a. To determine the maximum number of antennas that may safely be mounted on a tower, proceed as follows:

(1) From table I, determine the maximum allowable antenna area that can safely be added to the tower being used.

(2) From table II, determine the area of the antenna to be used with the tower.

(3) Divide the area of the antenna (table II) into the maximum allowable area that can be added to the tower (table I). This will give the maximum number of antennas that may be installed on the tower being used.

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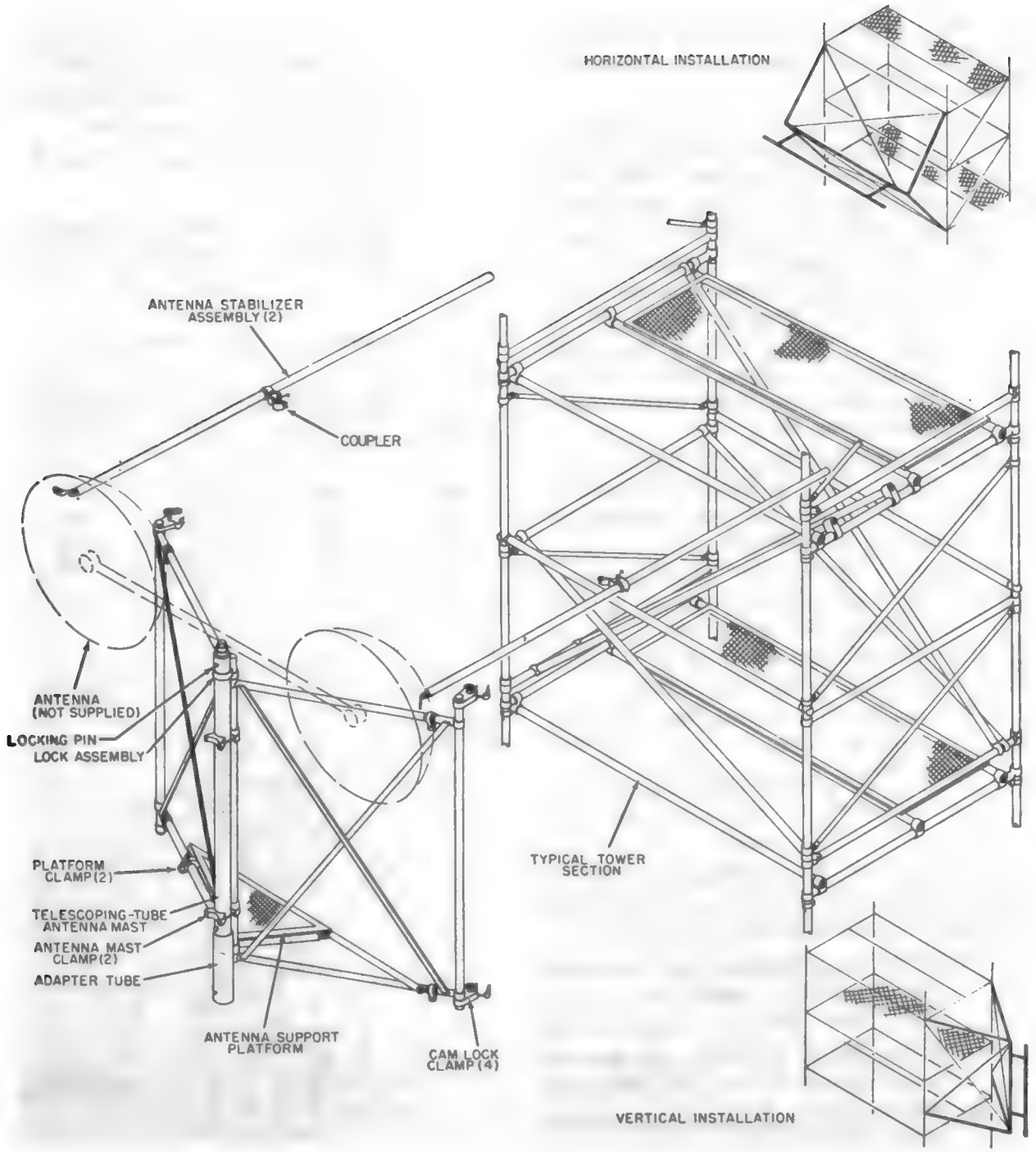


Figure 35. Installation of Antenna Support AB-296/G.

(4) For example, to determine the maximum number of 8-foot antennas that may be mounted on a 204-foot tower:

(*a*) From table I, the maximum allowable area that may be added to a 204-foot tower is 230 square feet.

(*b*) From table II, the area of an 8-foot antenna is 50.2 square feet.

(*c*) Divide 50.2 ((*b*) above) into 230 ((*a*) above):

$$\frac{230 \text{ sq ft}}{50.2 \text{ sq ft}} = 4 \text{ (antennas)}$$

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b. To determine the maximum number of antennas that may be mounted at a guy level, proceed as follows:

(1) From table I, determine the maximum allowable area that may be added at a guy level for the tower being used.

(2) From table II, determine the area of the antenna to be used with the tower.

(3) Divide the area of the antenna (table II) into the maximum allowable area that may be mounted at a guy level table I. This will give the maximum number of antennas that may be mounted at a guy level for the tower height being used.

(4) For example, to determine the maximum number of 8-foot antennas that may be mounted at any one guy level on a 204-foot tower:

(*a*) From table I, the maximum allowable per guy level for a 204-foot tower is 115 square feet.

(*b*) From table II, the area of an 8-foot antenna is 50.2 square feet.

(*c*) Divide 50.2 ((*b*) above) into 115 ((*a*) above):

$$\frac{115 \text{ sq ft}}{50.2 \text{ sq ft}} = 2$$ (maximum number of antennas per guy level)

c. To determine the maximum number of antennas that may be mounted on parallel sides of the tower (fig. 40), proceed as follows:

(1) From table I, determine the maximum allowable area on parallel sides of the tower being used.

(2) From table II, determine the area of the antenna to be used with the tower.

(3) Divide the area of the antenna (table II) into the maximum allowable area on parallel sides (table I). This will give the maximum number of antennas that may be mounted on parallel sides of the tower.

(4) For example, to determine the maximum number of 8-foot antennas that may be mounted on parallel sides of a 204-foot tower, proceed as follows:

(*a*) From table I, the maximum allowable area on parallel sides of a 204-foot tower is 115 square feet.

(*b*) From table II, the area of an 8-foot antenna is 50.2 square feet.

