TB 11-5820-1148-10

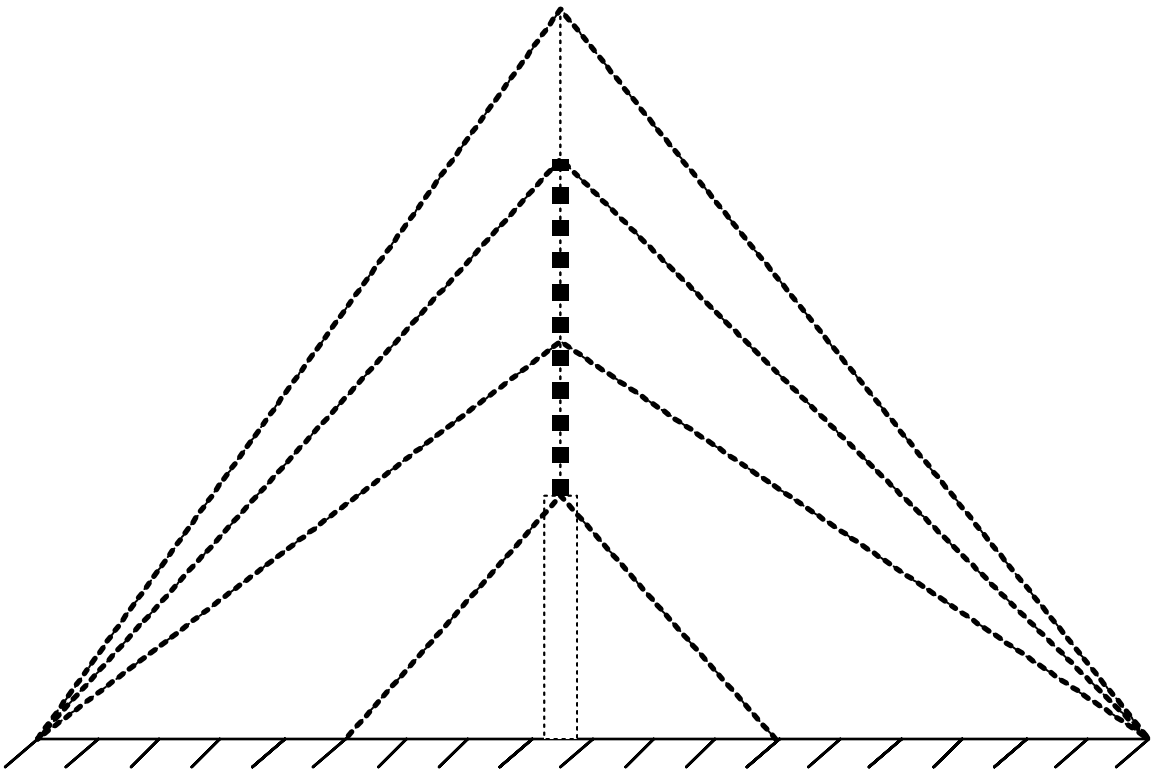
TECHNICAL BULLETIN

OPERATOR'S

ANTENNA ERECTION AND RECOVERY REFERENCE GUIDE

FOR

HF ANTENNA SYSTEM NSN: 5985-01-455-9286



HEADQUARTERS, DEPARTMENT OF THE ARMY

30 DECEMBER 2005

WARNING SUMMARY

SITE SAFETY PRECAUTIONS: HF Radio sites are potentially dangerous areas. A number of hazards exist during the deployment, operation, and tear down of tactical antenna systems, and it is important that a safety program be implemented in accordance with MIL-STD 882 and the safety section of MIL-STD-1472. The following hazards are particularly associated with HF antennas, including the FANLITE Antenna

Electrical Shock: Make certain that the deployment site is free of overhead wires, which must be considered dangerous electrical shock hazards. Ensure that no overhead wire is closer than 100 feet from the mast.

RF Burns: Contact with the transmitting antenna can cause painful injury from RF burns. Ensure that all power is OFF or isolated before deployment, tear down, or during maintenance operations.

