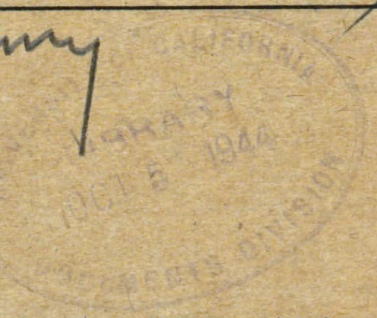


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1943

# TM 11-429

WAR DEPARTMENT TECHNICAL MANUAL

U.S. Dept. of Army



## WIND EQUIPMENT SCM-20-A

AND

## WIND EQUIPMENT AN/GMQ-1

WAR DEPARTMENT • 10 MARCH 1943

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*U.S. War Dept.*

NOV 1 1944

**TECHNICAL MANUAL  
WIND EQUIPMENT SCM-20-A**

**AND**

**WIND EQUIPMENT AN/GMQ-1**

CHANGES }  
No. 1 }

WAR DEPARTMENT,  
WASHINGTON 25, D. C., 25 September 1944.

TM 11-429, 10 March 1943, is changed as follows:

The date of this manual is changed to read: 10 March **1944**, wherever it occurs.

**5. WIND PANELS ML-204-A AND ML-204-B (figs. 3 and 4).**

\* \* \* \* \*

b. The wind-speed meter \* \* \* ma d-c movement. It has two external resistors that are controlled by the toggle switch mounted below it, to give the necessary calibration for the two ranges (par. 1c) of the instrument. Normally the switch is in the 150-mph range position.

**6. CARRYING CASES ML-207A and ML-207-B.**

a. Carrying Case ML-207-A contains the disassembled wind transmitter (par. 2a), the wind panel, and the set of running spares (par. 2c), of Wind Equipment SCM-20-A.

b. Carrying Case ML-207-B contains the disassembled wind transmitter (par. 3a), the wind panel, and the set of running spares (par. 3c), of Wind Equipment AN/GMQ-1.

\* \* \* \* \*

**8. SUPPORT ML-206-A.** Support ML-206-A \* \* \* provided with steps. It has additional accessories (par. 3e) for mounting on the ground as well as mounting on either roof or platform.

**11. UNPACKING.**

\* \* \* \* \*

c. Carry the other \* \* \* support when unpacking. Check the parts with those listed in paragraph 2e for SCM-20-A, or paragraph 3e for AN/GMQ-1.

**15. ASSEMBLING WIND TRANSMITTER.**

\* \* \* \* \*

b. Assemble the transmitter as follows:

\* \* \* \* \*

(8) Check the running spares (par. 2c) left in the case. Close the carrying \* \* \* parts are needed.

\* \* \* \* \*

**20. FINAL WIRING ADJUSTMENT.**

\* \* \* \* \*

d. Finally, close the panel and lock the wing clamps (par. 14d(3)).

**27. ANEMOMETER HEAD.**

\* \* \* \* \*

b. If a wind \* \* \* replace the assembly.

\* \* \* \* \*

(2) Remove the faulty \* \* \* the new assembly.

(a) On Support ML-205-A, simply climb the mast, loosen the thumbscrew, and lift off the old head and rotor. Put the new \* \* \* paragraph 15b(3).

\* \* \* \* \*

**36. (SUPERSEDED) MAINTENANCE PARTS LIST.**

NOTE: Order maintenance parts by stock number, name, and description. Only maintenance parts can be requisitioned.

AGO 527C

Ref. figure	Signal Corps stock No.	Name of part and description	Quan. per unit	Mfrs. part and code No.	Station stock	Region stock
Fig. 5	7A2023A/R1	<i>WIND TRANSMITTER ML-203-A and ML-203-B.</i> RESISTOR ASSEMBLY: consists of wirewound resistor and collector ring on 4-prong base plug; special.	1	WT-334 B	(*)	(*)
Fig. 5	7A2023A/C2	CONTACT ASSEMBLY: consists of 4 contacts mounted on a phenolic plate; special.	1	WT-312 B	(*)	(*)
Fig. 2	7A2023A/V1	VANE TAIL ASSEMBLY: consists of vane tail with locknut for mounting tail to vane shell; special.	1	WT-204 B	---	(*)
Fig. 13	3H305-14	BEARING: radial; $\frac{3}{4}$ " bore; $1\frac{1}{2}$ " OD, $\frac{5}{16}$ " wide; special; (provides bearing surface for rotation of wind vane shell).	2	S8-R D	---	(*)
Fig. 2	7A2023A/A1	ANEMOMETER HEAD: consists of bearing assembly complete in phenolic mounting, generator unit, and associated gear train; special; Signal Corps dwg. 74-58.	1	---	(*)	(*)
Fig. 12	7A2023A/B1	BEARING ASSEMBLY: less shaft; complete in phenolic housing which contains small radial bearing, rotor shaft, retaining nut with coupling No. 12-28 thread; special; Signal Corps dwg. 74-58.	1	---	---	(*)
Fig. 2	7A2023A/R.2	ROTOR: cup; consists of 3 plastic cups mounted on a spider; special; Signal Corps dwg. 74-58.	1	---	(*)	(*)

\*Indicates stock available.

Ref. figure	Signal Corps stock No.	Name of part and description	Quan. per unit	Mrs. part and code No.	Station stock	Region stock
Fig. 12	7A2023A/S1	SHAFT ASSEMBLY: 2.381" long; threaded at both ends: one end threaded 1/4", 12-24 threaded, National Fine; other end threaded 3/16", 10-32, National Fine; bushing 7/8" diam at end of 9/16" threaded portion; 2 pins on bushing 0.120" high to fit into cup rotor spider; special; Signal Corps dwg. 74-58. NUT: cap; phenolic; No. 10-32 tap. N. F. (holds cup rotor to anemometer head).	1			(*)
	7A2023A/N1		1	Dayton Insulating Molding Co. No. 116 3/4.	(*)	(*)
	7A2023A/W1	WASHER: flat; rubber and steel, zinc-plated; 0.281" ID, 1.1879" OD, 0.0641" thick (seals locking pin holes).	1	70344 A	(*)	(*)
	7A2023A/S5	SPRING: retainer; steel, nickel-plated (provides tension between washer and nut).	1	70276 A	(*)	(*)
		WIND PANEL ML-204-A and ML-204-B				
	3Z9692-3	SWITCH: toggle, SPST	2	20992 K or Bud Radio SW-1003.		(*)
Fig. 4	3F891-41	AMMETER: 0- to 1-milliamper; calibrated in double-range mph scale, 0-25 mph, 0-150 mph; supplied with 2-fixed noninductive calibrating resistors of 44,300 ohms and 9,700 ohms, respectively; special.	1	301 F		(*)
Fig. 4	7A2009-204A/W1	INDICATOR: wind direction; d-c self-synchronous repeater; special scale showing direction of wind through 360° of rotation; special.	1	807 H		(*)

Ref. figure	Signal Corps stock No.	Name of part and description	Quan. per unit	Mfrs. part and code No.	Station stock	Region stock
Fig. 10	7A1743-206A/S1	<p><i>SUPPORT ML-205-A and ML-206-A</i></p> <p>STAKES: ground; steel; bonderized; channel; special; parts of Support ML-206-A only.</p> <p>CAP: driving; malleable iron; certified; weight for No. 3 or No. 3½ post; weighs 2¼ lbs; part of Support ML-206-A only.</p> <p>CLAMP: cable guy; drop-forge finish; cadmium-plated; for 3/16" diam. wire rope.</p>	4	M		(*)
Fig. 10	7A1743-206A/C1		1	O	(*)	(*)
Fig. 7	5B3553		4	3 N	(*)	(*)

\*Indicates stock available.

[A. G. 300.7 (10 Aug 44).]

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**TM 11-429**

**C 1**

**BY ORDER OF THE SECRETARY OF WAR:**

**G. C. MARSHALL,**  
*Chief of Staff.*

**OFFICIAL:**

**J. A. ULIO,**  
*Major General,*  
*The Adjutant General.*

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IBn 1; T/O & E 1-627.

IC 3; T/O & E 3-267.

For explanation of symbols, see FM 21-6.

WAR DEPARTMENT TECHNICAL MANUAL

T M 11-429

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WIND EQUIPMENT  
SCM-20-A

AND

WIND EQUIPMENT  
AN/GMQ-1

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WAR DEPARTMENT •

10 MARCH 1943

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WAR DEPARTMENT,  
WASHINGTON 25, D. C., 15 MAY, 1943

TM 11-429, War Department Technical Manual, Wind Equipment  
SCM-20-A and Wind Equipment AN/GMQ-1 is published for the in-  
formation and guidance of all concerned.

[A.G. 062.11 (27 Feb 43).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,  
*Chief of Staff.*

OFFICIAL:

J. A. ULIO,  
*Major General,*  
*The Adjutant General.*

DISTRIBUTION:

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(For explanation of symbols see FM 21-6.)

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## **DESTRUCTION NOTICE**

**WHY** —To prevent the enemy from using or salvaging this equipment for his benefit.

**WHEN**—When ordered by your commander.

**HOW** —1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools, etc.

2. Cut —Use axes, handaxes, machete, etc.

3. Burn —Use gasoline, kerosene, oil, flame throwers, incendiary grenades, etc.

4. Explosives—Use fire arms, grenades, TNT, etc.

5. Disposal —Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

### **Use Anything Immediately Available For Destruction of This Equipment.**

**WHAT**—1. Smash—Wind panel, anemometer heads, cup rotors, spare resistor, and contact assemblies.

2. Cut —Guy cables, wires, etc.

3. Burn —Wooden cases and other combustible material.

4. Bend —Mast sections, vane tail, and counterbalance.

5. Bury or scatter—Any or all of the above pieces left after burning.

## **DESTROY EVERYTHING**

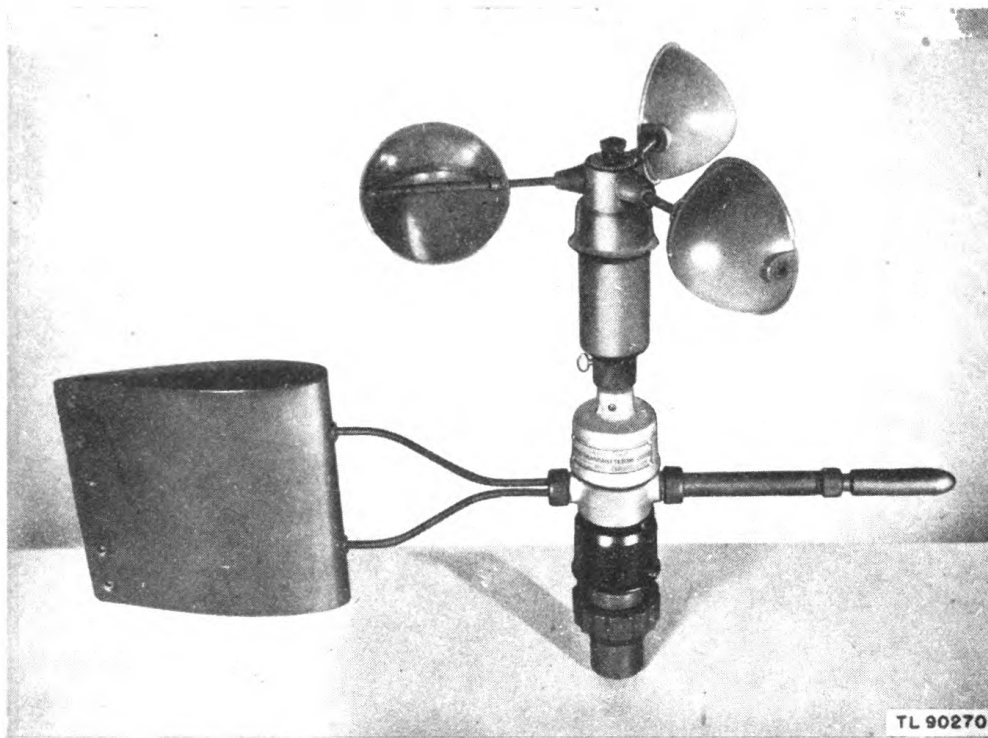


Figure 1. Wind Transmitter ML-203-A or ML-203-B, assembled.

