TECHNICAL MANUAL

OPERATOR'S MANUAL

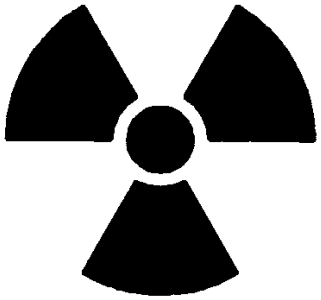
DIRECTION FINDER SETS AN/TRD-23, AN/TRD-23A, AN/TRD-15, AND AN/TRD-15A

This copy is a reprint which includes current pages from Changes 1 through 3.

HEADQUARTERS, DEPARTMENT OF THE ARMY
FEBRUARY 1973

WARNING

RADIATION HAZARD



STD-RW-2

Co	60
Ni	63
Ra	226

Tube types OB2WA used in this equipment contain radioactive material. These tubes are potentially hazardous when broken; see qualified medical personnel and the Safety Director if you are exposed to or cut by broken tubes

Do not place radioactive tubes in your pocket.

Be extremely careful not to break radioactive tubes while handling them.

Do not remove radioactive tubes from cartons until ready to use them.

Refer to paragraph 5--1 on handling, storage, and disposal of radioactive material.

WARNING

Be careful when working on the 115-volt ac line connections.

SERIOUS INJURY or DEATH may result from contact with these terminals.

DON'T TAKE CHANCES!

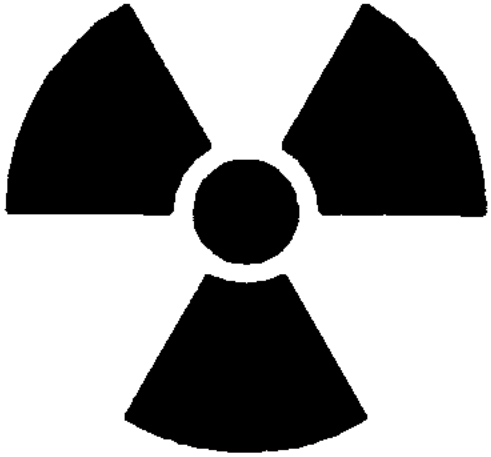
EXTREMELY DANGEROUS VOLTAGES EXIST IN THE FOLLOWING UNITS OF DIRECTION FINDER SETS AN/TRD-23, AN/TRD-23A, AN/TRD-15 AND AN/TRD-15A

Indicator, Azimuth/IP-669/TRD-15 4,000 volts

Oscilloscope AN/USM-318(V)1 (AN/TRD-23A) 2,500 volts

Oscilloscope HP-120B/AR (AN/TRD-23) 2,500 volts

CAUTION



RADIOACTIVE MATERIAL

Multimeter ..... Ra 226... 0.69 uCi.. NSN 6625-00-669-0769

Radiation Hazard Information: The following radiation hazard information must be read and understood by all personnel before operating or repairing items containing radioactive materials. The above component in the R-725/URR is potentially hazardous when broken. See qualified medical personnel and the local Radiation Protection Officer (RPO) immediately, if you are exposed to or cut by broken components. First aid instructions are contained in TB 43-0116 and TB 43-0122.

NEVER place radioactive components in your pocket.

Use extreme care NOT to break radioactive components while handling them.

NEVER remove radioactive components from cartons until you are ready to use them.

If any radioactive components are broken, notify the local RPO immediately.

The RPO will survey the immediate area for radiological contamination and will supervise the removal of broken components.

The above listed radioactive component will NOT be repaired or disassembled.

Controlled disposal is required for the above listed radioactive component. Dispose of the component as radioactive waste in accordance with AR 385-11.

Contact the local RPO or the CECOM Safety Office (Autovon 995-4427) for further guidance regarding radioactive components.

CHANGE No. } 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 1 July 1989

Operator's Manual
DIRECTION FINDER SETS
AN/TRD-23 (NSN 5825-00-926-0273)
AN/TRD-23A (NSN 5825-00-491-5253)
AN/TRD-15 (NSN 5825400-069-8763)
AND
AN/TRD-15A (NSN 5825400-491-5254)

TM 11-5825-231-10, 15 February 1973, **is changed as follows:**

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page. Added or revised illustrations are indicated by a vertical bar adjacent to the identification number.

Remove pages	Insert pages
None	A/(B blank)

2. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

WILLIAM J. MEEHAN II
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-51 Operator requirements for AN/TRD-15,A.

CHANGE

No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 1 January 1987

OPERATOR'S MANUAL
DIRECTION FINDER SETS
AN/TRD-23 (NSN 5825-00-926-0273)
AN/TRD-23A (NSN 5825-00-491-5253)
AN/TRD-15 (NSN 5825-00-069-8763)
AN/TRD-15A (NSN 5825-00-491-5254)

TM 11-5825-231-10, 15 February 1973, is changed as follows:

1. Remove old pages and insert new pages as indicated below New or changed material Is indicated by a vertical bar in the margin of the page. Added or revised Illustrations are indicated by a vertical bar adjacent to the identification number.

Remove pages	*Inserts pages*
i and ii	i and ii
1-1 and 1-2	1-1 and 1-2
1-27 through 1-30	1-27 through 1-30
2-1 through 2-14	2-1 through 2-20
3-1 through 3-13	3-1 through 3-15/(3-16 blank)
5-1 and 5-2	5-1 and 5-2
6-9 and 6-10	6-9 and 6-10
A-1	A-1/(A-2 blank)
B-5 and B-6	B-5 and B-6
Index 1 through Index 9	Index 1 through Index 9/(Index 10 blank)

2. File this change sheet in the front of the publication for reference purposes.

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

R.L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-36 literature requirements for AN/TRD-23 and 12-51 literature requirements for AN/TRD-15.

CHANGE

No 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *23 April 1981*

Operator's Manual
DIRECTION FINDER SETS
AN/TRD-23 (NSN 5825-00-926-0273)
AN/TRD-23A (NSN 5825-00-491-5253)
AN/TRD-15 (NSN 5825-00-069-8763)
AND
AN/TRD-15A (NSN 5825-00-491-5254)

TM 11-5825-231-10, 15 February 1973, is changed as follows:

1. The title of this manual is changed as shown above
2. New or changed material is indicated by a vertical bar in the margin.
3. Remove and insert pages as indicated in the page list below:

Remove	*Insert*
i and ii	i and ii
1-1 through 1-2	1-1 through 1-2
1-5 through 1-8	1-5 through 1-8
4-1 and 4-2	4-1 and 4-2
5-1 through 5-3	5-1 through 5-3
6-3 and 6-4	6-3/(6-4 Blank)
6-11	6-11/(6-12 Blank)
None	B-1 through B-11
None	C-1 and C-2

4. File this change sheet in front of the manual for reference purposes.

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Major General, United States Army
The Adjutant General

Distribution:

Active Army

TSG (1)
USAARENBD (1)
TRADOC (2)
DARCOM (2)
TECOM (2)
USAINSCOM (2)
OS Maj Comd (2)
USACC (2)
HISA (Ft Monmouth) (21)
Armies (1)
USASIGS (10)
Svc Colleges (1)
Ft Richardson (CERCOM Ofc) (1)
Ft Carson (5)
Ft Gillem (10)
WSMR (1)
USAERDAA (1)
USAERDAW (1)
Army Dep (1) except
SAAD (30)
TOAD (14)
SHAD (2)
USA Dep (1)
Sig Sec USA Dep (1)
Units org under fol TOE:
29-207 (2)
29-610 (2)
29-136 (1)

USAR: None
ARNG: None
For explanation of abbreviations used, see AR 310-50.

TECHNICAL MANUAL

No. 11-5825-231-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC *15 February 1973*

Operator's Manual

DIRECTION FINDER SETS AN/TRD-23 (NSN 5825-00-926-0273) AN/TRD-23A (5825-00-491-5253) AN/TRD-1 5 (5825-00--69-8763) AN/TRD-1 5A (5825-00-491-5254)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the pro-cedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, New Jersey 07703-5000. In either case a reply will be furnished to you.

***This manual supersedes TM 11-5825-231-10, 20 April 1966.**

LIST OF ILLUSTRATIONS

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual describes Direction Finder Sets AN/TRD-23, AN/rRD-23A, ANfrRD-15, and AN/TRD-15A and covers their installation, operation, and operators maintenance. It includes operation under usual and unusual conditions, cleaning and inspection, and replacement of parts available to the operators.

b. The maintenance allocation chart (MAC) appears in TM 11-5825231-25.

c. Official nomenclature followed by an (*) Is used to indicate all models of the equipment item used in this manual; therefore, Direction Finder Set AN/TRD-23(*) represents Direction Finder Sets AN/TRD-23 and AN/TRD-23A. Direction Finder Set ANfrRD-15(*) represents Direction Finder Sets AN/TRD-15 and AN/rRD-15A. Detector, Radio Frequency R-159(*)/ TRD represents Detectors, Radio Frequency RF-159/TRD and RF-159A/TRD. Drive, Goniometer-Rotary Coupler TG-126(*)/TRD represents Drives, Goniometer-Rotary Coupler TG-126/TRD and TG-126A/TD. Shelter S-280(*)/G represents Shelters S-280/G and S-280A/G. Antenna Positioning Kit MK-985(*)/G represents Antenna Positioning Kits MK-985/G and MK-985A/G.

d. Direction Finder Set AN/rRD-23(*) (fig. 1-1) is described in chapters 1 through 5. Direction Finder Set AN/TRD-15(*) (fig. 6-1), which is operationally similar to the AN/rRD-23(*), is described in chapter 6.

1-2. Consolidated Index of Army Publications and Blank Forms

Refer to the latest issue of DA Pam 310-1 to determine whether there are new editions, changes or additional publications pertaining to the equipment.

1-3. Maintenance Forms, Records, and Reports

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, as contained in Maintenance Management Update.

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140 55/ NAVMATINST 4355 73B/AFR 400-54/MCO 4430 3H.

c. Discrepancy in Shipment Report (DISREP) (SF361). Fill out and forward Discrepancy in Shipment Report (DISREP) SF 361 as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610. 19D/DLAR 4500.15

1-3.1. Deleted

1-3.2. Reporting Equipment Improvement Recommendations (EIR)

If your equipment needs improvement, let us know Send us an EIR You, the user, are the only one who can tell us what you don't like about the design Put it on an SF 368 (Quality Deficiency Report). Mall it to Commander, US Army Communications-Electronic Command and Fort Monmouth: ATTN: AMSEL-PA-MA-D, Fort Monmouth, New Jersey 07703-5000. We'll send you a reply.

1-3.3 Administrative Storage

Administrative storage of equipment Issued to and used by Army activities will have preventive maintenance performed In accordance with the PMCS charts before storing. When removing the equipment from administrative storage the PMCS should be performed to assure operational readiness. Disassembly and replacing of equipment for shipment or limited storage are covered In chapter 5, section I.

1-3.4. Destruction of Army Electronics Materiel

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

1-3.5. Hand Receipt (-HR) Manuals

This manual has a companion document with a TM number followed by "-HR" (which stands for Hand Receipt). The TM 11-5825-231-10-HR consists of preprinted hand receipts (DA Form 2062) that list end item related equipment (I e., COEI,BII and AAL) you must account for As an aid to property accountability, additional -HR manuals may be requisitioned from the US Army Adjutant General Publications Center, Baltimore, MD, In accordance with the procedures In Chapter 3, AR 310-2, and DA Pam 310-10.

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

a. Direction Finder Set AN/TRD-23(*) is a radio direction finder system which accurately detects and displays the azimuth bearing of radio signals in the 1.5- to 20.0-megahertz (MHz) frequency range on either a primary or secondary equipment console. Both consoles may be put into service to locate separate signals using the same antenna array.

b. The primary function of the system is to obtain bearing information communication signals picked up by the antenna array. This information is displayed on a cathode-ray tube which is continually sensed by electronic circuitry.

c. Functionally, Cabinet, Electrical Equipment CY-6691/TRD-23A (primary console) and Cabinet Electrical Equipment CY-6691TRD-23A (secondary console) are identical, and can be used for direction finding on different signal simultaneously. The No. 1 df receiver in each console is always required for direction finding.

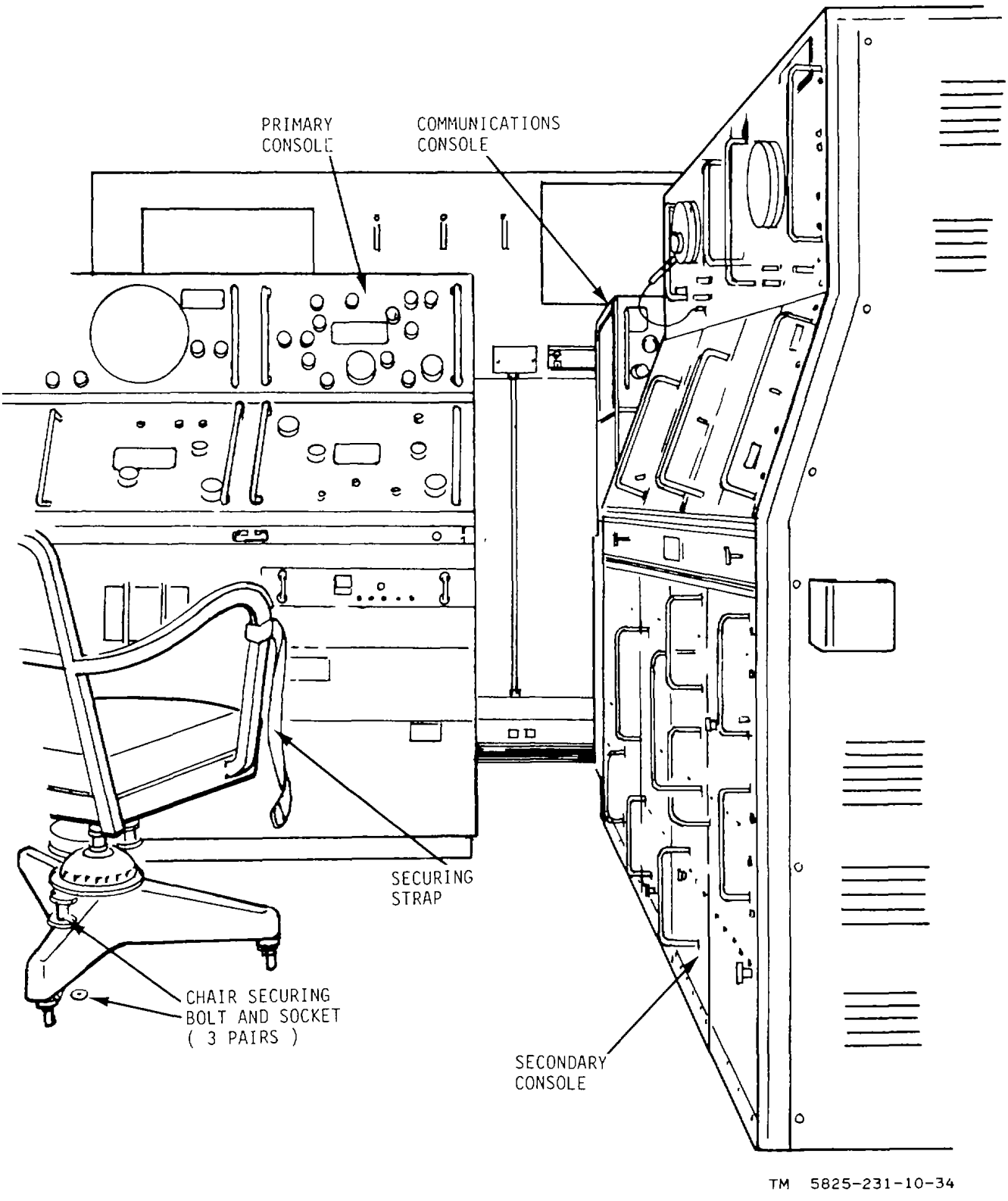


Figure 1-1. Direction Finder Set AN/TRD-23(*) shelter, Interior view.

When the incoming signal contains modulation, such as frequency modulation (FM) or frequency-shift keying (fsk), both the No 1 and No 2 df receivers are required to obtain an accurate bearing

d. Signal monitoring may be accomplished with any of the eight receivers Loudspeakers are provided for the monitor receivers in each console Audio signals from the df receivers may be monitored individually or binaurally with headphones connected to audio jack boxes.

e. The Communications Network receivers In Cabinet, Electrical Equipment CY-6023A/G (communications console) may be monitored on the loudspeaker in the console, or with headphones connected to the audio jack boxes.

f. Provisions for connections to external teletypewriter and radio transmitting equipment have been made

g. Figure 1-2 is a block diagram showing the AN/TRD-23(*) In a typical operating configuration.

(1) *Primary console.* Df receiver No. 1 is tuned to the frequency of the signal for which bearing is desired If this is a continuous-wave (cw) or amplitude-modulated (am) signal, an accurate bearing for the signal source will be displayed on Indicator, Azimuth IP-669/TRD (primary azimuth indicator) If other modulation is present on the signal, the configuration shown for the secondary console is used

(2) *Secondary console.* Df receivers No 1 and No 2 are tuned to the frequency of the signal for which a bearing is desired Modulation which interferes with the direction finding process (such as fm) is eliminated in this mode of operation, and an accurate bearing for the signal source is displayed on Indicator, Azimuth IP-669/TRD (secondary azimuth indicator).

(3) *Monitor and communications network receivers.* These receivers are tuned to frequencies of interest for monitoring purposes.

NOTE

Both primary and secondary consoles have the capability to operate on cw/am. and for pm/fsk direction finding.

h. The following is a list of the units in each console:

(1) *Primary console.*

AN/TRD-23	*AN/TRD-23A*
Indicator, Azimuth IP-669/TRD-15	Same
Receiver, Radio R-725/URR (monitor)	Same
Receiver, Radio R-725/URR (No. 1 df)	Same
Receiver, Radio R-725/URR (No. 2 df)	Same
Amplifier, Electronic Control AM-3345/TRD-15	Same
Coupler, Antenna CU-1874/TRD-23A	Same
Power Supply PP-4482/TRD	Same
Panel, Antenna Patching SB-3342/TRD-23A	Same
Distribution Boxes, Power J-2675/TRD (2)	Same
Drive, Gonlometer-TG-126/TRD Rotary Coupler TG-126/TRD	TG-126A/TRD
Detector, Radio Frequency RF-159/TRD	RF-159A/TRD
Distribution Box, Audio J-2674/TRD	J-2871/TRD-23A

(2) *Secondary console.*

AN/TRD-23	*AN/TRD-23A*
Indicator, Azimuth IP-669/TRD-15	Same
Receiver, Radio R-725/URR (monitor) .	Same
Receiver, Radio R-725/URR (No 1 df).	Same
Panel, Power Distribution SB-1747/TRD-15	Same
Receiver, Radio R-725/URR (No 2 df)	Same
Power Supply PP-4482/TRD	Same
Distribution Boxes Power J-2675/TRD (2).	Same
Detector, Radio Frequency RF-159/TRD	RF-169A/TRD
Distribution Box, Audio J-2674/TRD	J-2871/TRD-23A
Oscilloscope HP-120B/AR (monitor)	AN/USM-318(V)1
Panel, oscilloscope patch	Same

(3) *Communications console:*

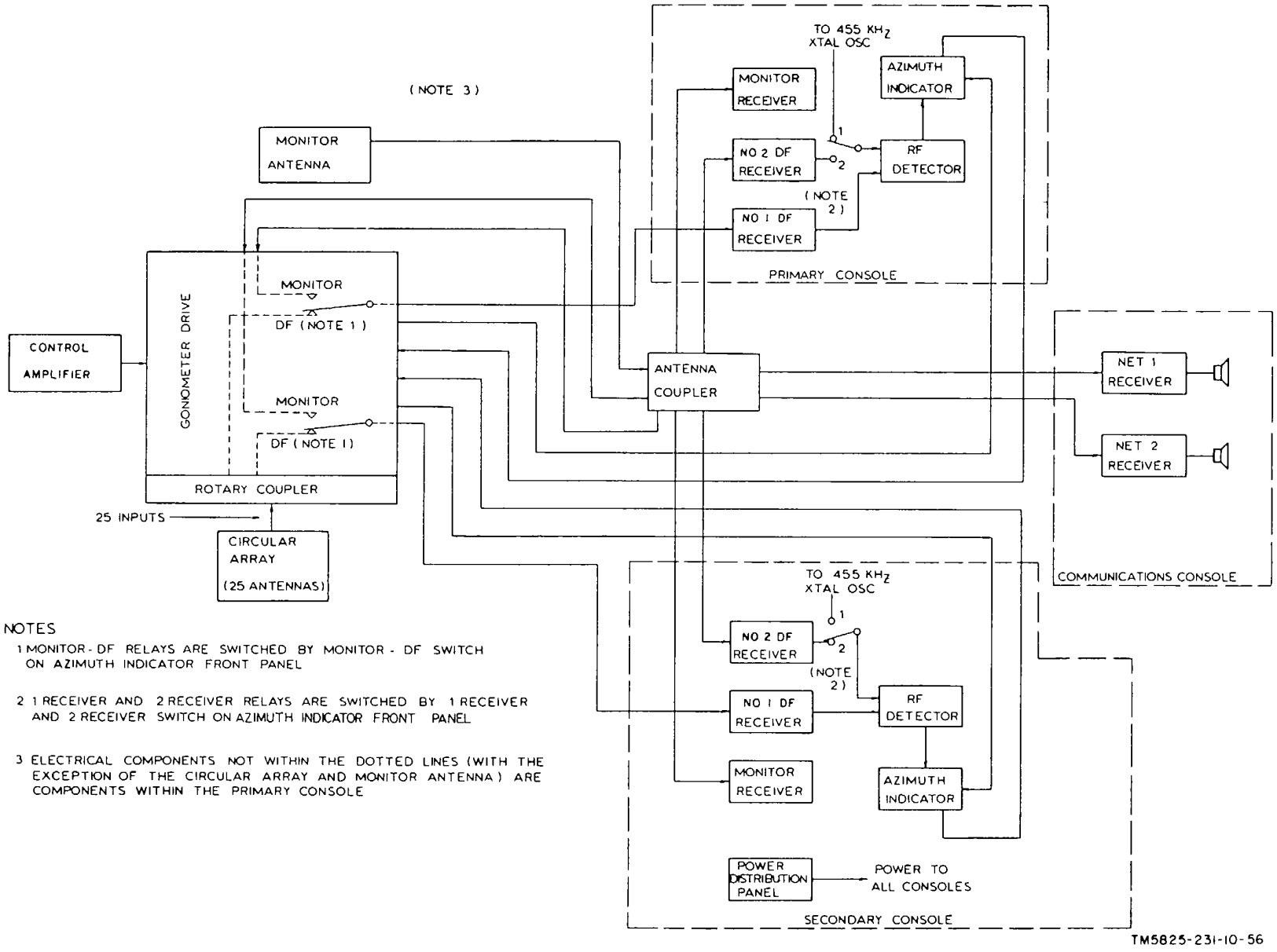
AN/TRD-23	*AN/TRD-23A*
Receiver, Radio R-725/URR (communications network 1).	Same
Receiver, Radio R-725/URR (communications network 2).	Same
Loudspeaker Assembly LS-585/TRD-23A	Same
Distribution Box, Power J-2675/TRD	Same
Distribution Boxes, Audio J-2674/TRD, and J-2679/TRD	J-2872/TRD-23A

1-5. Technical Characteristics

a. Direction Finder Set AN/TRD-23(*).

Frequency range ----------1 5 to 20 0 MHz
Type of modulation----------Am., cw, fm, pm, fsk
No of receivers ----------8.
Bearing sensitivity [1] ----------3 5 uv/meter minimum.
Bearing accuracy ----------±2'

[1] Bering sensitivity at 1.5 MHz - 9 0 uv/meter minimum.



NOTES

1 MONITOR - DF RELAYS ARE SWITCHED BY MONITOR - DF SWITCH ON AZIMUTH INDICATOR FRONT PANEL

2 1 RECEIVER AND 2 RECEIVER RELAYS ARE SWITCHED BY 1 RECEIVER AND 2 RECEIVER SWITCH ON AZIMUTH INDICATOR FRONT PANEL

3 ELECTRICAL COMPONENTS NOT WITHIN THE DOTTED LINES (WITH THE EXCEPTION OF THE CIRCULAR ARRAY AND MONITOR ANTENNA) ARE COMPONENTS WITHIN THE PRIMARY CONSOLE

Figure 1-2. Direction Finder SV/TRD-23(*), block diagram.

Bearing Indication ---------- Visual, half-propeller
Dower requirements ---------- 115 volts, single phase, or 230 volts, three phase 47 to 63 Hz, 6.5 kw maximum
Antennas ---------- 26 vertical top-loaded monopoles.
Weight---------- 5,000 pounds.

b. Antenna System AN/TRA-32.

Frequency range ---------- 1.5 to 20.0 MHz
Impedance ---------- 50 ohms.
Resonant frequency ---------- 6 MHz. (loaded).
No. of antennas---------- 26.

c. Coupler Antenna CU-1874/TRD-23A

Frequency range ---------- 2.0 to 32 MHz.
Input impedance---------- 72 ohms.
Output impedance ---------- 72 ohms.
Gain---------- 1.5 ±1.5 db.
Noise figure (typical) ---------- 8 db.
No. of outputs ---------- 8.
Power requirements ---------- 115/200 volts, single phase, 48 to 63 Hz, 28 watts.

d. Drive, Goniometer-Rotary Coupler TG-126 (*)/TRD.

Frequency range (rotary coupler).---------- 15 to 20.0 MHz
RF inputs (rotary coupler) ---------- 25.
RF outputs (rotary coupler) ---------- 2.
Motor speed ---------- 5,400 rpm.
Power requirements---------- 115 volts, 180 Hz.

e. Amplifier, Electronic Control AM3545/TRD-15.

Output ---------- 115 volts, 180 Hz.
Power requirements---------- 115 volts, 48 to 63 Hz, 900 volt-amperes.

f. Receiver, Radio R-725/URR.

Frequency range ----------0.5 to 32 MHz.
Types of modulation----------Cw, am., fm, fsk.
Sensitivity ----------4 uv for 10 db stn/n ratio.
Output ----------455 kHz IF audiofrequency line.
Power requirements----------115 volts, 48 to 63 Hz.

g. Detector Radio Frequency FR-159(*)/TRD.

Input ----------20455 kHz.
Output ----------Df (90 Hz); auxiliary (variable)
Loudspeaker----------1.
Power requirements----------6.3 volts ac, 5 amperes. 250 volts dc, 175 milliamperes.

h. Power Supply PP-4482/TRD.

Output ----------6.3 volts ac, 6.2 amperes. 250 volts dc, 200 milliamperes.
Power requirements----------115 volts, 48 to 63 Hz, 150 volt-amperes.

i. Indicator, Azimuth IP-669/TRD-15

Input ----------DF (90 Hz); Sweep (72 KHz).
Output ----------Sweep (72 KHz), visual display.
Power requirements----------115 volts, 48-63 Hz, 100 watts.

j. Panel, Power Distribution SB-1747/TRD-15.

Output ----------115 volts ac, 2,00 wats, adjustable.
Power requirements----------115/230 volts, 48 to 63 Hz, 2 kw.

K. Monitor Oscilloscope (HP-120B/AR and AN/USM 318(V)1)

Function	*HP-120B/AR*	*AN/USM-318(V)1*
Display	Single	Dual
Vertical Amplifier:		
Bandwidth	Dc to 450 kHz	Dc to 50 MHz
Sensitivity	10 mv/cm	5 mv/cm
Horizontal amplifier:		
Bandwidth	Dc to 300 kHz	Dc to 5 MHz
Sensitivity	100 mv/cm	100 mv/cm
Sweep range	5 µsec cm to 200 msec/cm	0.5 µsec cm to 2 sec/cm
Power requirements	115 to 230 volts, 50 to 1,000 Hz, 95 watts	115 to 230 volts, 50 to 400 Hz, 95 watts

l. Audio Box.

Input ---------- Transmitter (2)
Output ---------- Monaural headset, switched Binaural headset

m. Console (Primary, Secondary, and Communications).

(1) Primary console

Input ---------- Antenna input panel (26).
Output ----------Ac power strips (2).

(2) *Secondary console.*

Input ----------Ac power.
Output ----------Ac power strips (2).

(3) *Communications console.*

Input ----------Ac power.
Output ----------Ac power strips (2).

n. Shelter s-280(*)/G.

Air conditioners (2)---------- 9,000 btu.
Heater---------- 15,000 btu
Power requirements---------- 115 volts, 60 Hz, single or three phase, 6.5 kw.

o. Transmitter, Radio T-279A/UR.

Frequency range ---------- 0.5 to 30.0 MHz.
Modulation ---------- Cw, mcw.
Power requirements----------1.5 volts dc, 135 volts, dc.

1-6. Components and Dimensions

Major components, their overall dimensions, weights, and references to figures illustrating these components are listed below.

Federal stock number	Item	Qty	Height (In)	Depth (in)	Width (in)	Weight (lb)	Fig No
	Coupler, Antenna CU-1874/TRD-23A.	1	3.5	11.25	19.0	18.0	1-7
	Driver, Goniometer-Rotary Coupler TG-126 (*)/TRD.	1	10.5	12.06	19.0	69.5	1-8
	Amplifier, Electronic Control AM-3545/TRD-15.	1	7.0	12.5	19.0	51.6	1-9
	Receiver, Radio R-725/URR.	1	10.5	17.0	19.0	85.0	1-10
	Detector, Radio Frequency RF-159(*)/TRD	1	8.75	20.0	19.0	22.2	1-11
	Power Supply PP-4482/TRD.	1	7.0	7.5	19.0	28.6	1-12
	Indicator, Azimuth IP-669/TRD-15.	1	10.5	17.0	19.0	57.3	1-13
	Panel, Power Distribution SB-1747/TRD-15.	1	10.5	9.75	19.0	65.5	1-14
	Oscilloscope HP-120B/AR.	1	7.5	18.4	19.0	29.0	1-15①
	Oscilloscope AN/USM-318(V)1.	1	5.2	19.4	11.05	25.0	1-15①
	Distribution Box, Audio (J-2674/TRD,J-2679/TRD, J2871/TRD-23A, AND J-2872/TRD-23A	1	2.0	2.5	11.0		1-16
	Cabinet, Electrical Equipment CY-6691/TRD-23A (primary console).	1	54.0	27.0	40.0		
	Cabinet, Electrical Equipment CY-6690/TRD-23A (secondary console).	1	54.0	27.0	40.0		
	Cabinet, Electrical Equipment CY-6023A/G (communications console).	1	54.0	27.0	20.0		
	Transmitter, Radio T-279A/UR.	1	6.75	14.5	9.25	1.80	1-20
	Shelter S-280(*)/G	1	82.5	142.0	85.5	5,000	
	Loudspeaker Assembly LS-585/TRD-23A.	1	5.8	6.0	20.0		

Federal stock number	Item	Qty	Height (in)	Depth (in)	Width (in)	Weight (lb)	Fig No.
5995-912-7076	Cable Assembly, Radiofrequency CG-833A/U (7ft).	1					
5995-905-7183	Cable Assembly, Radiofrequency CC-833A/U (10 ft).	1					
5995-823-3065	Cable Assembly, Radiofrequency CG-1079B/U (2 ft).	1					
5995-905-9489	Cable Assembly, Radiofrequency CG-1079B/U (2 ft 6 in)	1					
5995-905-9488	Cable Assembly, Radiofrequency CG-1079B/U (5 ft 6 in)	1					
5995-905-9487	Cable Assembly, Radiofrequency CG-1079B/U (6 ft).	1					
5995-912-1879	Cable Assembly, Radiofrequency CG-1079B/U (9 ft).	1					
5995-903-7730	Cable Assembly, Radiofrequency CG-1079B/U (12 ft).	1					
5995-905-8293	Cable Assembly, Radiofrequency CG-3177/U (2 ft).	1					
5995-911-3688	Cable Assembly, Radiofrequency CG-3178/ TRD-15 (4 ft).	1					
6150-926-0810	Cable Assembly, Power, Electrical CX-11480/U (5 ft).	1					
6150-926-0809	Cable Assembly, Power, Electrical CX-11481/U (8 ft).	1					
6150-905-6013	Cable Assembly, Power, Electrical CX-11221/U (3 ft).	1					
6150-’005-6012	Cable Assembly, Power, Electrical CX-11222/U (3 ft 6 in).	1					
6150-905-6417	Cable Assembly, Power, Electrical CX-11223/U (3 ft).	1					
6150-905-7191	Cable Assembly, Power, Electrical CX-11224/U (2 ft 6 in).	1					
6150-905-8136	Cable Assembly, Power, Electrical CX-11226/U (6 ft).	1					
5995-999-5359	Cable Assembly, Power, Electrical CX-11520/U (2 ft 4 in)	1					
6150-905-7552	Cable Assembly, Power, Electrical CX-11228/U (3 ft 4 in).	1					
6150-905-7553	Cable Assembly, Power, Electrical CX-11229/U (2 ft 4 in).	1					
6150-926-0779	Cable Assembly, Power, Electrical CX-11227/U (5 ft 4 in)	1					
6150-926-0780	Cable Assembly, Power, Electrical CX-11180/U (5 ft 6 in)	1					
6150-905-7555	Cable Assembly, Power, Electrical CX-11180/U (5 ft).	1					
6150-905-7186	Cable Assembly, Power, Electrical CX-11181/U (6 ft).	1					
5995-164-7716	Cord Assembly CD-307A (6 ft 6 in).	1					
5985-922-7705	Panel, antenna Input.	1					
5825-923-2467	Panel assembly ac Primary.	1					
5825-926-0025	Panel assembly ac secondary.	1					
5975-923-2503	Panel, blank.	1					
5975-999-4635	Panel, blank.	1					
5975-941-2360	Panel, blank.	1					
5825-940-8120	Panel, monitor.	1		19	3.47		

1-7. Common Names

a. The chart (b below) lists the common names assigned to the units comprising the AN/ TRD-23(*).

b. Duplication of some units in more than one console In the AN/TRD-23(*) requires that those units be additionally identified by location, *for example,* the RF detector in the secondary console becomes the secondary RF detector.

Nomenclature	Common Name
Direction Finder Set AN/fRD-23/ (*)	Df set
Antenna System AN/TRA-32	Antenna system
Antenna Assembly AS-1882/GR monopole	Veriticle
Base, Antenna MT-865/GR	Mounting base
Counterpoise, Antenna MX-4487/G	Ground plane
Guy Set OA-7908/G	Antenna support ing wires
Coupler, Antenna CU-1874/fRD-23A	Antenna coupler
Panel, Antenna Patching SB-3342/TRD-23A	Antenna panel
Drive, Goniometer-Rotary Coupler TG-126-(*)/TRD	Goniometer drive
Goniometer, Electrical GO-42/ TRD-15	Goniometer
Coupler, Rotary, Radiofre-quency, CU-1096/TRD	Rotary coupler
Amplifier, Electronic Control AM-3545/TRD-15	Control amplifier
Receiver, Radio R-725/URR	Receiver
Detector, Radio Frequency RF-159(*)/TRD	RF detector
Power Supply PP-4482/TRD	Power supply
Indicator, Azimuth IP-669/TRD-15	Azimuth indica-tor
Panel, Power Distribution SB-1747/TRD-15	Power panel
Oscilloscope (all models)	Monitor oscilloscope
Distribution Box, Audio (all models)	Audio box
Cabinet, Electrical Equipment (all models)	Console
Transmitter, Radio T-279A/UR Transmitter	Target
Panel, patch, oscilloscope	Patch panel
Loudspeaker Assembly LS-585/ TRD-23A	Loudspeaker
Distribution Box. Power J-2675/ TRD	Ac power strip
Loading Disc, Antenna MX-1168/G R	Loading disc
Kit, antenna positioning MK-985(*)/G	Antenna position-ing kit
Shelter S-280(*)/G	Shelter

1-8. Description of AN/TRD-23(*)

a. The AN/TRD-23(*) consists of an antenna system and a shelter which contains three equipment consoles, a heater, air conditioners, lighting, and all necessary cables.

b. The antenna system is a group of 26 monopole antennas

(1) Twenty-five of these monopoles are arranged equidistantly around the circumference of a 150- (or 300-) foot circle, and, when connected to the rotary coupler, becomes the df antenna.

(2) The remaining monopole, placed near the center of the df antenna circular array, is connected to the antenna coupler and becomes the monitor antenna.

(c) The three equipment consoles In the shelter contain all the major operating units of the AN/TRD-23(*) (fig 1-3).

d. Power for the df set is supplied from an external source through the shelter circuit breaker panel The secondary console power panel controls all the operating units in the df set.

1-9. Antenna System AN/TRA-32

a. General. The, antenna system consists of 26 individual antennas The components of each antenna are’

(1) Antenna Assembly AS-1882/GR
(2) Base, Antenna MT-865/GR
(3) Counterpoise, Antenna MX-4487/G
(4) Guy Set OA-7908/G

b. Antenna Assembly AS-18821GR (fig 1-4).

NOTE

The antenna sections form a physical mast.

(1) Antenna Section AT-445/GR is a 3/4-inch diameter steel tube (1/8-inch wall thickness, painted finish) approximately 75 inches long. An internally threaded sleeve In the upper end of this section is used to attach the antenna loading disc. A locking lever at the lower end of this section is used to clamp the section to the section below.

(2) Antenna Section AT-444/GR is similar to Antenna Section AT-445/GR, except that it is a 7/8-inch diameter tube, approximately 100 inches long, and has a guy plate fastened to the upper end of the section A locking lever at the lower end of the section is used to clamp the section to the section below.

(3) Antenna Section AT-443/GR is similar to Antenna Section AT-444/GR, except that it is a 11/16-Inch diameter steel tube, approximately 100 Inches long, and has no guy plate A lock-

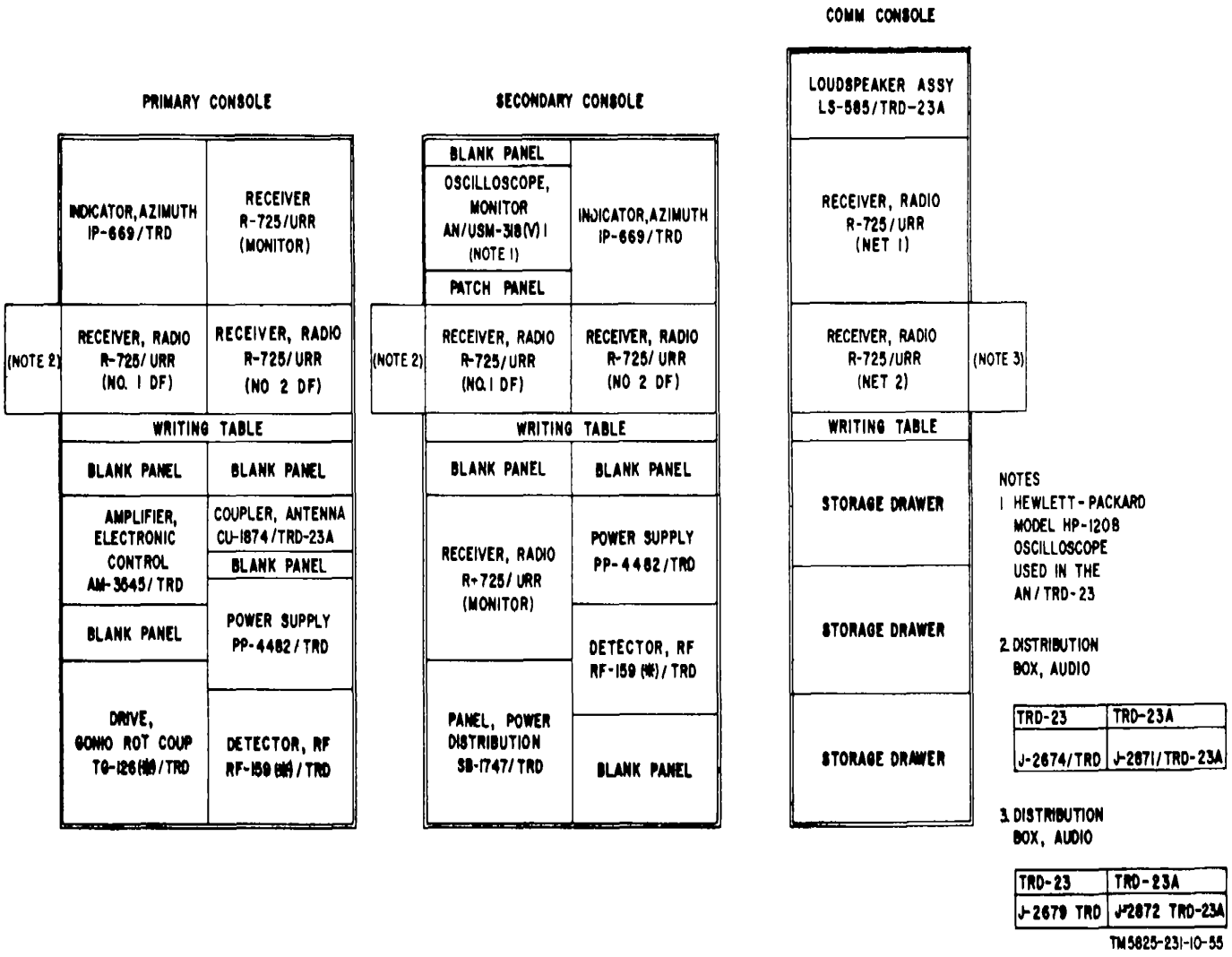


Figure 1-3 Direction Finder Set AN/TRD-23(*), consoles.

ing lever at the lower end of the section is used to clamp the section to Antenna Section AT-442/ GR.