(*c*) Divide 50.2 ((*b*) above) into 115 ((*a*) above):

$$\frac{115 \text{ sq ft}}{50.2 \text{ sq ft}} = 2$$ (maximum allowable antennas on parallel sides)

Table I. Maximum Allowable Antenna Area

Tower height (ft)	Maximum allowable area that can safely be added (sq ft)	Maximum allowable area per guy level (sq ft)	Maximum allowable area on parallel sides (sq ft)
204	230	115	115
162	345	115	230
120	560	115	345
78	680	200	455

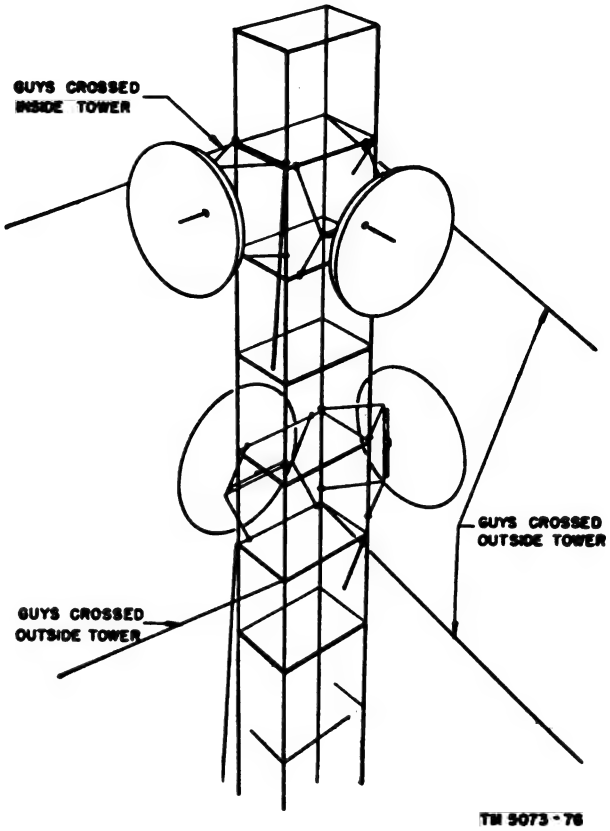


Figure 36. Typical antenna installation: two 8-foot antennas mounted on adjacent sides of the tower at the same level.

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Table II. Area and Diameter of Antennas

Diameter (ft)	Area (sq ft)
4	12.6
6	28.5
8	50.2
10	78
12	113
14	154
16	200

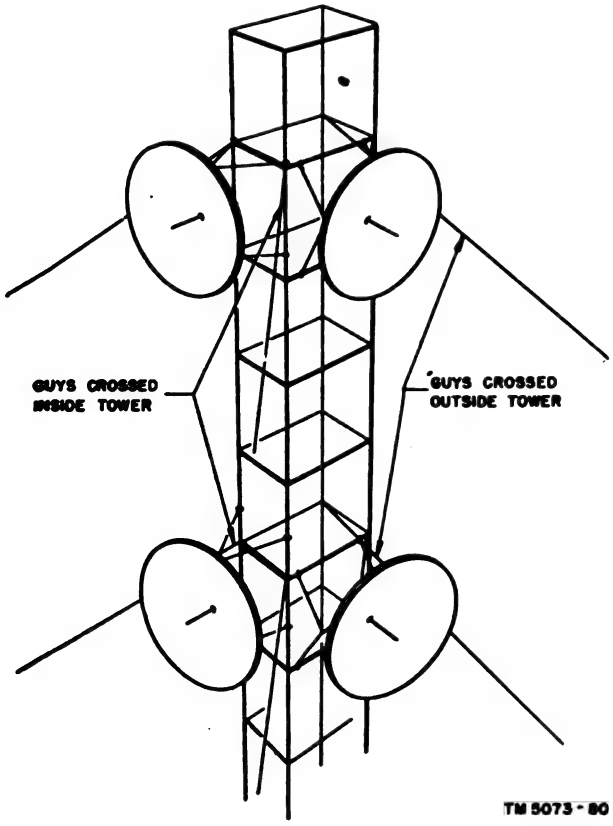


Figure 37. Typical antenna installation: two 8-foot antennas mounted on adjacent sides of the tower, one above and one below the guy attachment level.

35. Installation of Scaffold Tower Bracket MT–1157/G

Scaffold Tower Bracket MT–1157/G (fig. 41) can be mounted on either of the wide sides of any tower section to provide additional platform area. It must be mounted at the same level as the platform of the tower section to

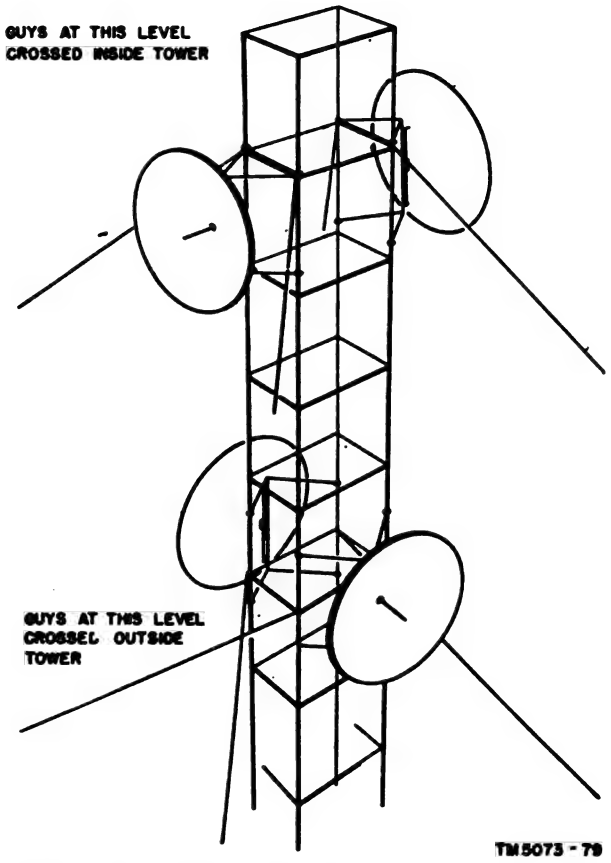


Figure 38. Typical antenna installation: two 8-foot antennas mounted opposite each other, at the same level.

which it is to be attached. The normal davit may be used to raise the scaffold, except when the scaffold is to be mounted on the same wide face as a previously installed antenna. The davit should be mounted so that the davit boom arm is at least two sections above the point where the scaffold is to be mounted. Install the scaffold as follows:

a. Attach the hoist line to the eyebolt in the scaffold frame.

b. Hook the two horizontal snap braces to the cross tube of the end rail.

c. Turn the scaffold so that the upper sides of the platform is toward the tower. Fasten the tag line around the center platform of the folded scaffold.

d. Use one of the methods described in paragraph 27 and raise the scaffold until the hook ends of the long horizontal members are at the height at which the scaffold is to be attached.