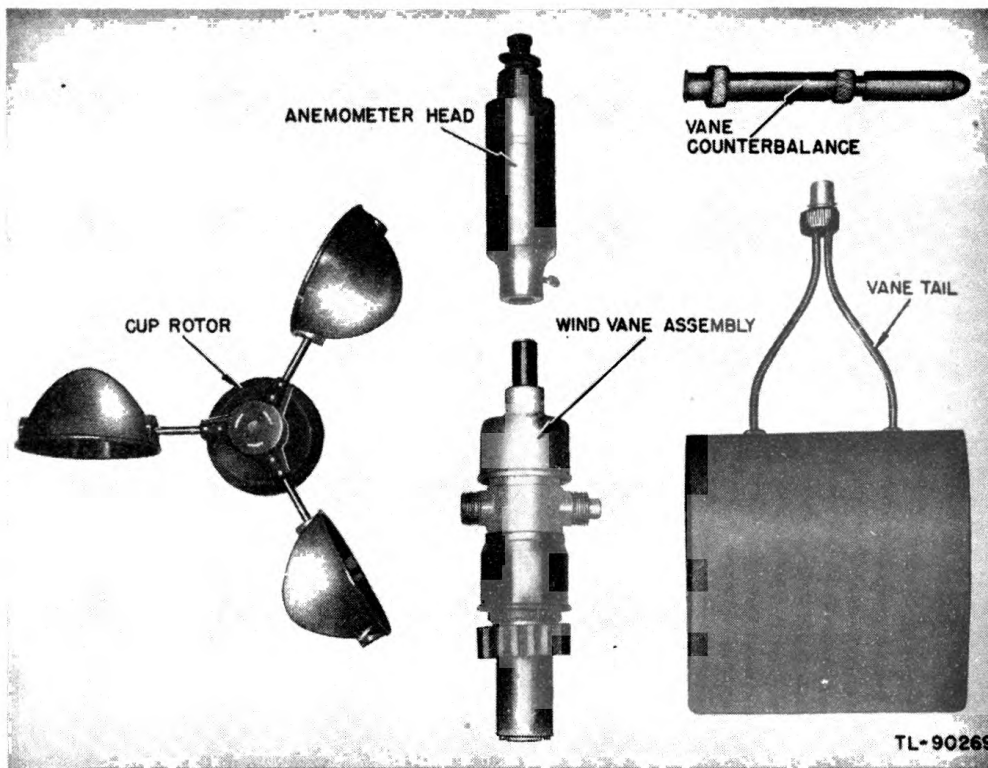


Figure 2. Wind Transmitter ML-203-A or ML-203-B, disassembled.

# SECTION I

## DESCRIPTION

---

### 1. GENERAL.

*a.* Wind Equipment SCM-20-A and Wind Equipment AN/GMQ-1 are sets of equipment for measuring and remotely indicating the speed and direction of surface winds. Wind Equipment SCM-20-A is intended primarily for permanent attachment to airdrome control towers. Wind Equipment AN/GMQ-1 is intended primarily for semi-permanent installations at weather stations.

*b.* Wind Equipment SCM-20-A and Wind Equipment AN/GMQ-1 differ only in the type of support used. The wind transmitter and wind panel units used by each equipment are identical in construction and appearance, and the parts of each are completely interchangeable.

*c.* The wind speed indicator of both sets of equipment is a meter calibrated in two scales: one from the starting speed of approximately 2 miles per hour (mph) to 30 mph; the other from the starting speed to 150 mph.

*d.* The wind direction indicator of both sets of equipment is a meter calibrated in degrees for every 10° position of the compass, and the cardinal and inter-cardinal letters are included on the dial.

*e.* The wind speed transmitter of both sets of equipment has an over-all speed accuracy of  $\pm 1\frac{1}{2}$  mph from the starting speed to 30 mph,  $\pm 3$  mph from 30 mph to 75 mph, and the accuracy from 75 mph to 150 mph is 4 percent of the scale reading.

### 2. COMPONENTS OF WIND EQUIPMENT SCM-20-A.

- a.* Wind Transmitter ML-203-A (fig. 1), which consists of (fig. 2):
- 1 cup rotor
  - 1 anemometer head
  - 1 wind vane assembly
  - 1 vane tail
  - 1 vane counterbalance
- b.* Wind Panel ML-204-A (figs. 3 and 4).

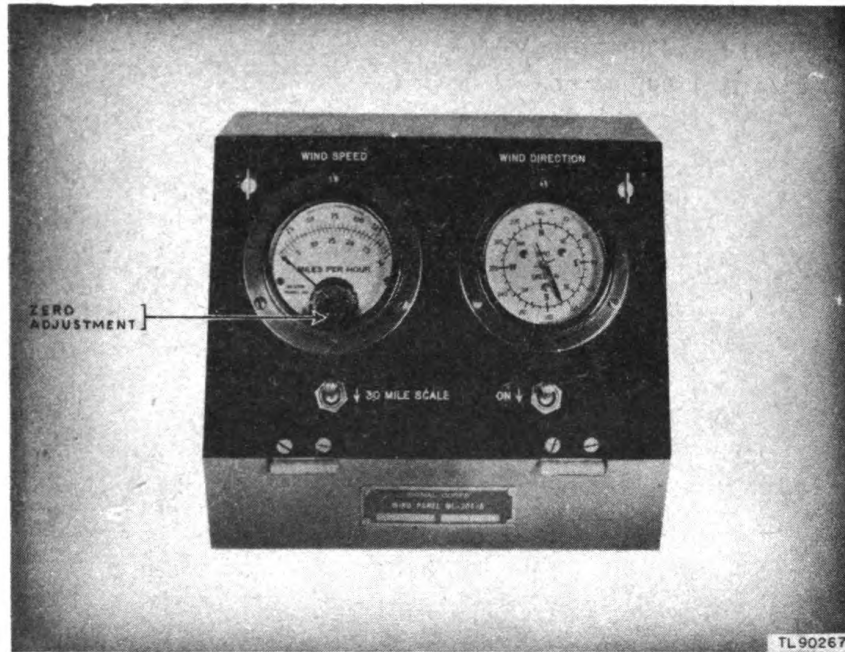


Figure 3. Wind Panel ML-204-A or ML-204-B.

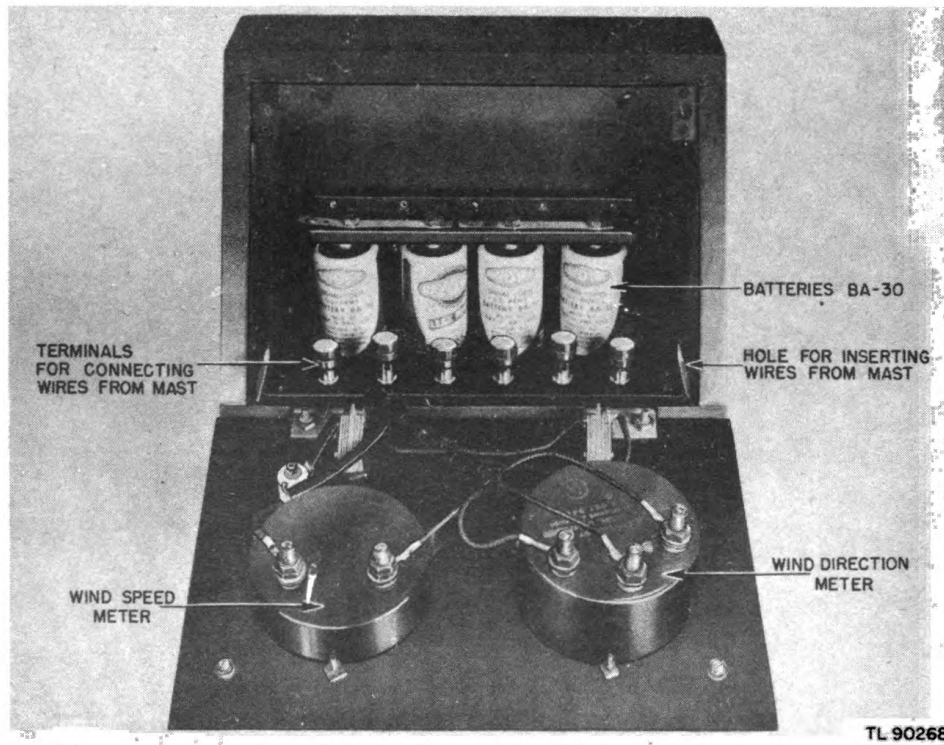


Figure 4. Wind Panel ML-204-A or ML-204-B, opened.



- c. A set of running spares, which consists of:
  - 1 cup rotor
  - 1 anemometer head
  - 2 wind vane resistor assemblies
  - 1 wind vane contact assembly
- d. Carrying Case ML-207-A for transporting Wind Transmitter ML-203-A, Wind Panel ML-204-A, and the set of running spares.
- e. Support ML-205-A, which consists of:
  - 1 top mast section
  - 1 bottom mast section
  - 1 mast base
  - 4 roof brackets
  - 4 guy wire assemblies
  - 4 wire clamps
  - 4 eyebolts with handnuts and swivel rods
  - 10 lag screws
- f. Wire W-110-B (600 feet).

### 3. COMPONENTS OF WIND EQUIPMENT AN/GMQ-1.

- a. Wind Transmitter ML-203-B (fig. 1), which consists of (fig. 2):
  - 1 cup rotor
  - 1 anemometer head
  - 1 wind vane assembly
  - 1 vane tail
  - 1 vane counterbalance
- b. Wind Panel ML-204-B (figs. 3 and 4).
- c. A set of running spares, which consists of:
  - 1 cup rotor
  - 1 anemometer head
  - 2 wind vane resistor assemblies
  - 1 wind vane contact assembly
- d. Carrying Case ML-207-B for transporting Wind Transmitter ML-203-B, Wind Panel ML-204-B, and the set of running spares.
- e. Support ML-206-A, which consists of:
  - 1 top mast section
  - 1 middle mast section
  - 1 bottom mast section
  - 1 mast base
  - 4 roof brackets
  - 4 ground stakes

- 4 guy wire assemblies
- 4 wire clamps
- 4 eyebolts with handnuts and swivel rods
- 10 lag screws
- 2 stakes GP-2
- f. Wire W-110-B (600 feet).
- g. Carrying Case ML-208-A for transporting Support ML-206-A and Wire W-110-B.

#### **4. WIND TRANSMITTERS ML-203-A and ML-203-B (figs. 1 and 2).**

a. Wind Transmitter ML-203-A is the measuring and transmitting unit for Wind Equipment SCM-20-A. Wind Transmitter ML-203-B is the similar unit for Wind Equipment AN/GMQ-1. They are identical in every respect. Each consists of an anemometer (an instrument that rotates with the wind to measure its speed) and a wind vane (an instrument that positions itself in the direction from which the wind is blowing). The anemometer and the wind vane are mounted in separate housings that are assembled together on the same central shaft, with the wind vane assembly below the anemometer.

b. The anemometer consists of a 3-cup rotor and an anemometer head. The cup rotor is mounted and held on the anemometer head by a cap nut. The anemometer head is essentially an a-c generator driven through suitable gearing by the cup rotor. The lower end of the anemometer head fits on, and has generator terminals that plug into, the top end of the central shaft of the transmitter.

c. The wind vane assembly consists of a vane tail and a counterbalance attached to a rheostat unit (fig. 5) mounted on the central shaft of the transmitter, with the shaft and the base of the transmitter as part of the assembly. The rheostat unit is essentially a low-voltage d-c telemeter.

d. The central shaft of the transmitter is screwed into the transmitter base. The base is provided with a loctal socket to which the rheostat unit of the wind vane assembly and the generator of the anemometer head are connected.

#### **5. WIND PANELS ML-204-A AND ML-204-B (figs. 3 and 4).**

a. Wind Panel ML-204-A is the indicating unit of Wind Equipment SCM-20-A. Wind Panel ML-204-B is the similar unit for Wind Equip-

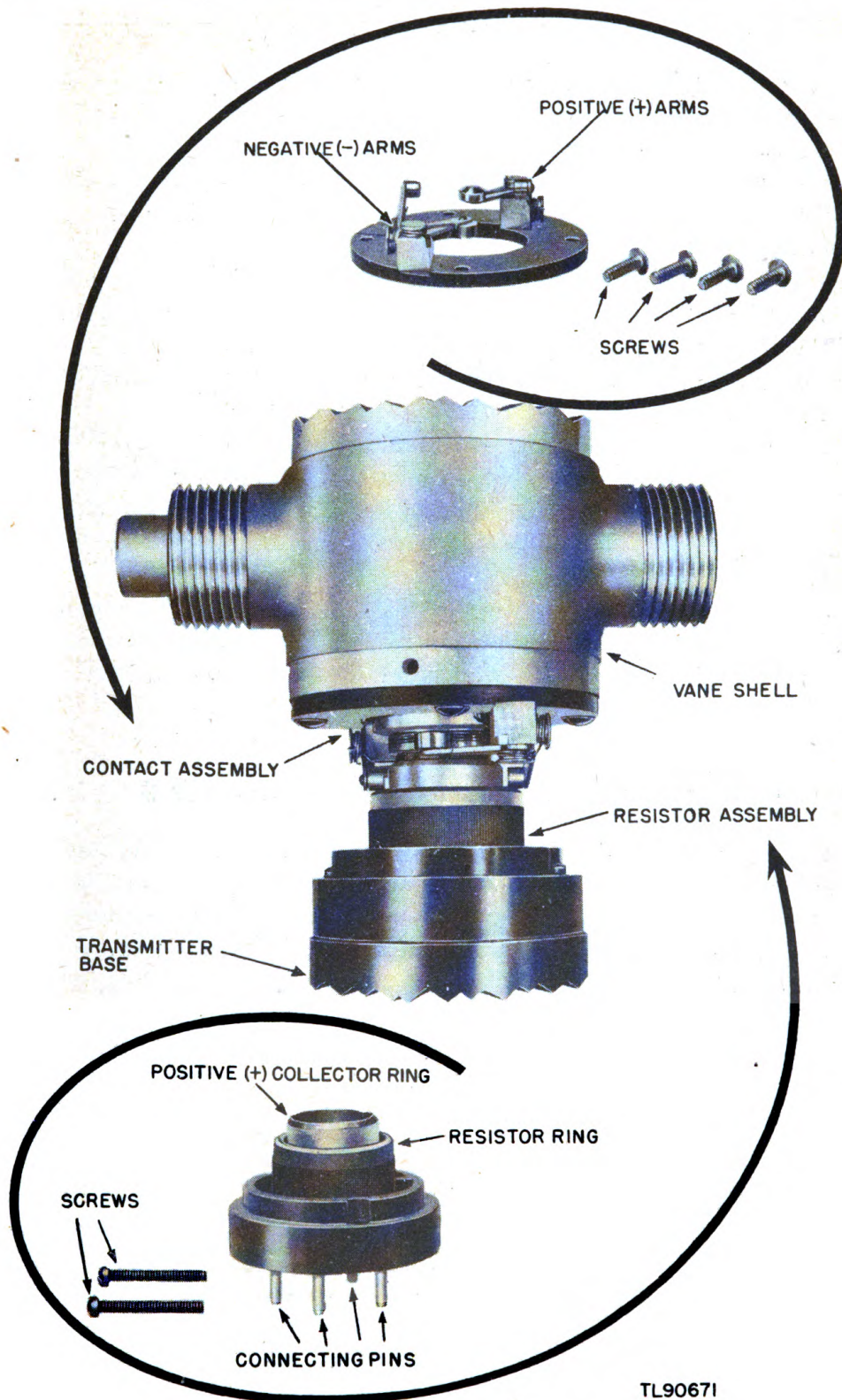


Figure 5. Wind vane rheostat assembly.

ment AN/GMQ-1. They are identical in every respect. Each consists of a small wooden box containing a rack for mounting dry batteries, and binding posts for connection of wires from the mast supporting the wind transmitter. The box has a hinged inclined panel on which is mounted a wind-speed meter, a wind-direction meter, and two single-pole toggle switches.