Collision: The mast, guy ropes, and antenna element wires are deliberately toned down to make them difficult to see. There is a very real collision risk from personnel, vehicles, and low flying aircraft. When the tactical situation permits, ensure guy ropes and antenna elements are clearly marked to prevent personnel injuries and equipment damage; also ensure that the selected deployment site is well clear of helicopter landing zones.

Radiation Hazards: At only one kilowatt, the radiation from the antenna is not considered to be of sufficient intensity that a hazard to personnel is likely. However, a potential hazard exists to nearby ordinance and fuel. Generally, a transmit antenna should not be deployed within 700 feet of explosive devices or within 170 feet of a fuel handling site.

Construction Hazards: Antenna erection requires two persons to safely perform this task. To reduce the possibility of injury, mast and antenna deployment should normally be conducted in daylight and during dry, windless weather (UNDER 25 MPH, 40 KPH). The construction team leader must emphasize the increased risks when conditions are less than ideal. Antenna setup and tear down should not be attempted during thunderstorms due to lightning risk. All team members should wear hard hats/Kevlar/gloves and goggles during mast and antenna deployment and tear down. Eye protection. Safety glasses, goggles, OSHA approved eye wear. Keep all unnecessary personnel away from the area while deploying or retracting the mast. Avoid placing hands between sliding clamp assemblies or joints while raising and lowering the mast. Failure to observe all warning may result in severe injury or DEATH.

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED DATA.

LIST OF EFFECTIVE PAGES

NOTE: The portion of text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages / work packages are:

Original.....0 .....30 DEC 2005

Page No.	Change No.
Cover	0
a	0
b blank	0
A	0
B blank	0
i - ii	0
1-1 thru 1-32	0

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 30 December 2005

TECHNICAL BULLETIN

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ANTENNA ERECTION AND RECOVERY REFERENCE GUIDE

FOR

ANTENNA SYSTEM NSN: 5985-01-455-9286

REPORTING ERROR AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. We'd prefer that you submit your recommended changes electronically, either by e-mail (AMSEL-LC-LEO-PUBS-CHG@mail1.monmouth.army.mil) or online (http://edm.monmouth.army.mil/pubs/2028.html).

Alternatively, you may mail or fax your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 located in back of this manual to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LEO-E-ED, Fort Monmouth, NJ 07703-5006. The fax number is 732-532-3421, DSN 992-3421.

Reports of errors or recommendations may also be sent to CDR, CECOM, AMSEL-LC-CCS-G-GN, Bldg 1200W, Nealis Ave, Fort Monmouth, NJ 07703, or you may contact Mr. Greg Youll, DSN 992-4748, Comm. 732-532-4748, donald.youll@us.army.mil.

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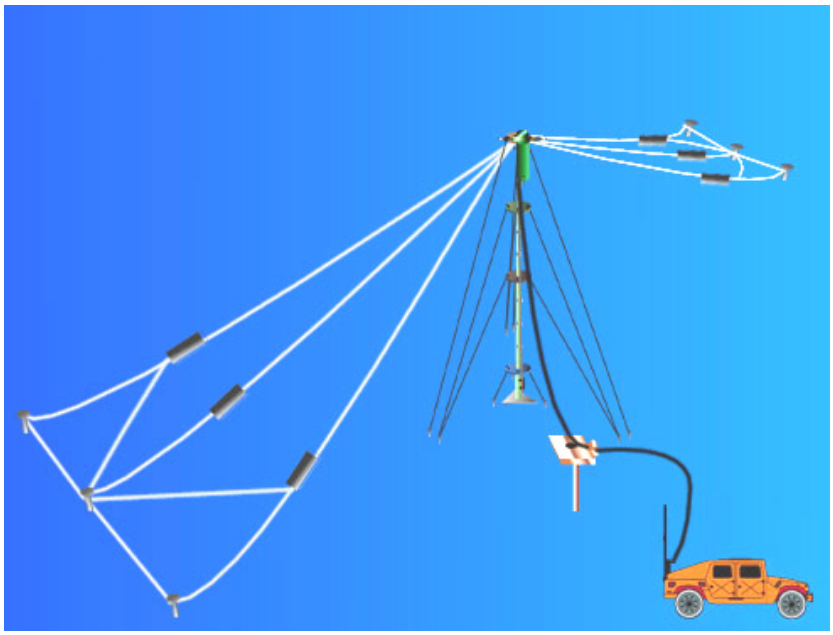
1 SCOPE

This is a reference guide for the erection and recovery of the HF antenna system NSN: 5985-01-455-9286. It may be used in lieu of contractors Technical Manual TM-1099, TM-H2270/2 and EL1142A which came with the antenna system.