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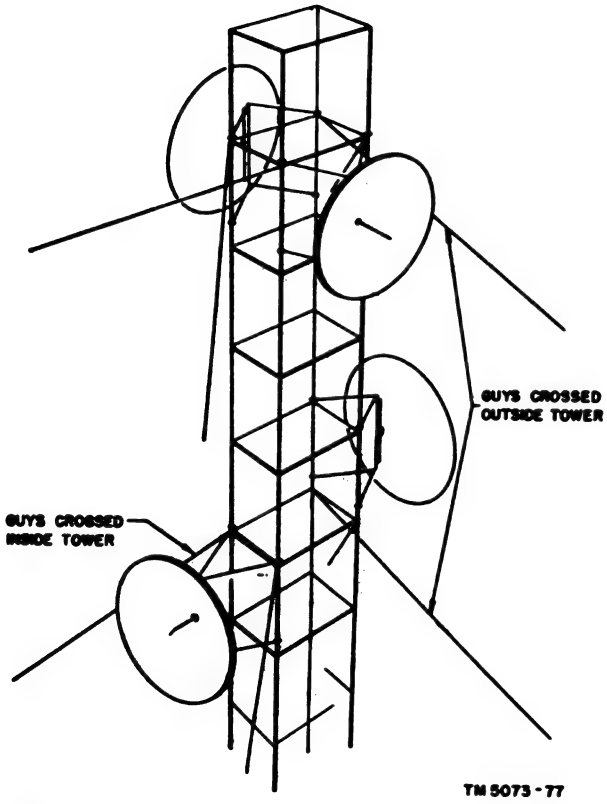


Figure 39. Typical antenna installation: one 8-foot antenna on each side of the tower, parallel antennas mounted above and below a guy attachment level.

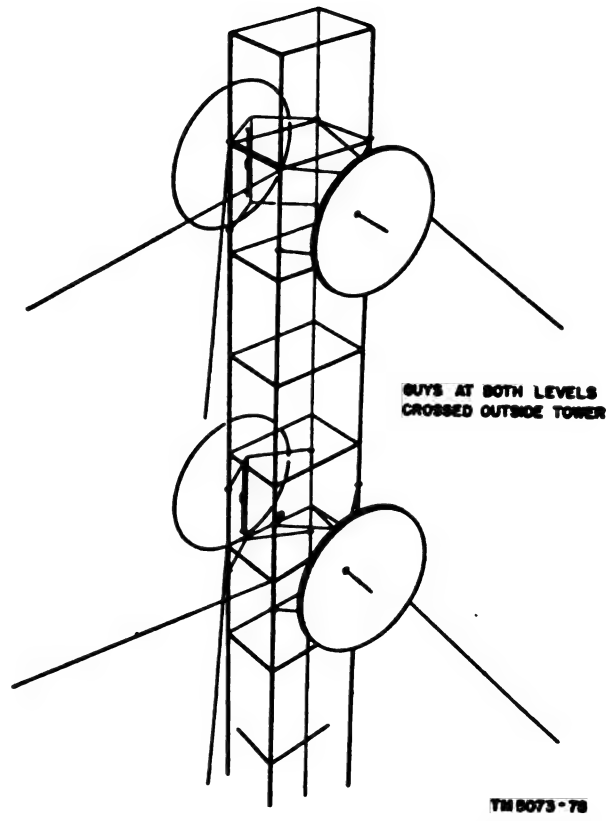


Figure 40. Typical antenna installation: two 8-foot antennas mounted on parallel sides, opposite each other, at the same level.

While it is being raised, guide it with the tag line to keep it from bumping the tower.

e. When the folded scaffold is in position, pull it toward the tower by grasping the hook ends of the long horizontal members. Guide both long horizontal members of the scaffold through the tower and engage the hook ends with the horizontal members on the far side of the tower section. The locator, welded to the long horizontal member of the scaffold (fig. 41) should rest on the top horizontal member on the near side of the same tower section.

f. From inside the tower, hook the two diagonal snap braces to the intermediate horizontal member of the tower section immediately above or below the scaffold platform, whichever is more convenient. Hook the two horizontal snap braces to the intermediate horizontal member of the tower section immediately above the scaffold platform.

Caution: When the diagonal snap braces are attached to the intermediate horizontal member of the tower section immediately below the scaffold platform, the intermediate horizontal member of that tower section must be installed so that the open sides of the snap hooks are facing toward the inside of the tower.

36. Night Obstruction Marking

Warning lights must be mounted on towers 100 feet in height or over, to provide night indication of an obstruction to aerial navigation (fig. 42). Tower Platform Section MT–1156/U (par. 31) is supplied with Accessory Kit MK–100/U to support a 300-millimeter code beacon. Neither the warning lights nor the code beacon are supplied with the basic tower or any of its kits. Guard Obstruction Marker Light Set MK–221/G is available through normal supply channels for night obstruction marking of the tower.

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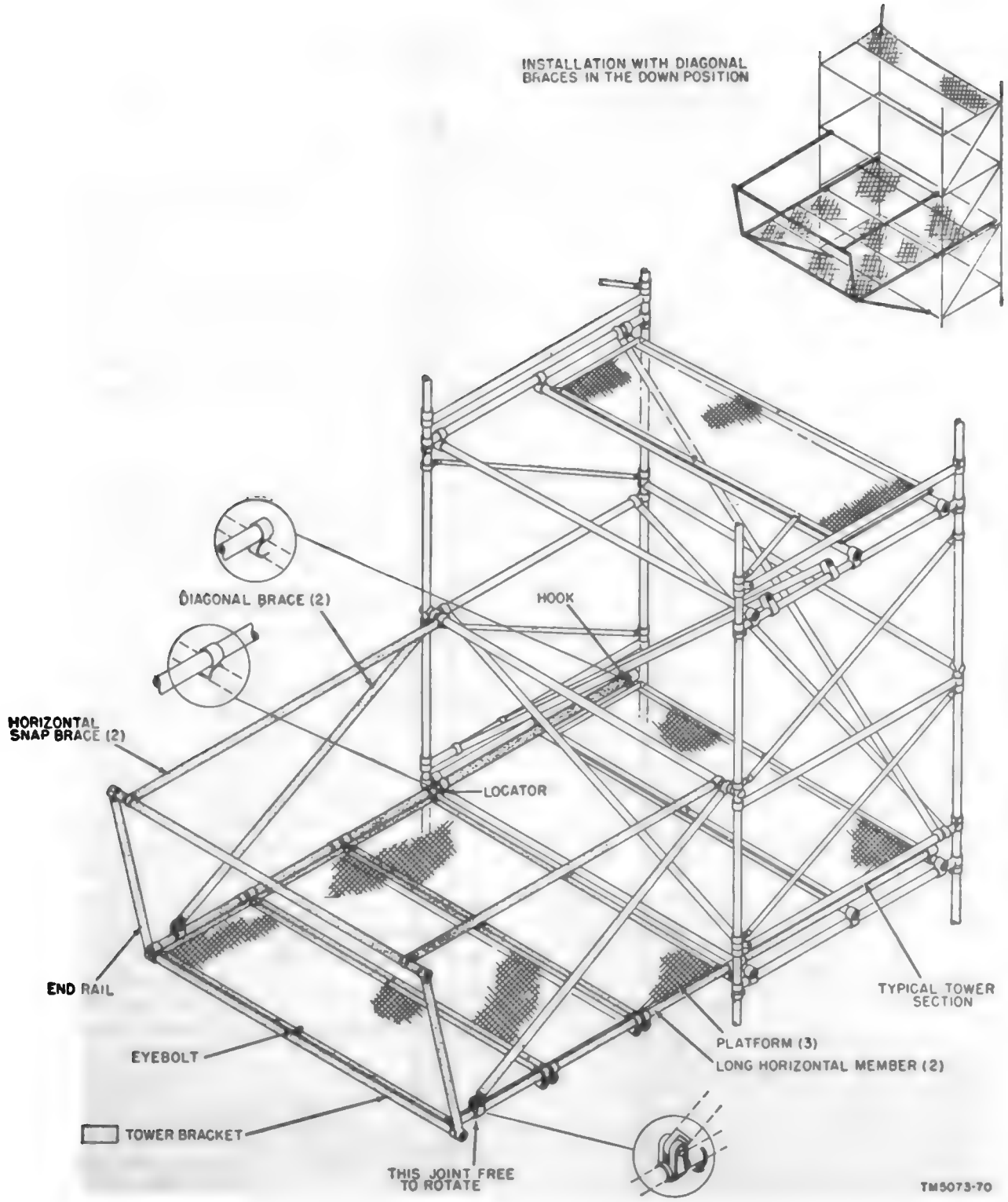


Figure 41. Installation of Scaffold Tower Bracket MT–1157/G.