*b.* The wind-speed meter is a rectifier-type a-c milliammeter having a 1 ma d-c movement. It has two external resistors that are controlled by the toggle switch mounted below it, to give the necessary calibration for the two ranges (par. 1*b*) of the instrument. Normally the switch is in the 150-mph range position.

*c.* The wind-direction meter is a specially designed (par. 23) low-voltage d-c self-synchronous repeater. It is similar to the standard d-c aircraft self-synchronous repeater used for indications of aircraft control flap positions. (In an emergency, the standard 12- or 24-volt aircraft self-synchronous indicator can be substituted.)

*d.* The battery supply consists of four Batteries BA-30 connected in series-parallel to provide 3-volt output. The battery circuit is controlled by the panel toggle switch mounted below the wind direction meter. Normally the switch is in the off position.

## **6. CARRYING CASES ML-207-A and ML-207-B.**

*a.* Carrying Case ML-207-A contains the disassembled wind transmitter (par. 2*a* (1)), the wind panel, and the set of running spares (par. 2*a* (3)).

*b.* Carrying Case ML-207-B contains the disassembled wind transmitter (par. 2*b* (1)), the wind panel, and the set of running spares (par. 2*b* (3)), of Wind Equipment AN/GMQ-1.

*c.* The cases are made of wood, and are identical in construction. Each has a hinged cover fastened by a catch, and is provided with handles for carrying. The inside is provided with felt-lined compartments for safe storage of the contents.

## **7. SUPPORT ML-205-A.**

Support ML-205-A is the mast support of Wind Equipment SCM-20-A. It consists of a hinged mast base, two 5-foot sections of pipe, and a set of accessories (par. 2*a* (5)) for mounting on a roof or wooden platform. The base and pipe sections are provided with means for assembling and clamping them together. The upper end of the top section is fitted with a plug wired to a connection box on the side of the pipe. The bottom section is provided with handles for orienting the

equipment. Steps are provided on both sections to permit climbing the mast when it is raised. *Support ML-205-A is not intended for ground installation.*

**8. SUPPORT ML-206-A.** Support ML-206-A is the mast support of Wind Equipment AN/GMQ-1, and is provided with a special Carrying Case ML-208-A (par. 9). It consists of the same items that make up Support ML-205-A (par. 7), excepting that it has a third section of pipe for insertion between the bottom and top sections and none of the sections are provided with steps. It has additional accessories (par. 2b (5)) for mounting on the ground as well as mounting on either roof or platform.

**9. CARRYING CASE ML-208-A.** Carrying Case ML-208-A is a special case in which Support ML-206-A (par. 8) and Wire W-110-B of Wind Equipment AN/GMQ-1 are packed. It is a wooden case with a hinged cover fastened by catches, and has handles for carrying. The inside is arranged for the proper storage of the disassembled support and the wire. Note that Support ML-205-A of Wind Equipment SCM-20-A has no special carrying case.

## *SECTION II*

# *INSTALLATION*

*TM 11-429*  
*Par. 10-12*

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### **10. LOCATION.**

*a.* Select a location for the wind transmitter that is not shielded by buildings or trees and which is easily accessible for maintenance of the instrument.

*b.* Locate the wind panel inside a building or shelter of some sort where the initial wiring and subsequent routine observations can be made with ease. *Never expose the wind panel to outdoor conditions.*

### **11. UNPACKING.**

*a.* Either set of wind equipment ordinarily is packed in two crates.

(1) One of the two crates of Wind Equipment SCM-20-A contains Carrying Case ML-207-A, and the other contains Support ML-205-A and 600 feet of Wire W-110-B.

(2) One of the two crates of Wind Equipment AN/GMQ-1 contains Carrying Case ML-207-B, and the other contains Carrying Case ML-208-A (par. 9).

*b.* Carry the crate containing either Carrying Case ML-207-A or ML-207-B to the shelter in which the wind panel will be installed. Do not unpack this crate until ready to wire the wind panel (par. 14*d*).

*c.* Carry the other crate to the site selected for the support, and unpack it. (If Wind Equipment SCM-20-A is being handled, the support and wire will be packed directly in this crate; if Wind Equipment AN/GMQ-1 is being handled, this crate will contain Carrying Case ML-208-A in which the support and wire are packed). Take care not to overlook or lose small parts of the support when unpacking. Check the parts with those listed in paragraph 2*c* for SCM-20-A, or paragraph 3*c* for AN/GMQ-1.

### **12. INSTALLING SUPPORT ML-205-A (fig. 6).**

*a.* Place the mast base in the center of the platform or roof. Put the hinged socket in a horizontal position. If the roof or platform is smaller

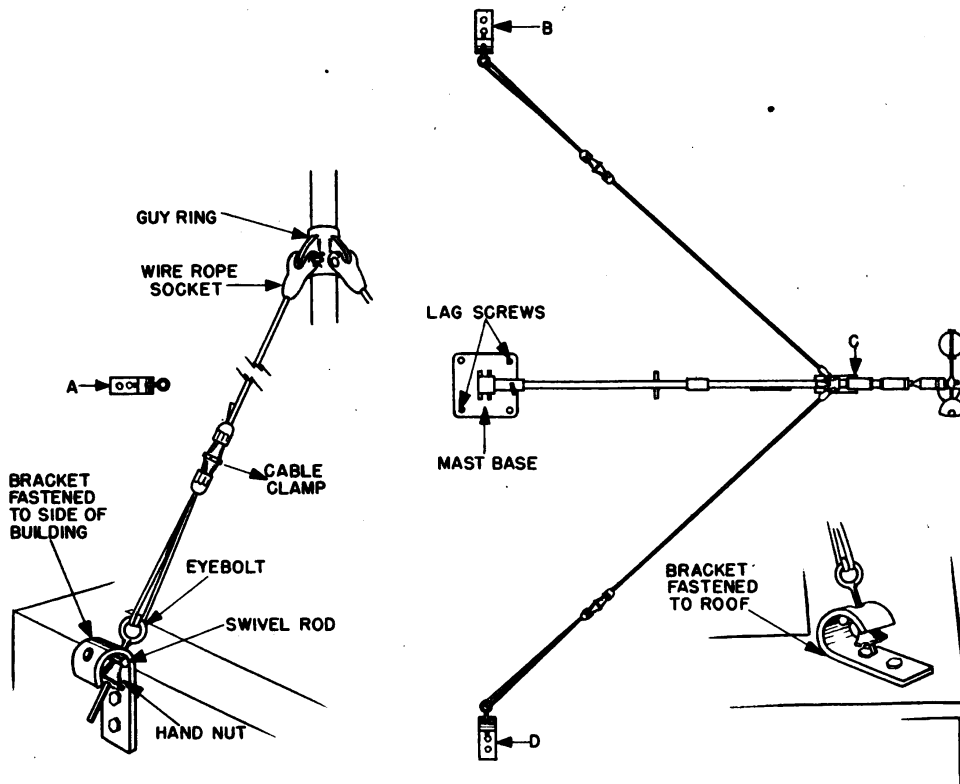
than 20 feet square, turn the base so the open end of the socket points toward a corner of the roof or platform. If the roof or platform is larger than 20 feet square, install the base in any position in the center of the area. Fasten the base with two of the lag screws provided with the support, using the two *small* holes in the base.

b. Fasten the roof brackets, which can be used either horizontally on the roof surface or vertically on the side of the building, as shown in the enlarged views in figure 6.

(1) If the roof or platform is smaller than 20 feet square, locate the brackets in the corners.

(2) If the space is larger, locate the brackets about 10 feet from the mast base and equally spaced around it, as shown at A, B, C and D in figure 6. Fasten the roof brackets with lag screws.

c. Insert an eyebolt through one of the holes in the curve of each bracket, and then slip on a swivel rod and screw on the handnut. Use the bracket hole nearest the end of the curve if the bracket is fastened on the roof; use the other hole if the bracket is fastened to the sidewall.



TL-90266

Figure 6. Support ML-205-A, showing assembly on roof or platform.

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d. Assemble the mast horizontally as follows:

(1) Insert the unslotted end of the bottom mast section (the one with the opposite slot and small hole located about one foot from the top end) into the hinged socket of the mast base. Make sure the clamp on the socket is loose enough for the section to be inserted easily, otherwise the socket may be damaged. Tighten the clamp on the socket.

(2) Loosen the clamp of the top mast section, and place the collar end over the bottom section, making certain that the pin inside the collar fits the slot in the end of the bottom section. Push the section down as far as it will go. Tighten the clamp. *Do not remove the cap from the end of the top section until ready to install the wind transmitter (par. 15c).*

e. Straighten out the four guy cables, and fasten them to the guy ring near the top of the mast. (The ring should turn freely on the mast. If it does not, lightly tap one of its lugs. Do not hit too hard or the lug may bend or snap off).

(1) Remove the cotter pin from the wire rope socket at one end of a guy cable and remove the connecting pin.

(2) Place the yoke of the socket over one of the lugs of the guy ring on the mast.

(3) Replace the connecting pin in the socket and through the hole in the guy ring lug. Replace the cotter pin and bend its ends so it cannot slip out.

(4) Repeat the steps in subparagraphs (1), (2), and (3) above, to fasten a guy cable to each of the three remaining lugs of the guy ring.

f. Connect the loose ends of three of the guy cables to eyebolts.

(1) Slip a cable clamp on the cable attached to the guy ring lug toward bracket B, figure 6.

(a) Unscrew the two nuts of the cable clamp, which is split lengthwise and divides into two halves when the nuts are unscrewed.

(b) Slip the cable end first through the nut with the larger hole, and then through the nut with the smaller hole.

(2) Insert the end of the cable into the eyebolt, and take a double turn through the eye, as shown in the enlarged view that is part of figure 6.

(3) Put the cable end back through the cable clamp nut that has the smaller hole, and then through the nut that has the larger hole.

(4) Place the split clamp sections over the wires between the nuts. Screw on the nuts. Pull up the slack in the cable and hand-tighten the nuts so the clamp prevents the wires from slipping.

(5) Repeat the steps in subparagraphs (1), (2), (3), and (4) above, to fasten the cable attached to the lug toward bracket D (fig. 6) to the eyebolt in that bracket.



(6) Repeat the steps in subparagraphs (1), (2), (3), and (4) above, to fasten the cable attached to the bracket on which the mast is resting, to the eyebolt in that bracket. Leave enough slack so the length of cable between the guy ring and the eyebolt is approximately the same as the lengths fastened to brackets B and D.

NOTE: The remaining guy cable is not fastened to bracket A until the mast is raised.

### 13. INSTALLING SUPPORT ML-206-A (fig. 7).

a. To mount Support ML-206-A on a roof or platform:

(1) The procedure is identical with that given in paragraph 12 for Support ML-205-A, except that a middle mast section is used between the bottom and top mast sections.