2 SELECT SITE FOR ANTENNA

2.1 PLANNING THE ANTENNA ERECTION

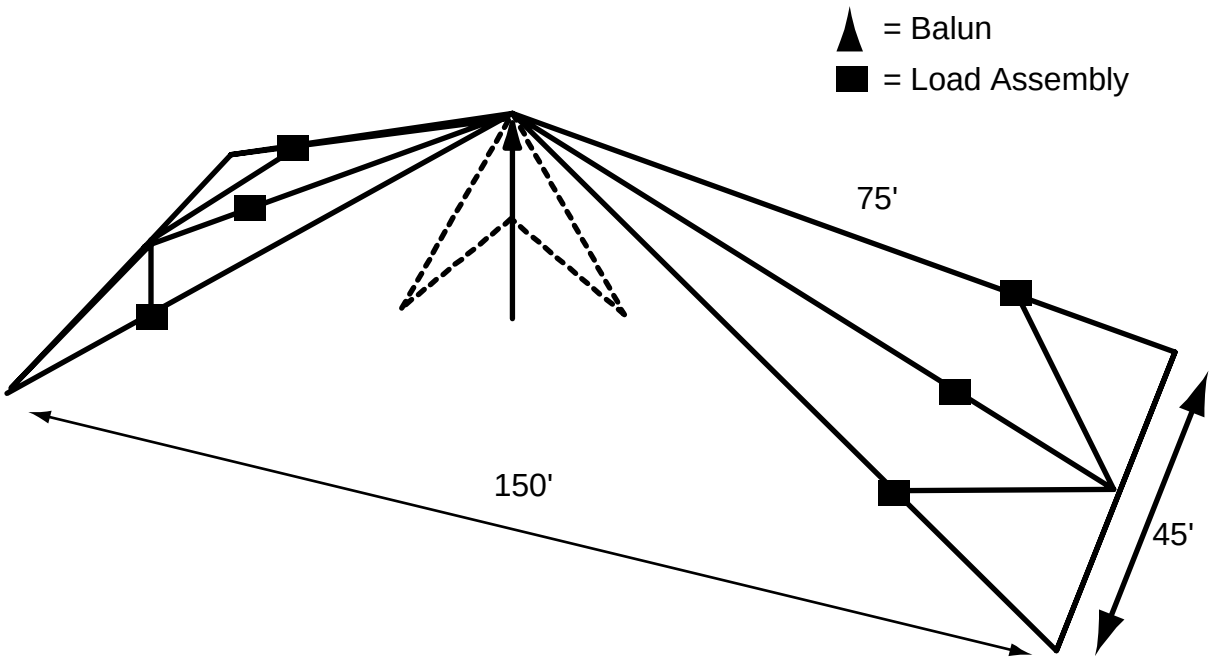
Consideration must be given to the impact that terrain has, i.e. vegetation, obstacles, and other circumstances, may have on the antenna deployment. Divide the tasks necessary to complete the job as evenly as possible between personnel available. A crew of two is the minimum number of persons required to perform this task safely. To avoid unnecessary lengthy trips to the far ends of the deployed antenna, plan ahead so that you arrive there with all the equipment and supplies you need to terminate and tension the element wires. Decide on the location for the antenna mast. Ensure you have sufficient coaxial cable to reach the mast base from the radio.

NOTE

The antenna and radio is designed to operate with the provided coaxial cables. The total run of cable should not exceed 150 feet from the balun to the radio.