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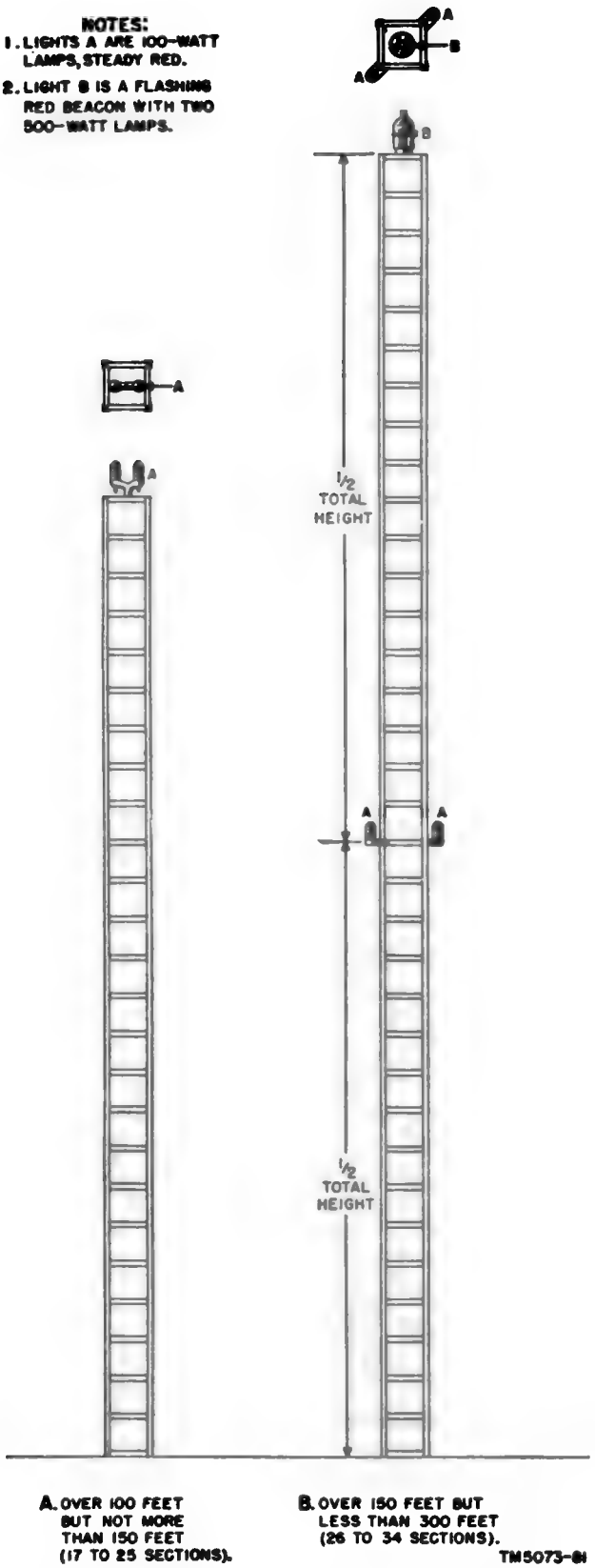


Figure 42. Lighting for night obstruction marking.

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CHAPTER 3
ORGANIZATIONAL MAINTENANCE

Section I. PREVENTIVE MAINTENANCE

37. Scope of Maintenance Performed at Organizational Level

The users of the associated radio equipment are responsible for the assembly, installation, and maintenance of the tower. The maintenance performed at this level consists of routine inspections of the tower, lubrication, and minor repairs to and adjustments of the components.

38. Tools, Materials, and Test Equipment

a. Two tensiometers and the following tools supplied with Tower AB–216/U are required for preventive maintenance purposes:

Quantity	*Tools*
2	Drive ratchet wrenches, ½-inch
2	Hexagonal sockets, ½-inch
2	Hexagonal sockets, 9/16-inch
2	Hexagonal sockets, ⅝-inch
2	Hexagonal sockets, 11/16-inch
2	Hexagonal sockets, ¾-inch
2	Hexagonal sockets, ⅞-inch
2	Hexagonal sockets, 29/32-inch
1	Hammer, 4-pound
2	Combination pliers with cutter
2	Screw drivers, 6-inch
1	Tape measure, 100-foot
1	Level

b. The 5/32-inch punch pin (for removing spring pins) and the following materials required for maintenance purposes are not supplied with the tower:

Sandpaper No. 000
Grease, Automotive and Artillery (GAA), 1-pound can
Paint, white
Paint, international orange
Oil, Engine (OE–10), 1-quart can
Cleaning Compound (Federal stock No. 7930–395–9542)
Lint-free cloth

39. Preventive Maintenance Requirement

Tower AB–216/U and its associated kits require regular maintenance inspections to detect and correct damage caused by continued exposure of the tower to the elements. These maintenance services are of the utmost importance. Failure of one tower section or one group of guys may cause complete failure of the tower, with resultant damage to equipment and possible injury to personnel.

40. Preventive Maintenance Service

Excessive dampness, salt spray, snow, ice, continuous heat, and rapid changes in temperature cause rusting or corrosion of the aluminum and galvanized components and blistering or peeling of the paint on the tower sections and antenna supports. High winds may cause the anchors to creep and the guys to slacken. In cold climates, heavy coatings of ice or an accumulation of snow may overload the tower and strain the guys. In addition, dirt, rust, or corrosion may clog the drain holes and water will accumulate and freeze in the vertical or horizontal members of the tower sections. This will cause the tower members to burst. To minimize the effects of these conditions, the preventive maintenance services outlined below should be performed at monthly intervals, or more frequently when warranted by severe weather conditions.

a. Inspection and Adjustment.

(1) Check the area around the support timbers and base plates for proper drainage. If the soil around the support timbers is worn away, add fill dirt and tamp the earth around the timbers. Dig drainage ditches to guide the water away from the base of the tower.

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(2) Check to see that Tower Section AB–208/U is level. Use the level supplied with the tower. Readjust the tee fitting on the vertical member of the tower section to level the tower.

Note. If the tower is badly distorted and cannot be leveled because the base plates or support timbers have settled unevenly. Dismantle the tower and reassemble it on a firmer foundation.