(2) Mount the middle section on the bottom section, and then the top section on the middle section. Proceed as instructed in paragraph 12d (2).

b. To mount Support ML-206-A on the ground:

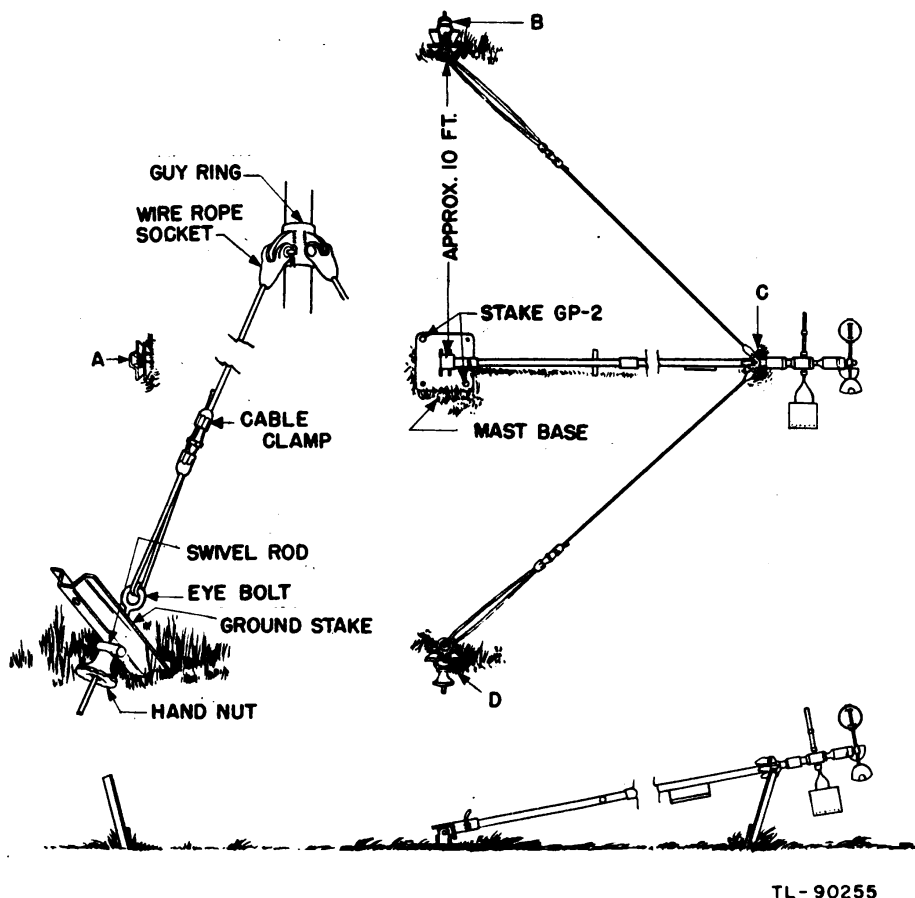
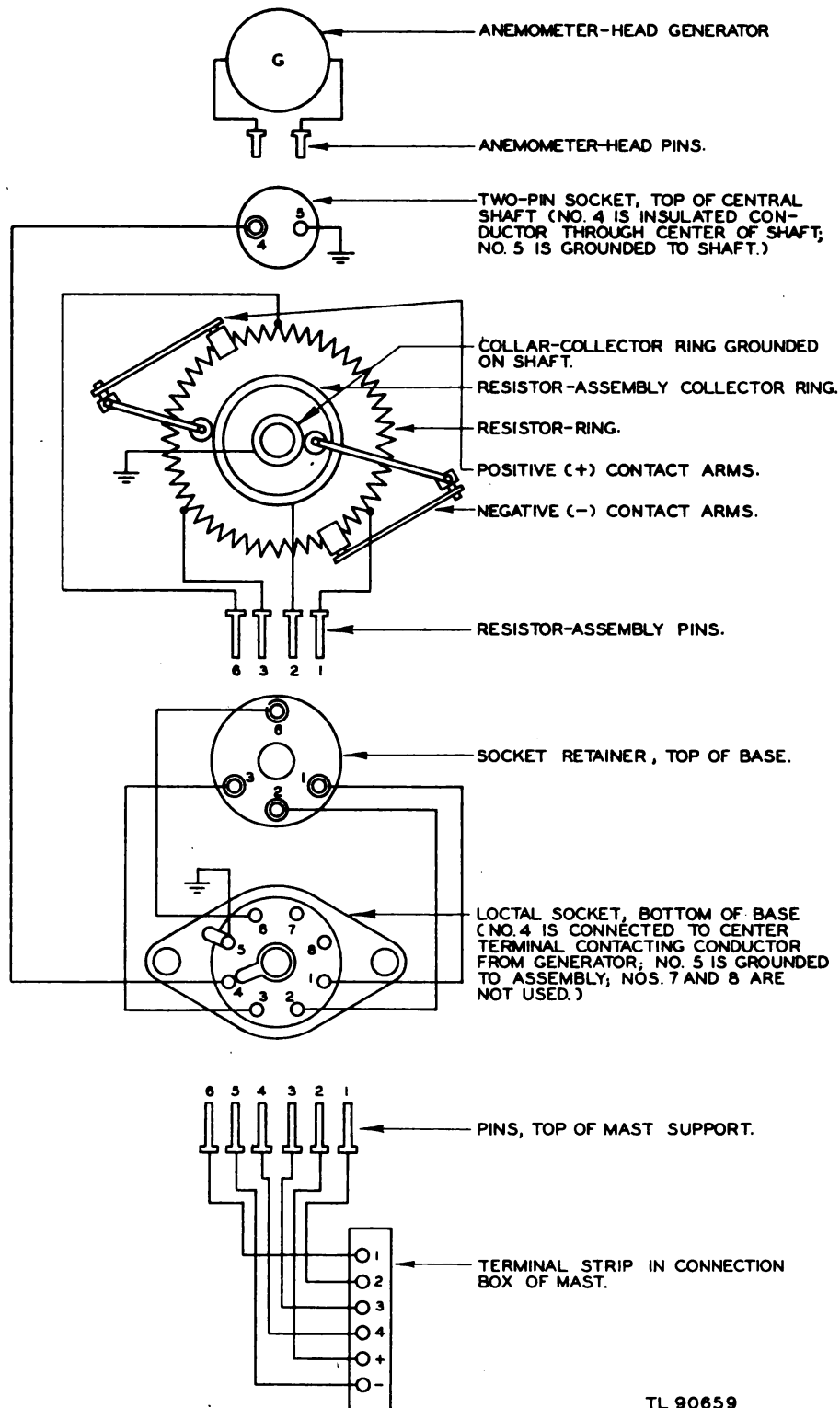


Figure 7. Support ML-206-A showing assembly on ground.



TL 90659

Figure 8. Wind Transmitter ML-203-A or ML-203-B and Support ML-205-A or ML-206-A, wiring diagram.

(1) Locate the mast base and drive two Stakes GP-2 into the ground through the two *large* holes in the base.

(2) . Locate the four large ground stakes about '10 feet away from the mast base and equally spaced around it (A, B, C, and D in fig. 7). Drive each stake firmly into the ground at about a 45° angle, with the top of the stake extending *away* from the direction of the mast base.

(a) Put the driving cap on top of each stake as it is being driven, to prevent damage to the stake, and be careful not to strike the spade portion of the stake. Never strike the stake a direct blow with the sledge hammer. If a driving cap is not available, use a piece of wood or some other flat solid object to protect the end of the stake.

(b) In soft ground, drive the stake in far enough to cover the spade; in hard ground, drive the stake in as far as possible. (On rocky ground where it is impossible to drive a stake, secure the guy wires to an imbedded rock or any other firmly rooted object.)

(4) Put eyebolts in the stakes, assemble the mast sections, and fasten the guy wires, the same way as instructed in paragraph 12 for Support ML-205-A, but remember to use the third mast section as instructed in subparagraph 13a (2) above.

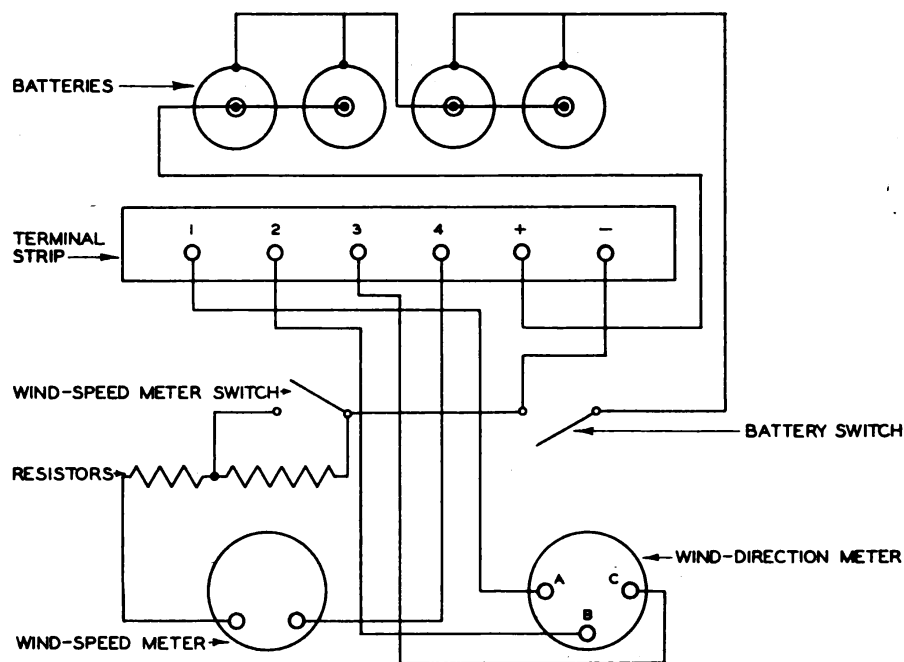


Figure 9. Wind Panel ML-204-A or ML-204-B, wiring diagram.

## 14. WIRING.

a. Three equal lengths of paired wires are required for wiring either Support ML-205-A or ML-206-A to either Wind Panel ML-204-A or ML-204-B.

(1) The 600 feet of Wire W-110-B that is provided is sufficient if the mast and wind panel are located within 185 feet (for SCM-20-A), or 190 feet (for AN/GMQ-1), of each other.

(2) The support and wind panel can be separated as far as 1000 feet from each other if sufficient wire is available.

b. Unwind the field wire from the spool and cut it into three equal lengths as follows:

(1) Place the spool on the ground so that it can roll, and anchor the end of the wire at the mast.

(2) Unwind the wire by rolling the reel along the ground in the direction of the location of the wind panel.

(3) Loop the wire around a stake or some other stationary object, and unwind more wire by rolling the spool back to the mast.

(4) Loop the wire around the mast, and unwind the remainder of the wire by rolling the spool in the opposite direction again.

(5) Cut the wire at the loops to obtain three approximately equal lengths of paired wires, with one end of each length at the mast and the other in the vicinity of the wind panel.

(6) Tie a knot at each end of one pair of wires, tie two knots at each end of another pair, and leave one pair unknotted. This will help identify the pairs after making connections at the mast.

c. Open the hinged cover of the connection box on the side of the top section of the mast, and insert the ends of the wires at the mast through the hole in the bottom of the box. Connect the wires to the terminals (fig. 8).

(1) Connect one wire (of the pair that has one knot at each end) to terminal No. 1, and connect the other to terminal No. 2.

(2) Connect one wire (of the pair that has two knots at each end) to terminal No. 3, and connect the other to terminal No. 4.

(3) Connect one wire of the remaining pair (unknotted at the ends) to the terminal marked plus (+), and connect the other to the terminal marked minus (-).

(4) Close and fasten the cover of the connection box on the mast. Gather the wires running from the box and twist them into the spiral hooks provided on the mast, so they will be fastened to the mast when it is raised (fig. 10).

d. Remove Carrying Case ML-207-A or ML-207-B from the crate at the site intended to install the wind panel. Remove the wind panel from the case. *Handle it with care.* Set the wind panel on its base on a table or shelf, or use the holes in the back of the box and screw or bolt it on a wall. Then connect the wires from the mast.

(1) Open the hinged front panel by twisting  $\frac{1}{4}$ -turn (counterclockwise) the small wing clamp in each upper corner. Do not let the panel drop down. Lower it gently.

(2) Insert the three pairs of wires from the mast into the box through either of the side holes (fig. 4). Connect the wires to the terminals (fig. 9).

(a) Connect one wire (of the pair that has one knot) to terminal No. 1, and connect the other to terminal No. 2.

(b) Connect one wire (of the pair that has two knots) to terminal No. 3, and connect the other to terminal No. 4.

(c) Connect one wire (of the unknotted pair) to the terminal marked plus (+), and connect the other to the terminal marked minus (−), in the box.

(3) Close the front panel and push and turn each wing clamp until its end is felt to engage the wire, then lock by twisting  $\frac{1}{4}$ -turn clockwise.

## 15. ASSEMBLING WIND TRANSMITTER.

a. Wind Transmitters ML-203-A and ML-203-B are stored in their respective Carrying Cases ML-207-A and ML-207-B in a disassembled condition. The parts required for one complete wind transmitter assembly are shown in figure 2.

b. Assemble the transmitter as follows:

(1) Remove the wind vane assembly from the carrying case and spin the vane shell to see that it turns easily. (The vane shell is that part of the assembly which has two threaded hub projections. If the shell does not turn easily, *do not force it.* Send it to the nearest mobile or fixed repair depot where the necessary tools are available.)

(2) Remove the anemometer head from the carrying case, and loosen but do not remove the thumbscrew from the socket at the lower end.

(3) Place the lower end of the anemometer head over the slotted shaft at the top of the wind vane assembly. Do not force the head on the shaft. Rotate the head until the pin in the lower end fits the slot in the shaft, and the head will slip on easily. Tighten the thumbscrew. Make it hand-tight only. *Do not use a tool.*

(4) Remove the vane tail from the carrying case and insert its small-cylinder end into the hollow hub on the side of the wind vane assembly.

Take care that the two pins on the cylinder are lined up with the slots in the end of the hub. Screw on the union nut. Make it hand-tight only.

(5) Remove the counterbalance from the carrying case and slip its open end over the hub on the opposite side of the wind vane assembly. Screw on the union nut. Make it hand-tight only.