(4) Antenna Section AT-442/GR is a 1 1/4-Inch diameter steel tube (1/4-inch wall thickness), approximately 100 inches long The mast insulator is built into the antenna section near its bottom A ball at the lower end attaches the mast socket in the mast base A removable cylindrical antenna coupler is on the side of the mast insulator above the ball Two terminating resistors and an antenna cable connector are within the coupler A rubber hood protects the cylindrical housing from the weather.

(5) Antenna Loading Disc MX-1168/GR (3/16-inch outside diameter tubing, 0.028-inch wall thickness, painted finish) consists of four 5 1/2-foot elongated loops which are fanned to form a top loading disc that is mounted to the top of Antenna Section AT-445/GR The loading disc improves sensitivity and balance in the low-frequency range by raising the effective length of the antenna The loading disc may be collapsed for shipment or storage purposes.

c. Base, Antenna MT-865/GR (fig 1-5) The antenna base is a 2-foot square wooden platform with a socket for the mast ball. A cutaway portion of the socket allows the mast to be lowered to a horizontal position. Also, three screws on the socket are used to adjust the mast vertically. Two pins are provided, one to lock the ball in the socket, and the other to keep the mast vertical. There are four holes in the platform through which oval-head steel stakes are driven to anchor the base to the ground One guy plate for attaching the adjacent antenna guy is secured to the base.

d. Guy Set OA-7908/G (fig 1-6) The guy set includes three 30-foot wire guys, four Guy

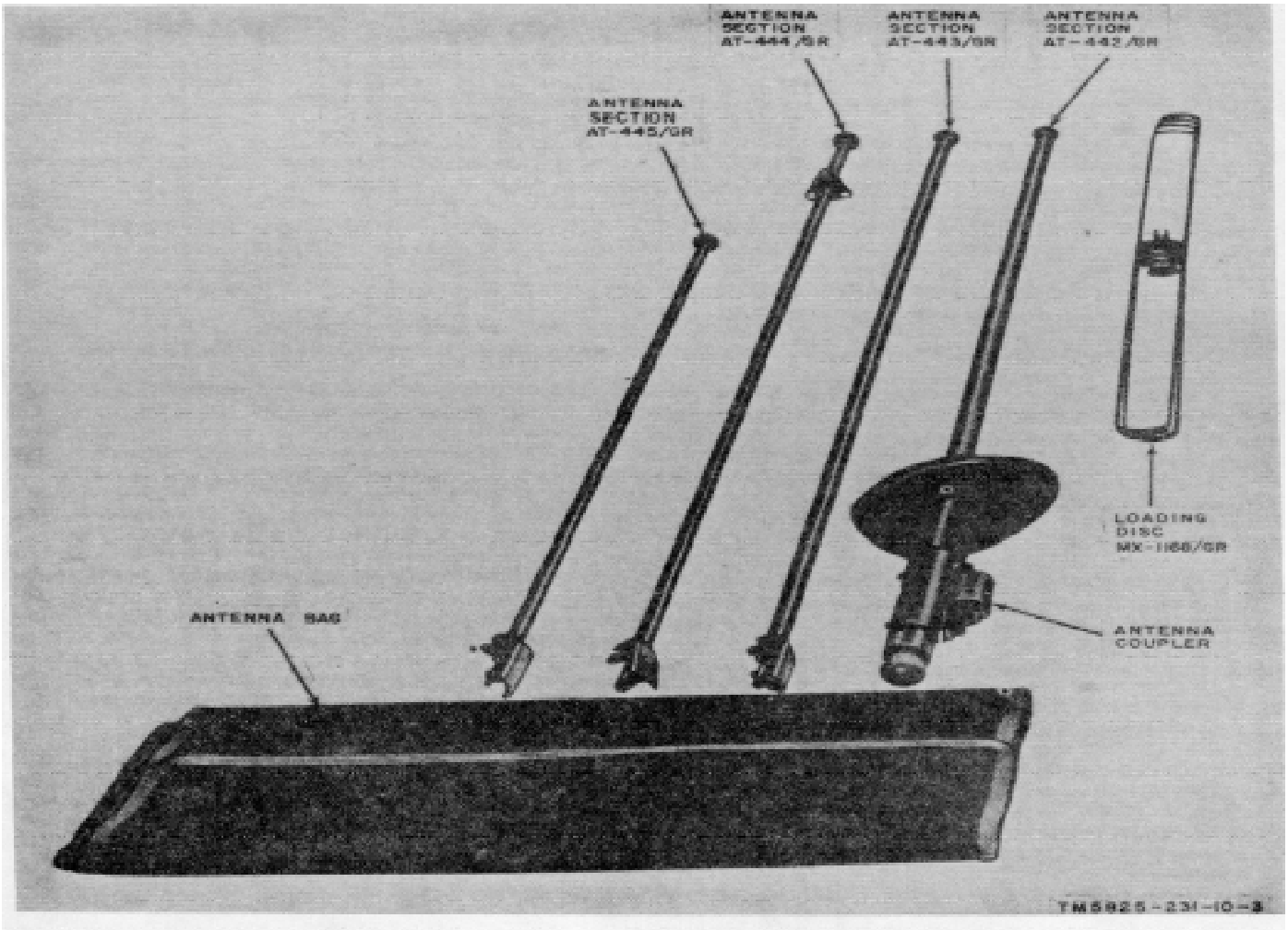


Figure 1-4. Antenna Assembly AS-1881/GR.

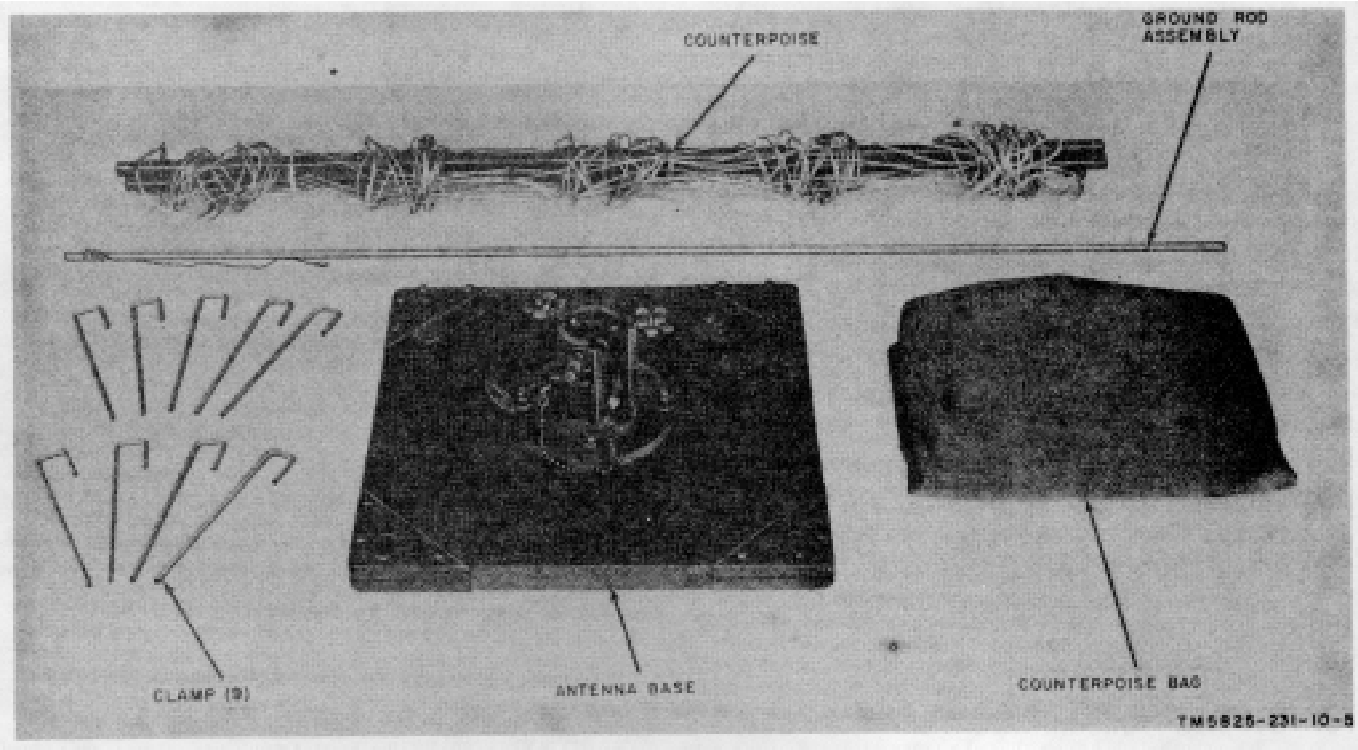


Figure 1-5. Base, Antenna MT-865/GR and Counterpoise, Antenna MX-4487/G.

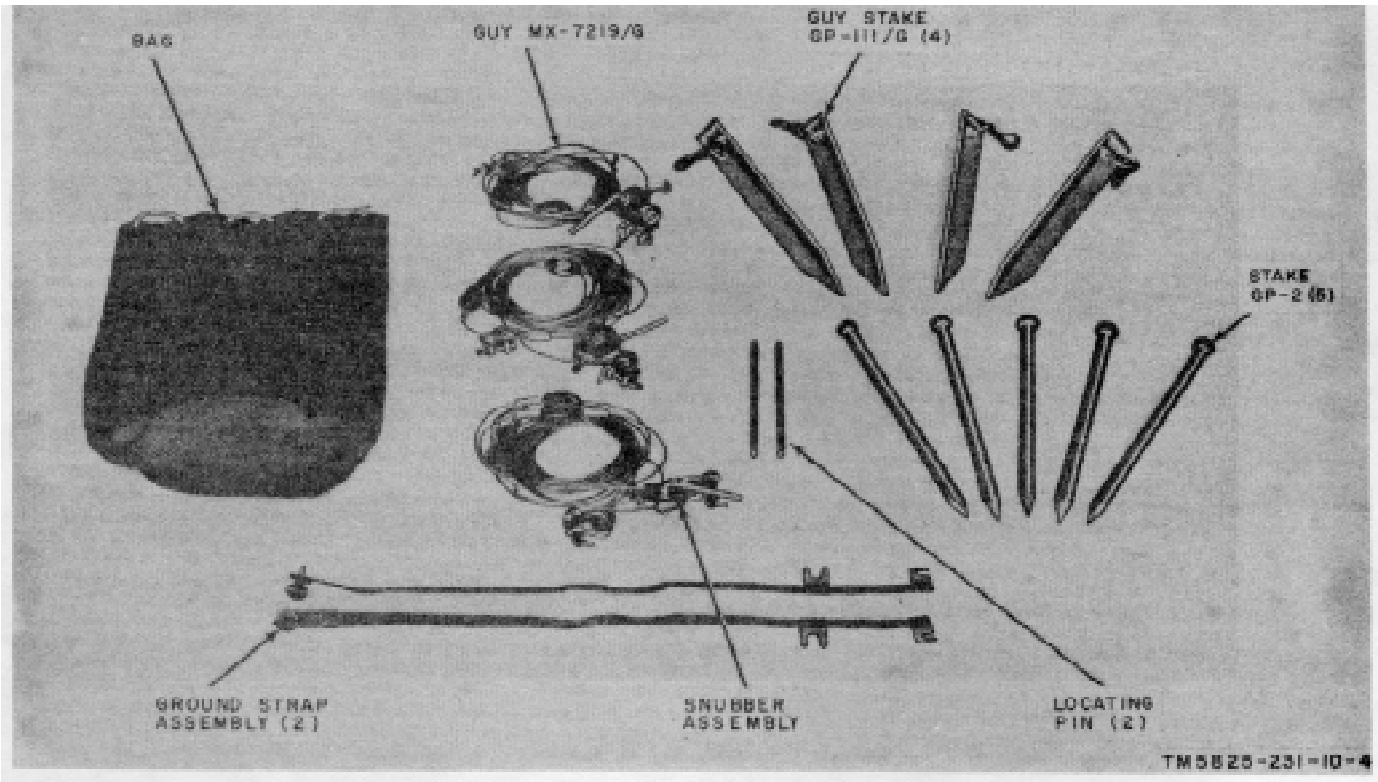


Figure 1-6. Guy Set OA-7908/G.

Stakes GP-111/G, two ground straps, two locating pins, and five Stakes GP-2 for anchoring the antenna base.

e. Counterpoise, Antenna MX-4487/G (fig. 1-5) The counterpoise assures uniform ground conductivity for all 25 antennas of the df antenna and the monitor antenna The system is composed of 26 individual sections, one for each antenna of the system Each counterpoise is approximately 10 feet square when unfolded and consists of nine sections of mesh made of 12-gage, stranded, tinned copper wire. Each counterpoise has two wooden rods at either end, or four In all The nine sections are joined to one another to the ground by metal clamps which fit over the wooden rods The counterpoise Is electrically grounded by driving the ground rod into the ground next to the braided strap connection on the counterpoise Connect the counterpoise to the ground rod wire with the screw on the braided strap connector.

1-10. Coupler, Antenna CU-1874/TRD-23A (fig 1-7)

a. The antenna coupler is a self-contained unit which provides connection of as many as eight receivers to the monitor antenna.

b. All cable connections are made at the rear of the unit The operating controls are on the front panel. The antenna coupler is mounted in the primary console (fig 1-3).

1-11. Drive, Goniometer-Rotary Coupler TG-126(*)/TRD (fig 1-8)

a. General. Two models of the goniometer drive are available The TG-126/TRD is supplied with the AN/TRD-23, and the TG-126A/TRD is supplied with the AN/TRD-23A. These units are physically and electrically Interchangeable.

b. Chassis. The goniometer drive includes a drive motor, a rotary coupler, a magnetic sync unit, and two goniometers The rotary coupler and one goniometer are driven directly. The other goniometer and sync unit are driven by a toothed pulley and serrated timing belt. The goniometer drive assembly is mounted at the bottom of the primary console (fig 1-3) Support rails enable the unit to be pulled forward to reach the goniometer for belt change or orientation adjustment.

c. Drive Assembly. The drive assembly consists of a motor, two painted aluminum goniometer housings, and a drive belt. The motor is a synchronous induction type which operates on 115 volts alternating current (ac), 180 Hertz (Hz) and rotates at 5,400 revolutions per minute.

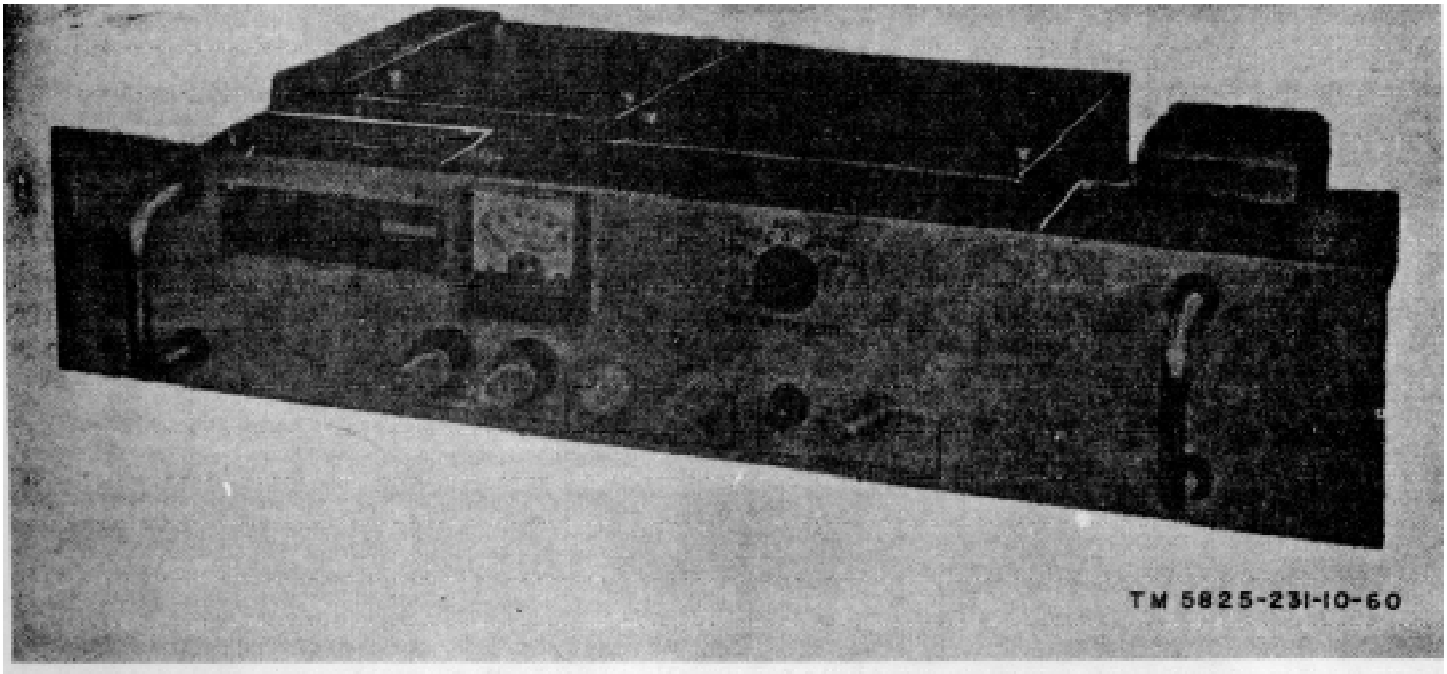


Figure 1-7. Coupler, Antenna CU-1874/TRD-23A.

(rpm). It is approximately 3 1/4 inches in diameter and 7 1/2 inches long.

d. Rotary Coupler. The rotary coupler is a painted aluminum assembly circular with 25 jacks equally spaced around its outer circumference. The antenna signals are applied to the rotary coupler through the connectors on the rear of the primary console The input impedance is 50 ohms and the output impedance is 1,000 ohms. The rotary coupler is 5 1/4 inches long by 6 ¼ inches in diameter

e. Relays The goniometer drive chassis contains coaxial relays for switching the signal to either of two modes of operation: am./gw or fm/fsk/pm.

f. Goniometers. The goniometers are cylindrical, end-mounted units that have one flat side which serves as a backplate for connectors. A constant velocity flexible coupling is mounted on the end of the rotor shaft The primary goniometer coupling is attached with setscrews to the drive motor The secondary goniometer coupling.

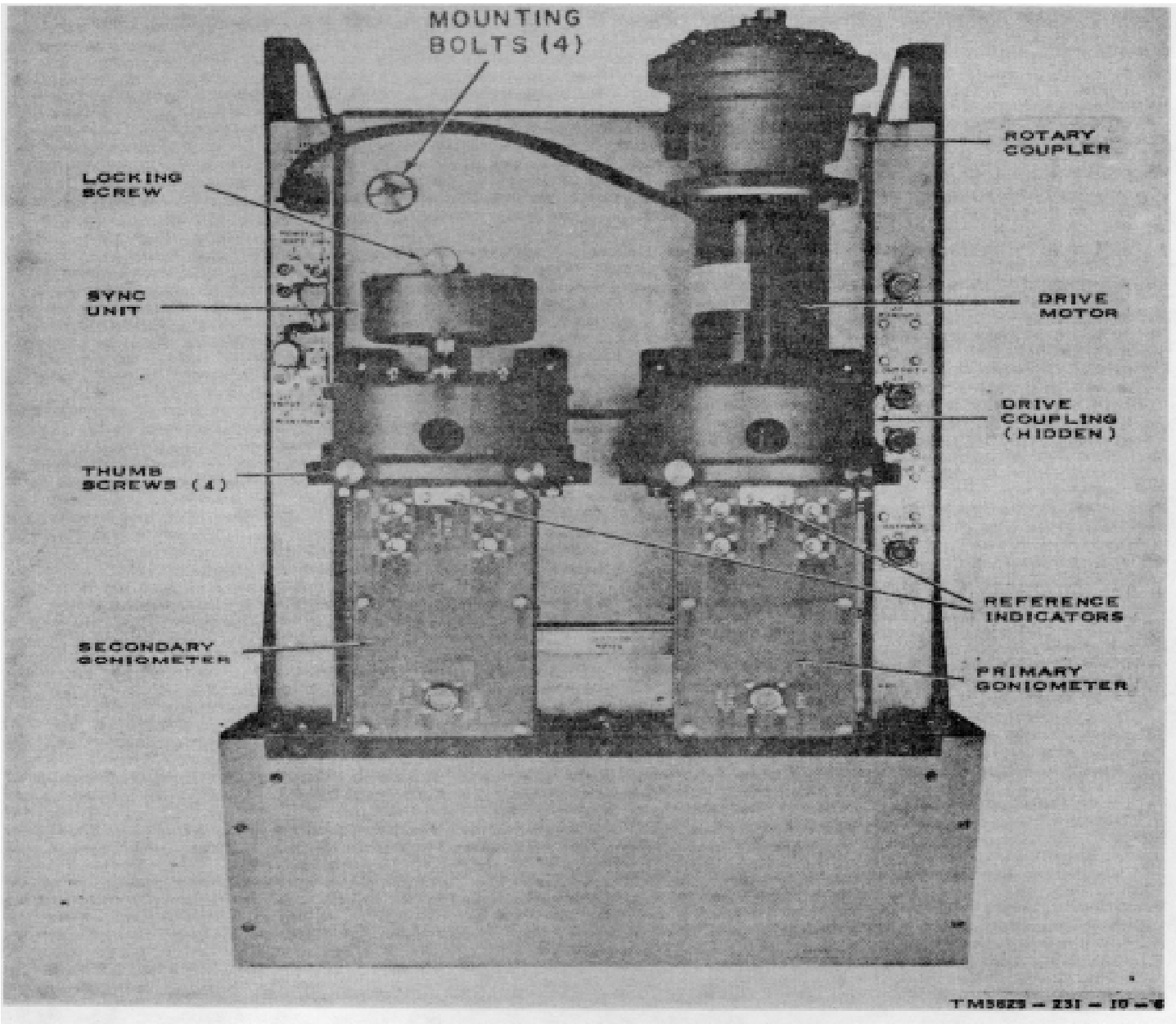


Figure 1-8. Drive, Goniometer-Rotary Coupler TG-126(*)TRD.

is attached with setscrews to a jackshaft. The drive motor shaft and jackshaft are fitted with toothed pulleys The drive belt rotates and the secondary goniometer in synchronization with the motor shaft, and drives the sync unit affixed to the other end of the jackshaft. The gonlometer contains a rotating primary rotor winding with two stator secondary windings physically displaced 90°. Each unit is 5 1/2 inches high, by 4 1/2 inches wide, 8 1/2 inches long.

1-12. Amplifier, Electronic Control AM-3345/TRD-1 5
(fig. 1-9)

a. The control amplifier supplies power to run the goniometer drive unit.

b. All controls and indicators are on the front panel, and all cables connect at the rear of the chassis The unit is installed In the primary console (fig 1-3).

1-13. Receiver, Radio R-725/URR
(fig 1-10)

a. Eight receivers are installed In the AN/TRD-23(*) (fig. 1-3).

b. The R-725/URR is a modified version of Radio Receiver R-390A/URR The two receivers are physically identical, but not interchangeable

c. All operating controls are on the front panel and all cable connections are made at the rear of the chassis.

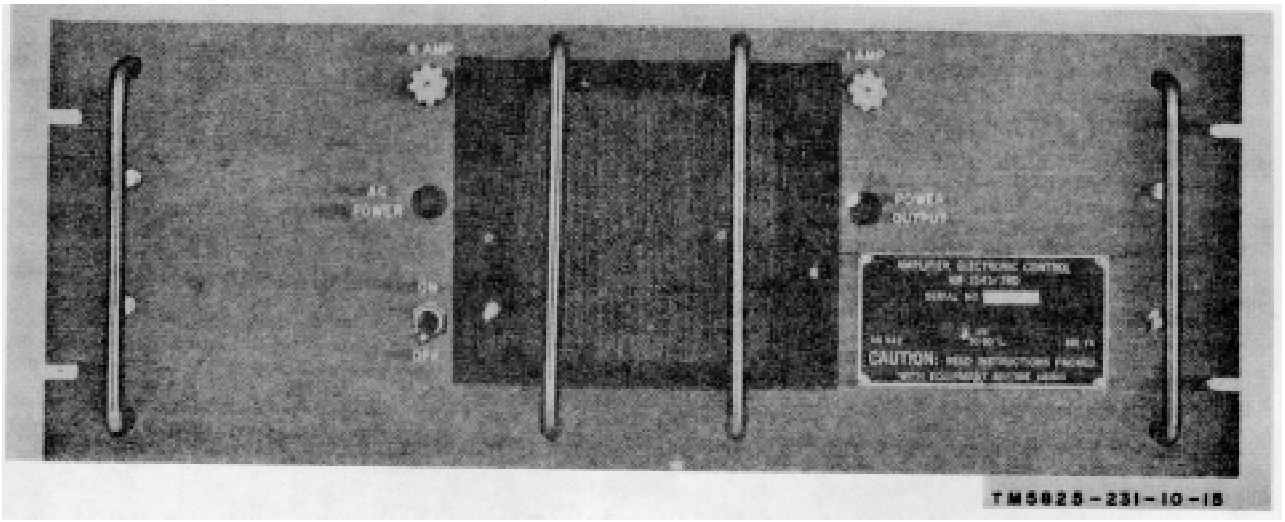


Figure 1-9. Amplifier, Electronic Control AM-3545/TRD-15.

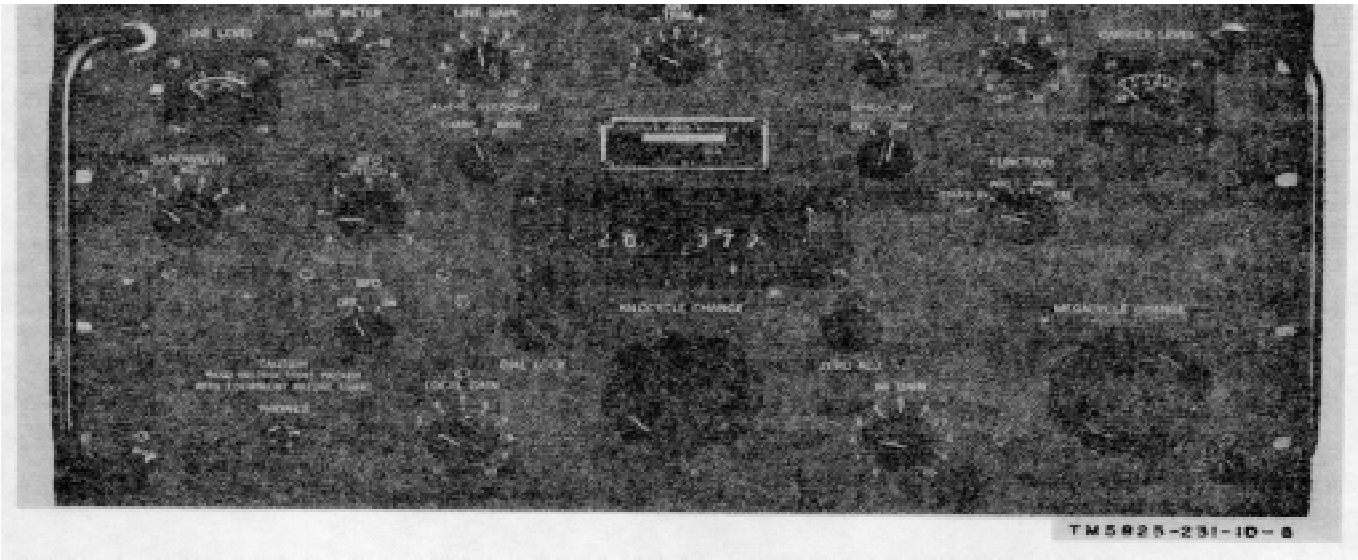


Figure 1-10. Receiver, Radio R-725/URR.

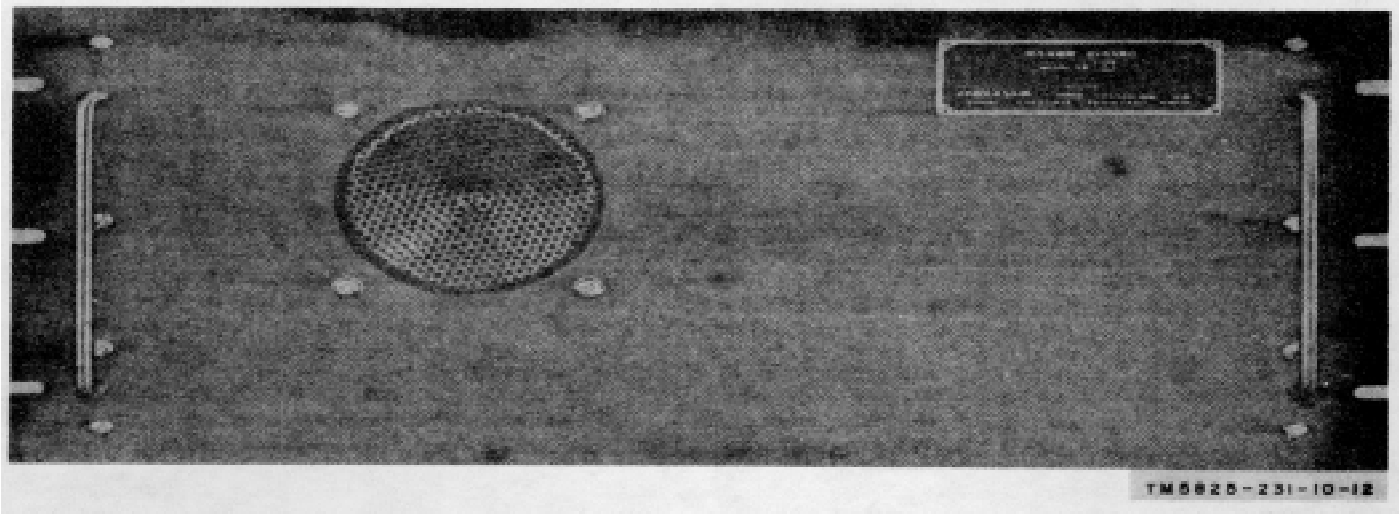


Figure 1-11. Detector, Radio Frequency RF-159(*)/TRD.

1-14. Detector, Radio Frequency RF-159(*)/TRD
(fig 1-11)

a. The RF detector extracts the bearing information from the received signal and supplies it to the azimuth indicator for display. A loudspeaker, for monitoring incoming signals, is on the chassis.

b. Two models of the RF detector are available The RF-159/TRD is supplied with the AN/TRD-23, and RF-159A/TRD is supplied with the AN/TRD-23A. These units are physically and electrically interchangeable.

c. The RF detector has a standard, 19-inch front panel on which all controls are mounted All cables connect at the rear of the chassis.

d. Two RF detectors are supplied with the AN/TRD-23(*): the primary RF detector is in the primary console, and the secondary rf detector Is in the secondary console Figure 1-1 shows the position of the two units in the two consoles.

1-15. Power Supply PP-4482/TRD
(fig 1-12)

a. The power supply provides the proper operating voltages to the RF detector.

b. The power supply has a standard, 19-inch front panel on which all controls are mounted All cabling connects at the rear of the chassis.

c. Two power supplies are provided in the *AN/*TRD-23(*): one in the primary console and one in the secondary console Refer to figure 1-3 for the location of these unit in the consoles.

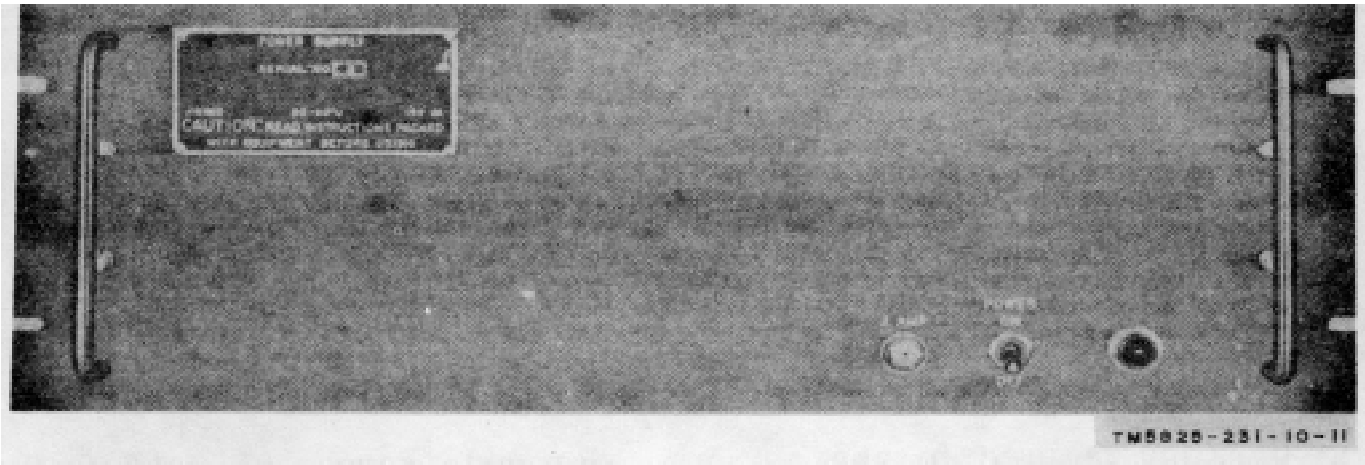


Figure 1-12. Power Supply PP-4482/TRD.

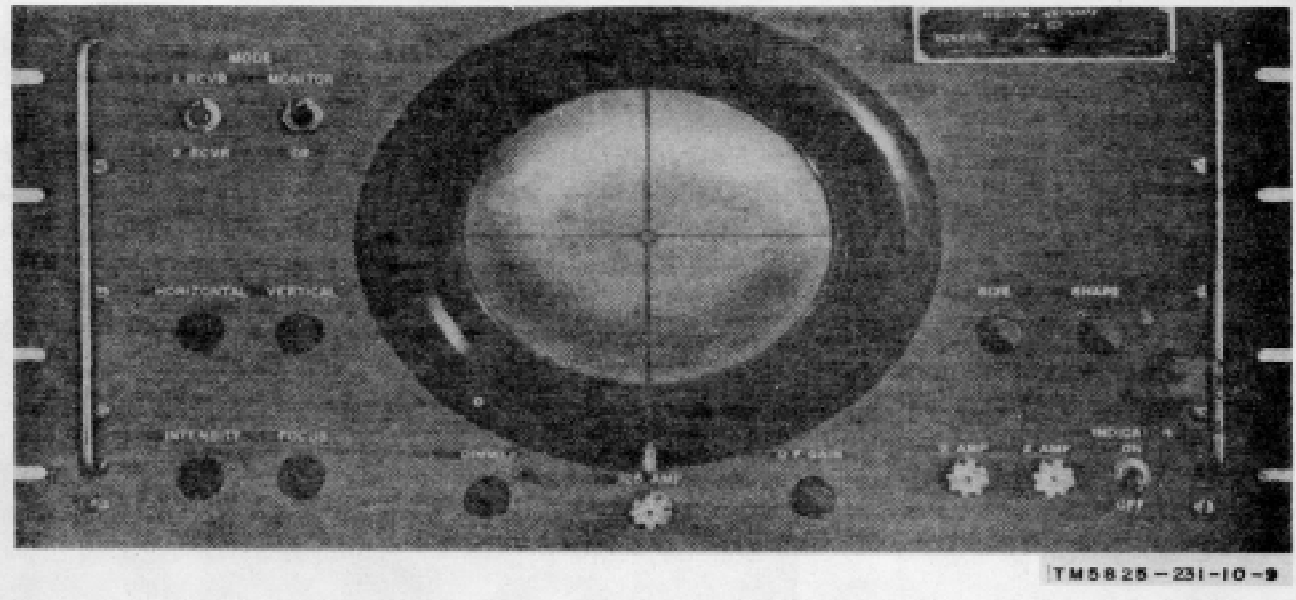


Figure 1-13. Indicator, Azimuth IP-669/TRD-15.

1-16. Indicator, Azimuth IP-69/TRD-15
(fig 1-13)

a. The azimuth indicator displays the bearing information obtained by the RF detector Etched crosshairs on a rotatable alidade help give accurate bearing determinations.

b. The front panel is a standard 19-inch rack size and mounts all controls and the display tube All cabling connects at the rear of the chassis Handles on the front panel are used to remove the unit.

c. Two azimuth indicators are provided with the AN/TRD-23(*): The primary azimuth indicator is in the primary console, and the secondary azimuth indicator is in the secondary console (fig 1-3).

1-17. Panel Power Distribution SB-1747/TRD-15
(fig 1-14)

a. The power panel is in the secondary console and controls all power to the units in the three consoles (fig 1-3).

b. All controls are on the front panel, and all cabling connects at the rear of the chassis.

1-18. Oscilloscopes HP-120B/AR and AN/USM-31 8(V)1
(fig. 1-15)

a. The monitor oscilloscope is used to check the operating condition of the df set.

b. The AN/TRD-23 uses Oscilloscope HP-120B/AR (fig 1-15①), and the AN/TRD-23A uses Oscilloscope AN/USM-318(V)1 (fig 1-15②)

c. Both monitor oscilloscopes fit the standard, 19-inch rack mounting in the secondary console (fig 1-3) and are Interchangeable.

d. All operating controls are on the front panel, and cable connections are made to the front panel from the patch panel mounted just below the monitor oscilloscope Power connects at the rear of the monitor oscilloscope.

e. A test probe is provided as a troubleshooting aid.

1-19. Distribution Boxes, Audio J-2674/TRD, J-2679/TRD, J-2871/TRD-23A, and J-2872/TRD-23A

a. The audio boxes provide headphone monitoring and transmitter keying input connections. An audio box is mounted on the side of each console (fig 1-3).

b. Figure 1-16 shows the J-2871/TRD-23A. The other models are electrically identical and similar In appearance; however, they are not interchangeable because of variations In mounting and panel markings.

c. Refer to paragraph 1-25 for nomenclature of models used in the AN/TRD-23(*).

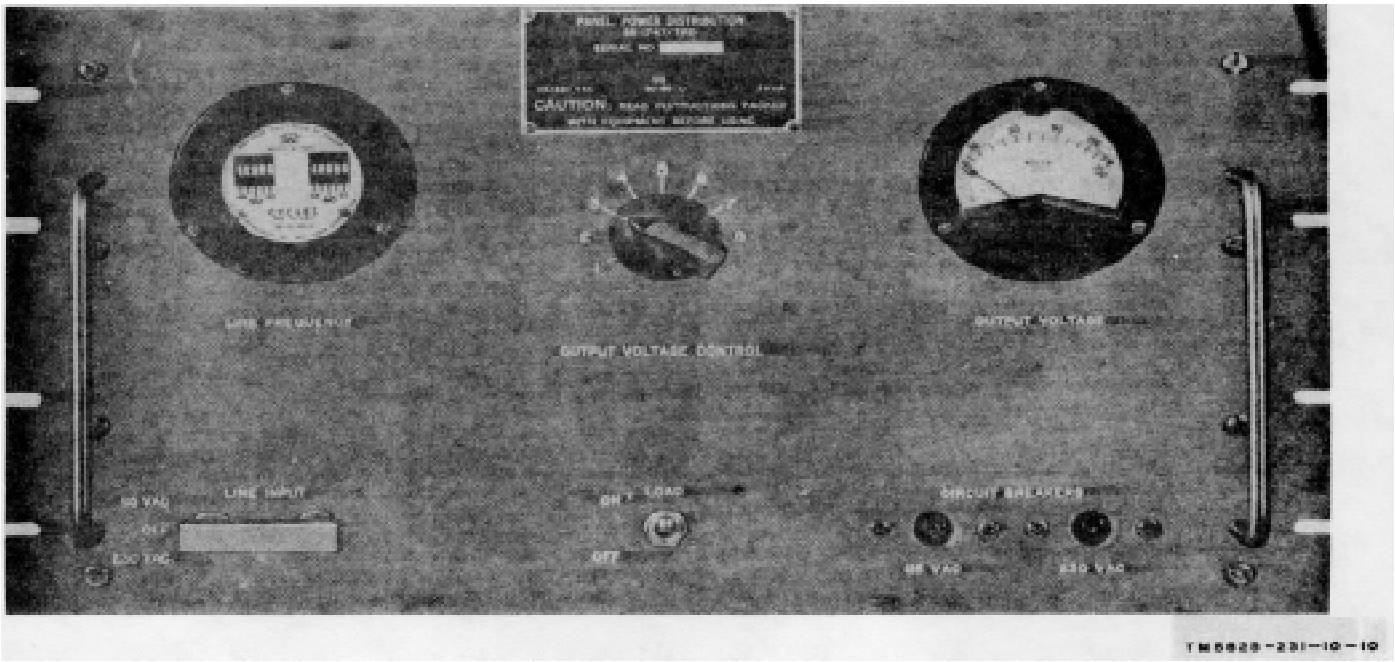


Figure 1-14. Panel, Power Distribution SB-1747/TRD-15.