(3) Check for loose anchors. If the anchors show signs of creepage, tamp the earth around the anchor rod with the tamping bar or the butt end of a piece of 2 x 4. If the anchor is loose or shows signs of pulling out, remove the anchor, reevaluate the soil conditions, and reinstall it (pars. 22, 23, and 24).

(4) See that each take-up winch is securely attached to the guy, guy spacer, or anchor. Look for rusted, corroded or badly distorted clevises, missing or broken thimbles in the guy spacers, and badly rusted or frayed guys. If it is necessary to replace any of the parts that are in series with the guys, follow the instructions given in paragraph 46.

Note. Damage to the nylon covering on the guys will not affect the strength or usability of the guy.

(5) See that the guys are securely attached to the tower. Check to see that the bolts and nuts that attach the clevis end of the guys to the guy straps (figs. 27 and 28) on the tower section are securely fastened.

(6) Check and adjust the tension on the guys (par. 30*d*). Be sure to replace the locking pin in the take-up winch after the guys have been adjusted.

(7) Check for clogged drain holes in the vertical and horizontal tower members. Use a short piece of #6 AWG copper wire supplied with the tower and clean the drain holes in the tower members. Pay particular attention to those in the vertical members of the AB–208/U, above the tee fitting.

(8) Check for bent, damaged, or missing horizontal or diagonal snap braces. Replace if necessary (par. 43).

Note. It is normal for some diagonal braces to creep a few inches after the tower is in use. If creepage is excessive (6 to 8 inches), restore the snap braces to their original position and wrap friction tape around the horizontal member to which it is attached to keep it in place.

(9) See that the ground rods are firmly imbedded in the soil and that the grounding studs on each corner of the tower sections are free of corrosion and that the ground wires are securely attached to them.

(10) Check the antenna, antenna support, and antenna stabilizers to see that they are securely attached to the tower sections. Pay particular attention to the clamps that mount the antenna support to the tower section and to the fittings that attach the antenna to the antenna support.

(11) If obstruction warning lights are mounted on the tower, check to see that the beacon platform is securely in place on the top tower section and that the lights are securely mounted and in good working condition.

b. Lubrication. The davit assembly, the snatch block, and the capstan must be lubricated to prevent corrosion and wear and to keep them in good operating condition; only the capstan requires disassembly. The tubular members of the tower components and the take-up winch do not require lubrication.

(1) *Lubricants.* The recommended lubricants for use on the tower components are Oil (OE–10) and Grease (GAA).

(2) *Preparation for lubrication.* The capstan must be partially disassembled for proper lubrication as follows:

(*a*) Remove the six bolts and lock nuts (fig. 43) that attach the back plate to the capstan casting and remove the back plate.

(*b*) Remove the drag rollers (par. 49).

(*c*) Remove the four round-head screws that attach the side plate (fig. 43) to the main capstan casting and remove the side plate. Do not lose the

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compression spring that is attached to the side plate.

(3) *Old lubricants.* Use Cleaning Compound and a lint-free cloth to wash away all the old lubricants. Wrap the cloth around a screw driver or similar implement to remove old lubricants from hard-to-reach places.

Warning: Prolonged breathing of Cleaning Compound fumes is dangerous. Make sure that adequate ventilation is provided. Cleaning Compound is flammable; do not use it near a flame.

(4) *Detailed lubrication instructions.* The charts below list all the components of the tower that require lubrication. The lubrication points in the charts refer to parts identified in the referenced illustration, except that the pins that mount the sheave (pulley) of the davit and snatch block which can be easily identified are not referenced.

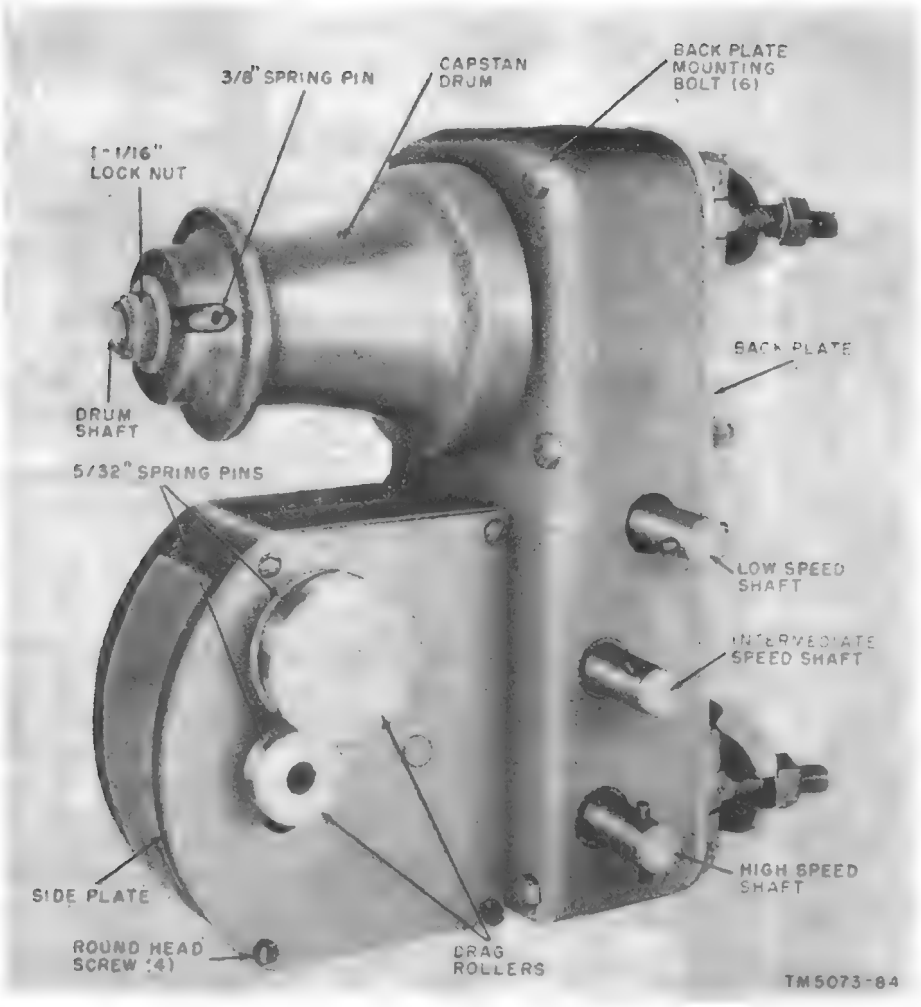


Figure 43. Capstan E–12/U, right-side view.