2.2 ALIGNMENT OF ANTENNAS

The broadband Fan Configuration is omni directional up to about 750-1,000 miles. However, better low angle performance for greater ranges will be obtained when the distant station is about 90 degrees off the long axis of the antenna i.e.; more or less in line with the outside elements of the antenna.



Space and clearance requirements:

- MAST: 50 feet vertical and 72 foot diameter circle.
- Antenna: 150 feet X 45 feet
- Personnel Clearance: 10 feet all sides Overall
- Antenna Size: 170 X 65 feet
- Distance to unshielded munitions when used with AN/VRC-100(V)1: 312 feet
- POL: 150 feet

3 LAY OUT COMPONENTS AND INVENTORY

3.1 MAST

ITEM	NAME	P/N	QTY
1	MAST CTM15	33117	1 EA

3.2 ANTENNA INVENTORY AND IDENTIFICATION OF PARTS

1	BAG, MAST STORAGE	A424	1
2	GROUND STAKE, 15" STEEL	32223	9
3	15 M HALYARD	31340	1
4	WEAK LINK	3/33784	1
5	LIGHTNING PROTECTION ASSY	JH10	1
6	UPPER GROUND ROD	JH11	1
7	LOWER GROUND ROD	JH12	1
8	GROUND ROD COUPLER	JH13	1
9	GROUND ROD DRIVING CAP	JH14	1
10	WEATHER PROOF SEALANT	WK-1	1
11	GUY REEL ASSY (120)/REEL & GUY ROPES	33194	1
12	GROUND SPIKE, TRIANGULAR	34385	1
13	HAMMER, 3 LB	Q76	1
14	BOX END WRENCH	BP162	1
15	CSA CARRYMAST CTM15 MANUAL	TM-H2270	1
16	LIGHTNING PROTECTION MANUAL	EL1142	1
17	CARRY MAST FIELD MANUAL	TM-1099	1
18	BAG, LFH STORAGE	DG33778	1
19	CABLE, COAXIAL 50 FOOT	SL30082-50	1
20	CABLE, COAXIAL 100 FOOT	SL30083-100	1
21	INNER TENSIONER	SL33776	2
22	LOAD ASSEMBLY	SL33812	EA
23	BALUN	SL31992S H1	1
24	GROUND PEG, 12"	DG33779	4
25	REEL ASSY/ANTENNA LFH	SL33775S	2
26	ILLUSRATED PARTS LIST (MANUAL)	EL1142A	1
27	OPERATION AND MAINT MANUAL	TM-1099	1

3.3 PARTS LIST ANTENNA SYSTEM P/N CTM15/LFH230KIT

3.3.1 Parts List Accessory Kit

SMR	Group - Item						Part Number	Qty	NSN
PAOFF	0000	Antenna System					CTM15/LFH230KIT	1	5985-01-455-9286
PAOFF		0100	Accessory Kit & Mast				CTM15S	1	
PAOFF			0101	Accessory Kit			SL33406	1	
PAOZZ				010101	Bag, Storage		A424	1	5985-01-371-5891
PAOZZ				010102	Ground Spike Triangular		34385	1	4030-01-412-8739
PAOZZ				010103	Ground Stake, 15 inch Steel		32223	9	4030-01-371-9460
PAOZZ				010107	HAMMER 20oz		33009	1	
PAOZZ				010108	BOX WRENCH 10mm		BP162	1	
PAOZZ				010109	PIN, STRIGHT, HEADLESS		32211	1	5315-01-469-5908
PAOZZ				010110	CSA CARRYMAST CTM15 TM		TM-H2270/2	1	
PAOZZ				010111	CARRYMAST (Field Instructions) TM		EI-1128-A	1	
PAOFF				010112	Guy Reel Assembly		33194	1	
PAOZZ					01011201	Reel	SL33150	1	5985-01-371-5739
PAOZZ					01011202	Guy Rope #4 Brown-top	33198SH4	3	4010-01-371-9567
PAOZZ					01011203	Guy Rope #3 Green-mid 1	33198SH3	3	4010-01-371-9568
PAOZZ					01011204	Guy Rope #2 Black-mid 2	33198SH2	3	4010-01-372-4418
PAOZZ					01011205	Guy Rope #1 Blue-bottom	33198SH1	3	4010-01-371-9569