1-20. Consoles

a. The consoles house all the operating units of the AN/TRD-23( ) The three consoles in each shelter are similar, but not interchangeable. The specific console used in the two models of the AN/TRD-23(*) Is listed In paragraph 1-25.

b. The primary and secondary console cabinets are reinforced aluminum with pairs of rails

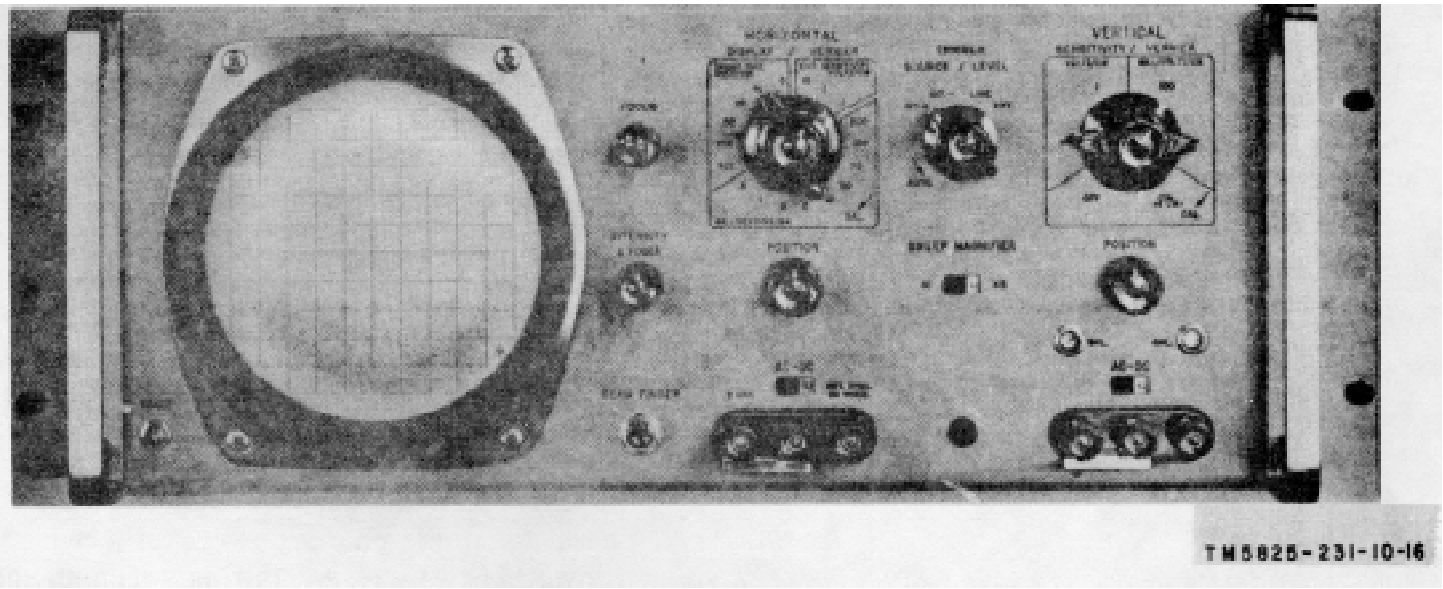


Figure 1-15①. Oscilloscope, monitor (sheet 1 of 2).

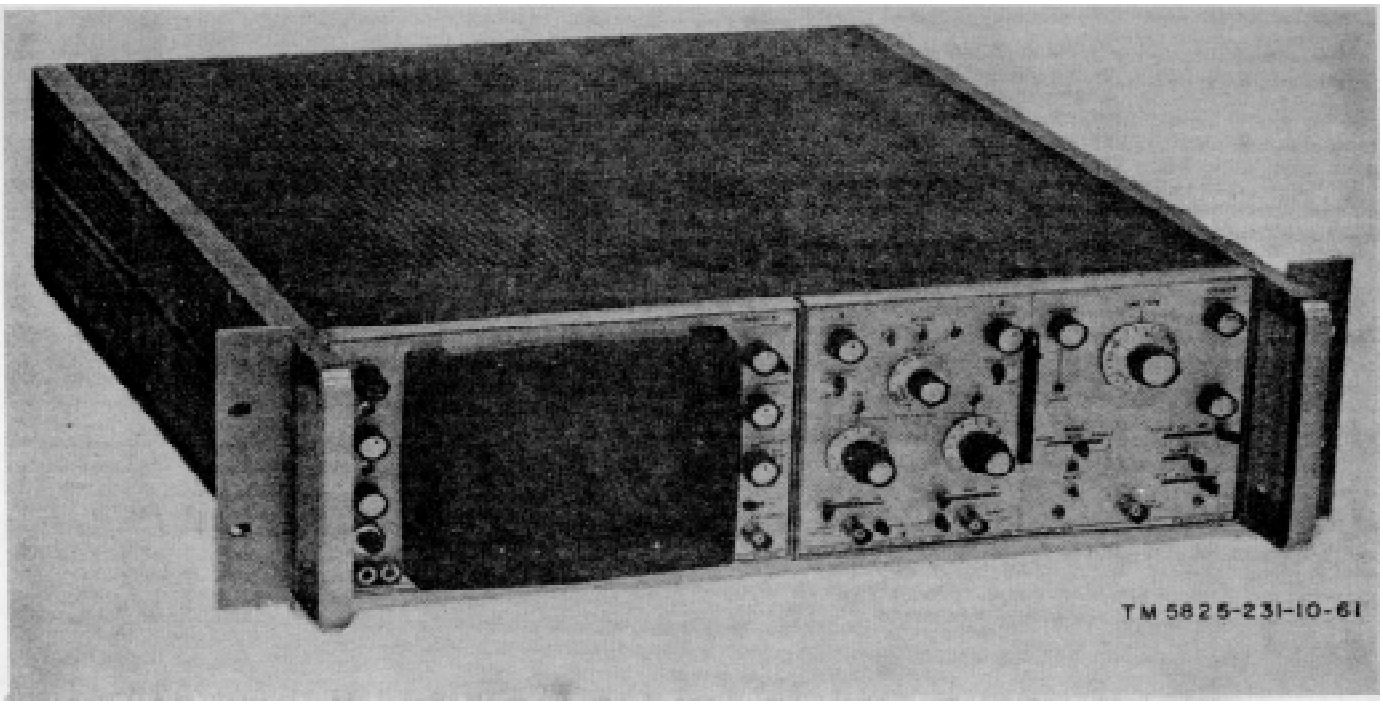


Figure 1-15②. Oscilloscope, monitor (sheet 2 of 2).

for mounting the various units. Stops are on each rail to prevent strain on the front panels. Standard, 19-inch panel mounting is used throughout Each cabinet contains a retractable writing table.

c. The communications console cabinet contains three storage drawers, and is only 20 inches wide, otherwise, it is similar to the primary and secondary console cabinets.

1-21. Shelter S-280(*)/G
(fig 1-17, 1-18, and 1-19)

a. The shelter houses all the equipment previously described, plus the following items:

(1) Air conditioner (2)
(2) Broom
(3) Pencil sharpener
(4) Coat hooks (3)
(5) Bulletin board
(6) Wastepaper basket.
(7) 5-gallon gas can
(8) Exhaust fan
(9) Heater
(10) First aid box
(11) Fire extinguisher
(12) Vacuum cleaner
(13) Rifle racks (3).
(14) Extension light.
(15) Chairs (3).
(16) Blackout curtain.
(17) Clock.
(18) Flashlight (AN/TRD-23A only).

b. A storage box, mounted between the air conditioners on the outside of the shelter, is used to store the canvas covers and power cables for the air conditioners when they are not in use. In the S-280A/G, the storage box is mounted by the secondary console

c. All power, audio, and RF cables that interconnect the three consoles pass through duct work. The ac power is wired for three-phase operation to a four-pin connector mounted on the outside front of the shelter Wherever 115-volt, single-phase commercial power is available, strapping Is added to the power terminals inside the main circuit breaker box to adapt three-phase to single-phase power; otherwise, a 15 Kilowatt (kw) power unit is recommended for use with the AN/TRD-23(*) A 150-foot three-

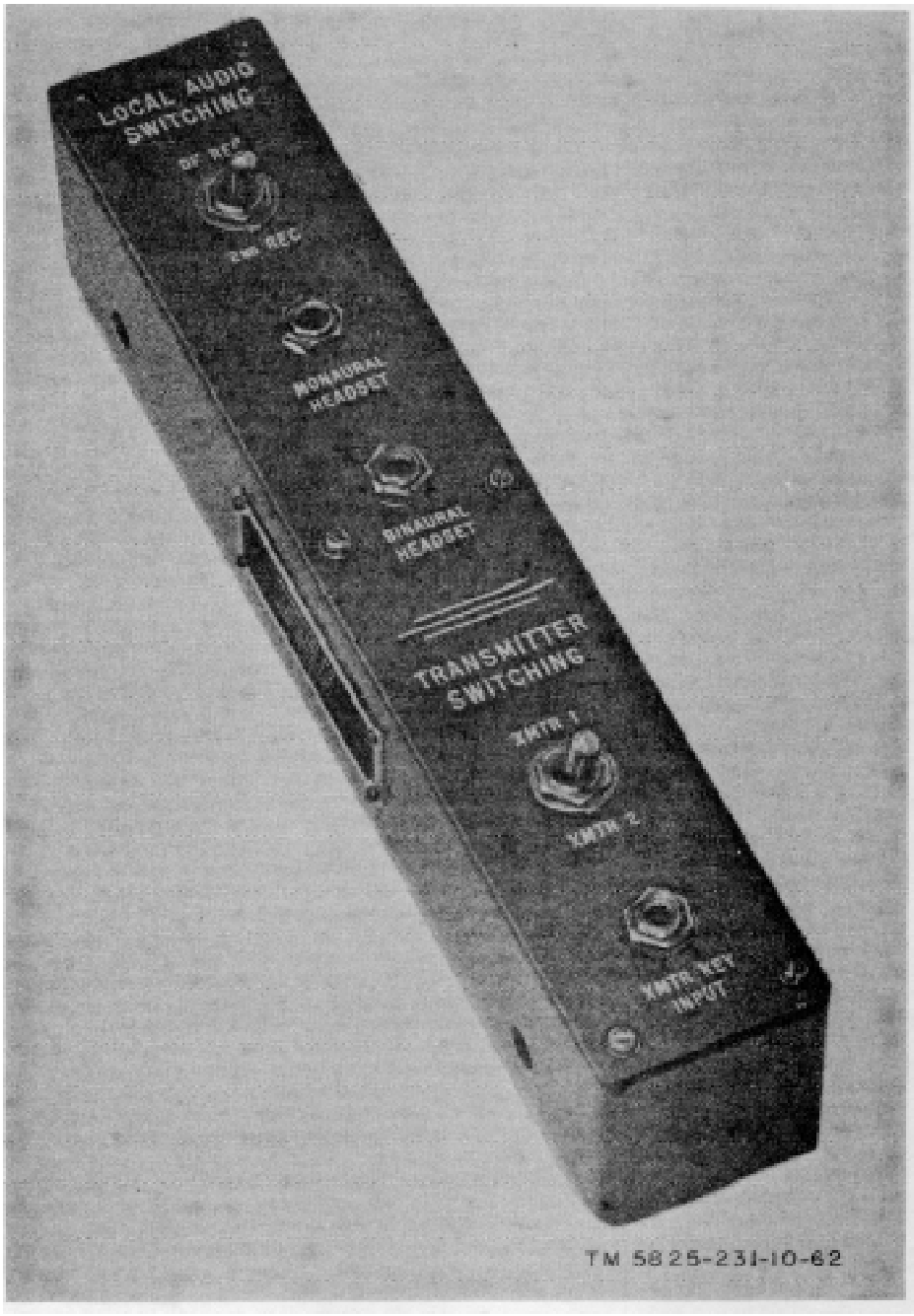


Figure 1-16. Distribution Box, Audio J-2871/TRD-23A.

phase cable and 150-foot extension cable (with appropriate connectors) are wound on two reels furnished with the AN/TRD-23 (*).

d. All antenna cables, as well as other auxiliary cables, enter at the side rear of this shelter.

e. The complete antenna system, including antenna-sections, antenna cables, counterpoise, guy sets mast bases, stakes, locating pins, shelter skids, and power cables are packed separately from the shelter.

f. The shelter has both heating and air-conditioning facilities. Two 9,000 btu air conditioners are supplied and one 15,000 btu heater (refer to TM 5-643 for specifications and instructions)

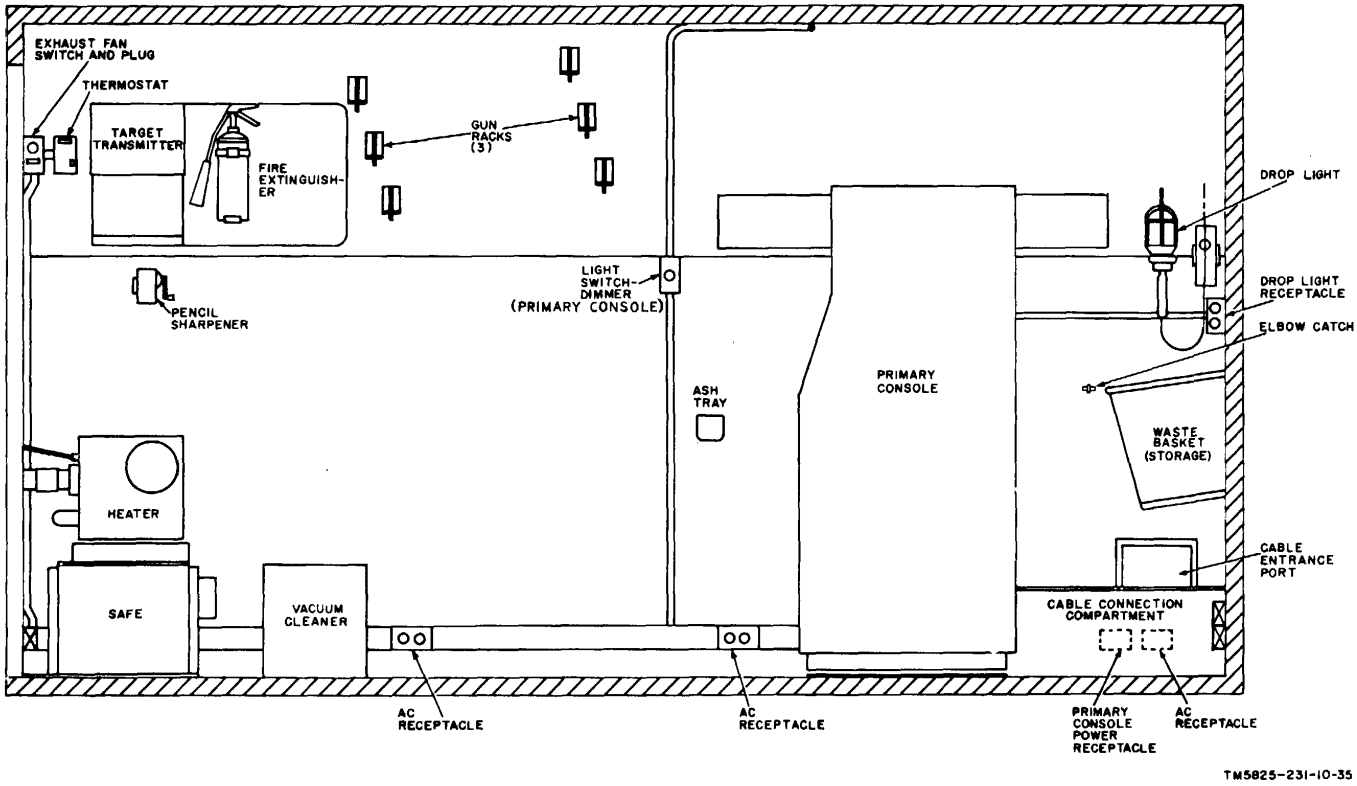


Figure 1-17. Shelter interior, roadside view.

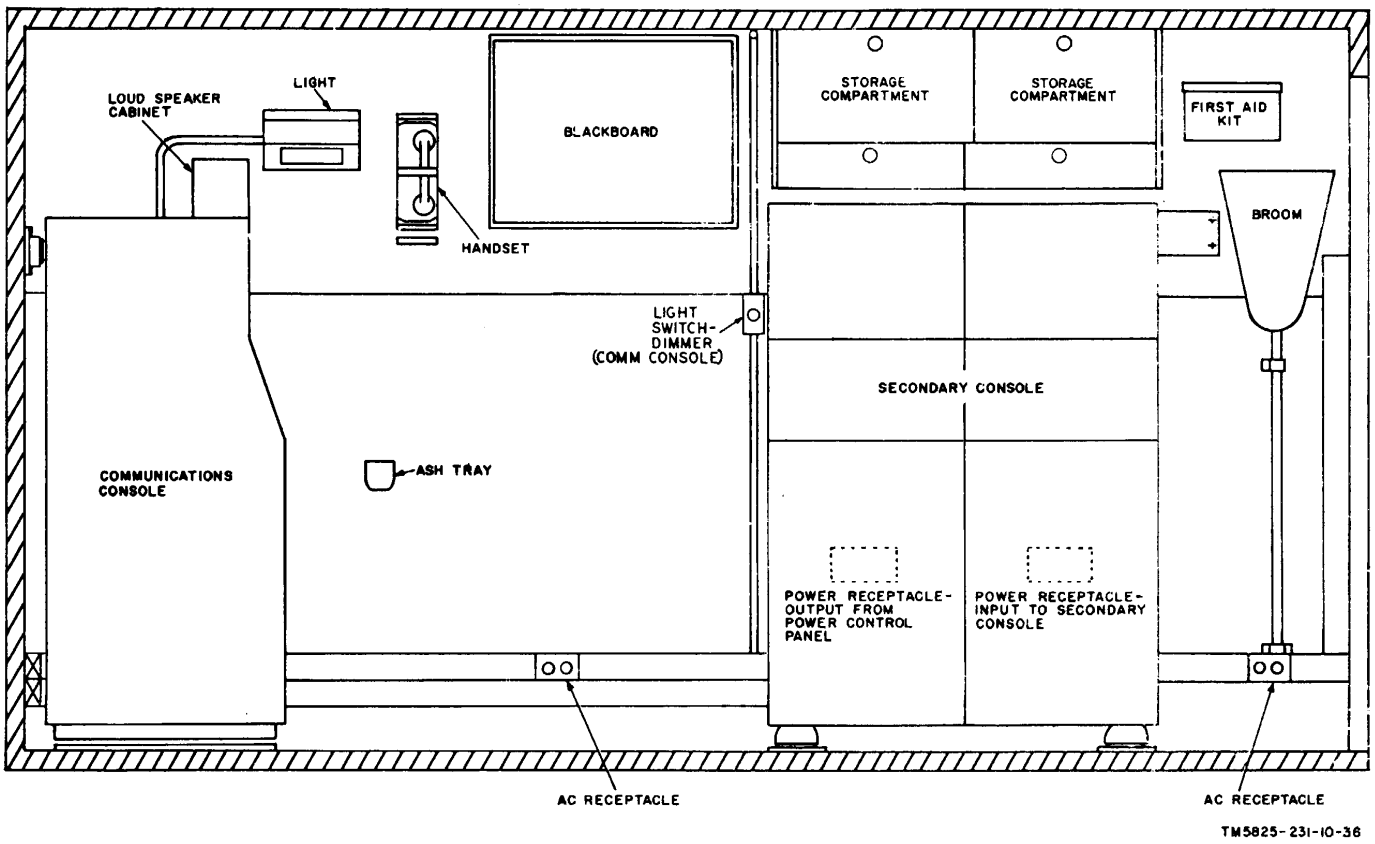


Figure 1-18. Shelter interior, curbside view.

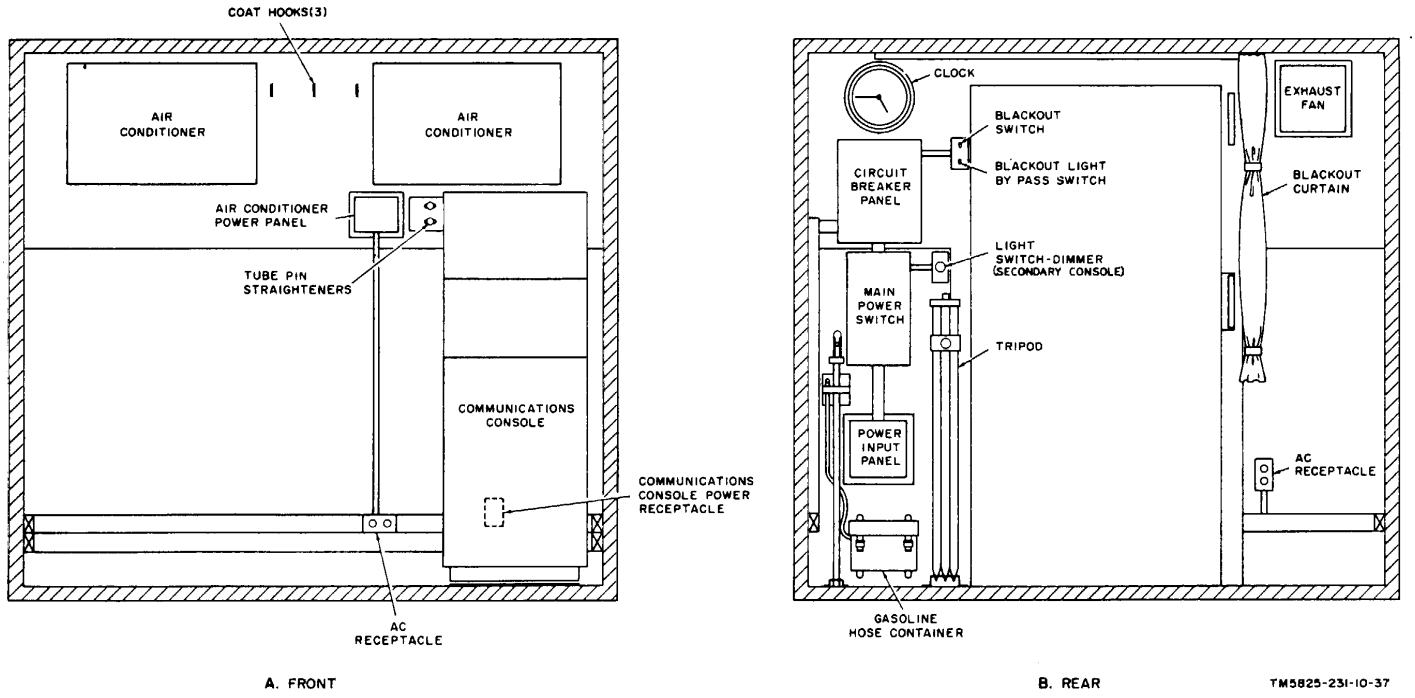


Figure 1-19. Shelter interior, front and rear.

for heating. A safe and various accessories are also provided.

g. The location of equipment in the S-280/G is shown in figures 1-17, 1-18, and 1-19. Differences between the S-280/G and the S-280A/G are described below.

(1) In the S-280A/G (fig. 1-17), the thermostat is above the exhaust fan switch and plug.

(2) The S-280A/G (fig. 1-18) has the following changes in equipment location:

(a) The communications console light is mounted on the ceiling.

(b) The accessories storage case is mounted on the floor beside the secondary console.

(3) The S280A/G (fig. 1-19) has the following changes in equipment location from the S-280/G.

(a) A flashlight is mounted below the exhaust fan.

(b) A line filter is added between the power input panel and the main power switch.

(c) The gasoline hose is mounted on three wall brackets.

(d) Air-conditioner aperture covers are stored behind the communications console.

1-22. Transmitter, Radio, T-279A/UR
(fig. 1-20)

a. The target transmitter is a self-contained, battery-powered portable unit for use as a signal source for calibrating and checking the operation of the direction finder equipment in the field. It emits a low-powered, continuous-wave or modulated continuous-wave (mcw} signal. For identification of the signal, and audio frequency tick is superimposed on the radio frequency signal approximately every 2 seconds. The target transmitter feeds a monopole antenna mounted on the top of the transmitter case.

b. All component parts are mounted on an assembly consisting of a vertical chassis, a top panel, and two horizontal chassis. The assembly is housed in a sheet steel case and is secured to the case by four screws. All operating controls are mounted on the top panel and are protected by a hinged cover which has a rubber gasket around the edge and is equipped with a metal carrying handle. A dual-purpose neon lamp, which serves as a ticking circuit, as well as the power ON indicator is housed in a panel indicator light assembly mounted on the top panel.

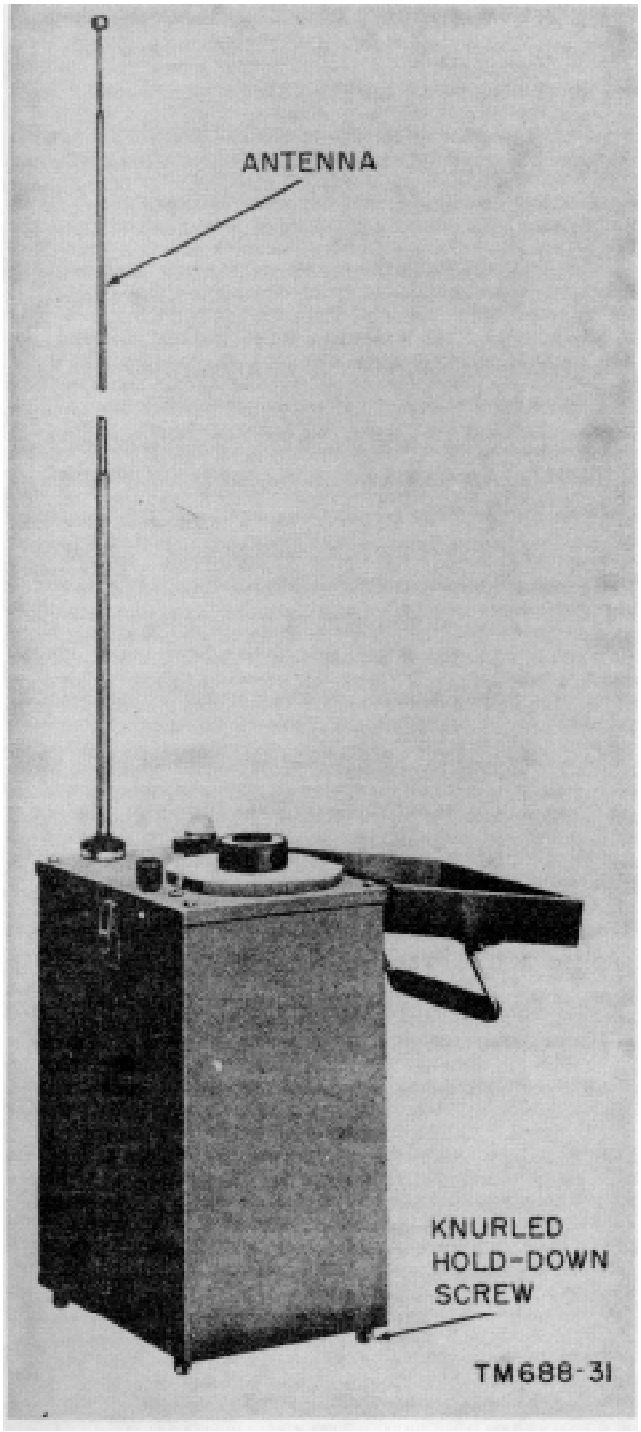


Figure 1-20. Transmitter, Radio T-279A/UR.

c. The antenna consists of five telescoping, chromium-plated brass segments adjustable to a 5-foot length. Telescoped segments are collapsed into the base by sliding them through the insulated rubber-sealed brushing mounted on the top panel. A spring clip under the insulator makes electrical and mechanical contact with the antenna.

1-23. Description of Minor Components

a. Kit, Antenna Positioning MK-985(*)/G (fig. 1-21, 1-22, and 1-23).

(1) An antenna positioning kit, required for installation of the antenna system at the selected site, is supplied with the AN/TRD-23(*).

(2) The antenna positioning kit supplied with the AN/TRD-23A is illustrated in figure 1-21, and the antenna positioning kit supplied with the AN/TRD-23 is illustrated in figures 1-22 and 1-23.

(3) The MK-985A/G, supplied with the TRD-23A, has two 150-foot steel tapes in a modified case.

(4) The following components are included in the antenna positioning kit:

(a) Antenna positioning disc.
(b) Plumb bob.
(c) Tapes.
(d) Locating stake.
(e) Compass.
(f) Assembly instructions.
(g) Assembly parts.

b. Pioneer Kit. A toolkit containing two sledge hammers, a shovel, and a mattock is supplied in a canvas carrying bag (fig. 1-24).

c. Vacuum Cleaner. The vacuum cleaner and its accessories are shown in figure 1-25.

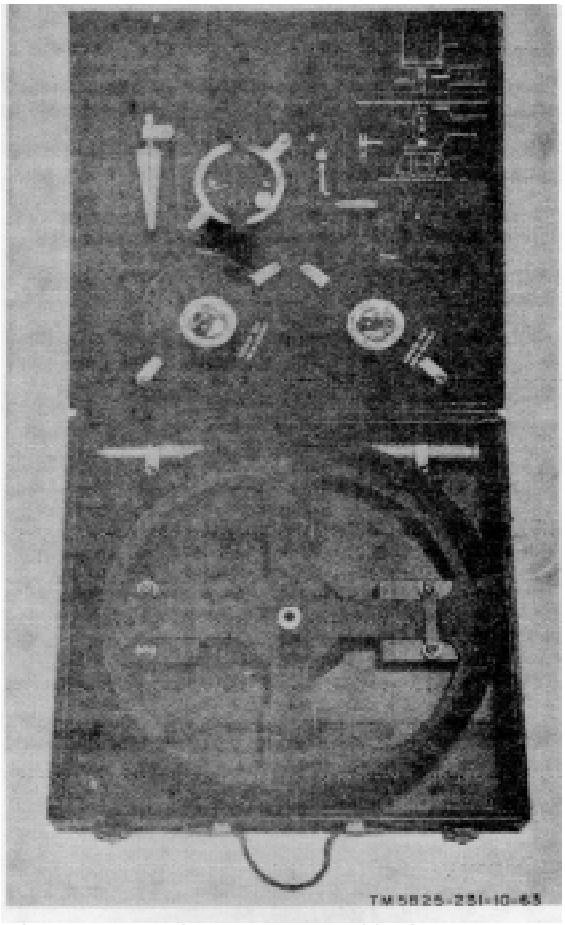


Figure 1-21. Kit, Antenna Positioning MK-985A/G.

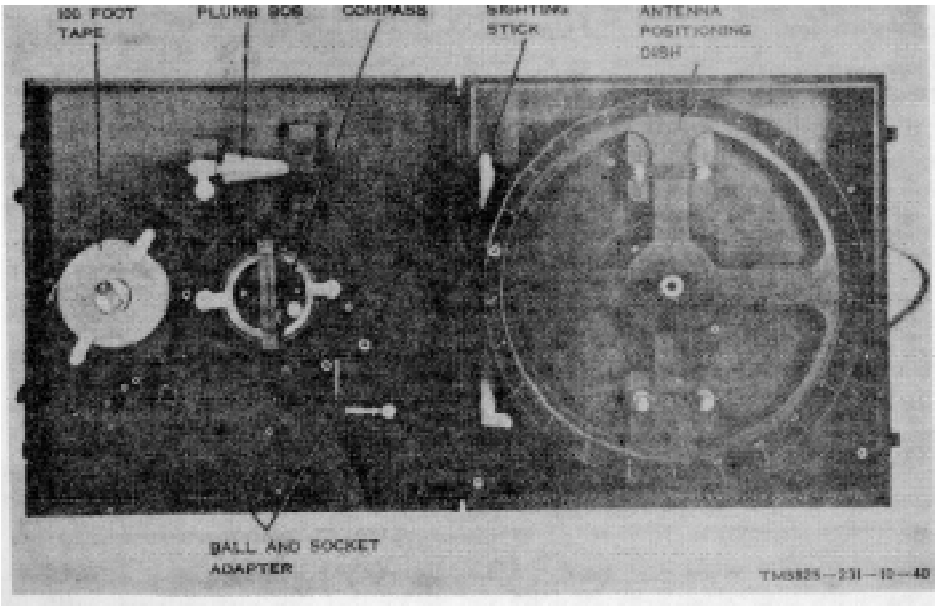


Figure 1-22. Kit, Antenna Positioning MK-985-G.

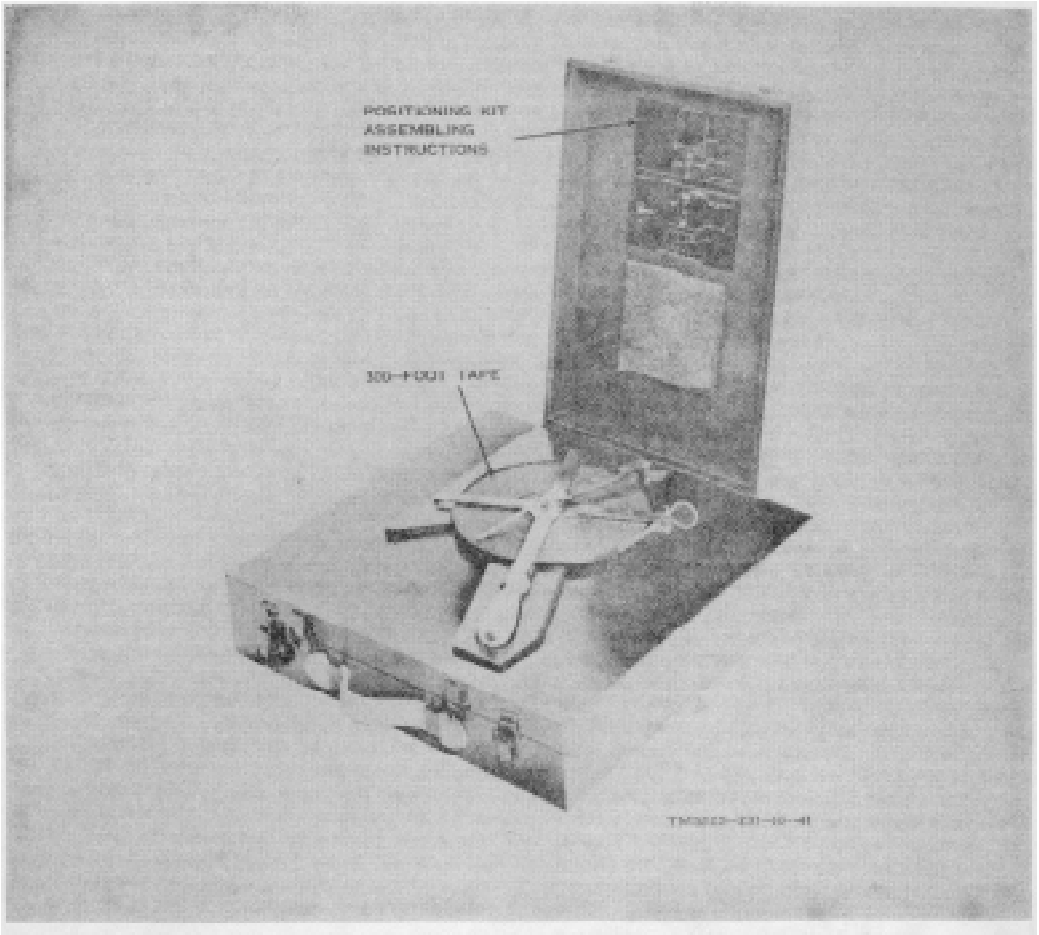


Figure 1-23. Kit, Antenna Positioning MK-985/G, top view.

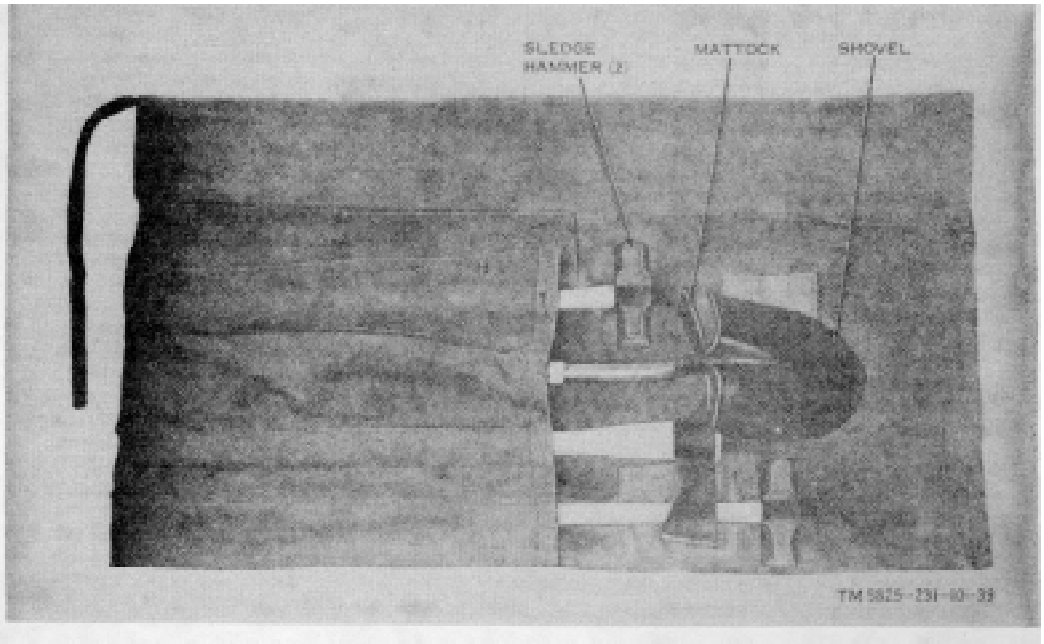


Figure 1-24. Pioneer kit.

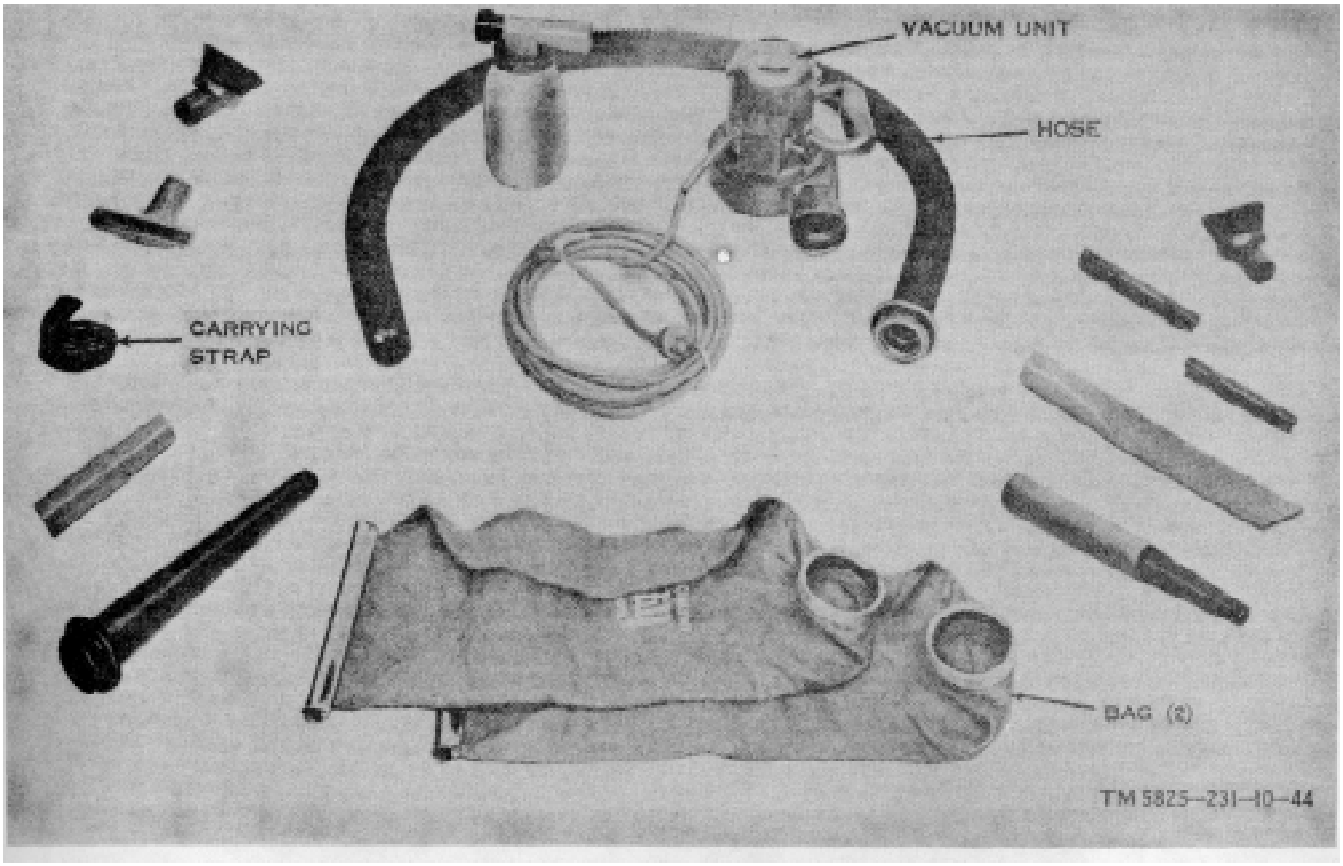


Figure 1-25. Vacuum cleaner.

d. Cable Reeling Machine RL-IE. A cable reeling machine (fig. 1-26) and a storage bag (fig. 1-27) are supplied with the AN/TRD-23(*).

e. Antenna Base Stowage Kit. The antenna bases (fig. 1-6) are stowed in five units (fig. 1-28), each unit a cube as shown in figure 1-29.

f. Compass and Tripod Assembly. The compass and tripod assembly, used to position the antennas, is shown in figure 1-80. Assembly instructions are in the steel tape compartment of the antenna positioning kit.

g. Viewing Hood and Viewing Hood Adapter. A viewing hood for the azimuth indicator is shown in figure 1-31. This hood is used when incident light levels in the shelter make the azimuth indicator trace difficult to see.

h. Additional Minor Components. The following items are also supplied with the AN/TRD-28(*):

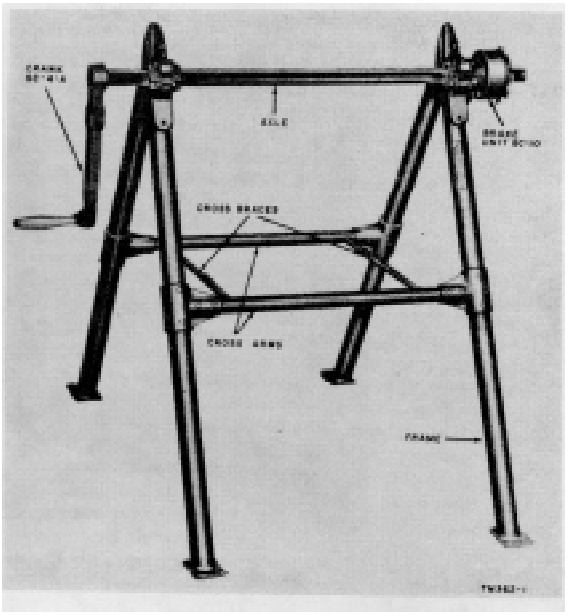


Figure 1-26. Cable reeling machine (leas reel).