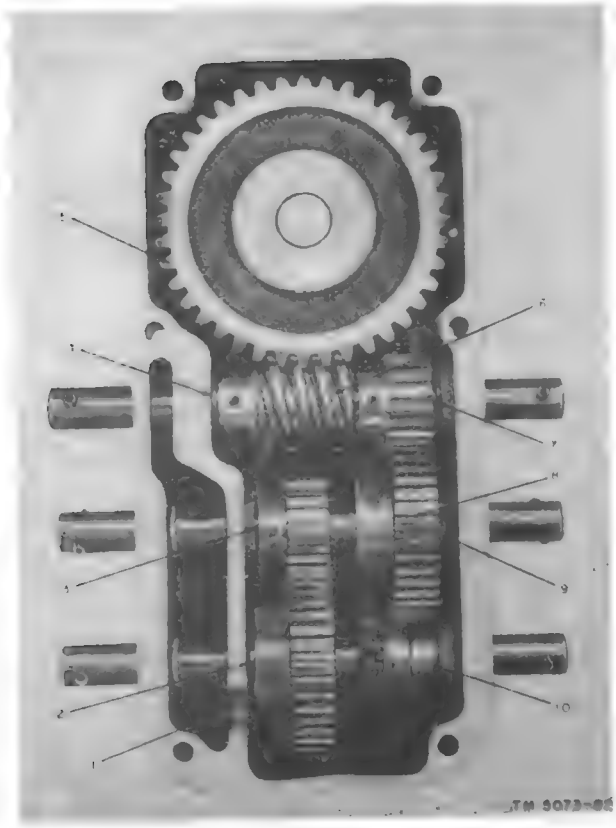
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(a) Oil.

Equipment	Part	Quantity	Interval	Fig. No.	Lubrication points
Davit	Sheave pin	1 to 2 drops	Daily, when in use		
Snatch block	Sheave pin	1 to 2 drops	Daily, when in use		
Capstan	Sleeve bearings	3 to 4 drops	Weekly, when in use	44	2, 3, 4, 7, 9, and 10
				45	3 and 4

(b) Grease.

Equipment	Part	Quantity	Interval	Fig. No.	Lubrication points
Capstan	Gears (all)	Generous amount	Semiannually	44	1, 5, 6, and 8
	Sprockets and chains (all)	Generous amount	Semiannually	45	1, 2, 5, 6, and 7



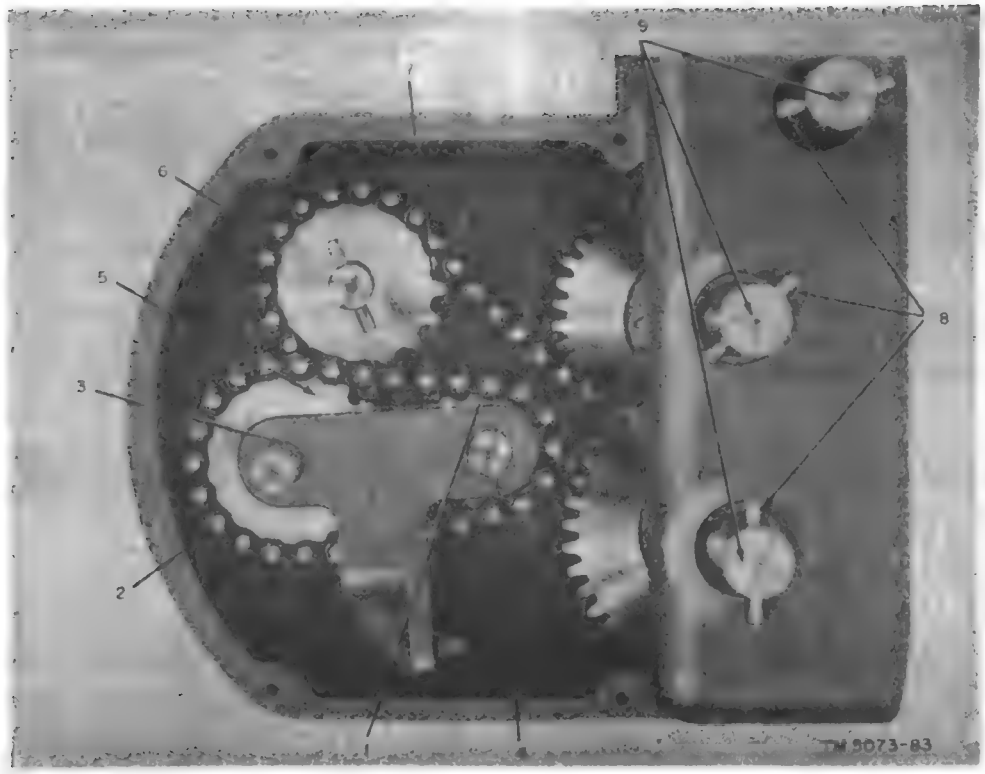
1 Spur gear
2 Sleeve bearing
3 Sleeve bearing
4 Sleeve bearing
5 Main drive gear assembly
6 Worm gear
7 Sleeve bearing
8 Spur gear
9 Sleeve bearing
10 Sleeve bearing

Figure 44. Capstan E–12/U, back plate removed.

c. Preservation. None of the components of the tower requires special weatherproofing or the application of any preservative except paint. When the finish of any part of the tower or the associated kits blisters or peels or shows signs of corrosion, thoroughly clean the affected area with No. 000 sandpaper and repaint it.

Note. The pins at the end of the snap braces must be free to move at all times. Before painting the snap braces, mask these pins with tape.

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1 Sprocket
2 Chain
3 Sleeve bearing
4 Sleeve bearing
5 Sprocket
6 Chain
7 Sprocket
8 Spring pin
9 Shaft

Figure 45. Capstan E–12/U, side plate removed.

Section II. REMOVAL AND REPLACEMENT

41. General

The extent of replacement that may be accomplished at this maintenance level will be limited by the parts available. Repair of Tower AB–216/U and its associated kits usually will be confined to the installation of new parts to replace components that have been damaged or have failed. Damaged components, such as snap braces, guys, take-up winches, anchors, and antenna supports, can be replaced without dismantling the tower. When the tower is damaged so that it is weakened structurally, disassemble it (par. 57) section by section until it is possible to replace the damaged portion.

Warning: When the tower is being repaired, personnel working on the tower must observe every precaution to prevent injury.

42. Removal and Replacement of Tower Section

If a tower section is so badly damaged that it must be replaced, the tower must be disassembled to the level of the damaged section. The damaged section must be removed, a new section installed, and the upper portion of the tower reassembled. Instructions for disassembling the tower are given in paragraph 57. Assemble a new section (par. 19) install it, and complete the reassembly of the tower as described in paragraphs 23 through 33.

43. Removal and Replacement of Horizontal and Diagonal Snap Braces

When more than one of these members are being replaced, replace them one at a time. Begin with the top snap brace and work down.

a. Removal. Hold the stainless-steel, spring-loaded pin, adjacent to the hook end of the snap brace depressed, and lightly tap the brace until it comes free of its mating member.

b. Replacement. Position the open hook end

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of the snap brace over its mating member and tap the snap brace to engage it.

44. Removal and Replacement of Guy MX–1201/U

a. Removal. If more than one guy is to be removed from the tower, remove them one at a time.

(1) Install a temporary rope guy to replace the guy being removed. Use the tag line or the hoist line for this purpose.

(2) Tie one end of the temporary rope guy above the guy strap (fig. 31) on the vertical member to which the damaged guy is attached and tie the other end to the anchor eye.