3.3.2 Parts List Mast

SMR	GROUP					Part Number	Qty	NSN
PAOFF	0102	Mast Assembly CTM 15				33117	1	
PAOFF		010201	Mast Outer Casing Assembly			33192SH1	1	5985-01-371-6867
PAOZZ			01020101	Tube Assembly, Mast Bottom		33157SH1	1	
PAOZZ			01020102	Base Plate		F178	1	
PAOZZ			01020103	Screw		BH74N/M6X16Pan HD	2	
PAOFF			01020104	Handle Assembly		33190D1	1	5340-01-384-3480
PAOZZ				0102010401	Handle	30734	1	5340-01-367-0329
PAOZZ				0102010402	Compass	32998	1	6605-01-383-2149
PAOZZ				0102010403	Compass Holder	32748	1	6605-01-367-6506
PAOZZ				0102010404	Level	30264	1	5985-01-377-9150
PAOZZ				0102010405	Level Holder	30738	1	5340-01-366-0439
PAOZZ				0102010406	Clamp Spindle	33405	1	
PAOZZ				0102010407	Strap Handle	32655	1	5340-01-367-0330
PAOZZ				0102010408	Screw	BH167C	2	5305-01-393-8533
PAOZZ		010202	Guy Ring (Brown)			33103D1	1	4030-01-371-9565
PAOZZ		010202	Guy Ring (Green)			33103D2	1	4030-01-372-4411
PAOZZ		010203	Guy Ring (Black)			33103D3	1	4030-01-372-4412
PAOZZ		010204	Guy Ring (Blue)			33103D4	1	4030-01-372-4413
PAOZZ		010205	Mast Tube 10th, O.D. 55.5mm			AC100G	1	5985-01-414-0042
PAOZZ		010206	Mast Tube 9th, O.D. 60.5mm			AC99G	1	5985-01371-6871
PAOZZ		010207	Mast Tube 8th, O.D. 65.5mm			AC98G	1	5985-01-371-6870
PAOZZ		010208	Mast Tube 7th, O.D. 70.5mm			AC97G	1	5985-01-371-9118
PAOZZ		010209	Mast Tube 6th, O.D. 75.5mm			AC96G	1	5985-01-371-9117
PAOZZ		010210	Mast Tube 5th, O.D. 80.5mm			AC95G	1	5985-01-371-6869