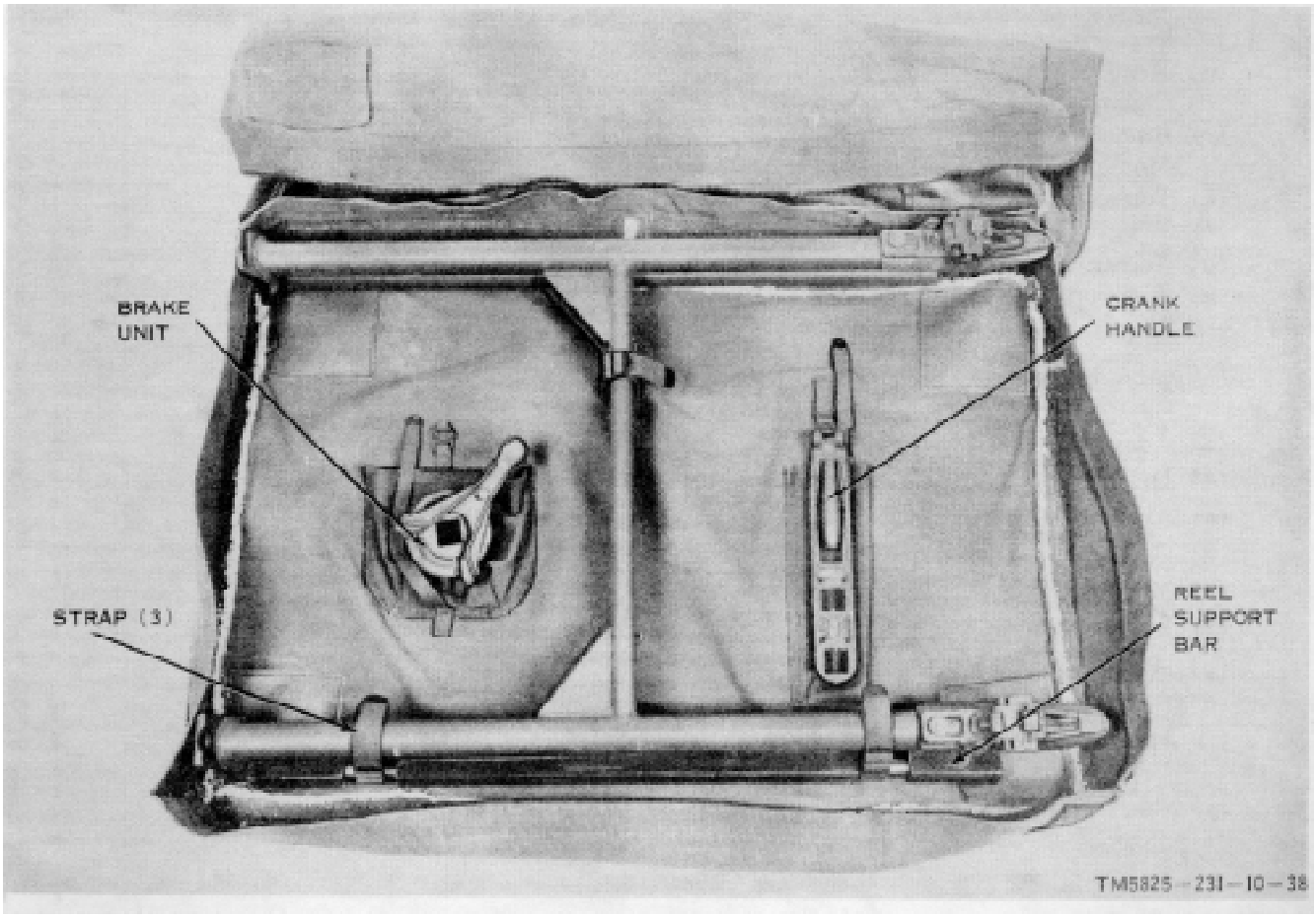


Figure 1-27. Cable reeling machine in storage bag.

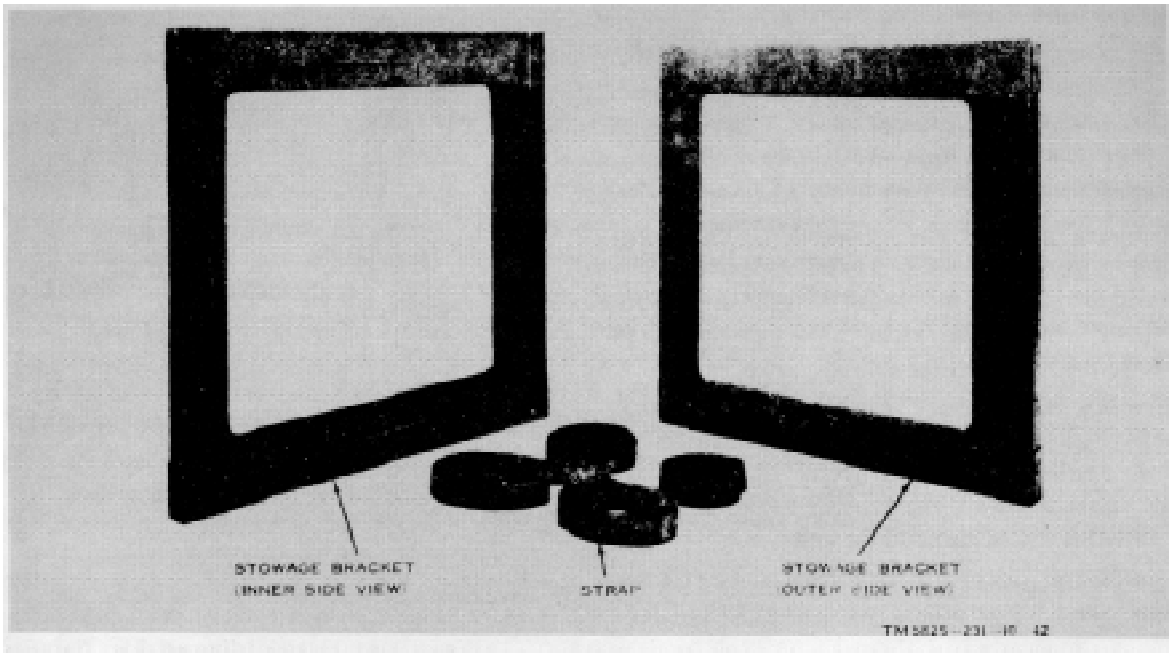


Figure 1-28. Antenna base stowage kit.

(1) *Accessories case (curbside).*
- *(a)* Headset cords (CD-307A) (3).
- *(b)* C-clamps (3).
- *(c)* Binaural headsets (3).
- *(d)* Monaural headsets (H-113/U) (3).
- *(e)* Telephone (TA-312()/PT).
- *(f)* Telegraph Keys J-38 (3).
- *(g)* Telegraph cords (3).
- *(h)* Air Conditioner power cables (2).
- *(i)* Ground straps (shelter) (2).

(2) *Communications console storage drawers.*
- *(a)* Adapters (UG-29/U) (35).
- *(b)* Drive belt.
- *(c)* Antistatic solution (2).
- *(d)* Goniometer (GO-42/TRD).
- *(e)* Marker cards (4).
- *(f)* Rod level.
- *(g)* Adhesive tape (3).
- *(h)* Colored tape (4).
- *(i)* Antenna input cables (CG-3177/U, 2 ft) (2).
- *(j)* Shaft couplers (2).
- *(k)* Jumper
- *(l)* Fuse puller.
- *(m)* Snap hooks (8).
- *(n)* Alignment tool.
- *(o)* Technical manuals.

(3) *Spare Parts cabinet.*

Item	Type	Quantity
Lamp	#47	6
Lamp	#327	1
Lamp	#328	8
Lamp	NE-2D	1
Lamp	NE-16	1
Lamp	NE-45	8
Lamp	40 watts, 120 vac	4
Lamp	PR-9 (flashlight)	1
Fuse	F02A250V 1/8A	40
Fuse	F02B250V 1/8A	10
Fuse	F02B250V 1/A4A	40
Fuse	F02A250V 3/8A	6
Fuse	F02B250V 3/8A	3
Fuse	F02A250V 1/2A	5
Fuse	F02B250V 3/4A	6
Fuse	F02B125V 1 1/2A	6
Fuse	F02A250V 2 A	16
Fuse	F02B125V 2 A	10
Fuse	F02B125V 3 A	40
Fuse	F03A250V 1 A	5
Fuse	F03A250V 8 A	S
Fuse	F16A250V 60 A	5
Tube	HP 50830952	1
Tube	OA2	8
Tube	3A4	1
Tube	3A5	1
Tube	6AK6	8
Tube	6DC6	8
Tube	6C4	8
Tube	6BJ6	16
Tube	6BH6	2
Tube	5R4WGY	4
Tube	1 HAS	4

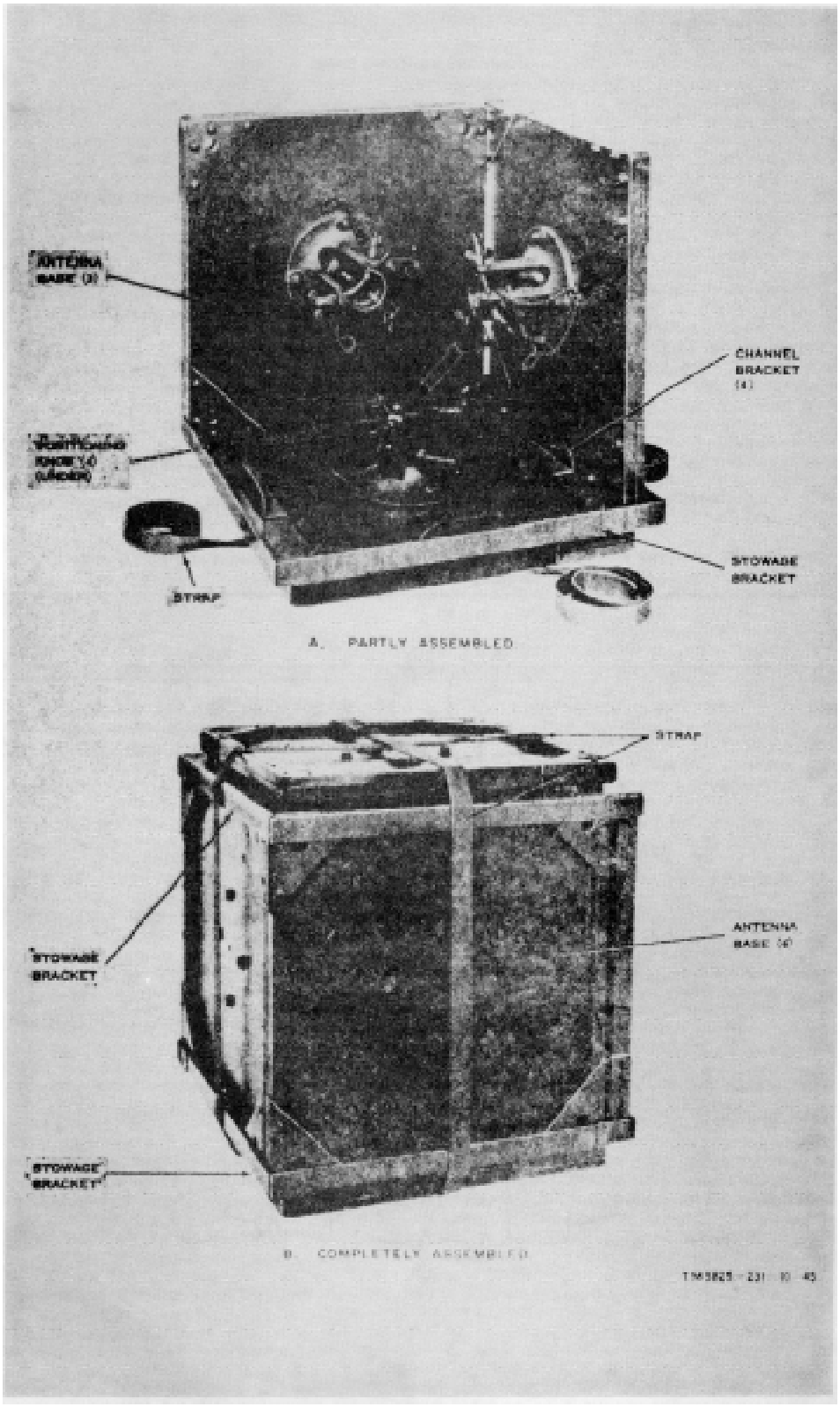


Figure 1-29. Antenna base stowage cubes.

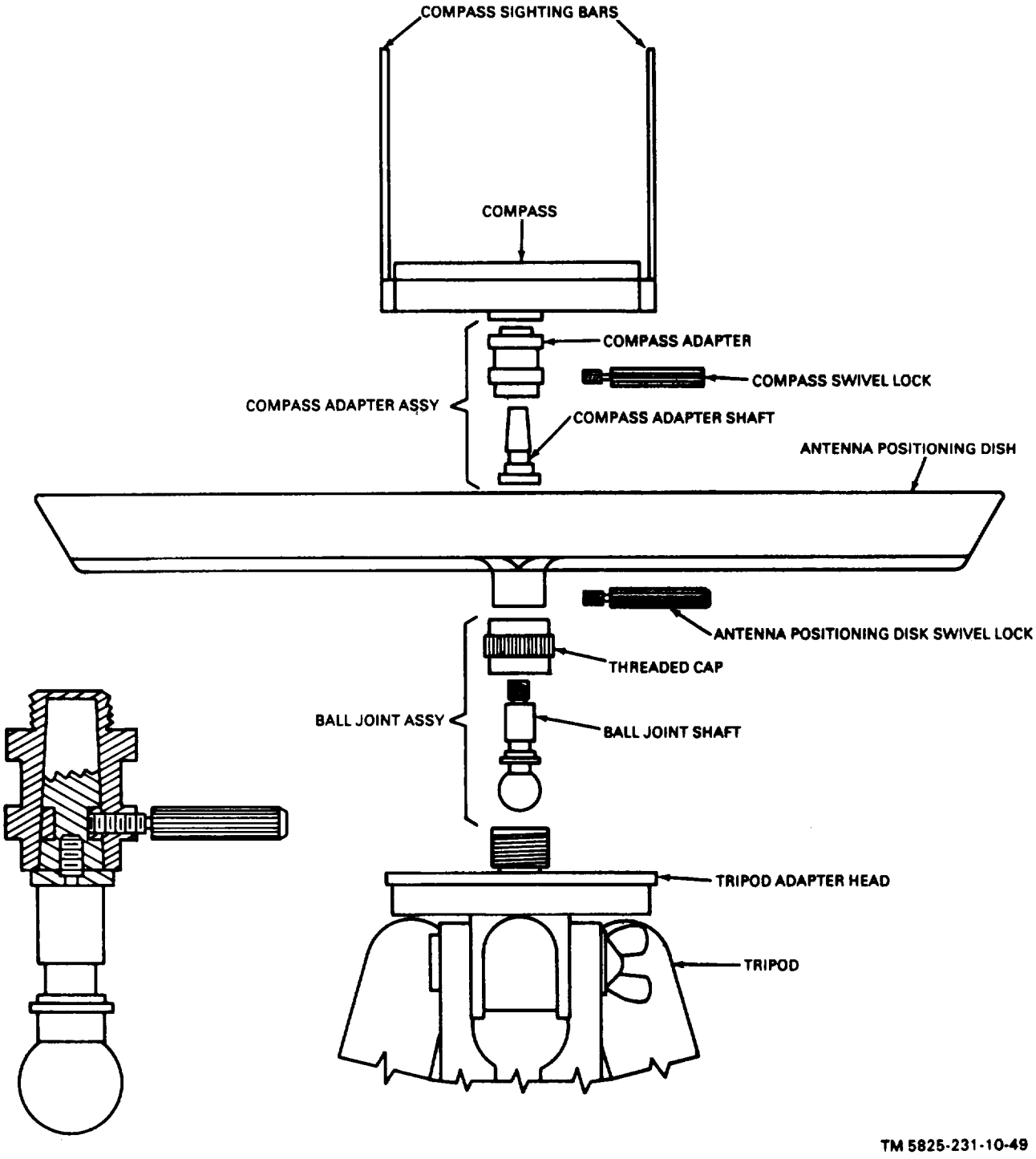


Figure 1-30. Compass and tripod assembly.

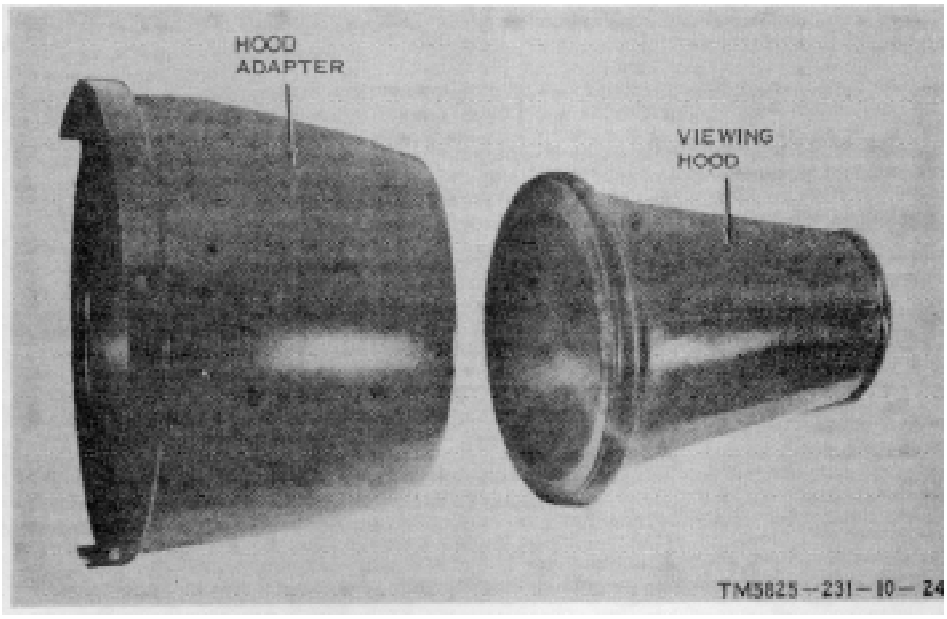


Figure 1-31. Viewing hood and adapter.

Item	Type	Quantity
Tube	OB2	4
Tube	12AT7	2
Tube	12AX7	8
Tube	6AU6	2
Tube	6005/6AQ5	3
Tube	5693	4
Tube	5654/6AK5	8
Tube	5693	9
Tube	5749/6BA6	16
Tube	5814	16
Tube	6922	4
Tube	5750/6BE6	4
Tube	6189/12AU7	6
Tube	ZZ1OOO/8228	1
Tube	7" crt	1
Transistor	2N3055	6
Crystal	72KCS	1
Crystal	455KCS	2
Crystal	550KCS	2
Crystal	555KCS	2

1-24. Additional Equipment Required

The items listed below are required for, but not supplied with, the AN/TRD-23(*).

a. Power Unit. One 115- to 230-volt, 60-Hz, three-phase 15-kw minimum power unit is required to furnish power to the shelter.

b. Battery BA-404/U. One BA404/U (FSN 6135-164-8779) is required for the target transmitter.

c. Battery BA-242/U. One BA-242/U (FSN 6135-164-8762) is required for the target transmitter.

1-25. Differences in Models

a. Direction Finder Sets AN/TRD-23 and AN/ TRD-23A are similar in purpose, operation, and appearance. The AN/TRD-23A includes improvements in the RF detector and goniometer drive, and a later model oscilloscope. The differences between models of the df set are:

Item	AN/TRD23	AN/TRD28A
Monitor oscilloscope	HP-120B	AN/USM-318(V)1
Power input filter	None	Included
Flashlight	None	Included
Unit bottom covers	None	Included
Fuel line bag	None	Included
pare circuit breaker	None	Included
Cabinet securing devices	None	Included
Antenna positioning dials painted	No	Painted luminescent
Steel tapes (measuring)	300 ft and 100 ft	160 ft (2 ea)

Item	AN/TRD-23	AN/TRD-23A
RF detector	RF-169/TRD	RF-159A/TRD
Goniometer drive	TG126/TRD	TG126A/TRD
Primary console	CY4873/TRD	CY-6691/TRD
Secondary console	CY-473/TRD	CY6690/TRD
Communications console	CY-023/G	CY-6023A/G
Audio box (primary and secondary consoles)	J-2674/TRD	J-2871/TRD-23A
Audio box (communications console)	J-2679/TRD (1) J-2674/TRD(2)	J-2872/TRD-23A
Antenna positioning kit	MK-986/G	MK-985A/G

b. All units in the consoles are electrically and physically interchangeable between the AN/TRD-23 and AN/TRD-23A. The primary differences between models is shown below.

Unit	AN/TD-23	AN/TRD-23A
Monitor oscilloscope	HP-120B (single display)	AN/USM318(V)1 (dual display) (modified sync pulse generator)
Goniometer drive	TG-126/TRD	TG-26A/TRD
RF Detector	RF-159/TRD	RF-159A/TRD (minor circuit changes)

c. While electrically similar, the following items are not physically interchangeable:
(1) Consoles.
(2) Audio boxes.

CHAPTER 2
INSTALLATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Site Selection

a. Technical Requirements for Good Site.

(1) The site area should be substantially flat for at least 150 yards from the center of the antenna system with not more than a gentle slope for several times that distance.

(2) The area should be the highest level available in the general vicinity. A site in a sharply defined valley is usually unsatisfactory.

(3) Mountainous or hilly country should be avoided when possible.

(4) The antenna system should be as far inland as possible from the shorelines of large bodies of water to avoid coastal re-fraction errors. If the installation must be made on or near the coast, the flattest area should be selected. Direction-finding accuracy is greatest when signals from the target area cross the coastline at right angles.

(5) The earth surrounding the antenna system should have uniformly high conductivity and equal moisture content. Areas evenly covered with grass or vegetation usually meet this requirement. Rocky or sandy soil has low conductivity; however, an area with uniformly low conductivity is preferable to an area of high conductivity which is spotted with rock or sand, or has varying moisture content.

(6) Regions abruptly showing bare spaces of the earth should be avoided. Such spaces usually indicate the presence of rock or mineral outcroppings or underground streams.

(7) The site should be as far as possible from tall trees, buildings, wire fences, power or telephone lines, radio antennas, railroad tracks, sharp ground contours (mountains, cliffs, and ravines), buried conductors (cables and pipelines), chimney stacks, water towers, rivers, lakes, streams, and main highways.

(8) Listed below are recommended distances to be maintained between the antenna system and various obstructions to minimize their effect on the accuracy of bearings.

Obstruction	*Distance to be maintained*
Scattered trees and single, small buildings.	200 yards
Wire fences	300 yards
High cliffs and deep ravines	More than 1 mile
Buried metallic conductor (other than telephone lines to Direction Finder Set AN/ TRD-28).	300 yards
Chimney stacks and water towers	500 yards
Overhead conductors and railroad tracks (power and telephone lines and antennas).	500 yards
Rivers, streams, and lakes	600 yards
Forest & and metal structures	500 to 1,000 yards
Mountains	5 to 25 miles

b. Electrical Inspection. After the most favorable area has been selected by visual inspection, perform if possible, the electrical tests given in FM 11-476.

2-2. Site Preparation

a. Location of Antenna System. Clear off and level an area of adequate size (para 2-7) for erection of the antenna system.

b. Location of Shelter. Locate the shelter near the center of the circular antenna array.

c. Location of Power Unit. Where commercial power is unavailable and a power unit is required, clear off and level an area approximately 300 feet from the shelter in a location of least interest.

2-3. Unpacking

a. Packaging Data. When packed for shipment, the components of Direction Finder Set AN/TRD-23(*) are placed in cartons and packed in boxes. Operating units are installed in the consoles in the shelter.

Shipping Containers				
Carton *No.*	Dimensions (In.)	Volume (Cu. ft)	Unit Weight (lb)	Contents
1 of 15	103 x183% x 97%,	1005.1	8000	Shelter antenna assemblies (less base and counterpoise).
2 of 156	33 x116 x 24.3	54.3		
3 of 16	33 x 116 x 24	54.3	696	
4 of 156	3 x116 x 24	54.3	696	
6 of 16	33 x116 x 24	54.3	696	
6 of 16	44 x 33 x 44	37.0	643	Counterpoise.
7 of 15	44 x 33 x 44	37.0	643	Bags
8 of 15	24 x 60 x 20	16.7	602	Guy sets.
9 of 15	24 x 60 x 20	16.7	602	
10 of 16	48 x 48 x 48	64.0	700	Cable reels.
11 of 16	40 x 96 x 40	88.9	685	Cable reels(RF).
12 of 15	40 x 96 x 40	88.9	685	
13 of 15	72 x 108 x36	162.0	1700	Antenna base.
14 of 15	48 x 48 x48	64.0	560	Chain assemblies, loading ramps, and accessories.
15 of 15	38 x 150 x 36	112.0	600	

All weights and dimensions are approximate.

b. Unloading. When packed for shipment, the df set and accessories are secured onto the beds of two M35 trucks, one containing the shelter and the other containing the antennas and accessories. These trucks are driven to the proposed site. Normally, the shelter is not removed from its truck during deployment. Unload the antenna truck as follows:

(1) Remove the six hold down assemblies.

(2) Remove the two loading skids and hook to the rear of the truck body.

(3) Remove the equipment from the antenna truck, use loading skids for heavy items such as cable reels and antenna base stowage cubes.

c. Transporting Equipment. Refer to truck loading instructions (para 5-4) for methods of transporting the equipment.

d. Removing Contents. Perform all the procedures outlined below when unpacking equipment in wooden boxes. When unpacking equipment in cartons, omit the procedures given in (1), (2), and (3) below.

(1) Carefully cut and fold back the metal straps.

(2) Remove the nails from the top and on side of the box with a nailpuller. Remove the top and one side. Do not attempt to pry open the box because the equipment may become damaged.

(3) Open the moisture-proof barrier that covers the carton inside the box. Remove the carton.

(4) Open the carton and the moisture-vaporproof barrier within the carton. Open the inner carton and remove the contents.

2-4. Checking Equipment

a. Inspect all equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6 (para 1-3).

b. Check to see that the equipment is complete as listed on the packing slip. If a packing slip is not available, check the equipment against those listed in paragraph 1-6. Report all discrepancies in accordance with DA Pam 738-750. Shortage of a minor assembly or part that does not affect functioning of the equipment should not prevent use of the equipment.

c. If the equipment has been used or reconditioned, check to see whether it has been chang-

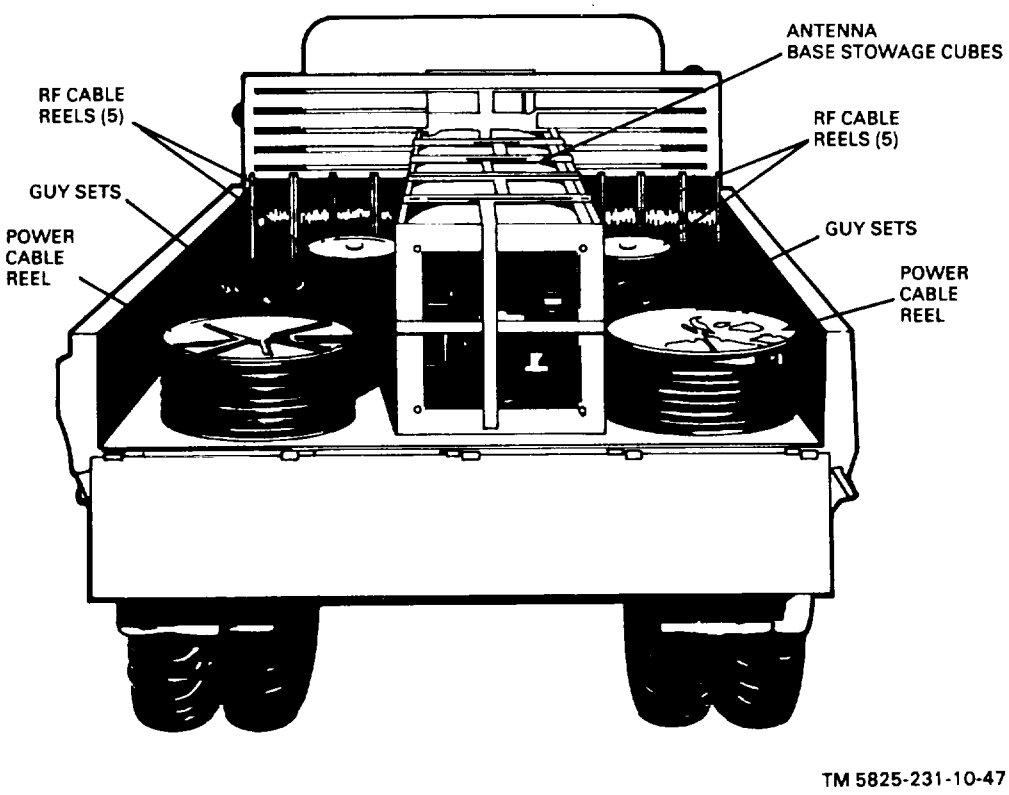


Figure 2-1. Antenna truck loaded, rear view.

ed by a modification work order (MWO). If the equipment has been modified, the MWO number will appear on the front panel near the nomenclature plate. Check to see whether the KWO number (if any) and appropriate notations concerning the modification have been entered in the equipment manual.

2-5. Tools and Equipment Required

Tools and equipment required for installation of the AN/TRD -28(*) include the antenna positioning kit and tripod (located in the shelter), and the pioneer kit (located on the antenna vehicle).

2-6. General Installation Instructions

The information given below is to aid in the proper installation of the antennas. Accuracy of bearing information is directly related to the accuracy of antenna installation; therefore, the installation instructions must be followed carefully.

2-7. Locating Individual Antennas

The standard array diameter of 150 feet is the

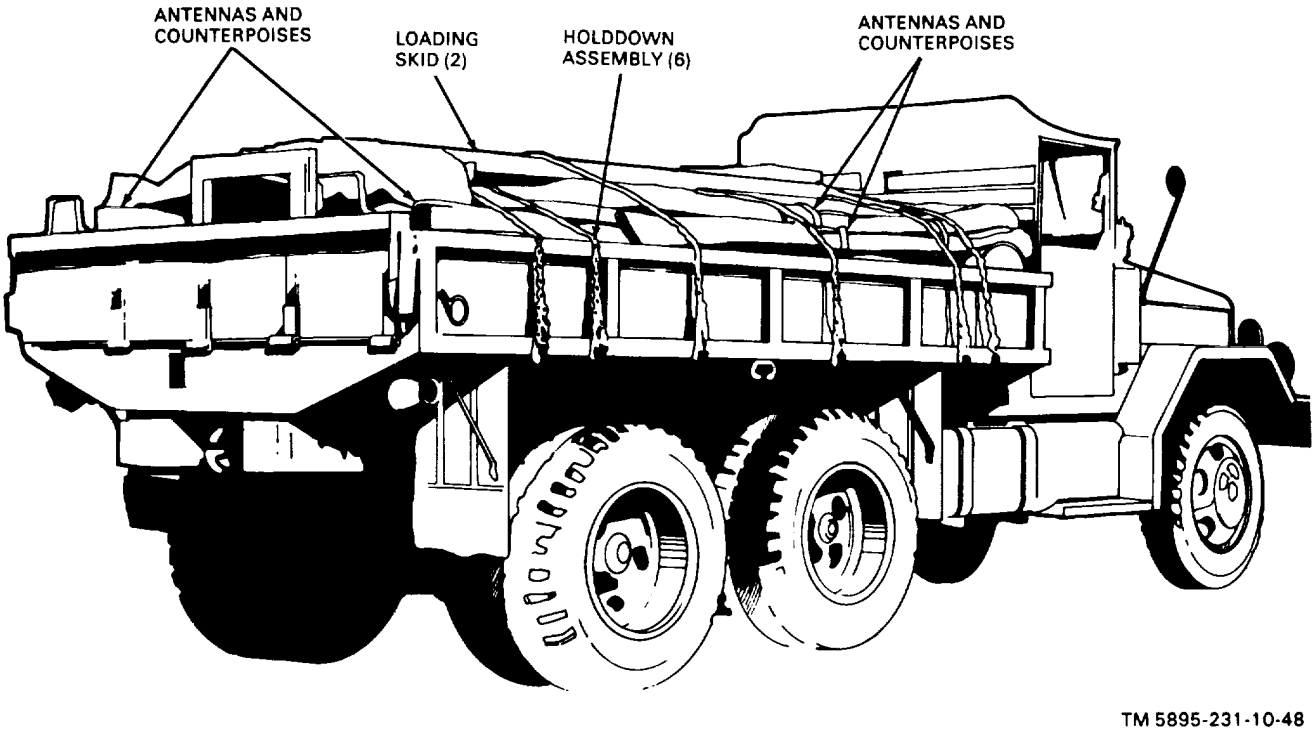


Figure 2-2. Antenna truck loaded, ride view.

maximum that will permit useful operation over the whole band. If the df set is to be used exclusively below 10 MHz or on signals to 20 MHz arriving at vertical angles above 60° (very close signals just beyond groundwave range), use a 300-foot diameter array. Twenty-five antenna masts are spaced equally around a circle that has a radius of 75 feet (fig. 2-3). The monitor antenna is approximately in the center of the circle. A position for the target transmitter (to be used for orientation) must be located at least 100 feet beyond the periphery of the antenna array. A point beyond the north antenna is usually selected; however, any azimuth can be used.

NOTE

The following instructions cover the installation of the 150-foot array using 110-foot cables. For the 300-foot array, double the spacing called out.

a. North Antenna. The north antenna position must be located before locating the remaining antennas. Proceed as follows:

(1) Locate the approximate center of the prepared site and drive a locating pin vertically into the ground, using 8-pound hammer 860H Allow a few inches of the pin to protrude above the ground.

(2) Set up the compass and tripod in accordance with figure 1-30 and the following instructions:

(a) Unstrap the tripod legs.

(b) Open the tripod legs and insert them

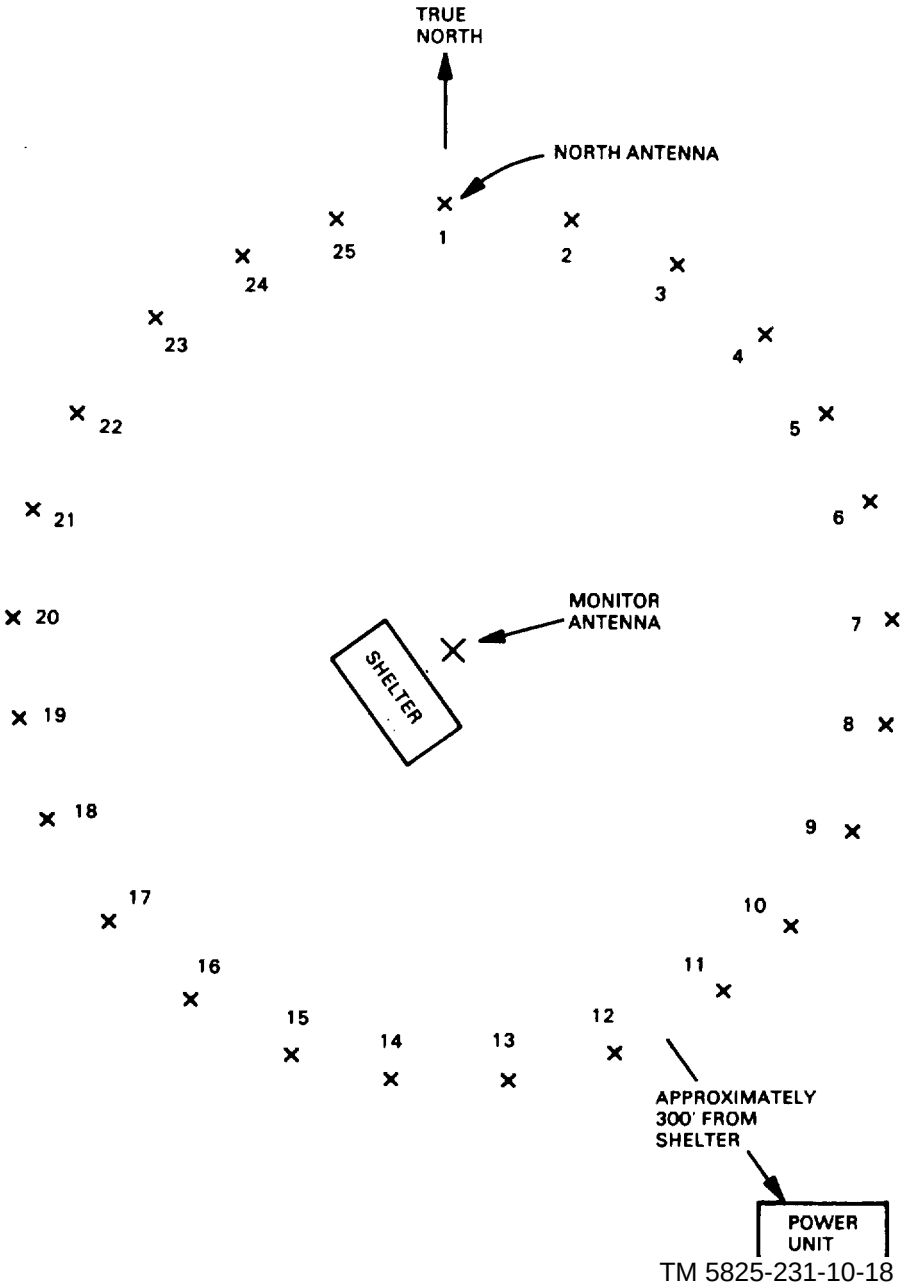


Figure 2-3. Typical site layout.

into the ground. With the thumbscrews (on tripod legs), adjust the legs for desired height.

(c) Attach the ball and socket adapter to the tripod. The large diameter, threaded section of the adapter screws into the tripod.

(d) Screw the ball and socket onto the adapter.

(e) Slip on the positioning disc and screw the compass onto the ball and socket.

(f) Attach the plumb bob to the ball and socket adapter.

(g) Locate the compass and tripod assembly directly over the locating pin; use the plumb bob.

(h) Refer to a suitable map and determine the magnetic declination for the locality in which the df set is to be installed. With a screwdriver, turn the declination screw on the rim of the compass to rotate the scale so that 0-360° mark moves away from the index for the number of degrees and in the direction which will compensate for the magnetic declination. *For exam-*

ple, to compensate for a magnetic declination of 12° west, rotate the compass scale so that the index points to the 348° mark (360° minus 12°).