(3) Remove the locking pin in the take-up winch attached to the damaged guy. Use a 7/8-inch socket and a ratchet wrench, and remove the damaged guy from the take-up winch.

(4) Remove the nut and bolt that attaches the clevis end of the guy to the guy strap on the tower section. Lower the guy to the ground.

b. Replacement. Install a new guy as described in paragraph 30.

45. Removal and Replacement of Antenna Support AB–296/G

a. Removal.

(1) Install the heavy duty davit (par. 25).

(2) Install the snatch block and coupler (par. 26).

(3) Attach the hook end of the hoist line to the top of the antenna support and attach tag line to the lower part of the antenna support.

(4) Use one of the methods of raising loads described in paragraphs 27 and 28. Place tension on the hoist line.

(5) Release the four cam locks that attach the antenna support to the tower and carefully lower the antenna support to the ground.

b. Replacement. Install the new antenna support as described in paragraph 33.

46. Removal and Replacement of Take-Up Winch and Guy Spacers

a. Removal.

(1) Remove Guy MX–1201/U as described in paragraph 44.

(2) Remove the nut and bolt that attaches the insulator clevis to the take-up winch (fig. 31).

(3) Remove the nut and bolt that attaches the guy spacer (fig. 30) to the anchor eye.

b. Replacement. To replace the take-up winch, guy spacers, and Guy MX–1201/U, follow the procedures described in paragraph 30.

47. Removal and Replacement of Guy Anchor MX–1202/U

a. Removal.

(1) Remove Guy MX–1201/U (par. 44).

(2) Remove the take-up winches and guy spacers (par. 46).

(3) Insert the digging bar through the anchor eye and turn the anchor counterclockwise until the anchor is free.

b. Replacement. Reinstall the anchor as described in paragraph 23.

48. Removal and Replacement of Plate-Type Anchor

a. Removal (F, fig. 13).

(1) Remove Guy MX–1201/U (par. 44).

(2) Remove the take-up winches and guy spacers (par. 46).

(3) Use the maul and drive the anchor rod down far enough (about 6 inches) so that the spear head at the end of the rod is free of the rod lock in the anchor plate.

(4) Attach the retrieving cable to the truck winch or bumper and raise the anchor plate about 4 inches (F, fig. 13).

(5) Attach a line to the eye of the anchor rod and pull the anchor rod out of the ground.

(6) Pull on the retrieving cable and remove the anchor plate.

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b. Replacement. Reinstall the anchor as described in paragraph 24.

49. Removal and Replacement of Capstan Drag Rollers
(Fig. 43)

a. Removal.

(1) Use a 5/32-inch punch pin and a hammer and drive the 5/32-inch spring pin from the small drag roller.

(2) Insert a screw driver between the small drag roller and the capstan casting. Push downward on the shaft that mounts the small drag roller until it is no longer in contact with the large roller.

(3) Slide the small roller off the shaft.

(4) Use the 5/32-inch punch pin and a hammer and drive the spring pin from the large drag roller. Slide the large roller off the shaft.

b. Replacement. Reserve the procedure in *a*(1) through (4) above to replace the drag rollers.

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CHAPTER 4

FIELD MAINTENANCE

Section I. GENERAL

50. Scope of Field Maintenance

The amount of repair that can be performed by units having field maintenance responsibility is limited only by the tools available and by the skill of the repairman. Field maintenance on Tower AB–216/U and its associated kits consists of repairing, rebuilding and refinishing the structural members of the tower, and the repair of the capstan and the take-up winch.

51. Tools and Shop Equipment

The tools and shop equipment required at field maintenance level are the same as those required at organizational level (par. 38) with the following additions.

a. Tools.

(1) $\frac{7}{32}$-inch punch pin (for removing spring pins).

(2) $\frac{3}{8}$-inch punch pin (for removing spring pins).

(3) Crescent type wrench, adjustable to $1\frac{1}{8}$ inches.

b. Shop Equipment. In addition to the normal tools found at field maintenance shops the following are required for the repair of the tower components.

(1) Arbor press (for removing sleeve bearings).

(2) Aluminum welding equipment (for repairing tower members).

Section II. REPAIRS

52. General

Repairs to tubular members of the tower components consist of cutting out and replacing bent or broken lengths of aluminum tubing and welding in new pieces; replacing broken or badly distorted guy straps; and repairing or replacing snap braces. The procedures necessary to accomplish these tasks fall into the category of general shop practices and are covered by special instructions issued by the repair organization responsible for the work.

53. Removal and Replacement of Capstan Gears and Sprockets (Fig. 45)

The procedures for removing any one or all of the gears and sprockets in the capstan are the same.

a. Removal.

(1) Use the proper size punch pin and a hammer and remove all the spring pins (8) that fasten the gears or sprockets to the shaft.

(2) Remove the shaft by sliding it to the right or left. Catch the gears or sprockets as they fall free of the shaft.

b. Replacement. To replace the gears or sprockets, reverse the procedures described in *a* above.

54. Removal and Replacement of Capstan Chain Drives (Fig. 45)

The two chains (2 and 6) that drive the sprockets controlling the drag rollers are formed into a loop by a detachable connecting link and a spring clip. Disassemble the connecting link and remove the chain as follows:

a. Removal.

(1) Examine the chain and locate the connecting link and spring clip.

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(2) Use a screw driver to disengage the spring clip from the stud on the detachable connecting link, and remove the connecting link and collar.

(3) Disengage the chain from the sprocket and remove the chain.

b. Replacement. Seat the chain links over the sprocket teeth and replace the connecting link by reversing the procedure in *a* above.

55. Removal and Replacement of Capstan Drum and Main Drive Gear (Figs. 43 and 44)

a. Removal.

(1) Remove 1 1/16-inch lock nut (fig. 43) from the drum shaft.

(2) Remove the 3/8-inch spring pin that retains the capstan drum.

(3) Remove the capstan drum by sliding it forward off the drum shaft.

(4) Remove the six bolts and lock nuts that fasten the capstan back plate to the casting and remove the back plate.

(5) Rotate the low speed shaft (fig. 43) and tap on the drum shaft from the front (threaded end). Remove the main drive gear assembly (5, fig. 44).

b. Replacement. To replace the capstan drum and the main drive gear assembly reverse the procedure described in *a* above.

56. Assembly and Disassembly of Take-Up Winch (figs. 46 and 47)

a. Disassembly.

(1) Remove the 1 1/16-inch lock nut (fig. 46) from the gear assembly mounting shaft.

(2) Release the latch and remove the lock pin.

(3) Remove the gear assembly mounting shaft by tapping the shaft gently on the threaded end with a block of wood or a mallet. Catch the guard, spacers, collar and gear assembly as they come free of the shaft.

(4) The spur gear and sheaves (2, fig. 47) that make up the gear assembly may be further disassembled by removing the two spring pins that fasten them together.

(5) Use a screw driver and remove the spring clip (fig. 46) that retains the worm drive shaft.

(6) Turn the worm drive shaft until the key that locks the worm gear (13, fig. 47) to the worm drive shaft is aligned with the cut-out (fig. 46) in the take-up winch casting.