SMR	GROUP			Part Number	Qty	NSN
PAOZZ		010211	Mast Tube 4th, O.D. 85.5mm	AC94G	1	5985-01-371-6868
PAOZZ		010212	Mast Tube 3rd, O.D. 90.5mm	AC93G	1	5985-01-367-4631
PAOZZ		010213	Mast Tube 2nd, O.D. 95.5mm	AC92G	1	5985-01-376-4630
PAOZZ		010214	Tube, Assembly, Mast-top/insert	33156	1	5985-01-384-9643
PAOZZ		010215	Circlip	A189N	1	5325-01-371-8267
PAOFF		010216	Clamp Assembly #10 (top), O.D. 55.5mm	33109-10	1	5340-01-372-6840
PAOZZ			01021601 Adjuster Nut	32710	1	5310-01-365-6099
PAOZZ			01021602 Nut Hex Self Lock	BJ73	1	5310-01-379-0024
PAOFF		010217	Clamp Assembly # 9, O.D. 60.5mm	33109-9	1	5340-01-372-6841
PAOZZ			01021701 Adjuster Nut	32710	1	5310-01-365-6099
PAOZZ			01021702 Nut Hex Self Lock	BJ73	1	5310-01-379-0024
PAOFF		010218	Clamp Assembly # 8, O.D. 65.5mm	33109-8	1	5340-01-375-4947
PAOZZ			01021801 Adjuster Nut	32710	1	5310-01-365-6099
PAOZZ			01021802 Nut Hex Self Lock	BJ73	1	5310-01-379-0024
PAOFF		010219	Clamp Assembly # 7, O.D. 70.5mm	33109-7	1	5340-01-372-8132
PAOZZ			01021901 Adjuster Nut	32710	1	5310-01-365-6099
PAOZZ			01021902 Nut Hex Self Lock	BJ73	1	5310-01-379-0024
PAOFF		010220	Clamp Assembly # 6, O.D. 75.5mm	33109-6	1	5340-01-372-8133
PAOZZ			01022001 Adjuster Nut	32710	1	5310-01-365-6099
PAOZZ			01022002 Nut Hex Self Lock	BJ73	1	5310-01-379-0024
PAOFF		010221	Clamp Assembly # 5, O.D.80.5mm	33109-5	1	5340-01-372-6842
PAOZZ			01022101 Adjuster Nut	32710	1	5310-01-365-6099
PAOZZ			01022102 Nut Hex Self Lock	BJ73	1	5310-01-379-0024
PAOFF		010222	Clamp Assembly # 4, O.D. 85.5mm	33109-4	1	5340-01-372-6843
PAOZZ			01022201 Adjuster Nut	32710	1	5310-01-365-6099
PAOZZ			01022202 Nut Hex Self Lock	BJ73	1	5310-01-379-0024
PAOFF		010223	Clamp Assembly # 3, O.D. 90.5mm	33109-3	1	5340-01-372-3771
PAOZZ			01022301 Adjuster Nut	32710	1	5310-01-365-6099
PAOZZ			01022302 Nut Hex Self Lock	BJ73	1	5310-01-379-0024
PAOFF		010224	Clamp Assembly # 2, O.D. 95.5mm	33109-2	1	5340-01-372-3090
PAOZZ			01022401 Adjuster Nut	32710	1	5310-01-365-6099
PAOZZ			01022402 Nut Hex Self Lock	BJ73	1	5310-01-379-0024
PAOFF		010225	Clamp Assembly #1, O.D. 100.5mm	33109-1	1	5340-01-372-3772
PAOZZ			01022501 Adjuster Nut	32710	1	5310-01-365-6099
PAOZZ			01022502 Nut Hex Self Lock	BJ73	1	5310-01-379-0024

3.3.3 Parts List Antenna

SMR	GROUP ITEM							Part Number	Qty	NSN
PAOFF	0200	Antenna (Fan Lite Dipole), 2.0 - 30.0 MHz						LFH230K	1	
PAOFF		0201	Reel Assembly, Element Wires					SL33775SH2	2	5985-01-371-5745
PAOZZ			020101	Reel				SL33150	2	5985-01-347-2835
PAOZZ			020102	Wire Assembly, Short (Inner Aerial Wire)				SL33774SH2	1	5985-01-371-5739
PAOZZ			'020103	Wire Assembly, Long (Outer Aerial Wire)				SL33771SH2	2	5985-01-371-5747
PAOZZ		0202	Inner Tensioner					SL3776	1	4030-01-372-4417
PAOZZ		0203	Balun					SL31992SH1	1	
PAOZZ		0204	Load Assembly					SL33812	6	5985-01-371-5744
PAOZZ		0205	Ground Peg					DG33779	4	4030-01-371-9461
PAOZZ		0206	Pouch					A450	1	5985-01-371-5889
PAOZZ		0207	Transit Bag					33778	1	5985-01-371-5890
PAOFF		0208	Coax, 50ft					SL30082	1	5995-01-377-6667
PAOZZ			020801	Cable, 50ft				RG-213/U	1	6145-00-660-8711
PAOZZ			020802	"N" Connector				UG-21DU	2	5935-01-539-0848
PAOFF		0209	Coax, 100ft.					SL30082-100	1	
PAOZZ			020901	Cable, 100ft				RG-213/U	1	6145-00-660-8711
PAOZZ			020902	"N" Connector				UG-21DU	2	5935-01-539-0848
PAOZZ		0210	Operation & Maintenance TM					TM1099	1	7610-10-372-1298
PAOZZ		0211	Illustrated Part List TM					EI 1142-A	1	