NOTE

Magnetic declination may be defined as the angle between true north and the direction indicated by a magnetic compass. This angle varies for different locations on the earth and changes continuously; therefore, it is necessary to use local charts or maps which show declination and the annual change in declination. West declination signifies that magnetic North is east of true North; east declination signifies that magnetic North is west of true North.

(i) With the spirit level on the compass, level the compass by adjusting the ball and socket joint.

(3) Release the compass needle and rotate the compass until the north end of the needle and the 0°-360° mark on the compass coincide. Lock the compass with the long knurled screw under the compass.

(4) Rotate the positioning disc (with engraved lines numbered from 1 through 26) until the view sights on the compass and the No. 1 engraved line on the disc coincide. Lock the positioning disc securely with the long knurled screw under the disc. The compass and positioning disc are now aligned for true North.

(5) Sight through the compass view sights, and use the 150-foot measuring tape to locate, and drive a locating pin into the ground exactly 75 feet from the center pin (fig. 24). This is the location for antenna No. 1, at true North with respect to the center of the antenna array.

b. Locating Antennas 2 through 25.

(1) Before locating the pin for antenna No. 2, drive a large wooden stake into the ground approximately 600 feet from the antenna system in line with the compass sights and the No. 1 antenna locating pin. This stake will serve to locate the target transmitter for orientation of the df set.

(2) Loosen the knurled screw and rotate the compass until the view sight and the No. 2 engraved line on the positining disc coincide. Each line on the positioning disc corresponds I to 14° 24' of rotation.

(3) Use the same procedure for locating the pin for antenna No. 1; measure off 75 feet and drive a locating pin into the ground.

(4) Repeat the procedure given in (3) above until pins have been placed for all 25 antennas.

c. Locating Shelter.

(1) The vehicle that contains the shelter should be driven into the area of the locating stakes and into the approximate position as indicated in figure 2-8. Consider the following factors when placing the shelter:

(a) The antenna cable entry on the shelter should face the center of the antenna array.

(b) The monitor antenna should be to the side of the shelter, not to the front or rear.

(c) The shelter door should be facing the power unit and parking lot. Be sure that the power unit is properly grounded.

(2) Deleted

(3) Drive a 6-foot ground stake well into the ground close to the power cable entrance and connect it to the shelter with the ground strap (fig. 2-5).

2-8. Deleted

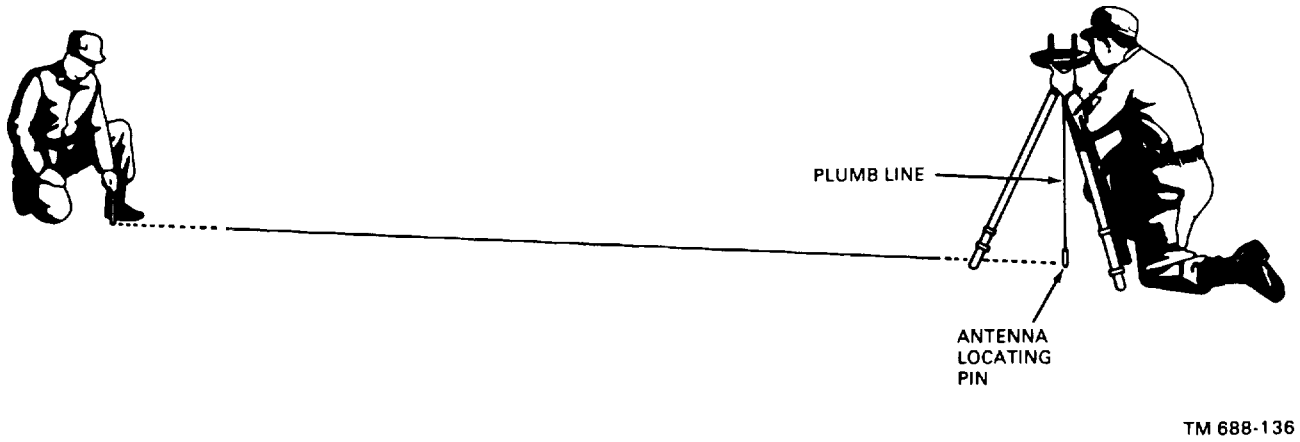


Figure 2-4. Locating position for antenna locating pin.

2-9. Counterpoise Installation
(fig. 2-6)

a. A wire mesh counterpoise (10 feet by 10 feet) with ground strap, a 6-foot grounding rod, and eight counterpoise clamps are used with each antenna.

b. Install each counterpoise as follows:

(1) Unroll the counterpoise completely.

(2) Center the counterpoise over the antenna locating pin, with the wooden rods pointing toward the inside of the array (fig. 2-6). Be careful not to move the antenna locating pin.

(3) Stretch the counterpoise so that it lies flat on the ground, and press in the eight counterpoise clamps over the wooden rods as shown in figure 2-6.

NOTE

The 6-foot grounding rods are installed after all RF cables are installed (para 2-13).

(4) Repeat steps (1) through (3) for each of the remaining antennas.

2-10. Antenna Base Installation

a. Each antenna base has a sighting hole through the bottom (fig. 2-7), centered under the casting, which permits location of the antenna locating pin when placing the base on the counterpoise. Do not move the locating pin when installing the antenna base.

b. Install the antenna base as follows:

(1) Remove the upper and lower retaining pins (fig. 2-7).

(2) Loosen the locknuts on the leveling screws until they are flush with the inside wall of the socket in the casting.

(3) Lift the antenna base and center it over the antenna locating pin; use the sighting hole for this operation. For the 150-foot diameter array, position the baseplate so that the well opening of the antenna base faces inward and the right leveling screw (as you stand outside the array and face inward) is pointing toward the antenna locating pin or the next antenna position on the right (fig. 2-8). For the 300-foot diameter array, position the baseplate so that the well opening points toward the center of the array (fig. 2-9).

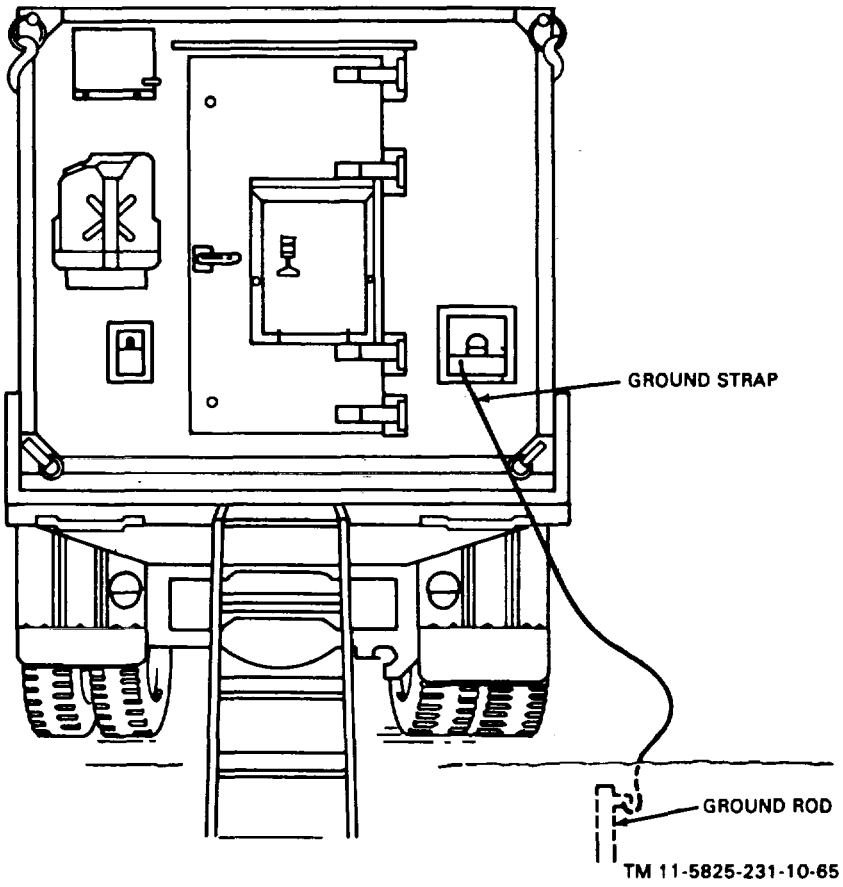


Figure 2-5. Shelter grounding.

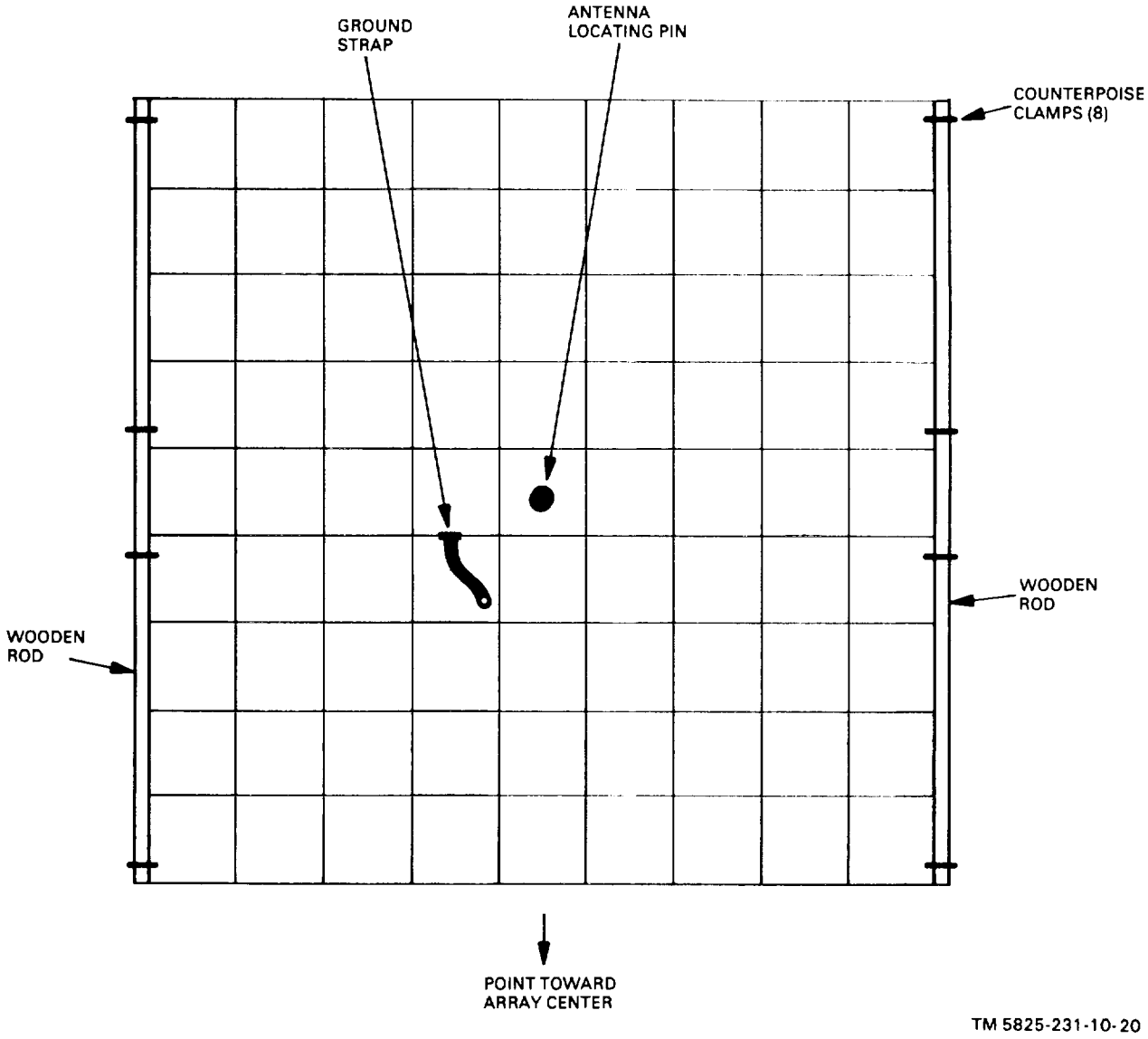


Figure 2-6. Counterpoise installation.

(4) Position a stake (GP-2) in each of the four corner holes and drive them into the ground with the sledge hammer. Do not move the antenna base while driving the base stakes into the ground.

(5) Repeat the procedures given in (1) through (4) above for each of the remaining antennas.

2-10.1. Installing Guy Stakes

a. Each antenna is secured with three guy wires spaced 120° apart. In the 150-foot diameter array, one guy wire is attached to an inner guy stake, one is attached to an outer guy stake, and one is attached to the guy adapter on the next counterclockwise antenna base (fig. 2-8). In the 300-foot diameter array, all guy wires are attached to guy stakes (fig. 2-9).

b. To install the guy stakes, proceed as follows:

(1) Measure 18 feet from the center of the baseplate across the leveling screws, using the antenna positioning tripod as a guide. In the 150-feet diameter array, only two stakes are required.

(2) At each measured point, drive a guy stake in at a slight angle away from the baseplate. Leave approximately 3 inches of stake above the ground. Be sure that the eyesnaps on the stake are facing the baseplate.

(3) Insure that the guy wires are adjusted to 30 feet in length.

2-11. Assembling Antenna

a. Remove the antenna coupler from the lower section by loosening the thumbscrews. Lay the antenna coupler aside to prevent damage while assembling the antenna.

CAUTION

Avoid getting dirt in the mast joints.

b. Arrange the antenna sections and loading disc neatly on the ground adjacent to the antenna base.

c. Complete the antenna assembly as follows:

(1) Place the ball end of the lower section, AT-442/GR, in the base mount socket and allow it to lie parallel to the ground through the slot in the casting. Insert the lower retaining pin; lock it in place.

(2) Join the remaining antenna sections. Refer to figure 2-10. Lock each clamp after joining the mast sections.

(3) Hook the three guy wires to the mast guy plate on the third section. Carefully stretch the guy wires toward the baseplate to keep them from becoming tangled.

(4) Fasten one guy wire to an inner guy stake and one to the guy adapter of the counterclockwise adjacent baseplate in a 150-foot diameter array, or to the second inner guy stake in a 300-foot diameter array.

(5) Open the loading disc until the angles formed by the loops are visually equal. Screw the loading disc to the top of the fourth section (fig. 2-11).

CAUTION

After the loading disc is in place, the antenna must be supported until it is erected. Allowing the loading disc to touch the ground will bend the loops.

2-12. Antenna Erection

a. Stand facing the baseplate and grasp the antenna firmly into both hands just below the mast guy plate.

b. Lift the antenna over your head with both arms extended (fig. 2-12).

c. While another soldier pulls on the outside guy wire moderately, slowly walk toward the base of the antenna, moving hand over hand until the antenna is upright.

CAUTION

Avoid crossing the guy wires while erecting the antenna.

d. Place the upper retaining pin in position, and fasten the remaining guy wire to the outer guy stake.

e. While still supporting the antenna, place the rod level against the base of the antenna mast, approximately 3 feet up from the baseplate.

f. Adjust the baseplate leveling screws until the bubble in the rod level is centered.

g. While one soldier observes the antenna from about 30 feet from two points 900 from each other, adjust the guy until the antenna stands straight up.

CAUTION

When adjusting the guy wires, do not over-tighten them; too much tension can permanently bend the antenna.

h. Repeat step *g.* if necessary.

i. Tighten the wingnuts on the guy wire snubber assemblies.

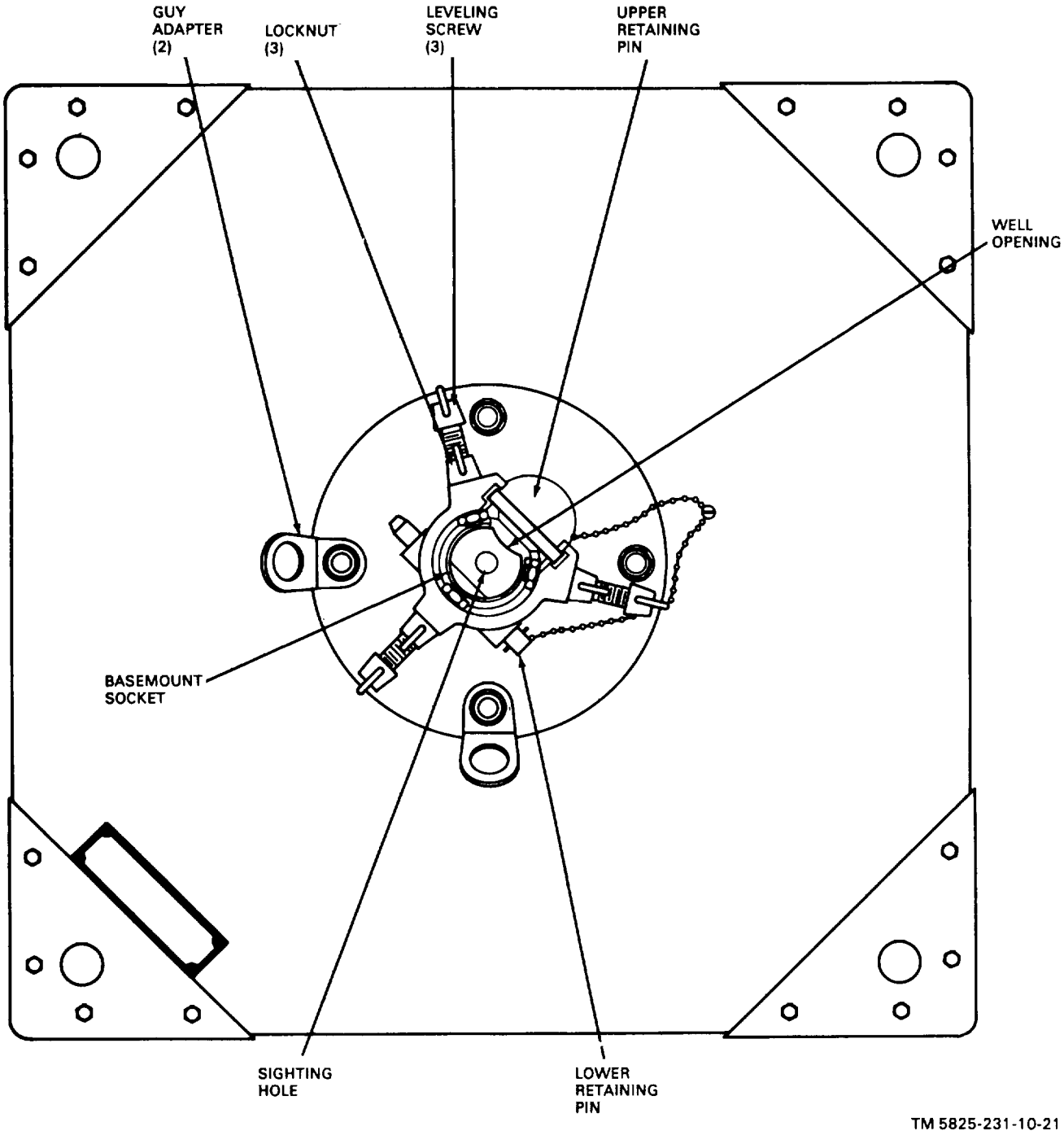


Figure 2-7. Antenna base installation.

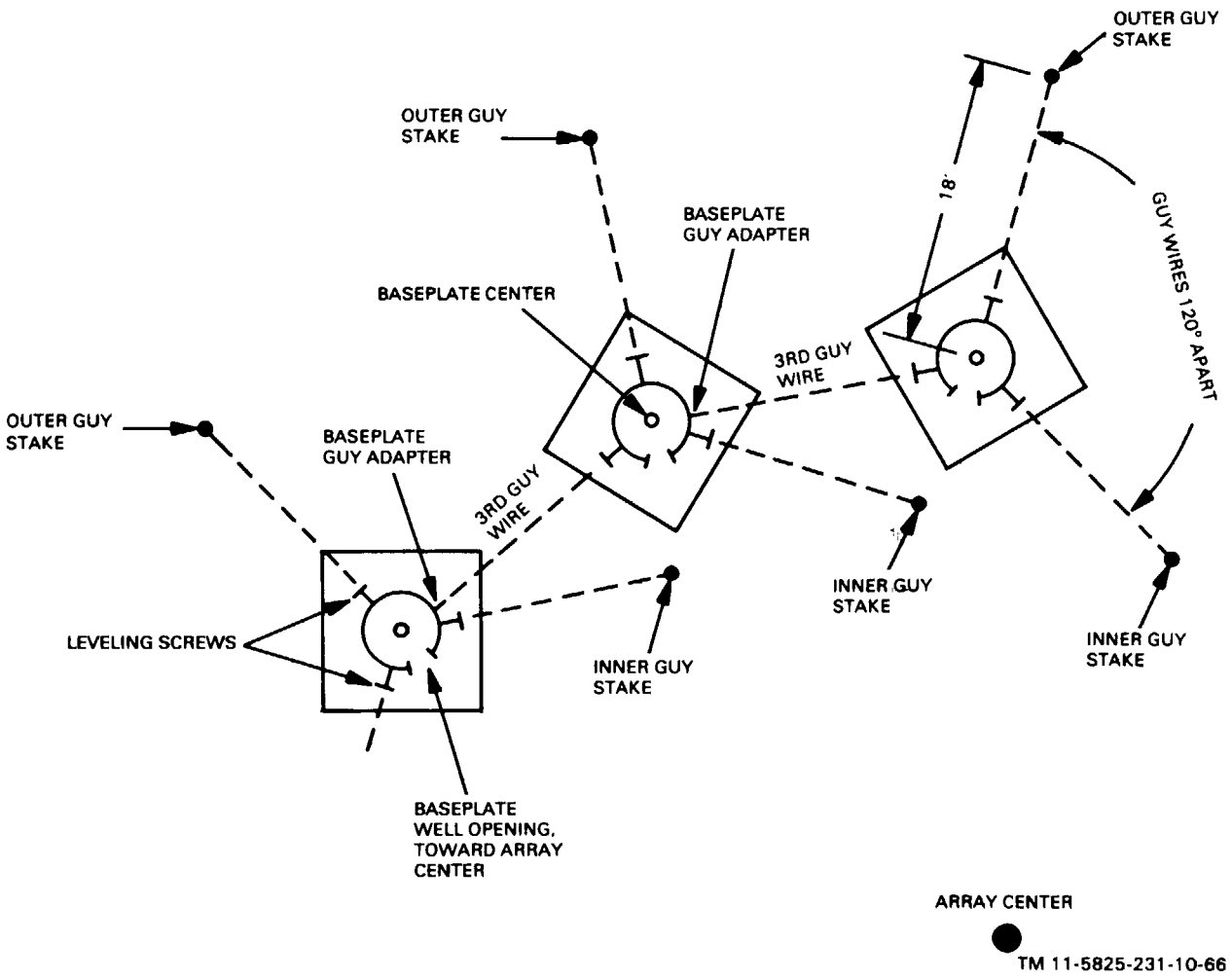


Figure 2-8. Orienting baseplates and locating guy stakes for 150-foot array.

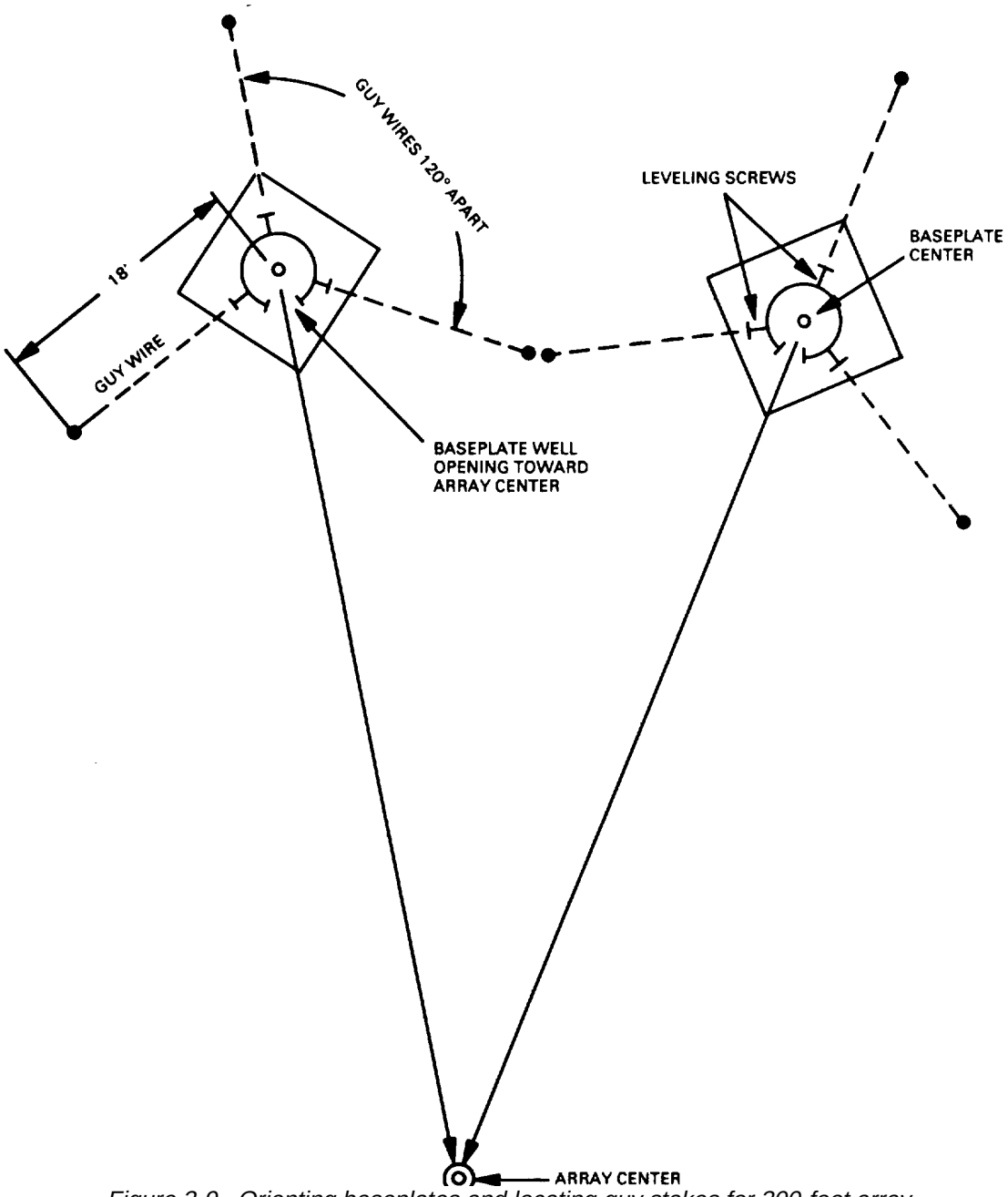


Figure 2-9. Orienting baseplates and locating guy stakes for 300-foot array.

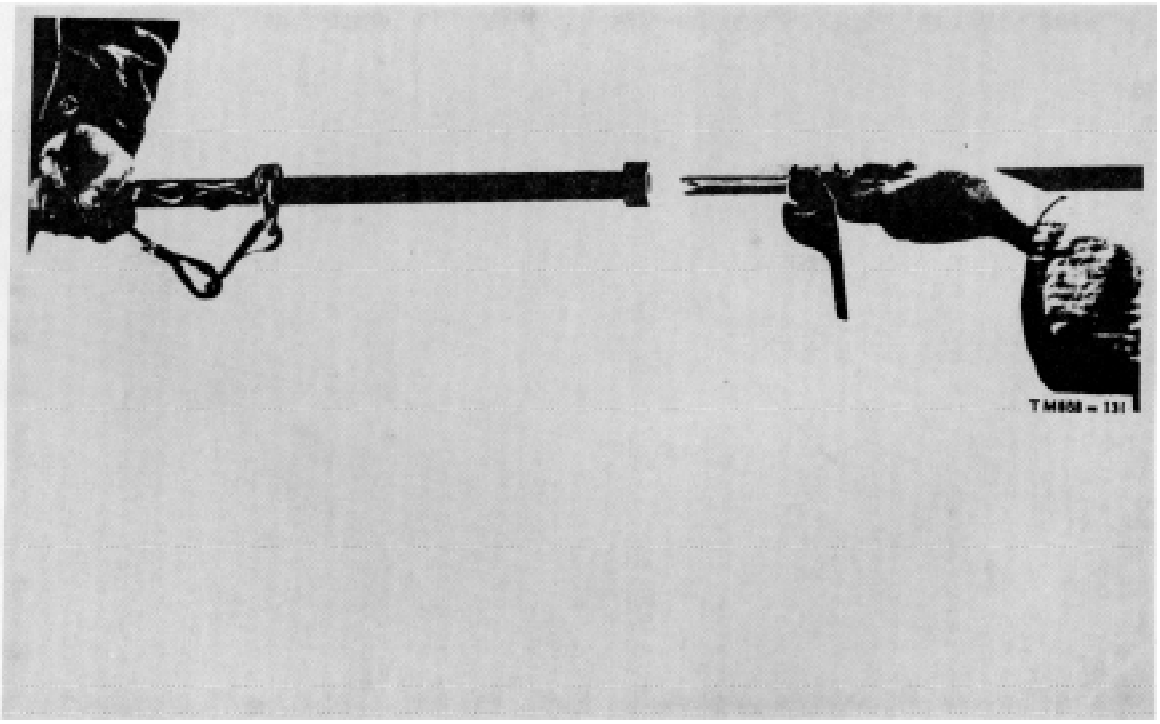


Figure 2-10. Joining antenna sections.

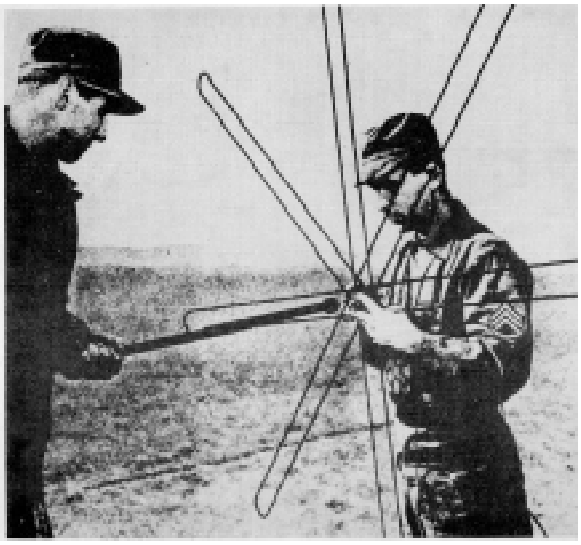


Figure 2-11. Installing loading disc.

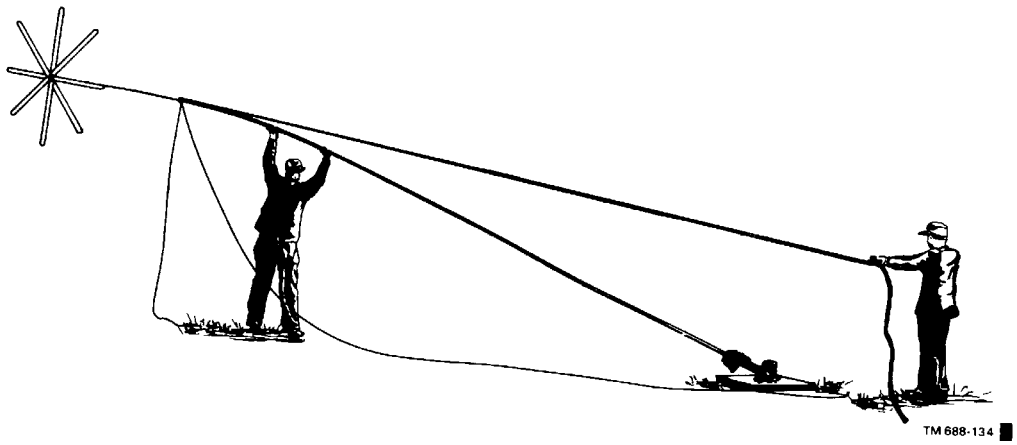


Figure 2-12. Antenna erection.

2-13. Antenna Ground Rod, Ground Strap and Coupler Installation (figure 2-13)

a. Drive the ground rod into the ground next to the braided ground strap on the counterpoise until the counterpoise ground strap reaches the wire from the head of the ground rod and the ground rod is firmly implanted. Connect the ground rod wire to the counterpoise ground strap.

b. Examine the connection lugs on the coupler and clean if required. Repeat for the shoulders of the connection studs on the antenna.

c. With the coaxial connector on the coupler facing down, complete the following procedures:

(1) Slide the lower connection lug in place.

(2) With a twisting motion, position the upper lug and firmly tighten the thumbnut on the antenna. Leave the lower connection loose.

(3) Examine the lugs on the grounding strap and clean them if required. Place the end U-shaped lug under the thumbnut on the lower antenna coupler connection stud.

(4) Firmly tighten the thumbnut on the ground connection lug and the antenna lug.

(5) Loosen the locknut on the leveling screw nearest the assembly and examine the face of the nut exposed; clean the nut if required.

(6) Slide the second lug over the leveling screw and firmly tighten the locknut.

(7) Place the loose end of the ground strap on a counterpoise wire.

(8) Tighten the thumbscrew until the wire is firmly grasped and makes good electrical connection.

(9) Flatten any portion of the counterpoise that may have been accidentally bent upward.

(10) Repeat the procedures given in (1) through (9) above for each of the remaining antennas.

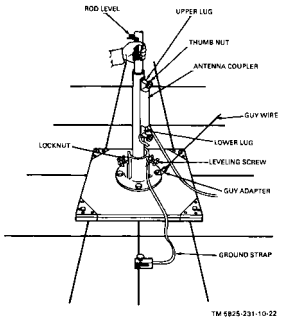


Figure 2-13. Antenna base connections.

2-1-4. Deleted

2-15. Monitor Antenna Installation

The monitor antenna may be installed at any convenient location. Installation procedures are the same as for individual antennas on the array (para 2-8 through 2-13), except that a locating pin is not required and the guy stakes are installed approximately 18 feet from the antenna base and 1200 apart in any direction.

2-16. Power Unit Installation

The power unit is not supplied as part of the system; therefore, specific instructions for locating and erecting are not covered in this manual. Refer to the manual covering the particular power unit used.

NOTE

The power unit should be mounted as far from the shelter as possible to minimize noises and fumes in the shelter.

2-17. Cable Installation

NOTE

Check to see that all power switches are set to OFF.

a. Antenna Cables.

(1) The antenna lead-in coaxial cables are marked on each end with the antenna number with which they are to be used. Be sure to connect the cables to correspondingly numbered antennas. The antennas are identified by number in clockwise rotation with the true North antenna being No. 1.

(2) The antenna cables have identical connectors on both ends. If the 150-foot antenna array is being used, the 110-foot antenna cables are connected directly between the antennas and the shelter.

NOTE

Each antenna cable is cut and tested for precise characteristics. Be sure that the cables match the antenna used.

(3) When the 300-foot antenna array is used, connect the 110-foot antenna cables to the 75-foot antenna cables with the UG-29B/U adapters. These adapters are stored in the communications console.

(4) Run each cable from its antenna to the cable entry port, through the stress bar, and to the antenna input panel. The cable should run from the antenna to the cable entry post in the most direct path possible. Connect the cables to the antenna input panel starting at the bottom row at the left and working upward.

(5) At the antenna end of each cable, coil the excess cable into a roll 12 to 18 inches in diameter, lay it on the baseplate, and connect it to the antenna coupler.

b. Power Cables.

(1) A 150-foot Cable, Power CX-11684/U and Cable Extension CX-11687/U are supplied with the AN/TRD-23 and AN/TRD-23A.. These cables are color-coded for three-phase operation as follows:

NOTE

The jumper in the master safety switch is connected for single-phase power. This must be removed to operate the equipment on three phase power.

Input pin No.	AN/TRD-23	AN/TRD-23A
LO	White	Green
L1	Any wire	Any wire
L2	Any wire	Any wire
L3	Any wire	Any wire

CAUTION

Do not connect all three leads to one terminal of the shelter input connector. This action will burn out the power input filter and place too much current through one pole of the three-pole circuit breaker. All terminals must be used to divide load current through all three breakers.

(2) The AN/TRD-23(*) may be operated from a single-phase source by leaving the jumper connected to the three terminals marked A, B, and C inside the circuit breaker box, and paralleling the power cable A, B, and C leads at the power source.

2-18. Target Transmitter Battery Installation

Since the target transmitter is shipped without batteries, requisition one Battery BA-404/U (1.6 volt) and one Battery BA-424/U (135-volt) and install as follows:

a. Open the cover and check to see that the ON-OFF switch is at OFF.

b. Turn the target transmitter on its side and unscrew the four knurled holddown screws on the bottom (fig. 1-20).

c. Pull the chassis assembly out of the case.

d. Unscrew the lower holddown screws and lift off the lower plate.

e. Set Battery BA-242/U in place with its socket adjacent to the plug.

f. Connect the plug and replace the lower plate, locating the antenna guide block under the antenna. Tighten the knurled holddown screws.

g. Turn the target transmitter right side up.

h. Open the battery clamp on the center plate by unscrewing the knurled screw.

i. Slide Battery BA-404/U in place with the socket facing the hole in the end bracket. Connect the plug and close the battery clamp. Tighten the knurled screw.

j. Return the chassis into its case and tighten the knurled holddown screws on the bottom of the case.

Section II. INITIAL ADJUSTMENT OF EQUIPMENT

2-19. Preoperational Procedure

Complete the following on the goniometer drive before turning on the df set (fig. 1-8):

a. Loosen the four mounting bolts on the bottom half of the goniometer drive chassis and the four thumbscrews on the top half of the chassis.

b. Slowly and carefully pull out the chassis far enough to gain access to both goniometers.

CAUTION

Do not pull the chassis out too far, damage to cables and cable connectors could occur.

2-19.1. Goniometer Calibration

a Turn on the equipment as instructed in paragraphs 3-12 and 3-13.

b. Set up the target transmitter at the orientation point selected during station installation, and tune it to a clear channel near 2 MHz.

c. On receiver No. 1, tune in the target transmitter signal with the receiver in the 2 MHz bandwidth position.

d. Adjust the azimuth indicator DF GAIN control for the best propeller pattern and adjust the SIZE control for proper propeller size. Observe and record the number of degrees of propeller indication to the right or left of the bearing at the target transmitter orientation point. e. If the bearing indication is less than 15° off, proceed as follows:

(1) Loosen the two thumbscrews on the primary housing by turning them counterclockwise (fig. 1-8).

(2) While observing the primary azimuth indicator, rotate the goniometer so that the propeller pattern is aligned with the 0° mark.

CAUTION

Never rotate the goniometer more than 15° in any one direction or damage to the cables may result.

(3) Tighten the thumbscrews, being careful not to move the goniometer.

(4) Repeat steps e. (1) and e. (2) for the secondary goniometer, if necessary.

f If the bearing indication is greater than 15° proceed as follows:

(1) Loosen the thumbscrew on both the primary and secondary housings.

(2) Rotate each goniometer so that the black hairlines line up with the zero on the scale.

(3) Tighten the thumbscrews.

(4) Using the headphones, find a clear frequency on the primary receivers on both consoles. The frequency should be in the 2 to 4 MHz range.

(5) Perform the following steps on each console:

(a) Adjust the DF GAIN control to display the correct propeller pattern.

(b) Adjust the SIZE control to display the correct propeller length.

(c) Align the crosshairs to the exact center of the propeller pattern and observe the bearing. If the bearing falls between 0°and 1800, record the bearing. If the bearing falls between 180° and 360°subtract the bearing from 360° and record the result as a negative number. For example, if the bearing is 347° subtracted from 360° the result is -13°

(6) On the primary console, turn off the electronic

control amplifier. When the goniometer drive stops, a straight line will appear on the azimuth indicator. Adjust the INTENSITY control so that the image is not burned into the azimuth indicator.

(7) Pull on the drive belt to rotate the flex-coupler until one of the two set screws is visible through the hole in the housing (fig. 1-8).

NOTE

The two set screws are 90° apart.

(8) While holding the drive belt to keep the flexcoupler from turning, use the allen wrench to loosen the set screw. Turn the set screw about two complete turns counterclockwise.

NOTE

The supplied alien wrench will not reach the set screw. If a longer allen wrench is not available, use a pair of needle-nose pliers to hold the allen wrench.

(9) Pull on the drive belt to reveal the second set screw, and hold the drive belt.

(10) Tighten the locking screw to lock the flex-coupler in position.

(11) Loosen the second set screw.

(12) On the azimuth indicator, note the bearing of the straight line between 0°and 180°. Subtract the bearing result obtained in step (5), (c), above, from the new bearing. For example, if the original bearing result was -19° and the new bearing is 72° the difference is 53°

(13) Set the crosshairs on the degree difference.

(14) Rotate the flex-coupler with your index and middle fingers until the straight line on the azimuth indicator lines up with the crosshairs. If the degree of error was positive, the straight line should move counter-clockwise. If it was negative, the straight line should move clockwise.

(15) If one of the set screws is not accessible, loosen the locking screw and very slowly, with no sudden jerks, move the drive belt to rotate the flex-coupler until a set screw is accessible.