(6) Grasp the top and bottom ends of the wind transmitter, and hold the transmitter horizontally. The counterbalance must balance the vane tail. Loosen the union nut in the center of the counterbalance and move the weighted end of the counterbalance in or out a ways in the tube until correct balance is obtained. Tighten the union nut. Make it hand-tight only.

(7) Remove one cup rotor from the carrying case and lay it aside.

(8) Check the running spares (par. 2a (3)) left in the case. *Immediately requisition any parts that are missing.* Close the carrying case and put it away where it will be convenient when spare parts are needed.

c. Take the assembled transmitter (minus the cup rotor) to the mast, and attach it.

(1) Remove the screw cap from the end of the mast and screw in cap lug-on side of support for future use. (Fig. 10.)

(2) Insert the lower end of the transmitter assembly into the end of the mast, taking care that the key on the side of the transmitter base fits into the slot provided in the end of the mast. Tighten the union nut. Make it hand-tight only. *Do not use a wrench.*

## 16. PRELIMINARY WIRING ADJUSTMENT.

a. Open the wind panel and install four Batteries BA-30 in the rack that is provided.

(1) Hold a battery by the top and place the bottom against one of the base springs in the rack.

(2) Press down to compress the spring enough to slip the top of the battery under the top of the rack. Release the battery and the spring will hold it in place.

(3) Repeat the steps in subparagraphs (1) and (2) above to install a battery in each of the remaining three stalls of the rack.

(4) Close the panel but do not lock the wing clamps.

b. Hold the battery switch (the one below the wind-direction meter) down to ON. If the wind-speed meter shows a reading, it indicates that the wires are incorrectly connected to the panel terminals.

(1) Open the panel and transpose the wires connected to terminals 3 and 4. Close the panel.

- (2) If the meter still shows a reading when the battery switch is ON, open the panel again and transpose the wires connected to the plus (+) and minus (—) terminals. Close the panel.
- (3) If the meter still shows a reading when the switch is ON, open the panel and again transpose the wires connected to terminals 3 and 4. Close the panel.
- (4) If the meter still reads, repeat steps (1), (2) and (3) above; if that fails, recheck the wiring to the mast.

## 17. ATTACHING CUP ROTOR.

- a. Take the cup rotor to the mast and attach it to the wind transmitter.
  - (1) Remove the cap nut from the top of the anemometer head, and remove the spider spring and washer located under it.
  - (2) Fit the hub of the cup rotor over the threaded shaft of the anemometer head, taking care to line up the two pins there with the two holes in the hub. The shield on the rotor should extend down over the anemometer head (fig. 1).
  - (3) Replace the washer and then the spider spring.
  - (4) Replace the cap nut and tighten it. Make it hand-tight only. It is likely to break if tightened with a tool.

## 18. RAISING MAST.

a. Lift the top end of the mast high enough to stand directly beneath it, and face the mast base. Walk forward and raise the mast hand over hand until it is upright. (Another man can aid by pulling on the loose guy cable.)

- b. Fasten the loose guy cable to its bracket or stake.
  - (1) Slip the remaining cable clamp on the cable.
  - (2) Insert the end of the cable into the eyebolt fastened to bracket or stake A (figs. 6 and 7) and take a double turn through the eye, as shown in the enlarged views.
  - (3) Put the cable end back through the clamp, pull up the slack, and tighten the nuts on the ends of the clamp to hold the cable.

c. Adjust each guy cable until the mast is as nearly vertical as can be judged by the eye. Figure 10 shows the mast raised on the ground.

- (1) Loosen the cable clamp, pull up the slack or pay out more cable, as the case may be, and then tighten the clamp. (For permanent installa-

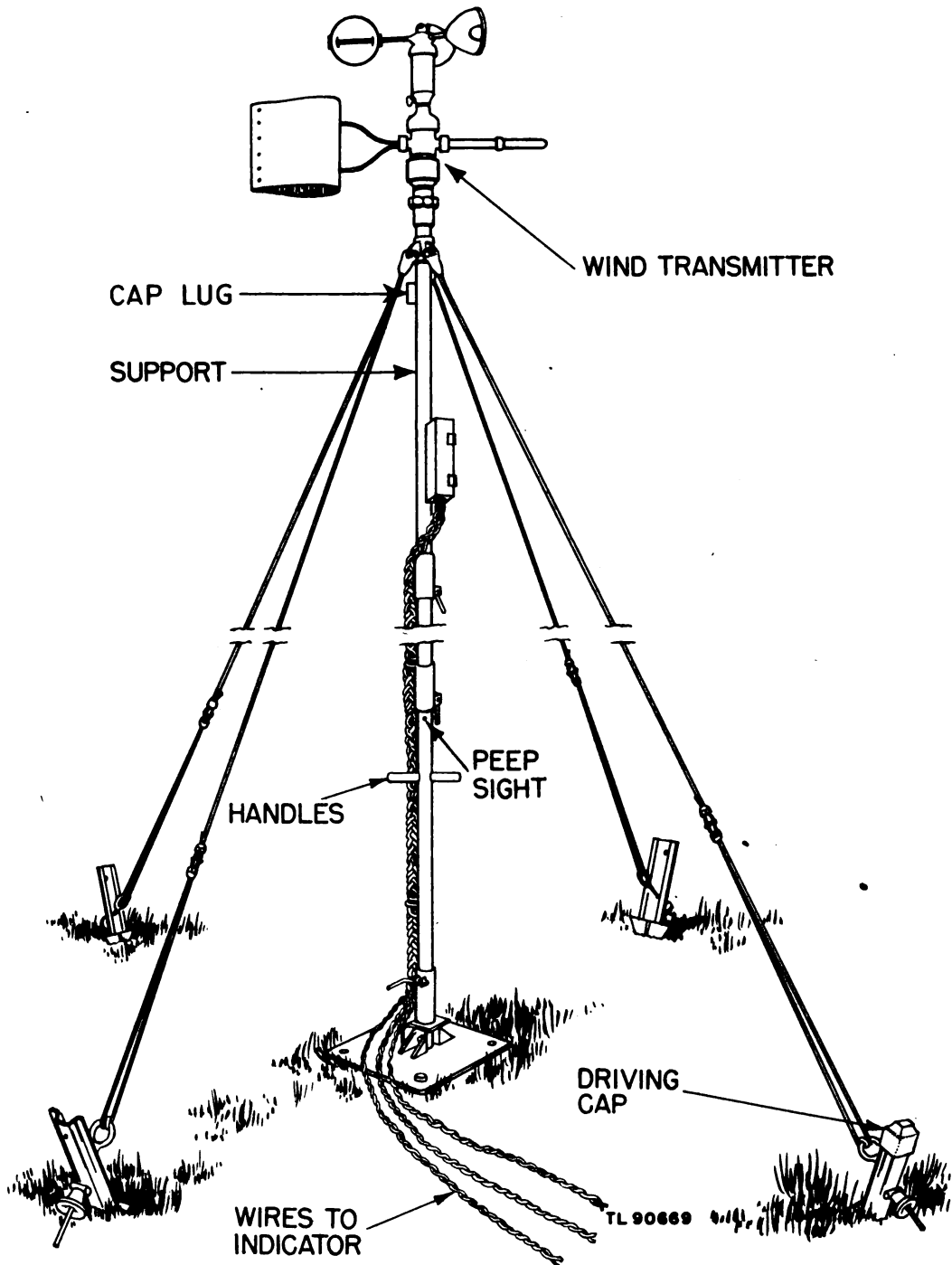


Figure 10. Support ML-206-A, showing assembly in raised position on ground. On a roof or platform, brackets instead of stakes are used to fasten guy cables, and screws instead of stakes are used to fasten mast base.



tions where wind is extremely severe, use a pair of wrenches or two pairs of pliers to tighten the clamp.)

(2) Finally, make the cable taut by adjusting the eyebolt hand nut.

## 19. ORIENTING.

a. It is necessary to orient the raised mast so the wind vane assembly can indicate true direction.

(1) Determine the *true* north direction from the mast, using a compass if necessary and allowing for the magnetic declination of the locality.

(2) About 100 feet away from the mast and on a line *due north* from it, locate a natural landmark or drive a stake into the ground.

b. Loosen the clamp on the mast base (fig. 10) so the mast can be turned in the socket, and sight the mast on the due north object.

(1) Stand at the mast and sight through the small hole located near the top of the bottom mast section. (The eye must be at the hole, not at the slot on the opposite side.)

(2) Grasp the handles on the bottom mast section and turn the mast until the object located on the *due north* line is sighted through the hole and slot.

(3) Tighten the mast base clamp to hold the mast in the oriented position.

## 20. FINAL WIRING ADJUSTMENT.

a. Hold the battery switch on the wind panel in the ON position. Note the reading of the wind direction meter.

b. If the meter indicates the direction in which the wind vane of the transmitter is pointing, the wiring is correct and needs no further adjustment.

c. If the meter indicates a different direction, open the wind panel and transpose the wires connected to terminals 1 and 2.

d. Finally, close the panel and lock the wing clamps (par. 14*d* (6)).

## SECTION III

### OPERATION

TM 11-429  
Par. 21

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#### 21. WIND PANEL.

a. *General.* Leave the wind panel closed (fig. 3) when the equipment is in operation. Do not keep the equipment in operation if either meter appears to be erratic. See Section V.

b. *Reading Wind-Direction Meter.* The dial of the wind direction meter is marked with the cardinal and inter-cardinal points of the compass, and is divided into thirty-six  $10^\circ$  graduations with numeral designations every  $30^\circ$ .

(1) To obtain a direction reading, hold the battery switch down to ON and note the direction indicated by the meter pointer.

(2) After taking the reading, release the switch and it will return to the off position.

c. *Reading Wind-Speed Meter.* The dial of the wind speed meter is calibrated directly in miles per hour. It has two scales, one above the other. The upper scale is calibrated from 0 to 150 mph; the lower scale from 0 to 30 mph. In case wind-speed meter does not read zero when not connected or with no wind, rotate zero adjustment (fig. 3) clockwise or counter-clockwise until zero reading is obtained.

(1) To take a wind speed reading, note the position of the meter pointer on the upper scale (150-mph range).

(a) If it indicates a speed above 30 mph, take the reading directly from the 150-mph scale.

(b) If it indicates a speed below 30 mph, throw the switch (located directly below the meter) and hold it down. Take the desired reading from the position of the meter pointer on the lower scale (30-mph range). After noting the reading, release the switch and it will return to the normal position on the 150-mph scale.

(2) Never use the switch when the meter pointer indicates more than 30 mph on the upper scale. To do so will damage the meter. The purpose of the switch is to use the lower scale's wider calibration for the slower wind speeds. Upper scale readings, even of wind speeds less than 30 mph, will be satisfactory for most purposes. The real value of switching over to the lower scale is in reading wind speeds less than 15 mph.

# SECTION IV

## FUNCTIONING OF PARTS

TM 11-429  
Pars. 22-23

### 22. WIND SPEED SYSTEM.

*a.* The wind speed portion of the equipment utilizes an a-c generator at the wind transmitter and a rectifier-type a-c milliammeter at the wind panel.

*b.* At the transmitter, the generator shaft is coupled through a gear train to a three-cup rotor exposed to the wind. The cup rotor turns because of the wind force on it, and its rotational speed is proportional to the wind speed. The generator driven by the cup rotor develops a voltage which is proportional to the cup rotor speed. Thus the output of the generator is proportional to wind speed. The current is conducted by wires from the wind transmitter (fig. 10) to the wind panel.

*c.* At the wind panel, the current is fed through an arrangement of two resistors and a single-pole switch to the milliammeter which measures the strength of the current (fig. 9).

(1) One resistor is 44,300 ohms, the other is 9,700 ohms. The wind speed meter switch normally is open and both resistors (totaling 54,000 ohms) are in series with the milliammeter. This permits the milliammeter to handle safely the output of the generator when the cup rotor is driven by the maximum wind (150 mph) for which the equipment is designed. The upper scale of the milliammeter dial is calibrated for this range.

(2) When the switch is closed, the 44,300-ohm resistor, is shunted out of the circuit, and only the 9,700-ohm resistor remains in series with the milliammeter. This permits the milliammeter to be more sensitive to the smaller currents generated by low wind speeds, but limits the maximum current it can handle safely to that produced by the transmitter generator when driven by no more than a 30-mph wind. The lower scale of the milliammeter dial is calibrated for this range.

### 23. WIND DIRECTION SYSTEM.

*a.* The wind direction system of the equipment is essentially a d-c self-synchronous repeater system, with the transmitting portion at the wind transmitter, and the repeater at the wind panel.

*b.* The transmitting portion is a rheostat (fig. 5) consisting of a stationary resistor assembly and a movable contacting assembly actuated by the wind vane.

(1) The resistor assembly consists of a resistor and a metal collector ring mounted together on a plastic base.

(*a*) The resistor is a continuously wound torroidal resistor ring divided into three equal electrical sections by three taps spaced 120 degrees apart. Each tap is wired to a pin in the plastic base (fig. 8).

(*b*) The collector ring is mounted in the center of, and extends above the resistor ring. It is insulated from the resistor and is wired to the fourth pin in the bottom of the base.

(*c*) The complete resistor assembly plugs into a socket in the wind transmitter base, and is connected through the wiring of the wind transmitter and the support to the wind panel. At the panel the three resistor contacts are connected to the three terminals of the wind-direction meter, and the collector ring is connected through a single pole switch to the positive terminal of the battery supply, consisting of four dry cells connected in series parallel to furnish 3 volts (fig. 9).