(7) Remove the worm gear by tapping the worm drive shaft through the casting from the spring clip end. Catch the worm gear as it comes free from the shaft.

b. Assembly. To assemble the take-up winch reverse the procedures described in *a* above.

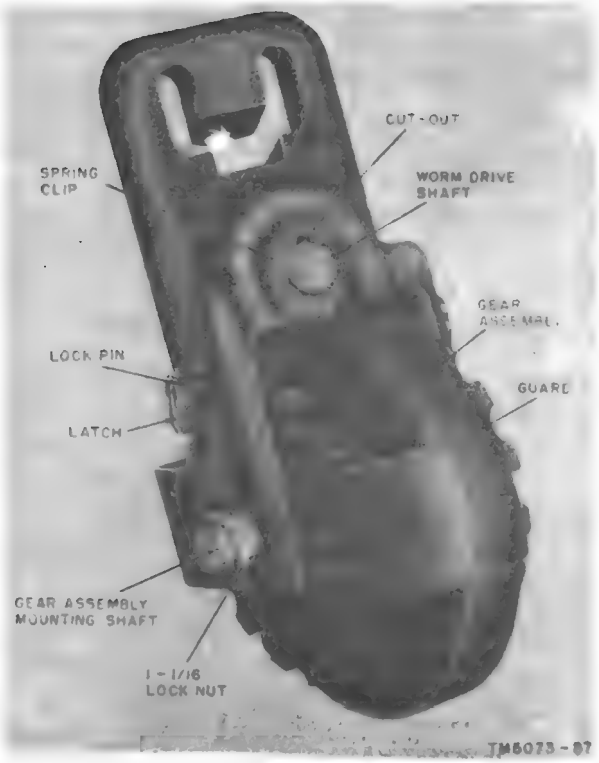
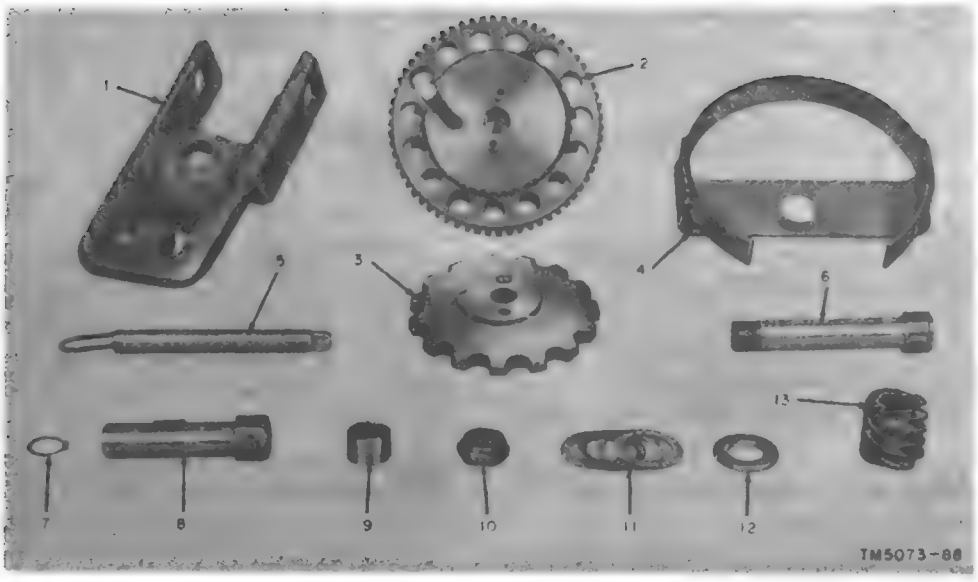


Figure 46. Take-up winch assembled.

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1 Take-up winch casting
2 Spur gear
3 Sheave (2)
4 Guard
5 Lock pin
6 Gear assembly mounting shaft
7 Spring clip
8 Worm drive shaft
9 Collar
10 1 1/16-inch lock nut
11 Spacer (4)
12 Washer
13 Worm gear

Figure 47. Take-up winch, disassembled.

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CHAPTER 5

SHIPMENT AND STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND STORAGE

57. Disassembly of Tower

In general, the procedure for disassembling the tower is the reverse of the installation procedure. Follow the instructions described below to disassemble the tower.

a. Install the davit for heavy duty operation (par. 25).

b. Select one of the methods described in paragraph 27, and remove the antennas and antenna supports (par. 45).

c. Remove the scaffold tower bracket by reversing the procedure described in paragraph 35.

d. Adapt the davit for normal lifting (par. 25) and remove the tower sections by reversing the procedures described in paragraph 29. Be sure to place the interlock clip in the storage hole (fig. 24), to prevent it from being lost.

e. When a guy level is reached, remove the guys (par. 44) and lower them to the ground.

Note. Do not detach any guys until the tower section to which they are attached is about to be removed and lowered to the ground.

f. Remove the guys from the take-up winches (par. 46) and then remove the guy spacers from the take-up winch and anchor.

g. Remove the ground rods and the grounding wire attached to the lowest tower section.

h. Lift Tower Section AB–208/U off the base plates. Remove the lag screws that fasten the base plates to the support timbers and remove the base plates.

i. Remove the anchors as described in paragraphs 47 and 48.

58. Repacking for Shipment and Limited Storage

a. If original packing materials are on hand, use them and reverse the unpacking procedures given in paragraph 15. General repacking information is usually available at depots.

b. The prime requirement is to pack the equipment to prevent damage during transit or limited storage. Package the equipment securely and use sufficient wadding to minimize the effects of severe jolting. Make sure that the tensiometer and tools are protected from the weather.

Section II. DEMOLITION TO PREVENT ENEMY USE

59. General

The demolition procedures in paragraph 59 should be used to destroy the tower and its components to prevent its being used or salvaged by the enemy. Demolition of this equipment will be accomplished only upon order of the commander.

60. Methods of Destruction

Use any or all of the following methods to destroy the tower.

a. Smash. Smash the tower sections and all other tubular components of the tower, take-up winches, the davit, the capstan casting, chest and tools; use sledges, axes, pickaxes, hammers, crowbars, or other heavy tools.

b. Cut. Cut all guys and ropes; use axes or machettes.

c. Explosives. Fasten blocks of TNT to the vertical members of the tower sections and detonate.

d. Disposal. Bury or scatter the destroyed parts in slit trenches, fox holes, or throw them into streams or rivers.

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	Paragraphs	Page
AB–206/U, Tower Support Base Plate. (*See* Tower Support Base Plate AB–206/U.)		
AB–207/U, Tower Section. (*See* Tower Section AB–207/U.)		
AB–208/U, Tower Section. (*See* Tower Section AB–208/U.)		
AB–216/U, Tower. (*See Tower* AB–216/U.)		
AB–296/G, Antenna Support. (*See* Antenna Support AB–296/G.)		
AB–298/U, Tower Section Set. (*See* Tower Section Set AB–298/U.)		
Accessory Kit MK–100/U:		
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Use	3*b*	3
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Use	30*a*(5)	40
Anchor:		
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Using Truck V–18A/MTQ	23*b*	20
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For explanation of abbreviations used, see SR 320–50–1.

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