(16) Tighten the locking screw and then tighten the set screw.

(17) Loosen the locking screw and very slowly, with no sudden jerks, move the drive belt to rotate the flex-coupler until the second set screw is accessible.

(18) Tighten the locking screw and then tighten the set screw.

CAUTION

Make sure that both set screws are tight or the rotor shaft may slip, causing error and scoring the shaft.

(19) Repeat steps (7) through (18) above for the secondary console.

2-20. Deleted

2-21. Deleted

2-22. Secondary Console Calibration

After the primary, azimuth indicator has been properly aligned, the secondary azimuth indicator must be checked and adjusted if necessary.

a. Deleted

b. Deleted

c. Deleted

d. Deleted

e. Check to see that both azimuth indicators are now properly aligned.

f. Shut off the target transmitter.

CHAPTER 3

OPERATING INSTRUCTIONS

Section I. CONTROLS AND INDICATORS

3-1. Damage from Improper Settings

a. A cathode-ray tube display with the intensity of the beam set too high can burn holes in the phosphorescent coating of the tube. When power is applied to the azimuth indicator, check to see that the intensity is not too high.

b. Improper setting of the azimuth indicator FOCUS control can result in erroneous reading of bearing information.

3-2. Antenna Coupler Controls and Indicators

(fig. 3-1)

Control	Function
POWER ON-OFF switch and indicator	Turns antenna coupler power on and off. Lamp lights when switch is on.
TEST METER SWITCH	Connects antenna coupler panel meter to various test points within antenna coupler.

3-3. Control Amplifier Controls and Indicators

(fig. 3-2)

Control	Function
ON-OFF switch	Turns control amplifier on and off.
AC POWER lamp	Indicates that ON-OFF switch is set to ON when lighted.
POWER OUTPUT lamp.	Indicates control amplifier is sup plying power to goniometer drive when lighted.

3-4. Receiver Controls and Indicator

(fig. 3-3)

Refer to TM 11-5820-358-10 for additional information on the controls of the receiver.

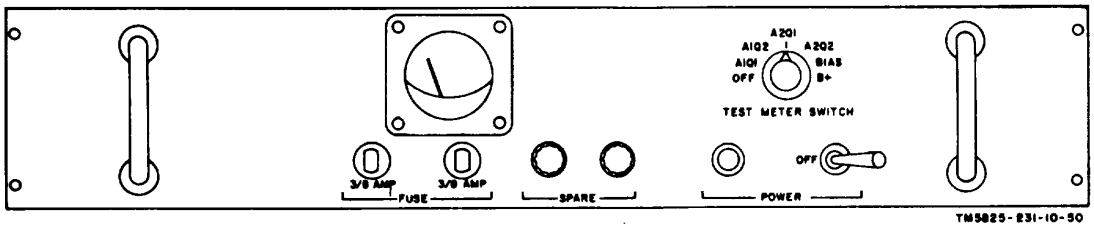


Figure 3-1. Antenna coupler controls and indicators.

LINE LEVEL meter ..... Indicates level of balance line audio output.
LINE METER switch ..... Meter switch has four positions:

Sw pos	Action
OFF	Disconnects meter from balanced line output.
+10	Adds 10 volume units to LINE LEVEL meter vu indication.
0	Indicates LINE LEVEL meter directly.
-10	Subtracts 10 volume units from LINE LEVEL meter indication.

Control	Function
LINE GAIN control	Controls level of signal applied to balanced line output terminals.
AGC switch	Determines rapidity of change in gain of receiver for a change of signal strength.
LIMITER switch and control	Increasing clockwise rotation of control increases reduction of static interference.
CARRIER LEVEL meter	Indication of 0 db, with RF GAIN control at 10, corresponds to an input signal of approximately 2 microvolts.
BANDWIDTH KC switch	Causes receiver to reject frequencies that differ from carrier frequency by more than amount adjusted for.
BFO switch	Makes cw signals audible.
BFO PITCH control	Varies tone when receiving cw signals.
AUDIO RESPONSE switch	Sw pow — Action SHARP — 800-cps tone is loudest; used for cw. WIDE — Most voice frequencies are heard.
BREAK IN switch	Permits break-in operation if proper connections have been made at rear panel.
FUNCTION switch	Function switch has five positions: Sw pos. — Action OFF — Receiver is turned completely off. STAND BY — Receiver inoperative, but ready for instant use. AGC — Receiver operative, with gain controlled automatically. MGC — Receiver operative with gain controlled by RF GAIN control, or by an external control. CAL — Permits calibration of tuning system at 100-kc checkpoints.
ANT TRIM control	Permits peaking of received signal to maximum value.
DIAL LOCK control	When turned clockwise, locks KILOCYCLE CHANGE control to prevent accidental change of setting.
ZERO ADJ control	When turned clockwise, disengages frequency indicator from KILOCYCLE CHANGE control for calibration purposes.
LOCAL GAIN control	Controls level of af signal applied to local headset or loud speaker.
RF GAIN control	Manual control of amplification or received signal.
MEGACYCLE CHANGE control	Selects any one of 32 tuning bands in steps of 1 MHz; changes reading of first two digits of frequency indicator.
PHONES jack	Provides for connecting headset to receiver.

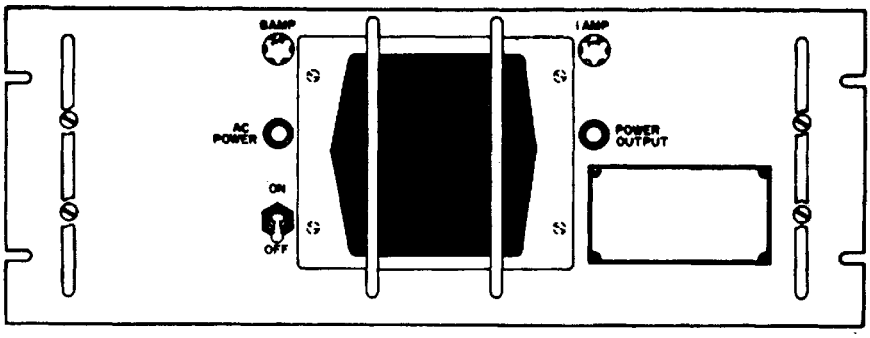


Figure 3-2. Control amplifer, controls and indicators.

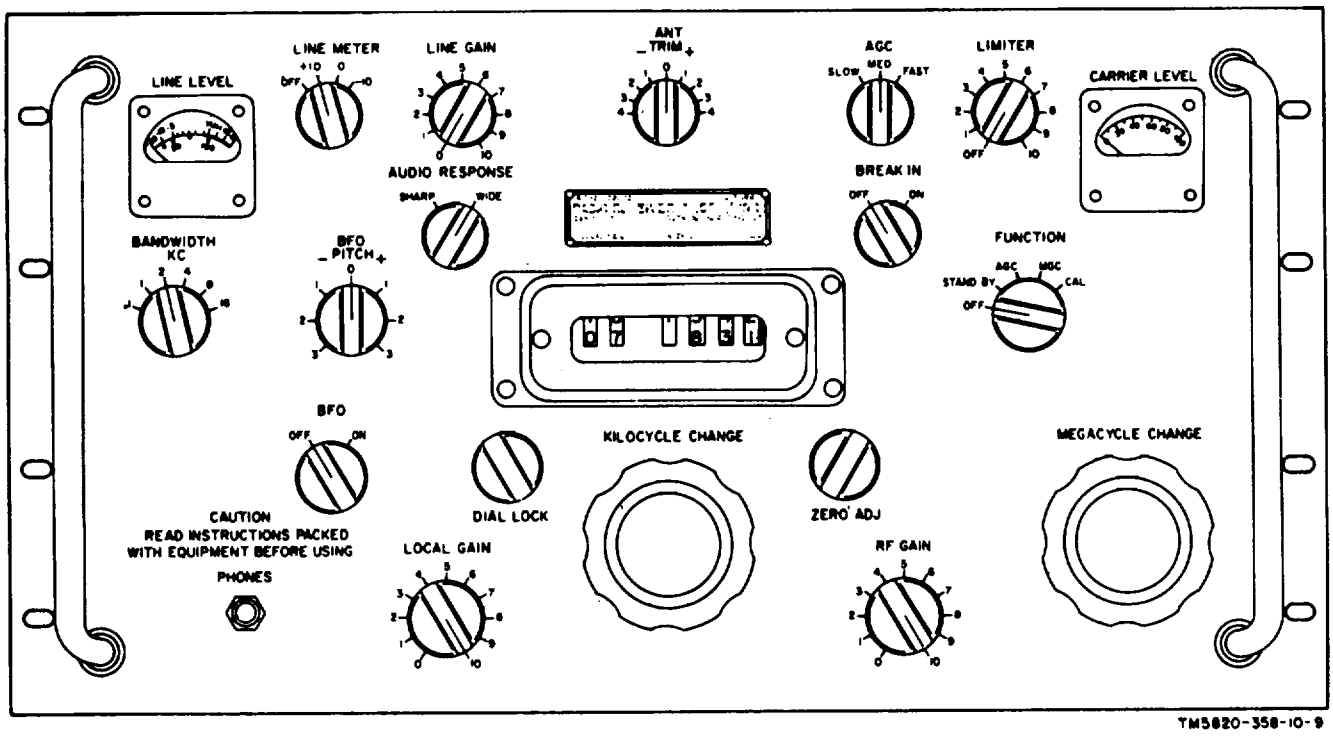


Figure 3-3. Receiver controls and indicators.

3-5. Power Supply Controls and Indicators

(fig. 3-4)

Control	Function
POWER ON-OFF switch	Turns unit on and off.
Ac power lamp DSI	Indicates unit is on.

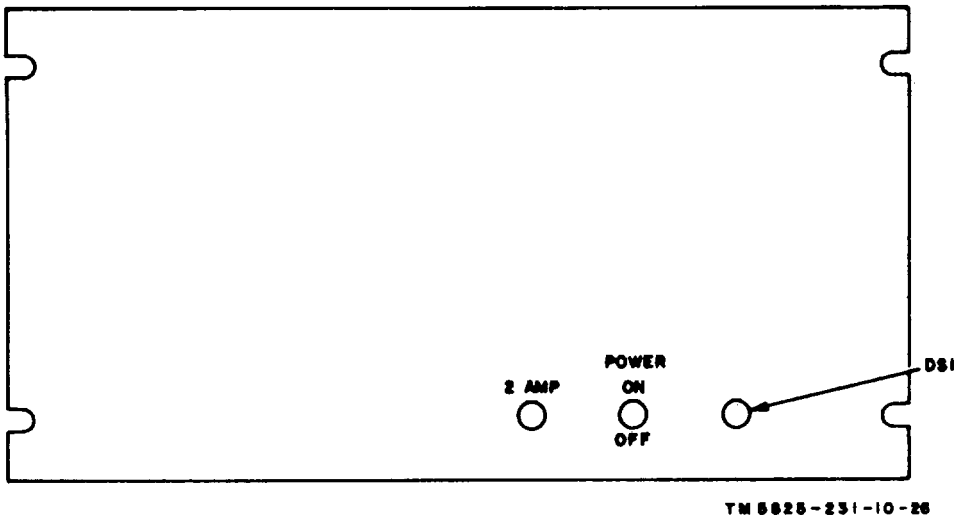


Figure 3-4. Power supply controls and indicators.

3-6. Azimuth Indicators Controls
(fig. 3-5)

Control — Function

INDICATOR ON-OFF switch — Turns azimuth indicator on and off.
MODE:
1 RCVR-2 RCVR switch — Selects single receiver or dual receiver df mode of operation. 2 RCVR position is used when received carrier is not of constant frequency.
MONITOR-D.F. switch — Selects monitor antenna or df antenna for input to No. 1 receiver. Blanks azimuth indicator screen when set to MONITOR.
HORIZONTAL control — Centers cathode-ray tube pattern horizontally.
VERTICAL control — G Centers cathode-ray tube pattern vertically.

CAUTION

Too high a setting will damage crt.

INTENSITY control — Varies brightness of cathode-ray tube pattern.
DIMMER control — Varies degree of light on azimuth scale.
D.F. GAIN control — Varies df signal level into azimuth indicator to display best propeller pattern.
SIZE control — Varies size of pattern.
SHAPE control — Adjusts no-signal pattern shape to conform to circular alidade scale.

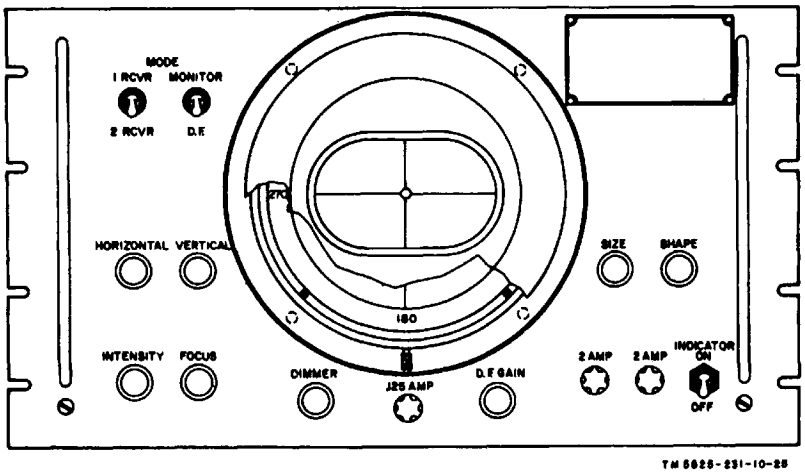


Figure 3-5. Azimuth indicator controls.

3-7. Power Panel Controls and Indicators
(fig. 8-6)

Control — Function

LINE INPUT switch — Turns power panel on and off. Selects proper line voltage.
LOAD switch — Connects and disconnects load from power panel.
CIRCUIT BREAKERS:
115 VAC button — Protective device overload on 116VAC input line. Push to reset.
230 VAC button — Protective device prevents overload on 230VAC input line. Push to reset.

Control	Function
OUTPUT VOLTAGE CONTROL	Adjusts output to proper operating voltage for system (115-volt nominal).
LINE FREQUENCY meter	Indicates frequency of line voltage.
OUTPUT VOLTAGE meter	Indicates output voltage.

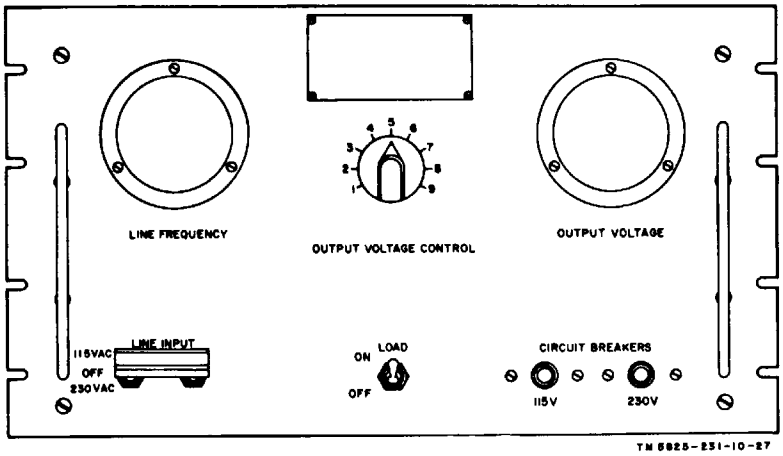


Figure 3-6. Power panel controls and indicators.

3-8. Monitor Oscilloscope Controls and Indicators

a. HP-120B/AR (fig. 8-7) controls and functions are shown below:

Control	Function
FOCUS control	Adjusts sharpness of cathode-ray tube pattern.
HORIZONTAL:	
VERNIER control	Adjusts sensitivity between ranges.
DISPLAY switch	Selects sweep speed or external sweep sensitivity.
POSITION control	Controls horizontal position of cathode-ray tube display.
AC-DC switch	.Selects ac or dc coupling of input signals to horizontal amplifier.
EXT SYNC OR HORIZ jack	External sync or horizontal amplifier input.
Z AXIS jack	Input for intensity modulation signal.
INTENSITY & POWER control	Adjusts intensity of cathode-ray tube and turns oscilloscope on and off.
SCALE screwdriver adjust	Aligns trace with graticle.
BEAM FINDER button	Returns beam to cathode-ray tube face regardless of horizontal and vertical POSITION settings.
TRIGGER:	
LEVEL control	Adjusts level of trigger point on sync signal.
SOURCE switch	Selects sweep synchronization.
SWEEP MAGNIFIER X1-XS switch	Multiples sweep speed selected by HORIZONTAL DISPLAY.
VERTICAL:	
SENSITIVITY switch	Selects vertical deflection sensitivity.
VERNIER control	Adjusts sensitivity between ranges.
POSITION control	Controls vertical position of cathode-ray tube display.
CAL screwdriver adjust	Adjusts calibration of vertical input.
BAL screwdriver	Adjusts for no vertical shift with rotation of vertical VERNIER.
AC-DC switch	AC position input capacitively coupled into vertical amplifier. DC position input directly coupled into vertical amplifier.

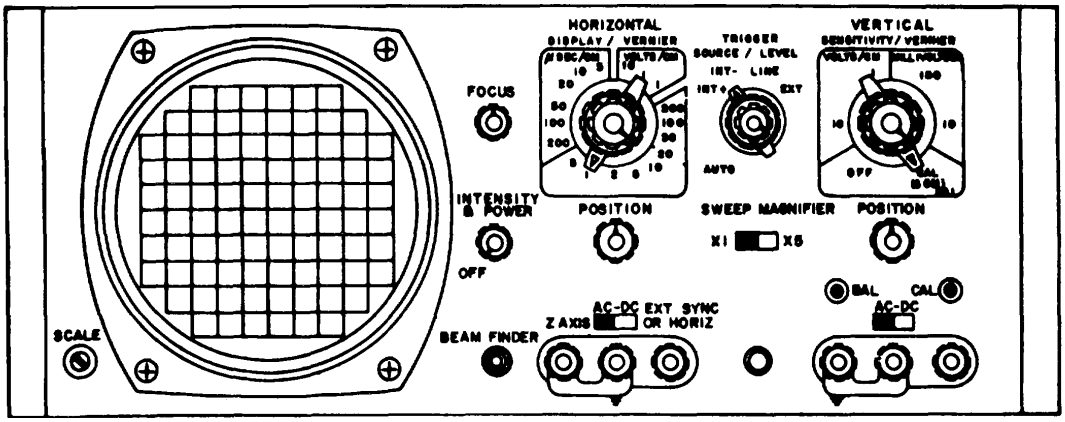


Figure 3-7. Oscilloscope HP-120 B/AR controls.

b. AN/USM418(V)1 (fig. 3-8) controls and functions are as follows:

FOCUS control ..... Adjusts for sharpest display.
ASTIGMATISM control ..... Adjusts for sharpest display.
SCALE control ..... Adjusts graticule brightness.
TRACE ALIGN control ..... Adjusts alignment of horizontal trace and graticule.
FIND BEAM switch ..... Push to bring CRT beam on screen.
INTENSITY control ..... Adjusts brightness of display.
POSITION control. ..... Coarse and fine adjustment of horizontal position of trace.
MAGNIFIER switch ..... Magnifies horizontal display.
DISPLAY switch ..... Selects source of horizontal input signal.
AC-DC switch ..... Selects ac or de coupling of an external horizontal input signal.
EXT INPUT jack ..... Input for external horizontal signal.
CALIBRATOR jacks ..... Provides 250-mv and 10-volt p-p, 1-khz square wave calibration signals.
POWER switch ..... Pushbutton switch with indicator lamp for turning oscilloscope on and off.
TIME BASE:
VERNIER control ..... Continuously varies sweep time between calibrated positions of TIME/CM switch.
TIME/DIV switch ..... Selects sweep speed.
TRIGGER HOLD-OFF control ..... Adjusts hold-off time between end of one sweep and beginning of next.
LEVEL control ..... Adjusts trigger level.
TRIGGER source switch:
LINE ..... Selects power input to scope as trigger source.
INT ..... Triggers from vertical input signal.
EXT . ..... Triggers from signal at EXT INPUT jack.
EXT-10 ..... -Reduces signal at EXT INPUT jack to usable trigger level.
SLOPE switch ..... Selects portion of signal which initiates sweep.
Coupling switch:
DC ..... Provides direct coupling for external trigger.
AC, ACF, ACS ..... Provides capacitive coupling for external trigger.
EXT INPUT jack ..... Connection for external trigger signal.

MODE switch:
- NORM..... -Sweep triggered by incoming signal.
- AUTO..... Sweep triggered by incoming signal plus free running.
- SINGLE ..... Sweep triggered once. Must be manually rearmed.
- RESET..... Rearms sweep circuit in SINGLE MODE.

UNCAL light..... Lights when VERNIER is not set to CAL.
VERTICAL:
- PROBE POWER jack..... Supplies +15 and -12.6 volts to active probe.
- INPUT jacks ..... A and B channel signal inputs.
- Coupling switches..... Selects AC, DC input coupling, or grounds (GND) the input.
- VOLTS/DIV switches and vernier..... Adjusts vertical amplifier inputs for input signal level in calibrated steps. Vernier provides for continuous adjustment between calibrated steps.
- POLARITY switches..... Adjusts for a normal (+ UP) or inverted (-UP) display.

POSITION controls..... Adjusts vertical positions of display
DC BAL control..... .Adjusted for minimum vertical shift when POLARITY is switched.
DISPLAY switch ..... Selects type of display.

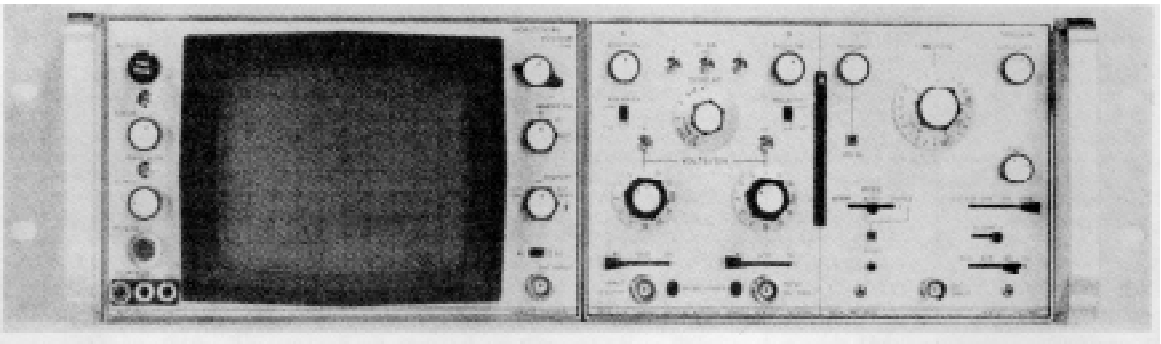


Figure 3-8. OscilloscopeAN/USM-318(V)I controls and indicators.

3-9. Audio Box Control
(fig. 3-9)

Control	Function
Primary and secondary console audio box:	
DF RCVR-2ND RCVR switch	Selects either df receiver or 2nd df receiver output for monitoring.
MONAURAL HEADSET jack	Connects monaural headset to receiver selected by DF RCVR-2ND RCVR switch.
BINAURAL HEADSET jack	Connects binaural headset to df and 2nd df receiver
XMTR 1-XMTR 2 switch	Selects either transmitter line for transmitter keying.
XMTR KEY INPUT jack	Connects transmitter key to transmitter line selected by XMTR 1-XMTR 2 switch.
Communications console audio box:	
NET 1 RCVR-NET 2 RCVR switch	Selects NET 1 or NET 2 receiver for monitoring.
MONAURAL HEADSET jack	Connects monaural headset to receiver selected by NET 1 RCVR-NET 2 RCVR switch.
BINAURAL HEADSET jack	Connects binaural headset to NET 1 and NET 2 receiver
XYTR 1-XMTR 2 switch	Selects either transmitter lines for transmitter keying.
XMYTB KEY INPUT jack	Connects transmitter key to transmitter line selected by' XMTR 1-XMTR 2 switch.

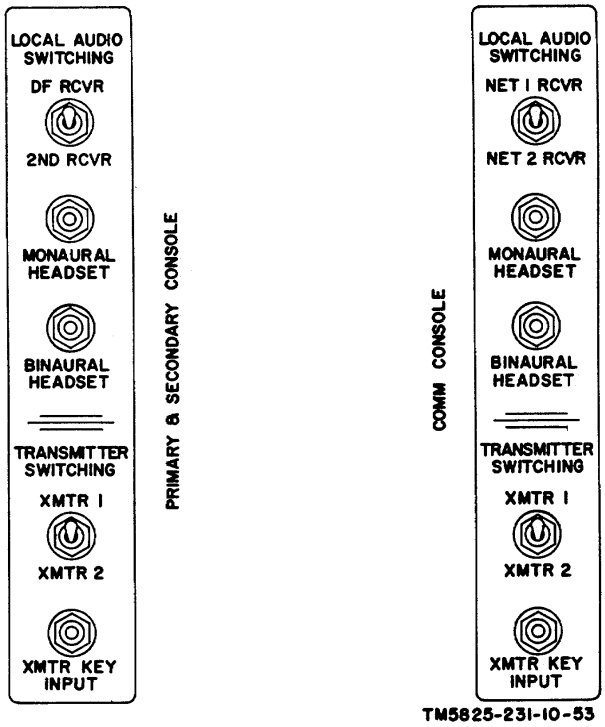


Figure 3-9. Audio box controls.

3-10. Shelter Controls
(fig. 1-17, 1-18, and 1-19)

Controls	Function
MAIN POWER switch	Turns on power (115 or 230 vac) to circuit breaker &
Circuit breaker box:	Turns power on following:
CB1	Air conditioner (RH).
CB2	Shelter lighting.
CB3	Air conditioner (LH).
CB4	Heater.
CB5	Primary, secondary, and communications consoles.
CB6	Convenience outlets 1, 2, and 3.
CB8	Convenience outlets 4, 5, and 6.
CB9 (spare)	
CB10 (spare)	
BLACKOUT switch	Turns off all lights in shelter.
BLACKOUT BY-PASS switch	Enables BLACKOUT switch to be bypassed.
Primary console LIGHT switch	Turns primary console lighting on.
Primary console DIMMER control	Varies degree of console lighting.
Secondary console LIGHT switch	Turns secondary console lighting on.
Secondary console DIMMER control	Varies degree of console lighting.
Communication console LIGHT switch	Turns communication console light on.
Communications console DIMMER control (-280A/G only)	Varies degree of console lighting.

3-11. Target Transmitter Controls and Indicators
(fig.8-10)

TRANSMITTER ON-OFF and INDICATOR	Turns transmitter on and off. INDICATOR lights when transmitter is on.
CW-MCW	Selects signal, either continuous wave (CW) or modulated continuous wave (MCW).
OUTPUT control	Potentiometer for adjusting output power.
Tuning control	Tunes target transmitter to desired frequency with tuning dial. Frequency will be within band selected by BANDSWITCH control.

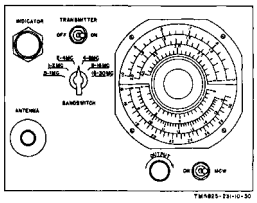


Figure 3-10. Target transmitter control and indicators.

Section II. OPERATION

3-12. Types of Operation

a. The primary and secondary consoles are functionally the same; therefore, the information given below applies to either console.

b. Direction finding of a signal that has a constant carrier frequency (one receiver mode) requires the use of only the No. 1 df receiver and the 25 df antennas.

c. Direction finding of a signal that does not have a constant carrier frequency (two receiver mode) requires the use of both receivers, the monitor antenna and the 25 df antennas.

d. Any signal can be monitored with the monitor receivers.

3-12.1. Prestarting Procedures

Before turning on the df set, make the following pre-cautionary checks:

a. Be sure that all equipment in the shelter, including circuit breakers, are turned off and that the intensity controls on the azimuth indicators are turned fully counterclockwise.

b. Check the shelter ground. Ensure that the ground rod is driven well into the ground and the ground strap between the rod and the shelter is well secured.

WARNING

Turn generator off while performing the following checks.

c. Check the tightness of the power cable connections at the shelter and at the generator terminal posts.

d. Check that the generator is properly grounded, is set for three-phase, and is adjusted for 110 Vac, 60 Hz.

3-13. Starting Procedure

a. Turn on the MAIN POWER switches and turn on the following circuit breakers and shelter switches.

CBI, Right Air Conditioner (as required)
CB2, Shelter Lights
CB3, Left Air Conditioner (as required)

CB4, Heater (as required)
CB5, Consoles
CB6, Convenience Outlets 1, 2, and 3 (as required)
CB7, Convenience Outlets 4, 5, and 6 (as required)
Primary Console lighting
Secondary Console lighting
Communications Console lighting

b. Set the console controls as follows:

(1) Power Distribution Panel (Secondary Console)

Control	Setting
LINE INPUT switch	115 VAC
OUTPUT VOLTAGE CONTROL	115 VAC
LOAD ON-OFF switch	ON

(2) POWER SUPPLY (Primary and Secondary Console)

Control	Setting
POWER ON-OFF switch (AC Power Lamp should light)	ON

(3) ELECTRONIC CONTROL AMPLIFIER (Primary Console)

Control	Setting
ON-OFF switch (AC power and Power Output lamps should light)	ON

(4) Antenna Coupler(Primary Console)

Control	Setting
POWER ON-OFF switch (Power lamp should light)	ON
TEST METER switch	All positions

Switch Position	Normal Indication
AIQI andAIQ2	40to56
A2QI andA2Q2	36to53
BIAS	40-56
B+	48-54

(5) Monitor Receiver (Primary and Secondary Console)

Control	Setting
BANDWIDTH	As required
RF GAIN	Fully cw
BFD	OFF
FUNCTION	AGC
AGC	FAST
LOCAL GAIN	Adjust for audible level on speaker, if used
MEGACYCLE and KILOCYCLE CHANGE	Desired frequency
LINE GAIN	Adjust for audible level on speaker, if used
AUDIO RESPONSE	Select for clear signal
LIMITER	ON for clear signal
ANTENNA TRIM	Adjust for strongest signal on CARRIER LEVEL meter
KILOCYCLE CHANGE	Fine tune for strongest signal on CARRIER LEVEL meter
DIAL LOCK and ZERO ADJUST knobs	Fully ccw

(6) DF Receivers (Primary and Secondary Consoles)

Control	Setting
FUNCTION	AGC
DIAL LOCK and ZERO ADJUST	Fully ccw
MEGACYCLE and KILOCYCLE CHANGE	Desired frequency
BANDWIDTH KC	2
RF GAIN	Fully cw
LOCAL GAIN	Adjust for audible level on speaker, if used
LINE GAIN	None
BFO	ON when tuning signal, OFF when taking bearing
AGC	FAST
AUDIO RESPONSE	WIDE
LIMITER	OFF
ANTENNA TRIM	Adjust for strongest signal on CARRIER LEVEL meter
KILOCYCLE CHANGE	Fine tune for strongest signal on CARRIER LEVEL meter

(7) Azimuth Indicator (Primary and Secondary Consoles)

Control	Setting
INDICATOR ON-OFF	ON
MODE MONITOR/DF	Monitor when tuning signal, D.F. when taking bearing
MODE 1 RCVR/2 RCVR	I RCVR for most signals, 2 RCVR for FSK and weak signals

3-14. Operating Procedures

a. Calibration. Calibration of the df receivers must be performed when the equipment is turned on and when a band change is made.

(1) Turn the KILOCYCLE CHANGE knob to the nearest 100 KC setting of the desired frequency. For example, if the desired frequency is 2877, tune to 2900; if the desired frequency is 2843, tune to 2800.

(2) Turn the ZERO ADJUST control fully clockwise.

NOTE

Once the ZERO ADJUST has been turned fully clockwise, the KILOCYCLE CHANGE knob should not be forced passed its automatic stops. These stops are at a quarter turn in either direction.

(3) Set the FUNCTION switch to CAL.
(4) Turn the BFO switch to ON.
(5) Turn the BFO PITCH control to 0.
(6) Adjust the KILOCYCLE CHANGE knob until there is a null (a complete absence of sound) and the CARRIER LEVEL meter peaks and stays at the highest level.
(7) Turn the ZERO ADJUST control fully counterclockwise.
(8) Set the FUNCTION switch to AGC.
(9) Set KILOCYCLE CHANGE knob to desired frequency.

b. One-Receiver Mode. The primary and secondary consoles are functionally the same. The following procedures apply to both consoles.
(1) On the azimuth indicator, set the MODE 1 RCVR/2 RCVR switch to 1 RCVR.
(2) Set the controls on the No. 1 DF receiver as follows:
(a) Adjust the LOCAL GAIN control until a signal can be comfortably heard on the headsets.
(b) Set BFO switch ON when tuning a signal and OFF when taking a bearing.
(c) Tune the signal with the KILOCYCLE CHANGE knob and ANTENNA TRIM control until the CARRIER LEVEL meter is at its maximum reading.

(3) Set the controls on the azimuth indicator as follows:
(a) Set the MODE DF/MONITOR switch to DF.
(b) Turn the DF GAIN and SIZE controls fully counterclockwise.
(c) Adjust the FOCUS and INTENSITY controls for a pin size dot on the scope. Then adjust the HORIZONTAL and VERTICAL controls to center the dot on the scope.
(d) Adjust the FOCUS, SIZE, SHAPE, AND INTENSITY controls until a sharply defined circle extends to the edge of the scope.
(e) Adjust the SIZE control until the extremities of the lighted area on the scope are just within the inner diameter of the azimuth scale.
(f) Adjust the SHAPE control to obtain a circular pattern. Readjust the SIZE control as necessary.
(g) Readjust the INTENSITY control for the dimmest possible viewing level.
(h) Adjust the DF GAIN control for a normal pattern (fig. 3-11). Too much or too little gain will produce a bad pattern. Use the crosshairs to read the azimuth. If a normal pattern cannot be obtained, use the procedures in paragraph c. below for the Two Receiver Mode.

c. Two-Receiver Mode. When a signal is too weak or flutters excessively on the scope, the two receiver mode should be used. FSK signals are especially liable to flutter or weakness.
(1) Perform the procedures in paragraph b. Above for One Receiver Mode.
(2) On the azimuth indicators, set the MODE 1 RCVR/2 RCVR switch to 2 RCVR, and the MODE DF/MONITOR switch to MONITOR.
(3) Set the controls on the No. 2 DF receiver as follows:

(a) Adjust the LOCAL GAIN control until a signal can be comfortably heard on the headset.

(b) Set BFO switch to ON when tuning a signal and OFF when taking a bearing.

(c) Tune the signal with the KILOCYCLE CHANGE knob and ANTENNA TRIM control until the CARRIER LEVEL meter is at its maximum reading.
(d) Calibrate the receiver (paragraph 3-14., a.).

(e) Tune back to the original frequency. Be sure to approach it from the same direction as you did when you originally tuned it, i.e., if you tuned to 4500 from 5000, then above 4500 and back down to 4500. The reason for this is that many signals operate on two tones, and it is important to tune the same part of the signal on both receivers.

(f) Fine tune the No. 1 and No. 2 DF receivers with the KILOCYCLE CHANGE knobs and ANTENNA TRIM controls for maximum indication on the CARRIER LEVEL meters.

(4) On the azimuth indicator, set the MODE DF/MONITOR switch to DF.

(5) On the No. 1 and No. 2 receivers fine tune with the KILOCYCLE CHANGE knob for the best possible propeller pattern.

d. Monitor Oscilloscope Operation. The monitor oscilloscope is provided primarily for monitoring the 455-kHz intermediate frequency (IF) output of the No. 1 DF receiver. One of two monitor oscilloscopes is supplied with the df set: the HP-120B or the AN/USM 318.

(1) Monitor Oscilloscope HP-120B. The time base of this unit is synchronized with the df set scan rate of 90 Hertz by means of a pulse derived from the goniometer drive. The time is adjusted so that a complete scan of the antenna system is displayed. The display is a continuous monitor of the individual antenna outputs. A faulty antenna cable or connection in the antenna field will be immediately observed as a hole in the IF pattern display (fig. 3-12).
Set the HP-1 20B controls as follows:

(a) Turn the INTENSITY POWER control fully clockwise. Allow a 5-minute warmup.

(b) Check to see that the SYNC and IF lines are connected to the oscilloscope inputs.

(c) Adjust the FOCUS control for the sharpest image.

(d) Turn the red HORIZONTAL VERNIER knob to mid setting. This control is used to stop pattern movement.

(e) Turn the VERTICAL VERNIER knob fully counterclockwise.

(f) Set the black HORIZONTAL DISPLAY knob to 2 milliseconds/CM.

(g) Set the black VERTICAL SENSITIVITY control to 10 millivolts/CM.

(h) Set the SWEEP MAGNIFIER switch to X1.

(i) Set both AC-DC switches to AC.

(j) Adjust the HORIZONTAL POSITION control to position the pattern in the middle of the scope.

(k) Adjust the VERTICAL POSITION control to vertically center the pattern.

(l) Set the black TRIGGER SOURCE knob to EXT.

(m) Set the red TRIGGER LEVEL control to AUTO.

(n) On the azimuth indicator, set the MODE MONITOR/DF switch to DF.

(o) Adjust the red HORIZONTAL VERNIER knob to stabilize the pattern on the scope.

(p) Adjust the red VERTICAL VERNIER knob for the best display; the pattern should be about six grids high.

(q) Adjust the INTENSITY power control in a comfortable viewing level.

(2) Monitor Oscilloscope AN/USM 318. This unit has a dual trace, and displays the sync pulse on its A channel and the IF signal on its B channel. The sync pulse occurs at a time that corresponds to the output of the No. 1 (North) antenna, so that discontinuities in the IF signal can be related to a particular antenna by their positive relative to the sync pulse.

Set the AN/USM 318 controls as follows:

(a) Push the POWER switch ON.

(b) Turn the INTENSITY control fully counter clockwise.

(c) Turn the HORIZONTAL control inner dial fully clockwise and set outer dial with arrow up.

(d) Set the MAGNIFIER switch to X1.

(e) Set the DISPLAY (oscilloscope) switch to INT.

(1) Set the AC-DC switch to AC.

(g) Set the A POSITION control with arrow up.

(h) Set the B POSITION control with arrow up.

(i) Set both POLARITY switches to + up.

(j) Set the DISPLAY control (vertical amplifier) to CHOP.

(k) Set the VOLTS/CM A channel (left side) to .5, and the B channel (right side) to .1.

(1) Set the both AC GND DC switches to AC.

(m) Connect the SYNC cable to A channel connector (left side) and the IF cable to B channel connector (right side).

(n) Turn the VERNIER control fully clock wise.

(o) Set the TIME/DIV control to 2 MSEC.

(p) Set the MODE switch to AUTO.

(q) Set LEVEL control to 0.

(r) Set the EXT +10 EXT INT LINE switch to INT.

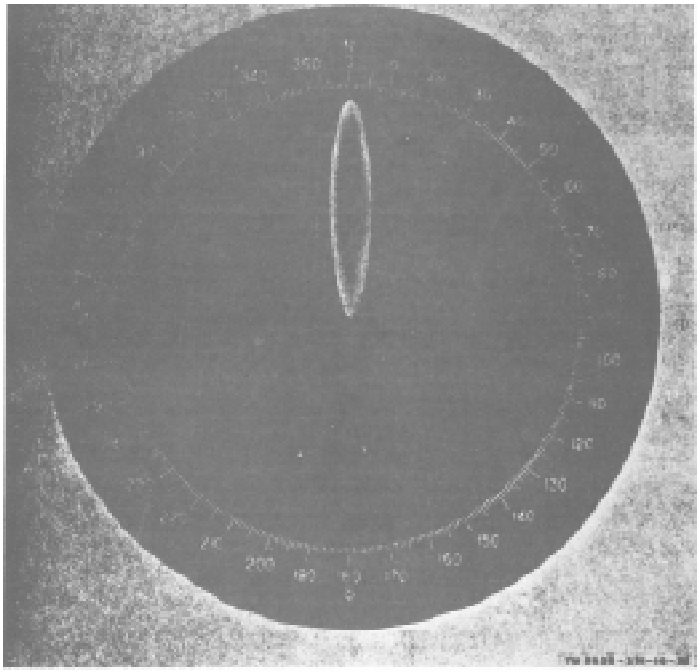


Figure 3-11. Azimuth indicator display, normal pattern

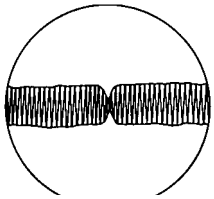


Figure 3-12. Monitor oscilloscope display, one antenna missing.

(s) Set the ACS ACF AC DC switch to AC.

(t) Turn the TRIGGER control fully counter-clockwise.

(u) Adjust the INTENSITY control for a comfortable viewing level.

(v) Adjust the FOCUS control for a sharp pattern.

(w) Adjust the SCALE control so that both the pattern and the scale can be seen.

(x) Adjust the HORIZONTAL control outer dial to center pattern on the scope.

3-15. General Operating Information

a, Be very careful that the receiver is accurately tuned. The bearing pattern will split or distort if tuning is not accurate, or if the DF GAIN control is improperly set.

b. The chart below lists the various types of signals and their characteristics, together with recommendations for reading them.