(2) The contact assembly (fig. 5) consists of two metal mounting blocks fixed on a plastic base. Each block bears two pivoted contact arms.

(*a*) One arm of each block is pivoted so it can move in the vertical plane and the other is pivoted to move in the horizontal plane. Each arm is provided with a spring to maintain tension in one direction, and each has a contact button at its free end.

(*b*) The mounting blocks are spaced on the plastic base so the contact arms which move vertically have their contact buttons spaced 180° apart while making contact with the resistor ring when the rheostat is assembled.

(*c*) One of the contact arms that move horizontally is mounted so its button makes contact (fig. 8) with the collector ring of the resistor assembly.

(*d*) The other contact arm that moves horizontally is mounted so its button makes contact (fig. 8) with a collector ring that is part of the collar holding the wind vane assembly on the central shaft of the wind transmitter. The collar and shaft constitute the negative side for both the wind direction and wind speed circuits.

*c.* The repeater at the wind panel is a meter movement consisting essentially of a rotor and a stator.

(1) The rotor consists of a small bar-type permanent magnet with a shaft mounted through a hole in the center of the magnet. The shaft is supported by jewel bearings and has an indicating needle mounted on one end.

(2) The stator consists of three identical form-wound coils spaced  $120^\circ$  apart and mounted on a copper cylinder surrounding the rotor. The coils are interconnected in a delta connection, and are encased in a special shell that shields them from terrestrial magnetism. The three terminals of the coil assembly are connected to the three terminals of the transmitter resistor.

d. The single pole switch in the positive side of the battery supply normally is open and no current flows through the wind direction system (figs. 8 and 9).

(1) When the switch is closed, current flows to the collector ring of the resistor assembly at the wind transmitter.

(2) Current is taken from the collector ring and fed to the resistor ring by one pair of contact arms, and the circuit is completed by the other pair of arms.

(3) The current is distributed among the three sections of the resistor and the three delta-connected coils of the meter movement at the wind panel, so the needle attached to the rotor shaft of the meter movement maintains a fixed angular relationship to the position of the contact arms on the resistor. In other words, the magnet of the repeater follows in synchronism the positions of the contact arms moved by the wind vane.

## *SECTION V*

### *PREVENTIVE MAINTENANCE*

*TM 11-429*  
*Pars. 24-27*

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#### **24. ROUTINE INSPECTION.**

*a.* Maintaining Wind Equipments SCM-20-A or AN/GMQ-1 in good operating condition depends on regular inspection to detect broken, worn or dirty parts.

*b.* Thoroughly examine the equipment at least once every two months if it is installed where conditions are normal. Inspect more often if rain or dust are severe.

*c.* Periodically replace the resistor and contact assemblies as instructed in paragraph 28.

**25. CALIBRATION.** The equipment is calibrated before it is sent to the field. Further adjustment is not required, *so do not attempt it.* Any change in the calibration will be due to damage of one of the component parts of the wind transmitter or of the wind panel. The damaged part must be replaced. The mast support does not affect the calibration in any way.

#### **26. CUP ROTOR.**

*a.* The cup rotor is a complete and permanent assembly. Damage to any part of it requires replacement of the entire cup rotor.

*b.* Inspect the cup rotor for loose, cracked or broken cups, or bent cup arms, which will cause the rotor to be unbalanced and result in serious vibration of the equipment at high speeds. If any of these faults are detected, immediately replace the cup rotor with the one from the spare parts.

*c.* Do not attempt to repair a damaged rotor. Send it to a depot. The correct calibration of the equipment is dependent upon the position and shape of the cups.

#### **27. ANEMOMETER HEAD.**

*a.* The anemometer head of the wind transmitter is the heart of the wind speed system, and is adjusted for maximum sensitivity before being

sent out to the field. In use, however, its bearings may become dirty or corroded and reduce the sensitivity.

*b.* If a wind speed of more than 3 mph is required to make the cup rotor on the anemometer head turn, replace the assembly.

(1) Assemble a new anemometer head and a-cup rotor (par. 17) from the spare parts in the carrying case.

(2) Remove the faulty head and attached cup rotor from the support and replace it with the new assembly.

(a) On Support ML-205-A, simply climb the mast, loosen the thumb-screw, and lift off the old head and rotor. Put the new assembly on as instructed in paragraph 15*b* (3).

(b) On Support ML-206-A, first lower the mast (par. 28*b* (2)), then replace the head as instructed in (a) above, and raise the mast (par. 18).

(3) Immediately requisition a new anemometer head to maintain a full complement of spare parts.

*c.* Remove the cup rotor from the faulty head.

(1) Examine the rotor for faults (par. 26). If it is in satisfactory condition, store it with the spare parts.

(2) Replace the washer, spider spring and cap nut on the faulty head, and send the head to a depot for repair. *Do not attempt to repair it in the field.*

## 28. WIND VANE ASSEMBLY.

*a. Routine.* (1) Inspect the wind vane assembly frequently to determine that the vane turns freely and that the resistor and contact assemblies are not broken or dirty.

(2) Obtain a whole new wind vane assembly from a depot whenever the assembly is sluggish in operation and loses sensitivity, that is, if more than a 3-mph wind is required to move the wind vane when it is 10° off the wind stream. Send the old assembly to the depot.

(3) Replace a resistor assembly (fig. 5) with a new one from the spare parts after *every four months of service*, regardless of whether or not it is broken or dirty.

(4) Replace a contact assembly (fig. 5) with the new one from the spare parts after *every six months of service*, regardless of whether or not it is broken or dirty.

*b. Removing Wind Transmitter from Mast.* Whenever a fault is detected in the operation of the wind vane assembly, or when it is time to replace the resistor or contact assemblies as instructed in subparagraphs

(2) and (3) above, remove the entire transmitter (fig. 1) from the mast support.

(1) REMOVING WIND TRANSMITTER FROM SUPPORT ML-205-A. (a) Climb mast and take cap from cap lug near top of mast (fig. 10).

(b) Unscrew the union nut holding the wind transmitter, and lift the transmitter out of the pipe.

(c) Screw the cap on the open end of the mast pipe. Make it hand-tight only.

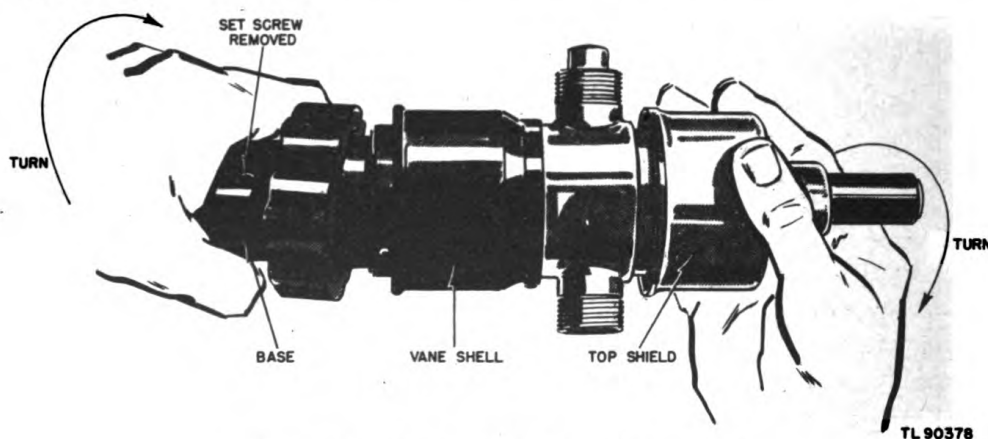


Figure 11. Unscrewing wind vane assembly.

(d) Hold the wind transmitter carefully while descending the mast.

(2) REMOVING WIND TRANSMITTER FROM SUPPORT ML-206-A. Support ML-206-A does not have steps for climbing. It has to be lowered to remove the wind transmitter.

(a) Loosen but do not remove the hand nuts on the eyebolts on brackets or stakes B and D (figs. 6 and 7).

(b) Remove the hand nut and swivel rod from the eyebolt in bracket or stake A, and, while holding on to the guy cable to keep the mast erect, remove the eyebolt from that bracket or stake.

(c) While one man holds on to the loose guy cable, another should stand on the opposite side of the mast and carefully pull it over and lower it hand over hand while walking backward. Take care not to disturb the wires held to the mast by the spiral hooks. Rest the top of the mast on bracket or stake C.

(d) Unscrew the union nut holding the wind transmitter to the mast and slide the transmitter from the pipe.

(e) Screw a cap on the open end of the mast pipe. Make it hand-tight only.



- c. Disassembling Wind Transmitter.* (1) Take the wind transmitter to a sheltered place, preferably inside a building.
- (2) Loosen the thumbscrew and lift off the anemometer head and attached cup rotor from the wind vane assembly. Lay them aside where they will be safe.
- (3) Unscrew the union nut and remove the vane tail from the vane shell.

NOTE: If the vane tail is damaged, obtain a replacement as soon as possible. It controls the accuracy of the wind direction system. Except in an emergency, do not attempt to repair a damaged vane tail.

- (4) Unscrew the union nut and remove the counterbalance from the vane shell.
- (5) Separate the two main sections of the wind vane assembly (fig. 11).
- (a) Remove the set screw from the base of the assembly.
- (b) Grasp the base with one hand and the top shield with the other and unscrew and remove the base from the vane shell.

*d. Replacing Resistor Assembly.* (1) Remove the three screws on the base that hold the two shields (one within the other) around the resistor assembly, and remove the shields.

- (2) Remove the two screws that hold the resistor assembly in place (fig. 5). Remove the resistor assembly by pulling it up from the socket in which its four connecting pins are inserted.
- (3) Plug a new resistor assembly in the socket, taking care to position its pins properly, and fasten it with the two screws.
- (4) Replace the two shields, one inside the other, to enclose the resistor assembly, and fasten them to the base with the three screws.

*e. Replacing Contact Assembly.* (1) Remove the three screws on the vane shell that hold the two shields (one within the other) around the contact assembly, and remove the shields.

- (2) Remove the four screws that hold the contact assembly in place (fig. 5). Remove the contact assembly by slipping it off the central shaft.
- (3) Slide a new contact assembly over the shaft, and fit it in place on the vane shell. Take care that the contact arms do not jam against the end of the collector ring on the shaft, and see that the screw holes in the contact mounting plate are lined up with the threaded holes in the vane shell. Fasten the new assembly with the four screws.
- (4) Replace the two shields, one inside the other, to enclose the contact assembly, and fasten them to the vane shell with the three screws.

*f. Reassembling Wind Transmitter.* (1) Insert the lower end of the central shaft to which the vane shell is attached, into the base and screw

them together, turning in the opposite directions from those indicated in figure 11.

- (2) Insert the set screw in the side of the base, and screw it all the way in.
- (3) Attach the vane tail and the counterbalance to the vane shell (par. 15*b* (4) and (5)).
- (4) Attach the anemometer head and cup rotor to the wind vane assembly (par. 15*b* (3)).

*g. Replacing Wind Transmitter on Mast.* (1) Replacing on Support ML-205-A.

(*a*) Carefully carry the transmitter and climb the mast support to within reach of the top.

(*b*) Unscrew the cap from the top of the mast, and insert the base of the transmitter into the pipe, taking care that the key on the side of the base fits into the slot provided in the end of the mast. Tighten the union nut. Make it hand-tight only.

(2) Replacing Wind Transmitter on Support ML-206-A. (*a*) Take the transmitter to the horizontal mast and attach it (par. 15*t*).

(*b*) Raise the mast (par. 18).

(*c*) Insert the eyebolt into bracket or stake A (figs. 6 and 7), slip the swivel rod on the eyebolt, then screw on the hand nut and tighten it.

(*d*) Tighten the eyebolt hand nuts on stakes B and D, and adjust all eyebolt handnuts to make the mast as nearly vertical as can be judged by the eye.

*h. Disposal of Used Resistor and Contact Assemblies.* (1) Keep the old resistor and contact assemblies that have been replaced because they were in service four and six months, respectively. These old assemblies can be used in an emergency, when a replacement is required and there are no new ones in the spare parts. Upon receipt of new assemblies, however, immediately replace the old ones that are being reused.

(2) Do not keep the old broken or dirty resistor and contact assemblies that are replaced because they are inoperative. Send them to the depot when requisitioning replacements.

**29. MAST SUPPORT.** *a.* Inspect the mast support at least once a month.

*b.* Check the guy cables to see that they are sufficiently tight.

*c.* Check the brackets or stakes to see that they have not loosened.

*d.* If a guy cable fails, salvage all the fittings, and obtain a replacement cable from a depot.

### 30. WIND PANEL.

*a. General Care.* (1) Keep the wind panel dry and located where it is not exposed to excessive dirt or dust.

(2) Requisition a replacement wind panel whenever the indicating meters of the one in use fail or are erratic (except that a lag of the wind-direction meter pointer behind the actual position of the wind vane may indicate weak batteries). Send the old wind panel to the depot for repair. Do not attempt repairs in the field.

*b. Battery Care.* (1) Keep the battery contacts dry, clean and free from corrosion.

(a) Dry the batteries, the springs, and the holders, with a clean cloth.

(b) Clean the bottom of each battery (where it makes contact with the spring) by scraping the zinc surface with a knife. Be careful to remove the dull white zinc oxide without gouging into the metal itself. Polish the scraped surface with sandpaper until it is bright.