Type of signal	Singles and Characteristics Characteristics	Recommendations
On-of keying (icw)	Sharp half-propeller when keying is on. Pattern splatters around in all directions when keying is off.	Read when keying is on; use crosshair. Bearing may also be read using afterglow.
Steady cw or amplitude-modulated signal	Sharp propeller tip	Read any time; use crosshairs.
Frequency shift keying (two receiver mode).	During keying, pattern will bounce to both sides of bearing.	Watch the bounce and set the croahairs at the midpoint about which the pattern is bouncing or read from afterglow.

Type of signal	Singles and Characteristics Characteristics	Recommendations
Weak signal	Characteristics are described above or the type signal received, except signals influenced by not	Watch the bounce and set the crosshairs at the midpoint about which the pattern bounces. Read bearing from after. glow.

3-16. Shutdown

When the df set is to be shut down, turn the power off in reverse order as follows:

a Turn off all of the df and communications equipment.

b. Set the power distribution panel LINE INPUTT switch to OFF.

c. Set all circuit breakers to OFF.

d. Set the MAIN POWER switch to OFF

Section III. OPERATON UNDER UNUSUAL CONDITONS

3-17. General

The df set may be difficult to operate in extreme heat or cold, humidity and moisture, or under sandy conditions Procedures for minimizing the effect of these unusual operating conditions are given in paragraphs -18 and 8-19.

3-18. Arctic Climates

Subzero temperatures and climatic conditions associated with cold weather affect the efficient operation of the equipment. Instructions and precautions for operation under such adverse conditions follow.

a. Keep the equipment warm and dry with the heater. Keep the transmitter in the shelter when not in se.

b. Improvise any means for preventing the transmitter batteries from freezing. To prevent heat loss when the transmitter is carried outside, place the transmitter in a bag lined with kapok, spun glass, fiber materials, animal skins, or woolen cloth.

c. RF antenna cable jackets may become very brittle from exposure to extreme cold. Do not wind cable on reel. Form cable into large diameter coil and secure at three equidistant places with rope.

d. Antenna guy installation requires special anchors for use in snow instead of stakes. Be especially careful when handling the rubber protective boot on the antenna coupler. Use anti-sieze compound on all threaded components of antenna.

3-19. Tropical or Desert Climates

a Conditions for tropical and desert climates are similar so procedures are identical.

b. After the shelter is in position and power is available, turn on the air conditioner and adjust for a pleasant condition.

c. After the air conditioners are running, keep the shelter door closed as much as possible, and keep in-out traffic at a minimum.

CHAPTER 4
MAINTENANCE INSTRUCTIONS

Section I. GENERAL

4-1. Scope of Operator's Maintenance

Listed below are the maintenance duties normally performed by the operator of the AN/rRD-23(*):

a. Operator's daily preventive maintenance checks and services (para 4-5).
b. Operator's weekly preventive maintenance checks and services (para 4-6).
c. Cleaning (para 4-7).
d. Troubleshooting (para 4-9).
e. Repairs and adjustments (para 4-10).

4-2. Tools and Equipment Required

No special tools or equipment is required to perform operator's maintenance on the df set.

4-3. Trichlorotrifluoroethane

Use trichlorotrifluoroethane for cleaning the df set.

WARNING

Adequate ventilation should be provided while using TRICHLOROTRIFLUOROETHANE. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the products of decomposition are toxic and irritating. Since TRICHLOROTRIFLUOROETHANE dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

Section II. PREVENTIVE MAINTENANCE

4-4. Preventive Maintenance Periods

Preventive maintenance checks and services are required daily in accordance with paragraph 4-6..The weekly checks shall also be performed under the following conditions:

a. When the equipment initially is installed.
b. When the equipment is reinstalled after removal for any reason
c. At least once each week if the equipment is maintained in standby condition.

4-5. Operator's Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Items to be inspected	Procedure	References
1	Exterior surfaces	Clean primary and secondary consoles, panels, and meter glasses.	Para 4-7.
2	Intercabling and connectors	Check all interconnecting cables and connectors for cracks and breaks. Replace cables that have cracks or broken connectors.	
3	Headset	Clean headset	Para 4-7.
4	Antennas, bases	Remove rust and corrosion	Para 4-7.
5	Knobs, dials, and switches	While making operating checks (items 6 through 11), observe that mechanical action of each knob, dial, and switch is smooth and free of external or internal binding.	
6	LINE INPUT switch (power panel)	Set to line voltage used (115 or 230 volts) and check to see that OUTPUT VOLTAGE meter indicates 115 VAC.	Para 4-9.
7	OUTPUT VOLTAGE CONTROL (power panel).	Adjust OUTPUT VOLTAGE CONTROL for a 115-vac indication on OUTPUT VOLTAGE meter.	
8	ON-OFF switch (control amplifier)	Set switch to ON and check to see that AC POWER lamp lights, goniometer drive motor runs, and POWER OUTPUT lamp lights.	Para 4-9.
9	INDICATOR switch (azimuth) indicator).	Set switch to ON and check to see that alidade lamps light and display appears on indicator cathode-ray tube.	Para 4-9.
10	POWER switch (power supply)	Set switch to ON and check to see that power supply ON lamp lights.	Para 49.
11	FUNCTION switch (receiver)	Set switch to AGC and tune in signal. Propeller pattern should indicate a bearing.	Para 3-13.

4-6. Operator's Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Items to be inspected	Procedure	References
1	Guy wires	Check guy wires for proper tension.	
2	Antennas	Inspect antennas for straightness.	
3	Cable clamps	Check for loose cable clamps on all external cables.	
4	Goniometer drive belt	Turn all power off and check goniometer drive belt for signs of water.	
5	Normal operation	Check df set during normal operation	Para 3-14.
6	Counterpoise mesh	Check counterpoise mesh for proper grounding	Para 2-9.
7	Guy stakes	Check guy stakes for proper seating.	
8	Antenna base stakes	Check antenna base stakes for proper seating.	

4-7. Cleaning

Inspect the exterior of the consoles and all units within the consoles. The exterior surfaces should be free of dirt, grease, and fungus.

a. Remove loose dirt with a clean, soft cloth.

b. Remove grease, fungus, and ground-in dirt from the cases; use a cloth dampened (not wet) with trichlorotrifluoroethane.

c. Remove dirt from plugs and jacks with a brush.

CAUTION

Do not press on the meter faces (glass) when cleaning: the meter may become damaged.

d. Clean the front panels, meter, and control knobs; use a soft, clean cloth. If dirt is difficult to remove, dampen the cloth with water; mild soap may be used for more effective cleaning.

Section III. CORRECTIVE MAINTENANCE

4-8. General

This section contains troubleshooting, repair, and adjustment procedures to be performed by the operator. When corrective measures fail to correct the trouble, refer the equipment to higher category maintenance

4-9. Troubleshooting Chart

Item No.	Trouble symptom	Probable trouble	Checks and corrective measures
1	OUTPUT VOLTAGE meter does not indicate 115 VAC.	Circuit breakers open and/or improper seating of power input cables.	Check circuit breakers. If circuit breakers are closed, check seating of power input cables.
2	Control amplifier AC POWER lamp does not light.	a. Fuse	a. Check fuse; replace if necessary.
		b. Pilot lamp loose in socket or burned out.	b. Check lamp; replace if necessary.

Item No.	Trouble symptom	Probable trouble	Checks and corrective measures
3	Power supply POWER ON lamp does not light.	Defective power supply fuse and/or pilot lamp loose in socket or burned out.	Check fuse and replace if necessary. Check pilot lamp for proper seating; replace if necessary.
4	Lamps around indicator alidade do not light.	Defective fuses (2AMP) and/or defective alidade lamps.	Check fuses and replace if necessary. Check lamps and re-
5	Display does not appear on indicator cathode-ray tube.	Defective fuse (.125 AMP) -1	Check fuse and replace- if necessary.
6	With target transmitter TRANSMITTER switch at ON, azimuth indicator does not display correct bearing.	Goniometer misadjusted	Adjust goniometer in accordance with paragraph 221.

4-10. Repairs and Adjustments

a. Replacement of Azimuth Indicator Alidade Lamps.

(1) Remove the screws that hold the alidade.

(2) Press in on the pilot lamp and turn it counterclockwise to unlock.

(3) Pull the defective lamp out and replace it with a new one. Push the lamp in and twist it clockwise to lock.

b. Replacement of Control Amplifier, Azimuth Indicator, Power Supply, and Rf Detector Power-ON Pilot Lamps.

(1) Turn the glass indicator jewel counter clockwise and pull out to expose defective lamp.

(2) Press in on the lamp and turn counter clockwise to unlock.

(3) Pull the defective lamp out and replace it with a new one. Push the lamp in and twist it clockwise to lock.

c. Replacement of Antenna Coupler POWER on Pilot Lamp.

(1) Turn the glass indicator jewel counter clockwise and pull out to expose defective lamp.

(2) Press in on the lamp and turn counter clockwise to unlock.

(3) Pull the defective lamp out and replace it with a new one. Push the lamp in and twist it clockwise to lock.

d. Replacement of Fuses.

(1) Twist the fuse cap counterclockwise to unlock.

(2) Pull the cap out and remove the defective fuse from the cap.

(3) Replace the defective fuse with a new one and insert the cap and fuse back into the fuseholder.

(4) Push in on the fuse cap and twist clock wise to lock.

CHAPTER 5
SHIPMENT AND LIMITED STORAGE

5-1. Handling, Storage, and Disposal of Radioactive Material

Follow the procedures for safe handling, storage, and disposal of radioactive materials given in TB SIG 225, AR 40-580, and AR 755-380.

5-2. Disassembly of Equipment

The instructions given below are recommended as a guide for preparing the AN/TRD-23(*) for shipment and storage:

a. Antenna System. Disassembly of all 26 antennas is the same. Follow the procedures in the order given below:

(1) Disconnect the CG-92G/U (75 ft) or the CG-92G/U(110 ft) from the antenna coupler (fig. 2-12).

(2) Remove the antenna coupler by loosening the thumbnuts on the antenna (lower antenna section). Slide the upper end out (eft to right); then lift up to remove the assembly.

(3) Loosen the guy wires.

(4) Disconnect the guys.

(5) Holding the antenna in an upright position, pull out on the upper retaining pin on the antenna base (fig. 2-8).

(6) Slowly walk away from the base, moving hands back, one at a time, until antenna is low enough for the removal of the loading disc.

(7) Unscrew the loading disc from the upper mast section (fig. 2-10).

(8) Unlock and remove the lower retaining pin.

(9) Unlock the clamps on the antenna sections and place the sections in the antenna container.

(10) Remove the guy sakes and the base stakes and place them in their container.

(11) Set the antenna base aside and remove the counterpoise ground strap from the ground rod by removing the holding screw.

(12) Remove the counterpoise clamps and the ground rod. Fold the counterpoise in half with the two wooden rods on each end.

(13) Roll up the counterpoise from each end toward the center.

(14) Place the counterpoise and clamps in the counterpoise container.

b. Power Cables. Disconnect the power cable from the power unit. Rewind on the large reel with the cable reeling machine provided. If the 160-foot extension cable has been used, place it on the other large reel.

c. Antenna Cables. Rewind the antenna cables on their respective reels using the cable reeling machine provided. Each reel accepts six 110-foot cables and is marked with the numbers of the cables that are to be wound on that reel.

5-3. Packing

a. Antenna Bases. The antenna bases are packed in cubes as follows:

(1) Spread the straps at right angles to each other and place a base in the center (A, fig. 1-29).

(2) Place a stowage frame on top of the base 5 with the positioning knobs on the outside of the frame (fig. 1-28) in the holes in the base.

(3) Place one base vertically in the channel on each side of the frame so that the corners overlap.

(4) Place a stowage frame on top of the four bases with the inside down.

(5) Place a base on top of the frame with antenna mounting assembly inside the cube and

the positioning knobs on the frame engaging the holes in the base. Secure the straps.

(6) A cube can be formed with 4 or 5 bases by leaving off the first or the last base.

b. Shelter. Before loading the shelter for shipment, perform the following procedures:

(1) Secure all chairs to the floor. Fasten the chair arms together with the straps provided for this purpose.

(2) Be sure that the storage drawers and cabinet doors are in the locked position.

(3) Secure the RF cable entrance cover with the two dzus fasteners.

(4) Place the telegraph keys and the head sets in the storage bin.

(5) Secure the ash trays and the extension light.

(6) Secure the broom.

(7) Secure the equipment in the consoles with the panel screws.

(8) Tighten the four bolts on the goniometer drive plate assembly and the locking screw on the sync pulse generator.

(9) Clamp the first aid box cover.

(10) Close the doors of the wall circuit breaker and the power box.

(11) Place the target transmitter in the storage box and clamp the storage lid.

(12) Secure the clock door and key.

(13) Secure the ceiling lamp lid assemblies.

(14) Push in and lock the console, pull out the shelves.

(15) Store and secure the waste paper basket.

(16) Check for loose heater and safe bracket mounting bolts.

(17) Check and retighten, if necessary, all visible bolts that secure the consoles to the mounting plates and shelter walls.

(18) Remove the excess cable slack in the consoles and sec ire them in place.

(19) Close the primary console cabinet doors and lock in place with the swivel plate.

(20) Secure the gasoline heater extension pipe assembly to the wall.

(21) Fold the blackout curtain and strap it to the wall.

(22) Mount the tripod and secure it to the wall.

(23) Pack the vacuum cleaner in the box and secure it to the shelter floor.

(24) Secure the wall telephone with the strap provided for this purpose.

(25) Secure the pencil sharpener.

(26) Coat hooks and rifle racks should be free of clothing and hardware.

(27) Close and lock the safe drawer.

(28) Secure the fire extinguisher.

(29) The floor and top of the consoles must be free of books and loose objects.

(30) Check the bulletin board mounting screws; retighten if loose.

(31) Remove the antenna positioning kit and proceed as follows:

(a) Secure the compass needle using adjustment under compass housing.

(b) Secure all the clamps that hold the assembly parts in spaces provided.

(c) Screw in the two long locking screws for the compass and the positioning disc assemblies.

(d) Close the antenna positioning kit and clamp it shut; store the kit in the space provided and secure it.

(32) Close and clamp the cable entry lid and the air conditioner power lid.

(33) Place protective caps over the power connector, the fuel line intake, and heater parts.

(34) Secure the gasoline can.

(35) Close and secure the exhaust fan cover.

(36) Place the air conditioner power cables into the storage bin and clamp the lid.

(37) Close and lock the shelter door.

(38) Check for and retighten all loose air conditioner mounting bolts.

5-4. Truck Loading

a. Deleted

b. After all cables are placed on the reels, and antenna bases are secured into cubes, load the antenna truck as follows:

(1) Load the antenna base cubes by sliding them up the loading skids provided.

(2) From a row of the cubes in the center of the truck (fig. 2-1).

(3) Load the cable reels and position them as shown in figure 2-2.

(4) Distribute 14 guy sets on each side of the row of base cubes.

(5) Load 14 counterpoises and 13 antennas on each side on top of guy sets, staggered back and forth to make an even pile.

(6) Place the pioneer kit on one side and the reeling machine on the other side on top of the pile.

(7) Place the loading skids, one on top of the other, down the center of the base cubes.

(8) Place two antennas on top of the base cubes, one on each side of the loading skids.

(9) Secure the load with the six chain tiedowns (fig. 2-2).

CHAPTER 6

DIRECTION FINDER SET AN/TRD-15(*)

Section I. INTRODUCTION

6-1. Scope

a. This chapter describes operation, Installation, and maintenance procedures for Direction Finder Set AN/TRD-15(*) (df set).

b. Unless otherwise stated in this chapter, all instructions for the AN/TRD-23(*), given in chapters 1 through 5, apply to the AN/TRD-15(*).

c. Functionally, the two systems are the same, except for monitoring and communications facilities.

6-2. General

a. Each section in this chapter corresponds to instructions given in previous chapters for the AN/TRD-23(*).

b. A listing of the procedures for the AN/TRD-23(*) which apply to the AN/TRD-15(*) are presented at the beginning of each section, followed by detailed instructions which apply only to the AN/TRD-15(*)

6-3. Purpose and Use of AN/TRD-15(*)

(fig. 6-1)

a. The AN/TRD-15(*) is a dual console radio direction finder system which accurately detects and displays the azimuth bearings of signals of interest in the 1.5-to 20.0-megahertz (MHz) frequency range. Detection and display of signals containing cw, am, fm and fsk types of modulation are possible with this set Bearings on two different signals may be obtained simultaneously.

b. The primary function of the df set is to obtain bearing information about communications signals. The azimuth bearing of a signal is shown directly on a cathode-ray tube (crt) calibrated in degrees.

c. The AN/TRD-15(*) requires a shelter and an external power source in addition to the equipment supplied.

d. Figure 6-2 is a block diagram showing the df set in a typical operating configuration.

(1) *Primary console.* Df receiver No. 1 is tuned to the frequency of the signal for which a bearing is desired. If this is a cw or am. signal, an accurate bearing for the signal source will be presented on the primary azimuth indicator. Df receiver No. 2 is tuned to a frequency which is being watched for activity If modulation is present on the signal which prevents obtaining a bearing display, such as fm or fsk, the configuration, shown for the secondary console, is used.

(2) *Secondary console.* Df receivers No. 1 and No 2 are tuned to the same frequency Because of cancellation of the signal modulation in the RF detector, an accurate bearing for signals containing fm or fsk modulation is produced The bearing of the signal source is displayed on the secondary azimuth indicator.

6-4. Technical Characteristics

Frequency range --------- 1.5 to 20.0 MHz.
Type of modulation ------Am., cw, fm, pm, fsk.
No of receivers ---------- 4.
Bearing sensitivity-------- 3.5 uv/meter minimum
Bearing accuracy---------$\pm 2^{o}$.
Antennas ---------- 26 vertical monopoles.
Power requirements ----- 115 to 230 volts, single phase, 47 to 63 Hz, 2 kw.

[1] Bearing sensitivity at 1.5 MHz = 9.0 uv/meter minimum

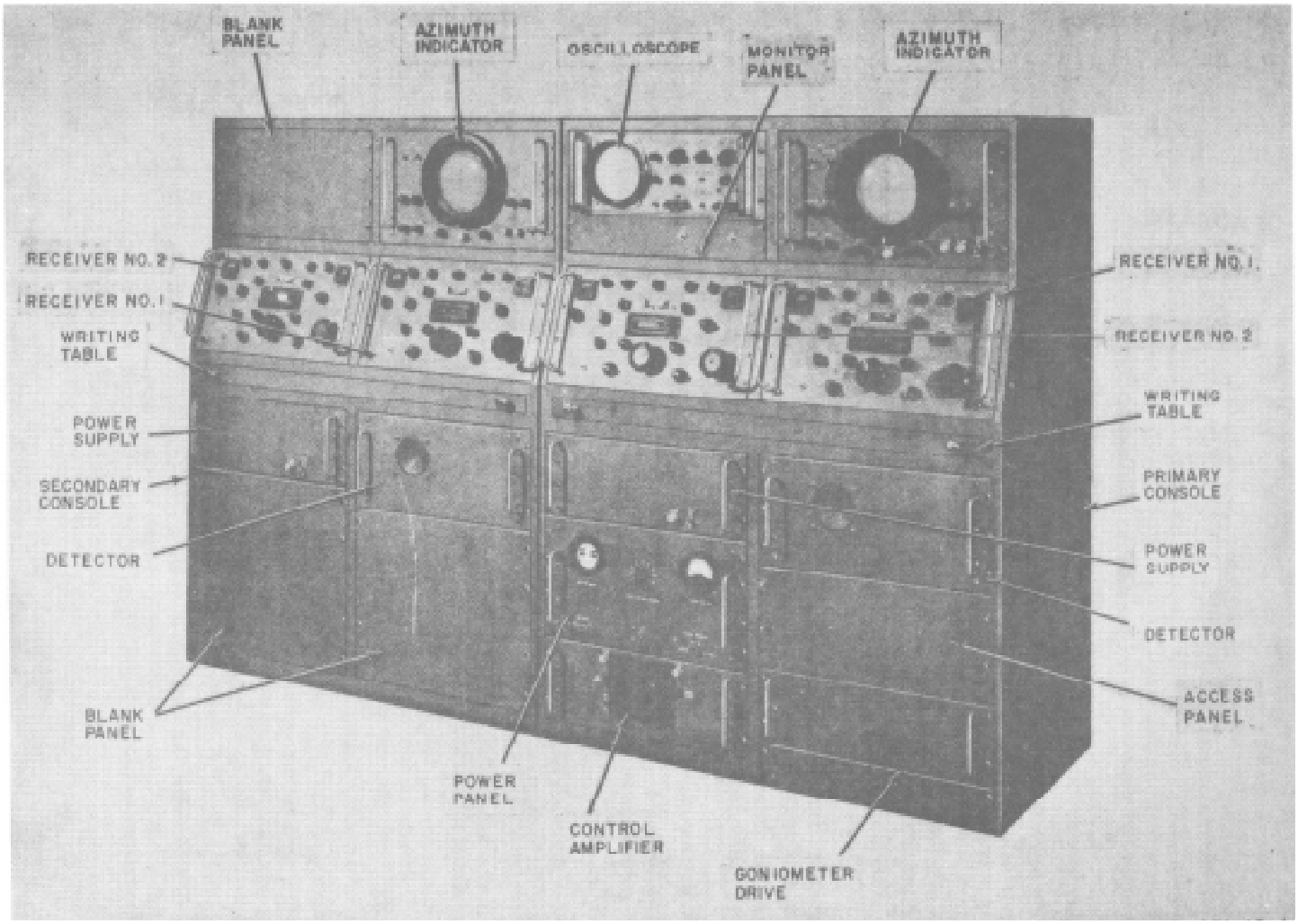


Figure 6-1. Direction Finder Set AN/TRD-15(*).

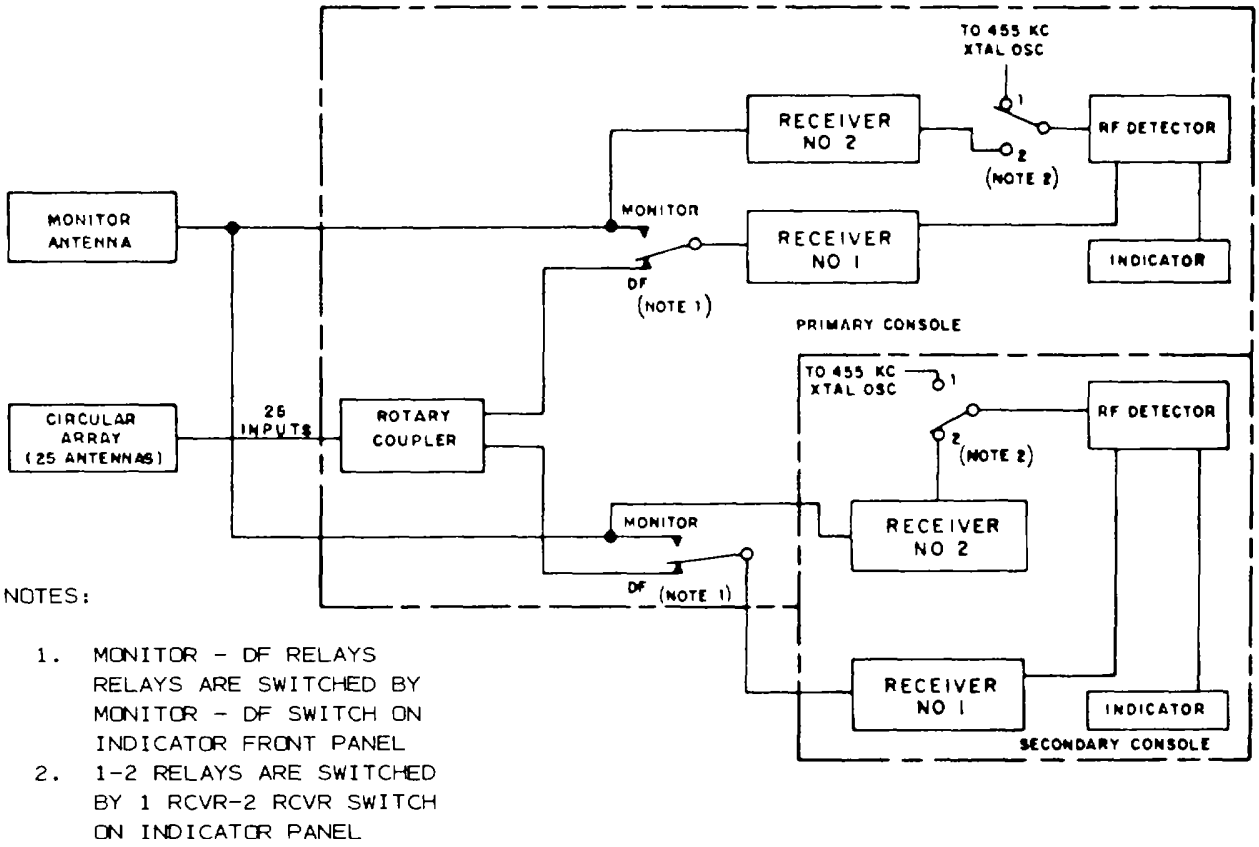


Figure 6-2. Direction Finder Set AN/TRD-15(*), Block Diagram

6.5. Components and Dimensions

Major components, their overall dimensions, weights, and references to figures illustrating these components are listed below.

Item	Height (In)	Depth (in)	Width (in)	Unit Weight (lb)	Fig No
Direction Finder Set ANTRD-15(*)					
Amplifier, Electronic Control AM-3545/TRD-15	7.0	12.5	19.0	51.6	
Antenna System AN/TRA-32					
Cabinet, Electrical Equipment CY-4873/TRD	54.0	27.0	40.0		
Coupler, Rotary, Radiofrequency CU-1096/TRD-15	3.5	11.25	19.0	18.0	
Detector, Radiofrequency RF-159TrRD	8.75	20.0	19.0	22.2	
Drive, Goniometer Rotary Coupler TG-126/TRD	10.5	12.06	19.0	69.5	
Goniometer, Electrical GO-42/TRD-15					
Indicator, Azimuth IP-669/TRD-15	10.5	17.0	19.0	57.3	
Oscilloscope HP-120BIAR	7.5	18.4	19.0	29.0	
Panel, Power Distribution SB-1747/TRD-15	10.5	9.75	19.0	65.5	
Power Supply PP4482/TRD	7.0	7.5	19.0	28.6	
Radio Transmitter T-279/UR	6.75	14.5	9.25	18.0	
Receiver. Radio R-725J/URR	10.5	17.0	19.0	85.0	
Detector, Radio Frequency RF-159A/TRD	8.75	20.0	19.0	22.2	1-12
Drive, Goniometer-Rotary Coupler, TG-126A/TRD	10.5	12.06	190	69.5	1-9
Oscilloscope ANIUSM-318(V)1	5.2	19.4	11.05	25.0	1-15

6-6. Description of Equipment

a. The AN/TRD-15(*) consists of an antenna system, primary and secondary consoles, installation equipment, technical manuals, accessory items and spare parts.

b. The antenna system and installation equipment supplied with the AN/TRD-16(*) is identical to that supplied with the AN/TRD-23(*)

c. The two consoles contain all the major operating units of the df set. Figure 63 shows the location of the units In each console. The chart below lists the units In each console. Note that while the units themselves are identical to units In the AN/TRD-23(*), their locations differ In the AN/TRD-15(*). Refer to figure 1-3 for comparison.

d. Power for the df set is supplied from an external source The power panel In the primary console controls all the operating units In the df set A power input filter is provided with the AN/TRD-D15A.

e. A shelter is required to house the AN/TRD-15(*)

6-7. Description of Minor Components

a. The minor components listed below are supplied with the AN/TRD-15(*) Refer to paragraph 1-23 for a description of these items.

(1) Antenna positioning kit.
(2) Cable reeling machine and storage bag.
(3) Antenna base stowage kit.
(4) Compass and tripod assembly.
(5) Viewing hood and adapter

b. An accessory kit (fig. 6-4) is supplied with the AN/TRD-15(*) and includes:

(1) Antistatic solution

Consoles in AN/TRD-15(*)

Unit	*Primary console*	Secondary *console*
Indicator, Azimuth IP-669/TRD-15	1	1
Receiver, Radio R-725/URR	2	2
Amplifier, Electronic Control AM-3545/TRD-15	1	0
Drive, Goniometer-Rotary Coupler TG-126(')/TRD	1	0
Detector, Radiofrequency RF-159(')/TRD	1	1
Power Supply PP-4482/TRD	1	0
Panel, Power Distribution, SB-1747/TRD-15	1	0
Panel, Antenna Patching, SB-3342/TRD-23A	1	0
Oscilloscope, monitor (2 models)	1	0

SECONDARY CONSOLE

BLANK PANEL	INDICATOR AZIMUTH IP-669/TRD
RECEIVER,RADIO R-725/URR (NO 2 DF)	RECEIVER RADIO R-725/URR (NO 1 DF)
WRITING TABLE	
POWER SUPPLY PP-4482/TRD	DETECTOR,RF RF-159(*)/TRD
BLANK PANEL	BLANK PANEL

PRIMARY CONSOLE

OSCILLOSCOPE MONITOR AN/USM-318(V)1 (SEE NOTE)	INDICATOR AZIMUTH IP-669/TRD
PATCH PANEL	
RECEIVER RADIO R-725/URR (NO 2 DF)	RECEIVER RADIO R-725/URR (NO 1 DF)
WRITING TABLE	
POWER SUPPLY PP-4482/TRD	DETECTOR, RF RF-159(*)/TRD
PANEL POWER DISTRIBUTION SB-1747/TRD	
AMPLIFIER ELECTRONIC CONTROL AM-3545/TRD	DRIVE GONIO,ROT,COUR TG-126(*)/TRD

NOTE:
HEWLETT PACKARD MODEL HP-120B OSCILLOSCOPE IS USED IN THE AN/TRD-15.

Figure 6-3. Direction Finder Set AN/TRD-15(*), consoles

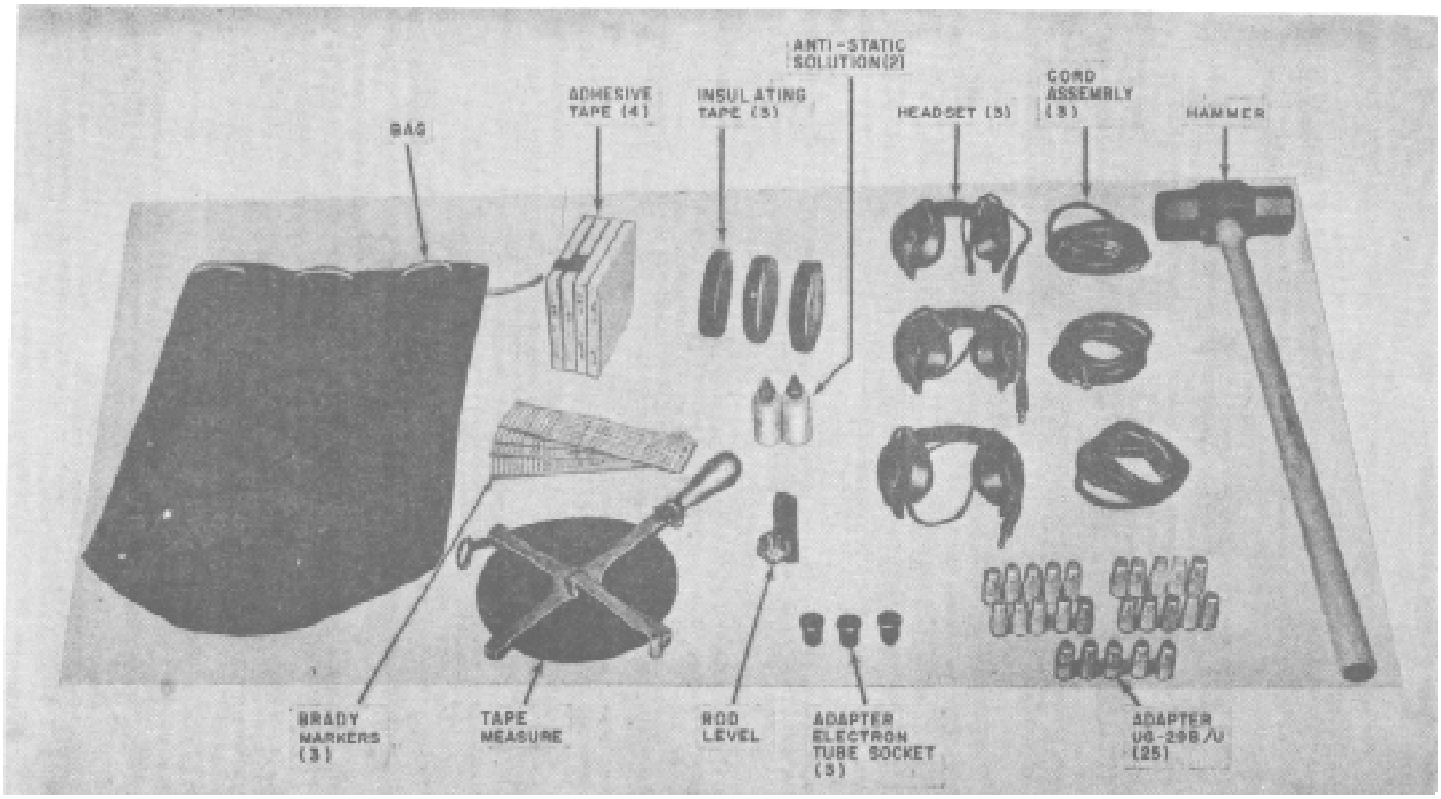


Figure 6-4. Accessory Kit AN/TRD--15(*).

(2) Level.
(3) Insulating tape.
(4) Alignment tool
(5) Headsets.
(6) Hammer
(7) Marker cards
(8) Colored tapes.

6-8. Additional Equipment Required

The items listed below are required, for, but not supplied with, the AN/TRD-15(*).

a. Power Unit PU-294/G. One PU-294/G, or equivalent, is required to power the df set.

b. Shelter. One shelter is required to house the two consoles.

c. Battery BA-404/U. One BA-404/U (FSN 6135-164-8779) is required to power the target transmitter.

d. Battery BA-242/U. One BA-242/U (FSN 6135-164-8762) is required to power the target transmitter.

6-9. Difference in Models

Direction Finder Sets AN/TRD-15 and AN/TRD-15A are similar in purpose, operation, and appearance The AN/TRD-15A includes improvements In the RF detector and goniometer drive, and a later model oscilloscope All units are interchangeable.

Item	*AN/TRD-15*	*AN/TRD-15A*
RF detector	RF-159/TRD	RF-159A/TRD
Goniometer drive	TG-126/TRD	TG126A/TRD
Monitor oscilloscope	HP-120B/AR	AN/USM-318(V)1
Antenna positioning kit	MK-985/G	MK-985A/G
Flashlight	None	Included
Steel tape	300 ft.	150 ft. (2 ea.)

Section II. INSTALLATION

6-10. General

a. Installation of the AN/TRD-15(*) is similar to that of the AN/TRD-23(*). Refer to the appropriate paragraphs in chapter 2 for information regarding the following operations:

(1) Siting (para 2-1 and 2-2)
(2) Checking equipment (para 2-4)
(3) Tools and equipment required for installation (para 2-5).
(4) Antenna system installation and checking (para 2-6 thru 217).
(5) Battery installation in target transmitter (para 2-18).
(6) Preoperational procedures (para 2-19 and 2-20).
(7) Primary console calibration (para 2-21).
(8) Secondary console calibration (para 2-22).

b. Additional installation information which applies only to the AN/TRD-15(*) is given in paragraphs 6-11, 6-12, and 6-13.

6-11. Unpacking

a. Packaging Data. When packed for shipment, the components of Direction Finder Set AN/ TRD-15(*) are placed in cartons and packed in wooden boxes. A typical shipping box and its contents are shown in figure 6-5.

(1) *Direction Finder Set AN/TRD-15 packing.*

Box No	Dimensions	Volume	Unit weight (lb)[1]	Contents of box
1 of 6	66 by 51 by 66	128	1,344	Accessories, console (2), cables.
2 of 6	44 by 88 by 30	67.2	1,553	Azimuth indicators (2), oscilloscope, receivers (4), power panel, control amplifier, goniometer drive, rf detector (2), power supply (2), blank panel.
3 of 6	66 by 116 by 48	213	2,786	Antenna assemblies (less base and counterpoise)
4 of 6	44 by 87 by 33	73.1	1,286	Counterpoise bags, ground stakes
5 of 6	63 by 132 by 35	169	2,826	Guy sets, antenna bases
6 of 6	66 by 82 by 43	135	1,868	Cables.

[1] The total weight is 11,663 pounds.

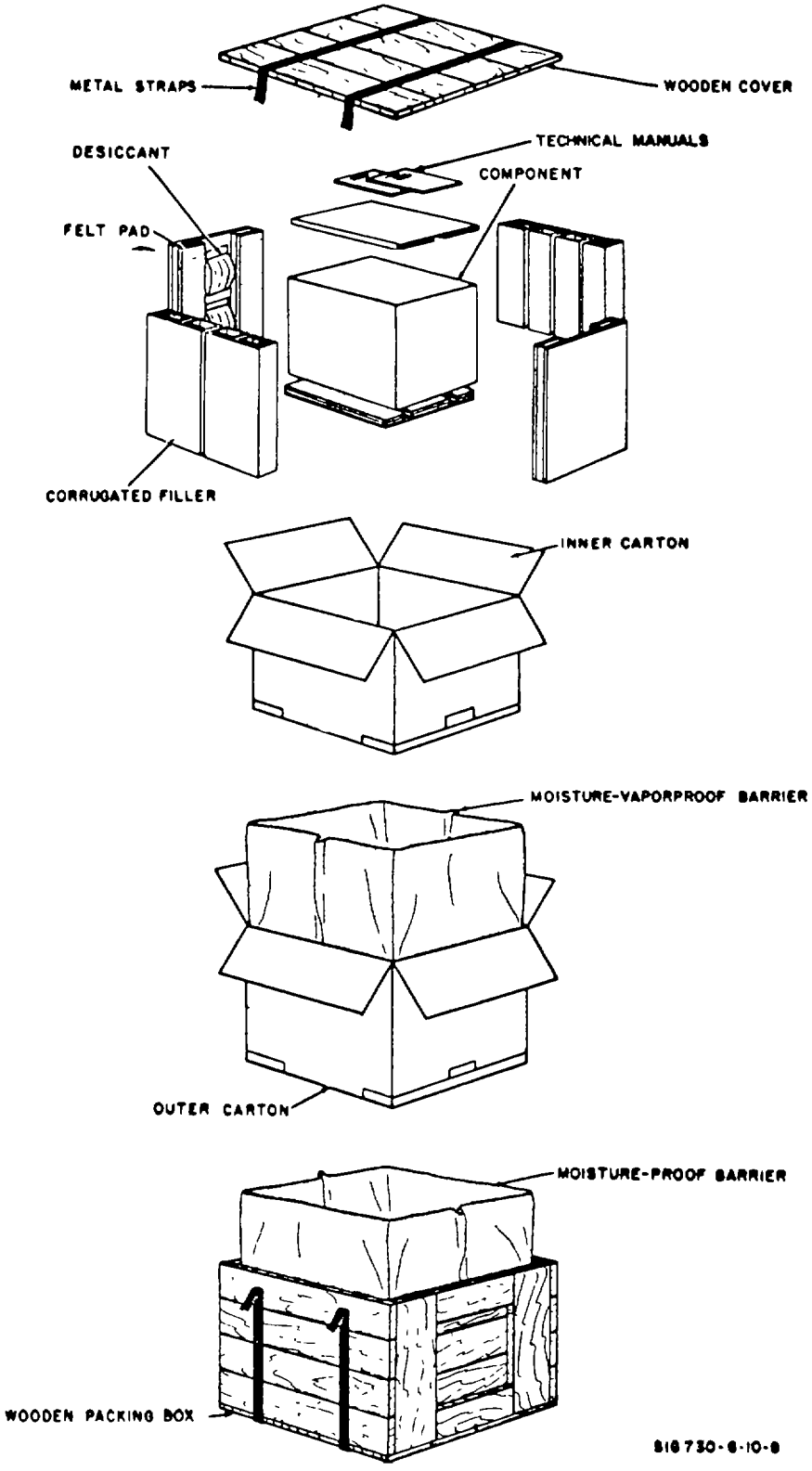


Figure 6-5. Typical packaging.

(2) *Direction Finder Set AN/TRD-15A packing.*

Box No.	Dimensions (in.)	Contents of box
1 of 11		Primary console.
2 of 11		Secondary console
8 of 11	83 by 105 by 18	Antennas
4 of 11	83 by 105 by 18	Antennas
5 of 11	36 by 68 by 80	Counterpoise.
6 of 11	68 by 87 by 30	Bases, antenna
7 of 11	24 by 60 by 20	Guy sets
8 of 11	52 by 69 by 26	Cables.
9 of 11	20 by 25 by 20	Spares.
10 of 11	24 by 56 by 20	Accessories
11 of 11	15 by 24 by 12	Target transmitter.

b. Removing Contents. Perform all the procedures outlined below when unpacking equipment in wooden boxes (fig. 6-6), When unpacking equipment in cartons, omit the procedures given in (1), (2), and (3) below.