(2) With normal use of the battery switch (which must not be used any oftener nor held closed any longer than actually is necessary to take a wind direction reading), the batteries in the wind panel should last at least six months.

(3) Replace the batteries whenever they show the slightest indication of weakening.

(a) Open the wind panel (par. 14*d* (1) ).

(b) Press downward on each old battery, and pull its top end from under the top of the rack.

(c) Insert new batteries (par. 16*a*) after preparing the contacts as instructed in (1) above.

(d) Be careful not to disturb the calibrating resistors of the wind speed meter, nor the wires connected to the terminal strip, when replacing batteries.

## SECTION VI

### CORRECTIVE MAINTENANCE

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**31. CUP ROTOR.** Do not attempt any repairs on a damaged cup rotor. Send it to the main depot for salvage.

**32. ANEMOMETER HEAD.** *a.* Determine whether the fault is in the upper bearing assembly or in the generator unit.

(1) Remove the three long screws (located on the ledge near the top of the head) that hold the two sections together.

(2) Separate the sections by twisting slightly and pulling them apart. Lay the generator unit aside.

(3) Spin the shaft in the upper bearing assembly. If it spins freely, the fault with the anemometer head lies in the generator unit. *Do not attempt to repair it.* Replace the upper bearing assembly on the generator unit and fasten them together with the three screws. Send the anemometer head to the main depot for salvage.

*b.* If the shaft of the upper bearing assembly does not spin freely, disassemble it for examination (fig. 12).

(1) Unscrew the coupling nut at the lower end of the shaft.

(2) Pull the shaft up and remove it from the housing.

(3) Remove the screws from the upper and lower bearing retainers, and remove the retainers.

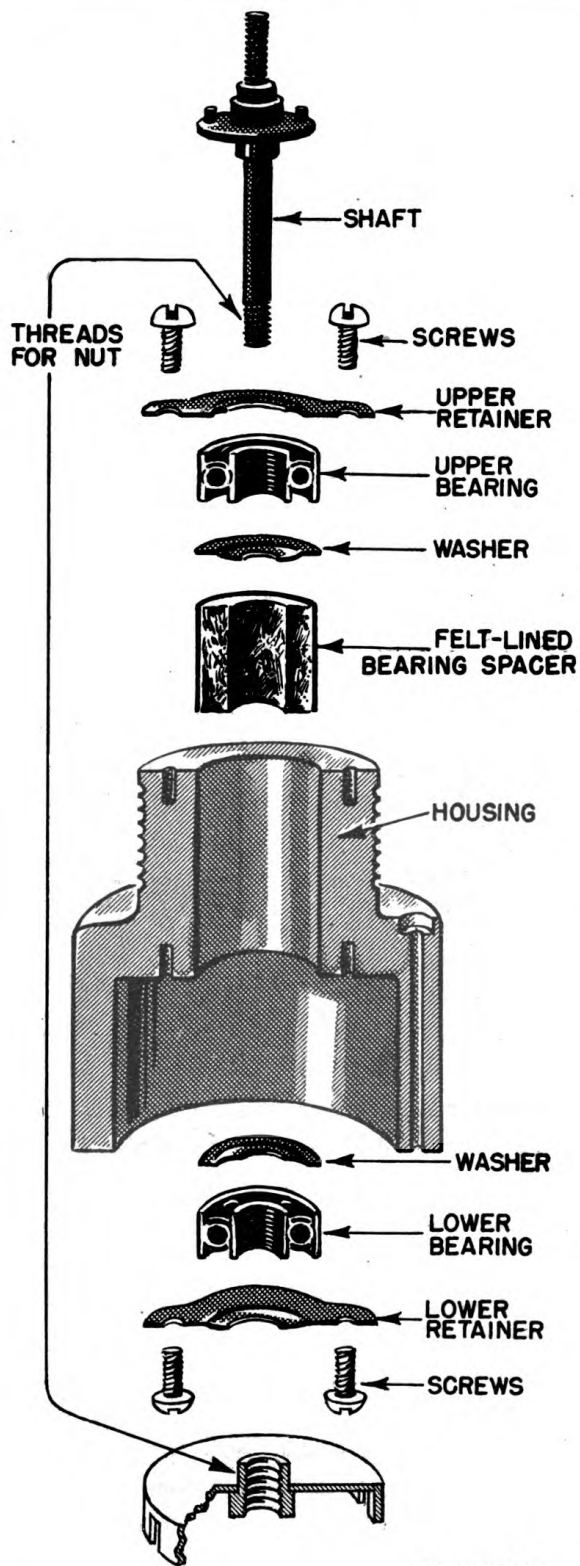
(4) Remove the two bearings and the felt-lined spacer (on some models the spacer is not lined) from the housing. Take care not to lose the washers separating the bearings from each end of the spacer.

*c.* Examine the removed parts.

(1) If the shaft is worn or broken, replace with a new one.

(2) If any part of the bearing assembly is worn or broken, replace the whole assembly, which consists of the housing, the two bearings, the two retainers, the spacer, and the two washers. (The shaft is separately replaceable).

(3) If the bearings are dirty, clean them (par. 35), and reassemble the parts, taking care that the raised center portions of the washers (placed at each end of the spacer between the bearings) extend toward the spacer.



TL 90377

Figure 12. Anemometer head upper bearing assembly, extended cross-section view.

Do not tighten the retainer screws too much or the threads in the plastic housing will strip.

(4) Fit the upper bearing assembly on the generator unit, taking care that the coupling pan engages the pin extending from the generator shaft, and that the screw holes of the two sections are lined up. Fasten with the three long screws, but do not tighten the screws too much and strip the threads in the plastic housing.

**33. WIND VANE ASSEMBLY.** *a.* Worn or dirty bearings will be the usual trouble with wind vane assemblies returned to a depot for repair.

*b.* The bearings are located within the vane shell section of the assembly.

(1) Separate the vane shell from the base section (par. 28c (5)), and lay the base aside.

(2) Remove the shields and the contact assembly from the vane shell (par. 28e (1) and (2)).

*c.* Disassemble the vane shell (fig. 13).

(1) Loosen the two set screws in the collar, and slide the collar off the shaft.

(2) Pull the shaft and attached top shield up and remove it from the vane shell.

(3) Remove the lower bearing, the lower washer, the spacer cylinder, the upper washer, and then the upper bearing, through the bottom opening of the vane shell.

*d.* Examine the bearings. Clean the ones that are dirty (par. 35). Replace the ones that are worn.

*e.* Reassemble the bearings in the vane shell, taking care that the raised center portions of the washers (placed at each end of the spacer inserted between the bearings) extend toward the spacer.

*f.* Replace the collar (thick-end first) on the shaft and up against the lower bearing in the vane shell. Tighten the two set screws, taking care to see that the end of each enters the depression provided for it on the shaft.

*g.* Replace the contact assembly and shields (par. 28e (3) and (4)), and screw the vane shell section into the base (par. 28f (1) and (2)).

**34. WIND PANEL.** *a.* Do not attempt any repairs to damaged meters on wind panels. Replace with new meter assemblies, and send the old ones to the main depot for salvage.

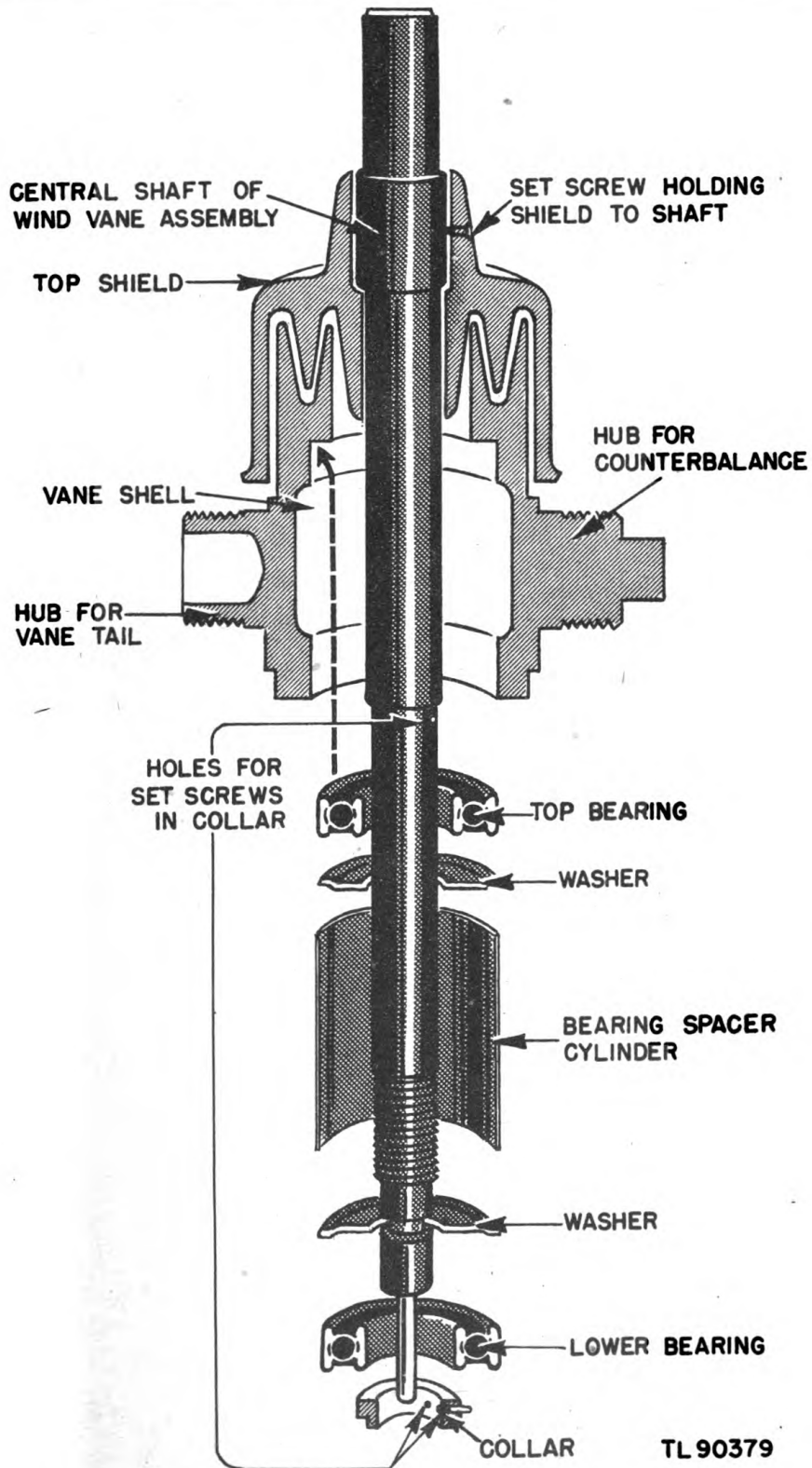


Figure 13. Vane shell bearing assembly, extended cross-section view.

b. A wind speed meter replacement includes new calibrating resistors. *Carefully follow the wiring diagram (fig. 9) when replacing the meter and resistors.*

**35. CLEANING BEARINGS.** a. Only the bearings removed from the upper bearing assembly of the anemometer head (par. 32b) and those removed from the vane shell of the wind vane assembly (par. 33c), are to be cleaned. *Do not attempt to remove and clean the bearings in the generator unit of the anemometer head.*

- (1) Wash the removed bearings thoroughly in kerosene or gasoline.
- (2) Spread Cities Service M-51A compound entirely over the clean bearings, and work the grease into the raceways.
- (3) *Under no circumstances should ordinary motor oil or grease be used on the bearings.* If the compound specified in (2) above is not available, simply wash the dirty bearings in kerosene.



## SECTION VII SUPPLEMENTARY DATA

### 36. TABLE OF REPLACEABLE PARTS.

NOTE: Order parts by Signal Corps Stock No., name, and description.

a. *Wind Equipment SCM-20-A.*

Quantity in Equip.	Signal Corps Stock No.	Name of Part and Description	Function	Mjr. Code	Drawing No.
1	7A2023A	Wind Transmitter ML-203-A	Transmit wind speed and direction to wind panel	A & B	
1	7A2009-204-A	Wind Panel ML-204-A	Indicate wind speed and direction	A & B	
1		Set of spare parts, including: 1 cup rotor 1 anemometer head 2 resistor assemblies 1 contact assembly	Replacement parts for operational maintenance of wind transmitter	A & B	
1		Carrying Case ML-207-A	Packing case for wind transmitter, wind panel, and spare parts	B	
1	7A1743-205-A	Support ML-205-A	Mast support for Wind Transmitter ML-203-A	A & B	
1	1B110B	Wire W-110-B, 600 ft.	Electrical connection between support and wind panel		

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b. Wind Equipment AN/GMQ-1

Quantity in Equip.	Signal Corps Stock No.	Name of Part and Description	Function	Mfr. Code	Drawing No.
1	7A2023B	Wind Transmitter ML-203-B	Transmit wind speed and direction	A & B	
1	7A2009-204-B	Wind Panel ML-204-B	Indicate wind speed and direction	A & B	
1		Set of spare parts, including: 1 cup rotor 1 anemometer head 2 resistor assemblies 1 contact assembly	Replacement parts for operational maintenance of wind transmitter	A & B	
1		Carrying Case ML-207-B	Packing case for wind transmitter, wind panel, and spare parts	B	
1	7A1743-206-A	Support ML-206-A	Mast support for Wind Transmitter ML-203-B	A & B	
1	1B110B	Wire W-110-B, 600 ft.	Electrical connection between support and wind panel		
1		Carrying Case ML-208-A	Packing case for Support ML-206-A and Wire W-110-B	B	

c. *Wind Transmitters ML-203-A and ML-203-B.*

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1	Cap nut, plastic	Secure cup rotor to anemometer head.	A & B	74-58 <sup>a</sup>
1	Cup rotor, consisting of 3 plastic cups mounted on a spider.	Rotate with the wind.	A & B	74-58 <sup>a</sup>
1	Spider spring, steel, 3-arm type	Hold cup rotor down.	A	70276 <sup>c</sup>
1	Spider gasket, rubber	Seal locking pin holes against rain, etc.	A	70344 <sup>c</sup>
1	Anemometer head, consisting of: 1 bearing assembly, complete in phenolic housing which contains small radial bearings, rotor shaft, retaining nut with coupling No. 12-28 thread, special.	Transfer cup rotor motion to generator unit.	A & B	74-58 <sup>a</sup>
	1 thumb screw, full-dog, stainless steel, No. 10-32 x 1/2" screw, length, Type "P".	Secure anemometer head to center shaft of wind vane assembly.	C	
	1 generator unit housing phenolic, with head-locating pin.	House generator unit.	A	70176 <sup>c</sup>

c. Wind Transmitters ML-203-A and ML-203-B.