(1) Carefully cut and fold back the metal straps.

(2) Remove nails from top and one side of box with nailpuller. Remove the top and one side. Do not attempt to pry open the box because the equipment may become damaged.

(3) Open the moisture-proof barrier that covers the carton inside the box. Remove the carton.

(4) Open the carton and the moisture-vaporproof barrier within the carton. Open the inner carton and remove the contents.

6-12. Shelter and Power Unit Installation.

a. The shelter and power unit are not supplied as part of the system; therefore, specific instructions for locating these units are not provided in this manual. Refer to the manual covering the particular shelter.

b. The information below is supplied only as a guide.

(1) The shelter should be positioned approximately 6 feet from the center antenna locating pin.

(2) The antenna cable entry on the shelter, when in place, should be closest to the center of the antenna array.

(3) The monitor antenna, when erected, should be to the side of the shelter and not to the front or rear.

(4) The shelter door should be facing the power units and parking lot.

(5) The power unit should be mounted as far away from the shelter as possible to minimize noises and fumes in the shelter

6-13. Cable Installation

CAUTION

Check to see that all power switches are off before connecting cables

a. Antenna Cables. The antenna cables supplied with the AN/TRD-16(*) are not numbered, and must be tagged with the Brady markers supplied as they are installed. Installation is otherwise as described in paragraph 217a

b. Power Cable. A 6-foot input power cable is supplied with the AN/TRD-15(*) which connects from J28 on the primary console to external power Connect the power cable (cable assembly, power, CX-11520/U inside the primary console from J27 of the console to JI of the power panel for 230 Vac operation or to J2 for 115 Vac operation Connect the power cable from the secondary goniometer and azimuth indicator from 6J 1 to J4 inside the primary power panel.

c. Interconnecting Cables:

(1) *Secondary goniometer and azimuth indicator.* Six cables connect the secondary goniometer in the primary console to the azimuth indicator in the secondary console. The cables and jacks are color-coded as follows:

Nomenclature	*Secondary Goniometer*	*Color*	*Secondary Azimuth indicator*
Cable Assemblies, RF CG 409G/U, 12 ft.	J1	Brown	J3
CG 409G/U, 12 ft.	J2	Blue	J4
CG 409G/U, 12 ft.	J3	Green	J5
CG 409G/U, 12 ft.	J4	Yellow	J6
Cable Assembly RF CG-1079B/U, 12 ft.	J5	None	J2
Cable Assembly, Power CX-2378/U, 8 ft.	J10	None	J11

(2) *Goniometer drive and df receivers.* Three cables connect between the goniometer drive chassis and the secondary df receivers as follows:

Nomenclature	*Goniometer Drive*	*Df receiver*
Cable Assembly, RF CG-888A/U, 10 ft.	J7	J103 of No. 2
Cable Assembly, RF CG-1079B/U, 9 ft.	J9	J104 of No. 1
Cable Assembly, RF CG-USA/U, 7 ft	J12	J108 of No. 1

(3) *Power.* A power cable (Cable Assembly, Power CX-118/U, 5 ft) connects between J27 of the primary console and J1 of the secondary console.

Section III. OPERATING INSTRUCTIONS

6-14. General

a. The AN/TRD-16(*) operates in a similar way as the AN/TRD-23(*). Refer to the appropriate paragraphs in chapter 8 for the following operating information:

(1) Operator's controls and indicators.

(2) Operating under unusual conditions.

b. Instructions for operating the df set under normal conditions, which apply only to the AN/ TRD-15(*), are provided in paragraphs 6-15 and 6-16.

6-15. Types of Operation

a. General. The two consoles of the AN/TRD-15(*) are functionally the same; therefore, bearing information may be obtained for two different signals simultaneously. As many as four different signals may be monitored simultaneously, depending on the mode of operation.

b. One Receiver (I RCVR) Mode. This mode of operation is used when bearing information is desired for an am. or cw signal. This mode allows the No. 2 df receiver to be used for monitoring purposes.

c. Two Receiver (t RCVR) Mode. This mode of operation requires both the No. 1 and No. 2 df receivers. It is used when the signal of interest contains modulation, such as fm or fsk, which interferes with the df set.

d. Monitor Mode. This mode of operation connects the No. 1 df receiver to the monitor antenna, providing a monitoring capability for the receiver. No df display is possible in this mode.

e. Df Mode. This mode of operation is used to obtain bearing information regarding signals of interest.

6-16. Starting Procedure

a. Turn on the main power to the df set. Refer to the appropriate shelter manual.

b. Set the primary console controls as follows:

(1) *Power panel.*

Control	*Setting*
LINE INPUT twitch	115VAC
OUTPUT VOLTAGE CON-TROL	115 vac
LOAD ON-OFF switch	ON

(2) *Power supply.*

Control	*Setting*
POWER ON-OFF twitch	ON
AC POWER lamp DS1	Lighted

(3) *Control amplifier*.

Control	*Setting*
ON-OFF witch	ON
AC-POWER lamp	Lighted
POWER OUTPUT lamp	Lighted

(4) *No. 1* and *No.* f *df receivers*

Control	*Setting*
AGC witch	FAST
BANDWIDTH KS switch	2 kHz
RF GAIN control	Fully cw
BFO witch	OFF
FUNCTION switch	AGC
LOCAL GAIN control	Adjust for audible level from headset.

NOTE

Use of the 2-kHz bandwidth is mandatory for direction finding.

(5) *Azimuth indicator.*

Control	*Setting*
INDICATOR on-off switch	ON
MONITOR-DF switch	DF
1 RCVR-2/RCVR Switch	1 RCVR

(6) *Monitor oscilloscope.* Apply power to the monitor oscilloscope and, after a 30 second warmup, adjust the controls for a proper display

on the crt. Refer to paragraph 3-13 for control settings

c. Set the secondary console controls in the same way as the primary console controls.

d. Reset the power panel OUTPUT VOLTAGE CONTROL for an approximate 115-volt ac indication on the OUTPUT VOLTAGE meter.

e. To turn off the AN/TRD-15(*), set the power panel LINE INPUT switch to OFF.

Section IV. MAINTENANCE

6-17. General

Operator maintenance of the AN/TRD 15(*) is identical to that required for the AN/TRD-23(*).

6-18. Maintenance Instructions

Maintenance instructions covering the following subjects are given in chapter 4 and also apply to the AN/TRD-15(*)

a. Preventive maintenance (para 4-4, 4-5, and 4-6)
b. Cleaning (para 4-7)
c. Troubleshooting and repair (para 4-8 and 4-9)

Section V. SHIPMENT AND LIMITED STORAGE

6-19. General

a. Refer to the appropriate paragraph in chapter 5 for instructions regarding the following:

(1) Handling, storage, and disposal of radioactive materials (para 5-1)

(2) Disassembly of antenna system (para 5-2).

b. The instruction given in paragraphs 6-19 and 6-20 apply to the AN/TRD-15(*) only.

6-20. Disassembly of Equipment

Disconnect the interconnecting cables listed in paragraph 6-13.

6-21. Protecting Transported Equipment

a. Equipment that is to be removed from service for periods exceeding approximately 2 weeks, or equipment that is to be shipped for use by other personnel or activities, normally is repackaged by higher category maintenance personnel. Refer equipment to organizational maintenance personnel for repackaging.

b. If the equipment is to be transported over a short distance under control of the using unit for immediate reuse, place each unit in a corrugated cardboard, or wooden box, and place padding over the control panels use rags or crumpled paper for padding.

APPENDIX A
REFERENCES

DA Pam 310-1	Consolidated Index of Army Publications and Forms
DA Pam 738-750	The Army Maintenance Management System (TAMMS)
FM 11-476	Radio Direction Finding, Field Operations
FM 34-86	Direction Finding Operations
TM 5-643	Repairs and Utilities, Preventive Maintenance for Heating Plants and Systems
TM 11-5820-358-10	Operator's Manual Radio Receiver R-390A/URR
TM 11-5825-231-24	Organizational, DS, and GS Maintenance Manual Direction Finder Sets AN/TRD-23, AN/TRD-23A, AN/TRD-15, and AN/TRD-ISA

APPENDIX B
COMPONENTS OF END ITEM LIST

Section I. INTRODUCTION

B-1. Scope
This appendix lists integral components of and basic issue items for the AN/TRD-23(*), AN/ TRD-15(*) to help you inventory items required for safe and efficient operation.

B-2. General
This Components of End Item List Is divided into the following sections.

a. Section II Integral Components of the End Item. These items, when assembled, comprise the AN/ TRD-23(*), AN/TRD-15(*) and must accompany it whenever it is transferred or turned In The illustrations will help you identify these items.

b. Section III Basic Issue Items These are the minimum essential items required to place the AN/TRD-23(*), AN/TRD-15(*) in operation, to operate it, and to perform emergency repairs. Although shipped separately packed they must accompany the during operation and whenever it is transferred between accountable officers. The Illustrations will assist you with hard-to-identify Items This manual is your authority to requisition replacement BII, based on TOE/MTOE authorization of the end item.

B-3. Explanation of Columns
a. Illustration This column is divided as follows.

(1) *Figure number* Indicates the figure number of the illustration on which the item is shown.

(2) *Item number* The number used to identify item called out In the illustration.

b. National Stock Number Indicates the National stock number assigned to the item and which will be used for requisitioning.

c. Description. Indicates the Federal item name and, if required, a minimum description to identify the item. The part number indicates the primary number used by the manufacturer, which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items Following the part number, the Federal Supply Code for Manufacturers (FSCM) is shown In parentheses

d. Location The physical location of each item listed is given in this column. The lists are designed to inventory all items in one area of the major item before moving on to an adjacent area

e. Usable on Code Not applicable "USABLE ON" codes are included to help you identify which component items are used on the different models. Identification of the codes used in these lists are:

Code	*Used on*
1	AN/TRD-23
2	AN/TRD-23A
3	AN/TRD-15
4	AN/TRD-15A

f. Quantity Required (Qty Reqd) This column lists the quantity of each item required for a complete major item

g. Quantity This column is left blank for use during an Inventory. Under the Rcvd column, list the quantity you actually receive on your major item. The Date columns are for your use when you inventory the major item

(Next printed page is B-2)

SECTION II. INTEGRAL COMPONENTS OF END ITEM

(1) ILLUSTRATION (A) FIG.	(B) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER	FSCM	(4) LOCATION	(5) USUABLE ON CODE	(6) QTY REQD	(7) QUANTITY RCVD	DATE
		5825-00-926-0273	AN/TRD-23			1	1		
		5825-00-491-5253	AN/TRD-23A			2	1		
6-1		5825-00-069-8763	AN/TRD-IS			3	1		
6-1		5825-00-491-5254	AN/TRD-ISA			4	1		
1-9		5825-00-918-6991	AMPLIFIER, ELECTRONIC CONTROL			1,2,3,4	1		
3-2			AM-3545/TRD-15	(80058)					
		5985-00-926-0178	ANTENNA SYSTEM AN/TRA-32 CONSISTING OF						
1-4		5985-00-926-0156	ANTENNA ASSEMBLY AS-1882/GR	(80058)		1,2,3,4	26		
1-4		5985-00-392-9061	ANTENNA SECTION AT-445/GR	(80058)	1,2,3,4	1			
1-4		5985-00-378-4723	ANTENNA SECTION AT-444/GR	(80058)	1,2,3,4	1			
1-4		5985-00-378-4722	ANTENNA SECTION AT-443/GR	(80058)	1,2,3,4	1			
1-4		5985-00-378-4721	ANTENNA SECTION AT-442/GR	(80058)	1,2,3,4	1			
1-4		5825-00-284-4240	LOADING DISC, ANTENNA MX-11168	(80058)		1,2,3,4	1		
1-4			ANTENNA BAG CCC-C-419			1.2,3,4	1		
1-5		5985-00-926-0227	ANTENNA COUNTERPOISE MX-44 87/GR						
1-5		5975-00-284-6089	ASSEMBLY, GROUND ROD SM-B-132347			1,2,3,4	1		
1-5		8105-00-918-0648	BAG, CANVAS, STORAGE			1,2,3,4	1		
1-5		5825-00-030-2964	BASE, ANTENNA SUPPORT MT-86 5/GR (80058)			1,2,3,4	1		
1-5		5825-00-049-7686	CLAMP, COUNTERPOISE SM-P-132344	(80058)	1.2,3,4	9			
1-5		5985-00-926-0227	COUNTERPOISE			1,2,3,4	1		
1-6			GUY SET OA-7908 CONSISTING OF	(80058)		1,2,3,4	1		
1-6			BAG, COTTON DUCK SM-C-535765	(80058)		1,2.3,4	1		
1-6		5995-00-537-5568	BASE GROUND STRAP ASSEMBLY SM-C-131904	(80058)		1,2,3,4	2		
1-6		5975-00-761-3230	GUY WIRE MX-7219	(80058)		1,2,3,4	3		
1-6		5825-00-569-0354	PIN, LOCATING SM-B-131824	(80058)	1,2,3,4	2			
1-6		5975-00-999-1923	SNUBBER ASSEMBLY	(80063)		1,2,3,4	1		
1-6		4030-00-187-5261	STAKE GP-2			1,2,3,4	5		
1-6			STAKE, GUY GP-I1I/G			1,2,3,4	4		
		5975-00-246-4346	CABINET, ELECTRICAL EQUIPMENT CY-6641/TRO-23A	(80058)		1,2	1		
		5975-00-246-4347	CABINET, ELECTRICAL EOUIPMENT CY-6690/TRD-23A	(80058)		1,2	1		
		5975-00-246-4344	CABINET, ELECTRICAL EQUIPMENT			1,2	1		
		5975-00-782-6950	CABINET, ELECTRICAL EQUIPMENT			3,4	2		
		6150-00-905-7555	CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11180/U (5 FT)	(80058)		1,2,3,4	2		
		6150-00-905-8137	CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11180/U (5 FT 6 IN)	(80058)		1,2	3		
		6150-00-905-8137	CABLE ASSEMBLY, POWER ELEC-TRICAL CY-11180/U (5 FT 6 IN)	(80058)		3,4	1		

SECTION II. INTEGRAL COMPONENTS OF END ITEM

(1) ILLUSTRATION (A) FIG.	(1) ILLUSTRATION (B) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER FSCM	(4) LOCATION	(5) USUABLE ON CODE	(6) QTY REQD	(7) QUANTITY RCVD	(7) QUANTITY DATE
		5995-00-999-5359	CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11181/U (5FT) (80058)		3,4	1		
		6150-00-905-7186	CABLE ASSEIBLY, POWER ELEC-TRICAL CX-11221/U (3 FT) (80058)		3.4	1		
			CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11221/U (6 FT) (80058)		1,2	1		
			CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11221/U (9 FT) (80058)		1,2	1		
		6150-00-905-6012	CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11222/U (3 FT 6 IN) (80058)		1,2,3,4	1		
		6150-00-905-6417	CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11223/U (3 FT) (80058)		1,2	2		
		6150-00-905-6417	CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11223/U (3 FT) (80058)		3,4	1		
			CABLE ASSEMBLY, POWEP ELEC-TRICAL CX-11224/U (3 FT) (80058)		1,2	1		
		6150-00-905-8136	CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11226/U (6FT) (80058)		1,2.3,4	3		
			CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11227/U (5FT 4 IN) (80058)		3,4	1		
		6150-00-905-7552	CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11228/U (3 FT 4 IN) (80058)		3,4	1		
		5995-00-905-8293	CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11228/U (12 FT) (80058)		1,2	2		
		6150-00-905-7553	CABLE ASSEMBLX, POWER ELEC-TRICAL CX-11229/U (2 FT 4 IN) (80058)		1,2,3,4	1		
		6150-00-926-0810	CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11480/U (5 FT) (80058)		3,4	1		
			CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11480/U (9 FT) (80058)		1,2	1		
		6150-00-926-0809	CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11481/U (8 FT) (80058)		3,4	1		
			CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11481/U (28 FT) (80058)		1,2	2		
		5995-00-999-5359	CABLE ASSEMBLY POWER ELEC-TRICAL CX-11520/U (2 FT 4 IN) (80058)		3,4	1		
			CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11655/U (150 FT) (80058)		1,2	1		
		5995-00-179-2926	CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11684A/U (150 FT) (80058)		1,2	1		
		5995-00-926-8279	CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11701/U (4 FT) (80058)		1,2	1		
		5150-00-905-7191	CABLE ASSEMBLY, POWER ELEC-TRICAL CX-11224/U (2 FT 6 IN) (80058)		3,4	1		

SECTION II. INTEGRAL COMPONENTS OF END ITEM

(1) ILLUSTRATION (A) FIG.	(1) ILLUSTRATION (B) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER FSCM	(4) LOCATION	(5) USUABLE ON CODE	(6) QTY REQD	(7) QUANTITY RCVD	(7) QUANTITY DATE
		5995-00-228-8786	CABLE ASSEMBLY, POWER ELECTRICAL CX-11986/U (6 FT) (80058)		1,2	1		
		5995-00-179-2928	CABLE ASSEMBLY, POWER ELECTRICAL CX-11987/U (80058)		1,2	1		
		5995-00-179-2932	CABLE ASSEMBLY,POWER ELECTRICAL CA-11988/U (4 FT) (80058)		1,2	1		
		5995-00-179-2927	CABLE ASSEMBLY POWER ELECTRICAL CK-11989/U (3 FT) (80058)		1,2	1		
		5995-00-905-8292	CABLE ASSEMBLY, RADIO FREQUENCY CG-92G/U (75 FT) (80058)		3,4	25		
		5995-00-905-8291	CABLE ASSEMBLY, RADIO FREQUENCY CG-92G/U (10 FT) (80058)		3.4	25		
		5995-00-578-6353	CABLE ASSEMBLY, RADIO FREQUENCY CG-409G/U (8 IN) (80058)		1,2,3,4	2		
		5995-00-889-0751	CABLE ASSEMBLY, RADIO FREQUENCY CG-409G/U (3 FT) (80058)		3,4	1		
		5995-00-823-2885	CABLE ASSEMBLY, RADIO FREQUENCY CG-409G/U (4 FT 6 IN) (80058)		3,4	1		
		5995-00-905-6415	CABLE ASSEMBLY, RADIO FREQUENCY CG-409G/U (5 FT) (80058)		3,4	1		
			CG-409G/U (5 FT 6 IN) (80058)		3,4	1		
		5995-00-905-6413	CABLE ASSEMBLY, RADIO FREQUENCY					
		5995-00-905-7194	CABLE ASSEMBLY, RADIO FREQUENCY CG-409G/U (6 FT) (80058)		3,4	4		
		5995-00-905-6416	CABLE ASSEMBLY, RADIO FREQUENCY CG-409G/U (6 FT 6 IN) (80058		3.4	1		
		5995-00-490-1034	CABLE ASSEMBLY, RAOIO FREQUENCY CG-409G/U (9 FT) (80058)		1,2	1		
		5995-00-490-1028	CABLE ASSEMBLY, RADIO FREQUENCY CG-409G/U (10 FT) (80058)		1,2	1		
		5995-00-985-8402	CABLE ASSEMBLY, RADIO FREQUENCY CG-409G/U (12 FT) (80058)		1,2,3,4	4		
			CABLE ASSEMBLY, RADIO FREQUENCY CG-409G/U (28 FT) (80058)		1,2	1		
		5995-00-905-7185	CABLE ASSEMBLY, RADIO FREQUENCY CG-833A/U (4 FT 6 IN) (80058)		3,4	1		
		5995-00-905-7184	CABLE ASSEMBLY, RADIO FREQUENCY CG-833A/U (5 FT) (80058)		3,4	1		
		5995-00-912-7076	CABLE ASSEMBLY, RADIO FREQUENCY CG-833A/U (7 FT) (80058)		1,2	3		
		5995-00-912-7076	CABLE ASSEMBLY, RADIO FREQUENCY CG-833A/U (7 FT) (80058)		3,4	1		
		5995-00-905-7183	CABLE ASSEMBLY, RADIO FREQUENCY		3,4	1		
			CABLE ASSEMBLY, RADIO FREQUENCY CG-833A/U (10 FT)		1,2	1		
			CG-833/U (28 FT) (80058)					
			CG-10318/U (2 FT) (80058)		1,2	1		
			CABLE ASSEMBLY, RADIO FREQUENCY CG-10318/U (4 FT 6 IN) (80058)		1,2	1		
			CABLE ASSEMBLY, RADIO FREQUENCY					
			CABLE ASSEMBLY, RADIO FREQUENCY CG-1D031/U (6 FT 6 IN) (80058)		1,2	1		
			CABLE ASSEMBLY, RADIO FREQUENCY CG-1031E/U (21 FT) (80058)		1,2	1		

SECTION II. INTEGRAL COMPONENTS OF END ITEM

(1) ILLUSTRATION (A) FIG.	(B) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER	FSCM	(4) LOCATION	(5) USUABLE ON CODE	(6) QTY REQD	(7) QUANTITY RCVD	DATE
		5995-00-823-3D65	CABLE ASSEMBLY, RADIO FREQUENCY			1.2,3.4	1		
			CG-1031B/U (28 FT)	(80058)		1,2	1		
		5995-00-926-8317	CABLE ASSEMBLY, RADIO FREQUENCY						
			CG-1079B/U (2 FT)	(80058)					
		5995-00-905-9489	CABLE ASSEMRLY,. RADIO FREQUENCY			3,4	1		
			CG-1079B/U (2 FT 6 I)	(8DO58)					
		5995-00-505-9468	CABLE ASSEMBLY, RADIO FREQUENCY			3.4	1		
			CG-1079B/U (5 FT 6 IN)	(80058)					
		5995-00-905-9487	CABLE ASSEMBLY, RADIO FREQUENCY			3.4	4		
			CG-10798/U (6 FT)	(8005B)					
		5995-00-912-1879	CABLE ASSEMBLY, RADIO FREQUENCY			1,2,3,4	1		
			CG-10798/U (9 FT)	(80058)					
		5995-00-9D3-7730	CABLE ASSEM8LY, RADIO FREQUENCY			1.2,3,4	1		
			CABLE ASSEMBLY, RADIO FREQUENCY			1,2	1		
			CG-1O79B/U (12 FT)	(80058)					
			CG-1079B/U (28 FT)	(800O58)					
		5995-00-905-8293	CABLE ASSEMBLY, RADIO FREQUENCY			1,2,3,4	25		
			CG-3177/U (2 FT)	(80058)					
		5995-00-911-3688	CABLE ASSEMBLY, RADIO FREQUENCY			3,4	1		
			CG3178/TR-15 (4 FT)	(8Q058)					
		5995-00-985-8357	CABLE ASSEMBLY, RADIO FREQUENCY			1,2,3,4	2		
			CG-3211/U (1 FT)	(80058)					
			CG-3312/U (6 FT)	(80058)		1,2	1		
			CONSOLE, DIRECTION FINDER SET OJ-155/TRD-15			3.4	1		
			CABLE ASSEMBLY, RADIO FREQUENCY						
			CONSOLE, DIRECTION FINDER SET QJ-156/TRD-1SA			3,4	1		
			CONSOLE, DIRECTION FINDER SET			1,2	1		
			CONSOLE, DIRECTION FINDER SET OJ-157/TR-23A	(80058)		1,2	1		
			CONSOLE, DIRECTION FINDER SET OJ-159/TRQ-23A	(80058)		1,2	1		
		5995-00-164-7716	CORD ASSEMBLY CD-307A (6 FT 6 IN)			1,2,3,4	1		
			CORD, TELEGRAPH			1,2,3,4	3		
1-7 3-1		5985-00-933-2455	COUPLER, ANTENA CU-L1874/TRD-23A	(80058)		1,2	1		
		5825-00-914-8972	DETECTOR, RADIO FREQUENCY RF-159/TRD	(80058)		1,3	2		
1-11		5825-00-135-9093	DETECTOR, RADIO FREQUENCY			2,4	2		
			DISTRIBLUTION BOX, AUDIO		1	3			
			RF-159A/TRD	(80058)					
			J-2674/TRD	(80058)					
		6110-00-999-9757	DISTRIBUTICN BOX, POWER		1,2	5			
			J-2625/TRD	(805S8)					
			J-2679/TRO	(80058)					
1-16		6110-00-135-9100	DISTRIBLTION BOX, AUDIO			2	2		
		6110-00-135-9099	DISTRIBUTION BOX, AUDIO			2	1		
3-9			J-2871/TRD-23A	(80058					
		5825-01-144-6000	DRIVE, GONIOMETER TG-126/TRD-15	(80058)		1,3	1		
		5825-01-135-6986	DRIVE, GONIOMETER-ROTARY COUPLER						
			TG-128A/TRD-25	(80058)		2,4	1		

SECTION II INTEGRAL COMPONENTS OF END ITEM

(1) ILLUSTRATION (A) FIG.	(B) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER	FSCM	(4) LOCATION	(5) USUABLE ON CODE	(6) QTY REQD	(7) QUANTITY RCVD	DATE
1-31		5999-00-999-7876	HOOD ADAPTER. VIEWING						
			SM-C-535960	(80063)					
1-31		5825-00-922-8119	HOOD, VIEWING			1,2,3,4	1		
			SM-C-536010	(80063)					
1-13		5820-00-918-6992	INDICATOR. AZIMUTH	(80058)		1,2	2		
3-5			IP-669/TRD-15						
3-11									
1-13		5825-00-918-6992	INDICATOR. AZIMUTH	(80058)		3,4	2		
3-5			IP-669/TRD-15						
3-11									
		5965-00-191-9283	LOUDSPEAKER ASSEMBLY			1,2	1		
			LS-585/TRD-23A	(80058)					
1-15		6625-00-246-4472	OSCILLOSCOPE			2,4	1		
3-8			AN/USM-318-V1						
1-15		6625-00-061-1874	OSCILLOSCOPE			1,3	2		
3-7			HP-1208/AR	(80058)					
		5825-00-923-2467	PANEL, ASSEMBLY AC PRIMARY			1,2,3,4	1		
		5825-00-926-0225	PANEL, PATCHING. COMM			1,2,3,4	1		
			SM-B-536034						
1-14		6110-00-914-8793	PANEL, POWER DISTRIBUTION		1,2,3,4	1			
			SB-1747/TRD-15	(80058)					
		5825-00-940-8120	PANEL, PATCH ASSEMBLY			1,2	1		
			SM-B-536038	(80063)					
		5985-00-922-7705	PANEL, ASSEMBLY, ANTENNA INPUT			1,2,3,4	1		
			SM-B-536040						
			POWER CABLES, AIR CONDITIONER			1,2	1		
1-12		5825-00-914-8831	POWER SUPPLY			1,2	2		
3-4			PP-4482/TRD	(80058)					
1-12		5825-00-914-8831	POWER SUPPLY			3,4	3		
3-4			PP-4482/TRD	(80058)					
1-10		5820-00-926-0180	RADIO, RECEIVER			1,2	8		
3-3			R-725/URR						
1-10		5820-00--926-0180	RADIO, RECEIVER			3,4	4		
3-3			A-725/URR						
			SHELTER						
			S-280(*)/G	(80058)					
			CONSISTING OF:						
1-19A		1120-00-592-4645	AIR CONDITIONER			1,2,3,4	2		
			HAC-750-H	(97450)					
1-18		9920-00-490-5716	ASHTRAY			1,2,3,4	3		
			SM-C-656941	(80063)					
1-17		7520-00-281-5911	BASKET, WASTEPAP ER			1,2,3,4	1		
			SM-D-6569002	(80063)					
1-18		BLACKBOARD				1,2,3,4	1		
			BOARD, BULLETIN			1,2,3,4	1		
			SM-C-656787	(80063)					
			CHAIR						
			GSA-FS-TYPE-FEZC-LIST-YLEAGFP			1,2,3,4	3		
1-19B		6645-00-451-8262	CLOCK			1,2,3,4	1		
			CC-C20634	(11755)					
1-19B			CURTAIN, BLACKOUT			1,2,3,4	1		
			SM-D-657198-1,2,3	(80063)					
			FAN EXHAUST			1,2,3,4	1		
			SM-D-656874	(80063)					

SECTION II INTEGRAL COMPONENTS OF END ITEM

(1) ILLUSTRATION (A) FIG.	(1) ILLUSTRATION (B) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER	(3) DESCRIPTION FSCM	(4) LOCATION	(5) USUABLE ON CODE	(6) QTY REQD	(7) QUANTITY RCVD	(7) QUANTITY DATE
		5965-00-243-9496	HEADSET, ELECTRICAL SM-C-657261	(80063)		1,2,3,4	3		
		5965-00-504-6370	HEADSET H-113/U	(81349)		1,2,3,4	2		
1-17			HEATER, SPACE UH-48-TYPE-1	(92878)		1,2,3,4	1		
1-19B			HOSE ASSEMBLY, FUEL SM-C-657205	(80063)		1,2,3,4	1		
		5805-00-162-6297	KEY, TELEGRAPH SM-B-656998	(80063)		1,2,3,4	1		
			SAFE SPEC-AA-F35-13			1,2,3,4	1		
1-18		5805-00-543-0012	SET, TELEPHONE TA-312/PT	(81349)		1,2,3,4	1		
			STRAP, GROUND			1,2	2		
1-20		5820-00-503-3418	TRANSMITTER, RADIO T-279A/UR			1,2	1		
		5825-00-503-3418	TRANSMITTER, RADIO T-279/UR			3,4	1		

SECTION III BASIC ISSUE ITEMS

(1) ILLUSTRATION (A) FIG.	(1) ILLUSTRATION (B) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER	(3) FSCM	(4) LOCATION	(5) USUABLE ON CODE	(6) QTY REQD	(7) QUANTITY RCVD	(7) QUANTITY DATE
			CABINET SPARE PARTS SM-D-657167						
			CONSISTING OF						
			CRYSTAL 72KCS			1,2,3,4	2		
			CRYSTAL 455KCS	(81349)		1,2,3,4	2		
			CRYSTAL 550KCS			1,2,3,4	2		
			CRYSTAL 555KCS			1,2,3,4	2		
			FUSE F02A250V1/8A			1,2,3,4	40		
			FUSE F02A250V1/8A			1,2,3,4	10		
			FUSE F02B250V1/4A			1,2,3,4	40		
			FUSE F02A250V3/8A			1,2,3,4	5		
		5920-00-229-1317	FUSE F02B250V3/8A	(81349)		1,2,3,4	3		
		5920-00-280-4960	FUSE F02A250V1/2A			1,2,3,4	5		
			FUSE F02B250V3/4A			1,2,3,4	5		
		5920-00-228-7882	FUSE CARTRIDGE F02B125V2A		1,2,3,4	5			
			FUSE F02A250Y2A			1,2,3,4	10		
			FUSE F02B2503A			1,2,3,4	40		
		5920-00-665-2881	FUSE F02A250V1A	(81349)		1,2,3,4	5		
		5920-00-557-5033	FUSE F03A250V8A	(81349)		1,2,3,4	3		
		5920-00-280-3181	FUSE F16B250V60A	(81349)		1,2,3,4	5		
			LAMP #47			1,2,3,4	6		
			LAMP #327			1,2,3,4	1		
			LAMP # 328			1,2,3,4	8		
		6240-00-892-4420	LAMP, GLOW NE-2D	(96906)		1,2,3,4	1		
		6240-00-179-1813	LAMP, GLOW NE-16			1,2,3,4	1		
		6240-00-179-1814	LAMP, GLOW NE-45			1,2,3,4	8		
			LAMP 40 WATTS, 120VAC		1,2,3,4				
			LAMP PR-9			1,2,3,4	1		
		5961-00-837-7262	TRANSISTOR 2N697	(81349)		1,2,3,4	6		
		5961-00-958-8169	TRANSISTOR 2N3055			1,2,3,4	1		
		5960-00-556-1444	TUBE, ELECTRON OA2W	(81349)		1,2,3,4	8		
			TUBE, ELECTRON IR2	(80740)		1,2,3,4	1		
		5960-00-188-8617	TUBE, ELECTRON 3A4	(81349)		1,2,3,4	1		
		5960-00-188-8627	TUBE, ELECTRON 3A5			1,2,3,4	1		
		5960-00-188-3551	TUBE, ELECTRON 6AK6			1,2,3,4	8		
		5960-00-985-8987	TUBE, ELECTRON 6DC6			1,2,3,4	8		
		5960-00-557-6780	TUBE, ELECTRON 6C4WA		1,2,3,4	8			
		5960-00-577-6186	TUBE, ELECTRON 6BU6			1,2,3,4	16		
		5960-00-188-3602	TUBE, ELECTRON 6BH6	(81349)		1,2,3,4	2		
		5960-00-284-5823	TUBE, ELECTRON 5R4WG3		1,2,3,4	4			
		5960-00-166-7674	TUBE, ELECTRON 16AS7G		1,2,3,4	4			
		5960-00-624-4718	TUBE, ELECTRON OB2WA		1,2,3,4	4			

SECTION III BASIC ISSUE ITEMS

(1) ILLUSTRATION (A) FIG.	(1) ILLUSTRATION (B) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER FSCM	(4) LOCATION	(5) USUABLE ON CODE	(6) QTY REQD	(7) QUANTITY RCVD	(7) QUANTITY DATE
		5960-00-262-0167	TUBE, ELECTRON 12AT7WA (81349)	1,2,3,4	2			
		5960-00-636-2218	TUBE, ELECTRON 6189/12AU7 (81349)	1,2,3.4	8			
		5960-00-827-8782	TUBE, ELECTRON 12AX7		1,2,3,4	2		
		5960-00-681-9802	TUBE. ELECTRON 6AU6		1,2,3,4	3		
		5960-00-669-6861	TUBE, ELECTRON 6005/6AQ5	1,2,3,4	2			
		5960-00-230-5240	TUBE, ELECTRON 5693		1,2,3,4	4		
		5960-00-262-0221	TUBE, ELECTRON 26Z5		1,2,3,4	8		
		5960-00-045-8639	TUBE, ELECTRON 5654/6AK5W	1,2,3,4	9			
		5960-00-264-2089	TUBE, ELECTRON 5749/6BA6	1,2,3,4	16			
		5960-00-262-0210	TUBE, ELECTRON 5814A		1,2,3,4	16		
		5960-00-676-9016	TUBE, ELECTRON 6922		1,2,3,4	4		
		5960-00-264-3002	TUBE, ELECTRON 5750/6BE6	1,2,3,4	4			
		5960-00-636-2218	TUBE, ELECTRON 6189/12AU7	1,2,3,4	6			
			TUBE, ELECTRON ZZ1000/8228	1,2,3,4	1			
			TUBE, ELECTRON 7" CRT		1,2,3,4	1		
1-26		3895-00-491-0547	CABLE, REELING MACHINE RL-31-EGFP (81349)		1,2	1		
			CASE, ACCESSORIES DL-SM-A-656828		1,2	1		

SECTION III BASIC ISSUE ITEMS

(1) ILLUSTRATION (A) FIG.	(B) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER	FSCM	(4) LOCATION	(5) USUABLE ON CODE	(6) QTY REQD	(7) QUANTITY RCVD	DATE
			COMMUNICATIONS CONSOLE STORAGE DRAWERS CONSISTING OF:						
		5935-00-149-3952	ADAPTER, CONNECTOR UG-29/U	(80058)		1,2	25		
			BAR, SHORTING			1,2	1		
			BELT, DRIVE			1,2	1		
			CARDS, MARKER			1,2	4		
			COUPLERS, SHAFT			1,2	2		
			GONIOMETER GO-42/TDR			1,2	1		
			HOOKS, SNAP			1,2	2		
		5995-00-905-8293	CABLE ASSEMBLY, RADIO FREQUENCY CG-3177/U (2 FT)	(80058)		1,2	2		
			LEVEL, ROD	(80063)		1,2	1		
			PULLER, FUSE			1,2	1		
			SOLUTION, ANTISTATIC			1,2	2		
			TAPE, ADHESIVE			1,2	3		
			TAPE, COLORED	(80058)		1,2	4		
			TOOL, ALIGNMENT TECHNICAL MANUAL KIT, ACCESSORY AN/TRD-15			1,2	1		
6-4			ADAPTOR, CONNECTOR UG-29B/U	(80058)		3,4	25		
6-4			ADAPTOR, ELECTRON TUBE SOCKET			3,4			
6-4		8105-00-926-2038	BAG, COTTON DUCK			3,4	1		
6-4			HAMMER			3,4	1		
6-4			LEVEL, ROD SM-L-112623			3,4	1		
6-4			MARKERS, BRADY			3,4	3		
			TAPE, ADHESIVE			3,4	2		
6-4			SOLUTION, ANTISTATIC SM-B-656945			3,4	2		
6-4			TAPE, INSULATING			3,4	3		
6-4			TAPE, MEASURE			3,4	1		
1-22			KIT, ANTENNA POSITIONING		1,3	1			
1-23			MK-985/G						
1-21		5985-00-229-6655	KIT, ANTENNA POSITIONING MK-985A/G CONSISTING OF	(80058)	2,4	1			
1-21			CLAMP, SWIVEL	(80063)		2,4	9		
1-21		5985-00-617-9043	DISC, ANTENNA POSITIONING		2,4	1			
1-21		5210-00-294-4589	BOB PLUMB SM-B-657071	(80063)		2,4	1		
1-21			TAPE	150 FT (80063)		2,4	2		
1-21		4030-00-490-5127	STAKE, GROUND SL-B-61956	(80063)	2,4	1			
1-21		6675-00-160-1099	COMPASS, MAGNETIC SM-C-656819			2,4	1		

SECTION III BASIC ISSUE ITEMS

(1) ILLUSTRATION (A) FIG.	(B) ITEM	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER	FSCM	(4) LOCATION	(5) USUABLE ON CODE	(6) QTY REQD	(7) QUANTITY RCVD	DATE
1-24			KIT, PIONEER CONSISTING OF		1,2,3,4	1			
1-24			SLEDGE HAMMER			1,2,3,4	1		
1-24			MATTOCK			1,2,3,4	1		
1-24			SHOVEL			1,2,3,4	1		
1-18			SHELTER CONSISTING OF			1,2,3,4	1		
1-27		3895-00-491-0547	BAG, REEL MACHINE SM-D-656921			1,2,	1		
1-18			BOX, FIRST AID			1,2,3,4	1		
			BROOM SM-D-656900-1			1,2,3,4	1		
		7240-00-222-3088	CAN, GAS 5 GAL MIL-C-1283	(80063)		1,2,3,4	1		
			CLEANER, VACUUM	(81349)		1,2,3,4	1		
1-29			CUBES, ANTENNA BASE STORAGE			1,2,3,4	1		
			DROP LIGHT SM-C-656902	(80063)		1,2,3,4	1		
			ELBOW CATCH			1,2,3,4	1		
1-17		4210-00-708-0031	EXTINGUISHER, FIRE, IN MIL-E-52051	(81349)		1,2,3,4	1		
		6230-00-161-6422	FLASHLIGHT TL-122-0	(80063)		1,2,3,4	1		
1-19A			HOOKS, COAT SM-8656801	(80063)		1,2,3,4	3		
1-28			KIT, ANTENNA BASE STORAGE		1,2,3,4	1			
1-17			RACK, RIFLE			1,2,3,4	1		
			STORAGE BOX SM-C-656970		1,2,3,4	1			
1-19B		5825-00-392-6549	TRIPOD SM-C-112615			1,2,3,4	1		

APPENDIX C
ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

C-1. Scope
This appendix lists additional Items you are authorized for the support of the AN/TRD-23(*), AN/TRD-15(*).

C-2. General
This list identifies items that do not have to accompany the AN/TRD-23(*), AN/TRD-15(*) and that do not have to be turned In with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

C-3. Explanation of Listing
National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The Items are listed in alphabetical sequence by item name under the type document (i e, CTA, MTOE, TDA, or JTA) which authorizes the item(s) to you If the Item you require differs between serial numbers of the same model, effective serial numbers are shown in the last line of the description If item required differs for different models of this equipment, the model is shown under the "Usable on" heading in the description column. These codes are identified as:

Code	*Used on*
1	AN/TRD-23
2	AN/TRD-23A
3	AN/TRD-15
4	AN/TRD-15A

(Next printed page is C-2)

SECTION II. ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION PART NUMBER AND FSCM USABLE ON CODE	(3) UNIT OF MEAS	(4) QTY AUTH
6135-00-164-8779 1	BATTERY BA-404/U	1,2,3,4	
6135-00-164-8762 1	BATTERY BA-242/U	1,2,3,4	
6115-00-635-5614	GENERATOR SET, GASOLINE ENGINE, TRAILER MOUNTED 80058 PU-294/G	1,2,3,4	

INDEX

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:

VERNE L, BOWERS
Major General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-51, (qty rqr block no. 505) Operator maintenance requirements for AN/TRD-15.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1993 0 - 342-421 (61986)

This page only for NON-SOFTWARE-related TM errors/improvements.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN...JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT. FOLD IT AND DROP IT IN THE MAIL.

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE

TEAR ALONG PERFORATED LINE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

PIN: 028162-000