Quantity in Equip.	Signal Corps Stock No.	Name of Part and Description	Function	Mfr. Code	Drawing No.
		1 generator unit, consisting of generator and associated gear train, mounted on an aluminum mounting plate. 3 screws, machine, fillister head, steel, No. 6-32 x 1 5/8".	Generate a voltage proportional to wind velocity.  Position and secure bearing housing and generator mounting plate to generator unit housing.	A & B	74-58 <sup>a</sup>
1		Central shaft assembly, including silver plated brass base contact, and insulator.	Central support for transmitter; base contact provides connection between generator and socket in transmitter base.	A & B	WT-290 <sup>b</sup>
1		Vane shell, aluminum.	Mounting for vane bearings, vane tail and counterbalance.	A & B	WT-308 <sup>b</sup>
1		Spacer, bearing, lower.	Spacer for vane shell bearings.	A & B	WT-305 <sup>b</sup>
2		Shield, bearing, large.	Separator between vane shell spacer and bearings.	A & B	WT-304 <sup>b</sup>
1		Collector ring, upper, brass, silver plated.	Hold vane shell assembly on central shaft, and serve as contact.	A & B	WT-310 <sup>b</sup>
1		Rain shield, molded bakelite with nameplate.	Prevent moisture entering wind vane bearing assembly.	A & B	70294 <sup>f</sup>

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1	Screw machine oval head, brass, zinc plate, black oxidized; No. 6-32 x 1/4".	Fasten rain shield to center shaft of wind vane assembly.	A & B	WT-301 <sup>b</sup>
1	Contact assembly, consisting of 4 contacts mounted on a phenolic plate.	Translate wind vane movement to resistor assembly.	A & B	WT-312 <sup>b</sup>
4	Screw, machine, binding head, stainless steel; No. 4-40 x 3/8".	Fasten contact assembly to vane shield.	A & B	WT-327 <sup>b</sup>
1	Resistor assembly, consists of wire wound resistor and collector ring on 4-prong base plug.	Variable resistance element for wind direction circuit.	A & B	WT-334 <sup>b</sup>
2	Screw, machine, filister head, brass; No. 4-40 x 7/8".	Fasten resistor assembly to base.	A & B	70336 <sup>c</sup>
1	Outer shield, with cover, steel, mounted on vane shell.	Protect rheostat element from weather.	A & B	WT-330 <sup>b</sup> (shield) WT-336 <sup>b</sup> (cover)
1	Inner shield, with cover, steel, mounted on transmitter base.	Protect rheostat element from weather.	A & B	WT-332 <sup>b</sup> (shield) WT-365 <sup>b</sup> (cover)
6	Screw, machine, binding head, stainless steel (black); No. 4-40 x 1/4".	Secure inner and outer shields and covers.	A & B	WT-328 <sup>b</sup>
2	Bearing, radial; No. S8-R, 3/4" bore, 1 5/8" OD, by 5/16" wide.	Provide bearing surface for rotation of wind vane shell.	D	S8-R

c. Wind Transmitters ML-203-A and ML-203-B.

Quantity in Equip.	Signal Corps Stock No.	Name of Part and Description	Function	Mfr. Code	Drawing No.
2		Set screw headless, cone point, stainless steel; No. 6-32 x 7/32".	Position collar-collector ring securely to central shaft.	A & B	WT-311 <sup>b</sup>
1		Vane tail assembly consisting of vane tail with locknut for mounting tail to vane shell.	Respond to change in wind direction.	A & B	WT-204 <sup>b</sup>
1		Counterbalance assembly, with adjustable weight and lock nut for mounting to vane shell.	Nose of wind vane and counterbalance of vane tail.	A & B	WT-205 <sup>b</sup>
1		Clamp nut, special, brass, black oxidized.	Secure wind transmitter to mast support.	A & B	WT-347 <sup>b</sup>
1		Transmitter base contact, brass, silver plated.	Electrical contact between generator and socket in transmitter base.	A & B	WT-298 <sup>b</sup>
1		Insulator, lower, phenolic.	Insulate transmitter base contact from center shaft.	A & B	WT-297 <sup>b</sup>
1		Setscrew, headless, full-dog, steel; No. 10-32 x 9/16".	Lock transmitter base, after screwing, to center shaft.	A & B	WT-323 <sup>b</sup>
1		Socket, loctal type; No. 88-3X, with 1 5/16" mounting centers.	Electrical contact between wind transmitter and mast support.	E	Cat. No. 65
2		Screw, special, fillister head, brass; No. 6-32 x 3/8".	Mount loctal socket to transmitter base.	A & B	WT-358 <sup>b</sup>

*d. Wind Panels ML-204-A and ML-204-B.*

1	Wind speed instrument, model No. 301 milliammeter, rectifier type, 1-ma range, calibrated with double-range mph scale.	Measure current from wind transmitter generator.	F	No. 301 with mod. scale 74-58 <sup>a</sup>
1	Resistor, calibrating, non-inductive, fixed resistance; value, 44,300 ohms.	Resistance for wind speed instrument.	G	WEP-131 <sup>b</sup>
1	Resistor, calibrating, non-inductive, fixed resistance; value, 9,700 ohms.	Resistance for wind speed instrument.	G	WEP-130 <sup>b</sup>
1	Screw assembly; No. 4-40 x 1/4", steel, penetrated.	Mount calibrating resistors on panel.	H	Special scale 74-58 <sup>a</sup>
1	Wind direction instrument, 3", d-c self-synchronous repeater, with special scale.	Indicate position of wind vane.		
6	Screw assembly, No. 4-40 x 1/2", steel, penetrated.	Mount wind speed and wind direction instruments to panel.		
2	Fastener with spring and grommet.	Closures for panel.	I	AJW3-35 S3-150 GA3-175
2	Spring bracket, special.	For panel fasteners.	A & B	WEP-122 <sup>b</sup>

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d. Wind Panels ML-204-A and ML-204-B.

Quantity in Equip.	Signal Corps Stock No.	Name of Part and Description	Function	Mfr. Code	Drawing No.
2		Hinge, narrow butt, modified, wrought steel; 1/4" x 1 3/8" x 1/16".	For attaching phenolic panel to wooden case.	J	Cat. No. 800 mod. WEP-33b 33b
2		Switch, toggle, spring return; 3 amp, 250 volt, with solder lugs, and 2 hex locknuts 1/16" thick.	One to make circuit at wind direction instrument; one to control 44,300-ohm, calibrating resistor of wind speed instrument.	K	Cat. No. 20992
1		Wire harness, with terminal lugs.	Connect binding posts and batteries to wind speed and direction instruments.	A & B	No. D-8412 WEP-60b
5		Terminal lug, Burndy, Hylug "Yavia" 14-T2.	3 for connecting wire harness to wind direction instrument; 1 from wire harness to wind speed instrument; 1 from wire connecting calibrating resistors to wind speed instrument.	L	Cat. No. 10 WEP-132b
6		Terminal lug No. 1, with hole for No. 8 screw, brass, tinned, cord type, 5/8".	Attach to binding posts on terminal board, connects wires to instruments.	L	No. 1
1		Terminal board assembly.	Receive leads from mast support.	A & B	
6		Binding post, complete.			



1		Battery block assembly, thermo-setting plastic.	Rack for batteries.	A & B	WEP-21 <sup>b</sup>
4		Contact, complete, brass.	Provide contact from battery to binding post.	A & B	
4	3A30	Battery BA-30.	Furnish current for wind direction circuit.		

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e. Support ML-205-A.

1		Mast base assembly, steel, consisting of a base plate, a swivel bracket and clamp screw device.		M	74-58 <sup>a</sup>
4		Roof bracket, steel.		M	74-58 <sup>a</sup>
10		Lag screw, steel bonderized; 1/2" diam. x 1 1/2" long, gimlet point.		M	74-58 <sup>a</sup>
1		Mast section, lower 1 1/2" standard steel pipe, with handles and steps.	Fastening mast base and roof brackets to wood.	M	74-58 <sup>a</sup>
1		Mast section, upper, 1 1/2" standard steel pipe, with steps, steel terminal box, and 4-lug guy ring.		M	74-58 <sup>a</sup>

e. Support ML-205-A.

Quantity in Equip.	Signal Corps Stock No.	Name of Part and Description	Function	Mjr. Code	Drawing No.
1		Plug, black phenolic, special 6-prong, brass, located in top of upper mast section.	Provide connection to local socket of transmitter.	A & B	WEM-76 <sup>b</sup>
1		Terminal board assembly.	For terminal box on upper mast section.	A & B	
6		Binding post, "Sergeant".	For terminal box.	A & B	
1		Wire harness, consisting of 6 wires with terminal lugs at one end, tinned at the other.	Connect 6-prong plug to terminal box.	A & B	WEM-75 <sup>b</sup>
6		Terminal lug; No. 1, with No. 8 hole, tinned, brass, cord type, $\frac{5}{8}$ ".	For wire harness.	L	
4	6L6832-6.18	Screw, machine, round head, steel, bonderized No. 8-32 x $\frac{3}{8}$ ".	For mounting terminal board in terminal box.		
1		Pipe cap, for upper mast section.	Protect 6-prong plug.	M	
4		Guy wire assembly, consisting of wire rope complete with socket.	Lateral bracing for mast support.	M	
4		Eyebolt, galvanized steel; $\frac{1}{2}$ " diam. 13 thd x 6" of threaded length, standard.	Attach wire rope to bracket or ground stake.	M	74-58 <sup>a</sup>

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4		Hand nut, cast iron, 1/2" ID 13 thd.	For eyebolt.	M	
4		Swivel rod, steel.	For eyebolt, to prevent hand nut loosening.	M	
4		Guy clamp, "Safe-Line", drop forge finish, cadmium plated, for 3/16" diam. wire rope.	Clamp wire rope fastened to eye- bolt.	N	

f. Support ML-206-A. Same parts as in e above, with the exception of  
 the mast section, and in addition, the following:

1		Mast section, lower; 1 1/2" stan- dard steel pipe, with handles. (No steps.)		M	74-58 <sup>a</sup>
1		Mast section, middle; 1 1/2" stan- dard steel pipe. (No steps.)		M	74-58 <sup>a</sup>
1		Mast section, upper, 1 1/2" standard steel pipe, with steel terminal box and 4-lug guy ring. (No steps.)		M	74-58 <sup>a</sup>
4		Ground stakes, steel, bonderized, special.		M	

f. Support ML-206-A. Same parts as in e above, with the exception of the mast section, and in addition, the following:

Quantity in Equip.	Signal Corps Stock No.	Name of Part and Description	Function	Mfr. Code	Drawing No.
1		Driving cap, malleable iron, certified; weight for post No. 3 or 3½, 2¼ lb.	Used for protection of ground stake while being driven.	O	
2	2A3302	Stake GP-2.	Fasten mast base to ground.		

<sup>a</sup> Signal Corps specification.

<sup>b</sup> Lionel Corp. drawing.

<sup>c</sup> Sangamo Elec. Co. drawing.

**37. LIST OF MANUFACTURERS.**

<i>Code</i>	<i>Manufacturer</i>	<i>Address</i>
A	Sangamo Electric Co.....	Springfield, Ill.
B	Lionel Corp.....	Irvington, N. J.
C	Parker-Kalon Corp.....	New York, N. Y.
D	Federal Bearing Co., Inc.....	Poughkeepsie, N. Y.
E	American Phenolic Corp.....	Chicago, Ill.
F	Weston Instrument Co.....	Newark, N. J.
G	Instrument Resistors Co.....	Little Falls, N. J.
H	The Rubicon Co.....	Philadelphia, Pa.
I	Dzus Fastener Co., Inc.....	Brooklyn, N. Y.
J	The Stanley Works.....	New Britain, Conn.
K	Arrow-Hart & Hegeman.....	Hartford, Conn.
L	American Radio Hardware Co., Inc.....	New York, N. Y.
M	Kerby Saunders, Inc.....	New York, N. Y.
N	National Products Co.....	Detroit, Mich.
O	Sweets Steel Co.....	Williamsport, Pa.

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