3.3.4 Parts List Lightning Protection Kit

SMR	GROUP ITEM			Part Number	Qty	NSN
PAOFF	0300	Lightning Protection Kit		LPK	1	
PAOZZ	0301	Lightning Protection Assembly		JH10	1	
PAOZZ	0302	Upper Grounding Rod		JH11	1	
PAOZZ	0303	Lower Grounding Rod		JH12	1	
PAOZZ	0304	Grounding Rod Connector		JH13	1	
PAOZZ	0305	Grounding Rod Driving Cap		JH14	1	
PAOZZ	0306	WEATHER Proof Sealant		WK-1	1	
PAOZZ	0307	Lightning Protection Kit (manual)		LPK1, 1KW	1	
PAOZZ	0400	15 m Halyard		31340	1	
PAOZZ	0500	Weak Link		33784	1	
AAL		Heavy duty Mast transit Bag		33424	1	
AAL		Antenna Wire 500 FT		E114	1	

4 MAST ERECTION

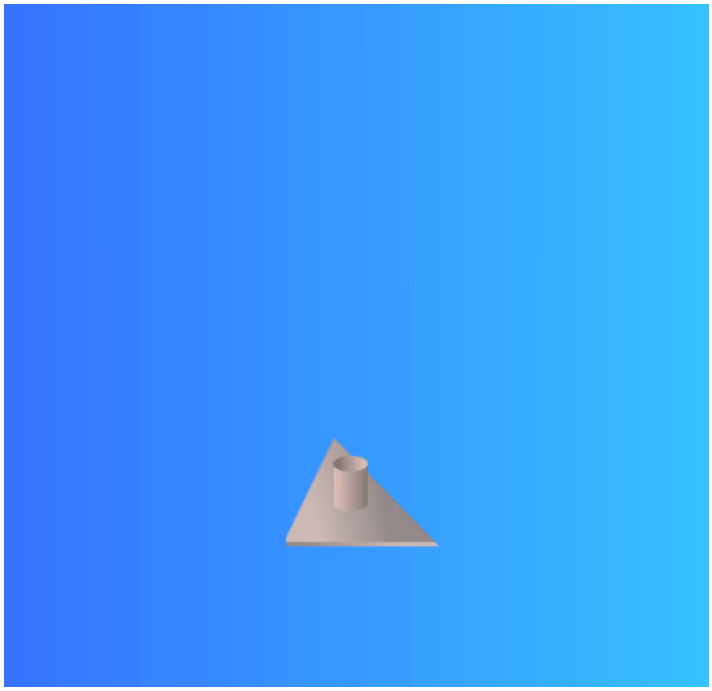
4.1 MAST DEPLOYMENT

NOTE

Remember to attach a halyard to the top of the mast before raising it. Erect the mast in accordance with the instructions.

Locate the center of the antenna field location.

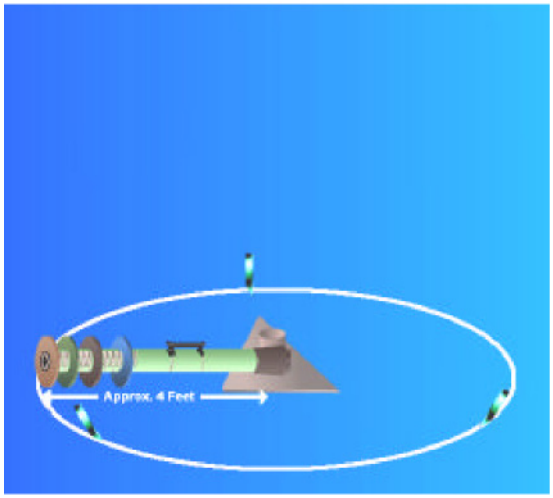
Lay out the mast, stakes, hammer and reel of guy ropes on the ground at what will be the base of the antenna.



Place the base plate on the ground with one corner facing directly upwind.

Drive the plate into the ground using the hammer, until the plate is flush with the ground.

4.2 LAY OUT THE STAKES



Use the mast as a ruler to locate the radius for the stakes.

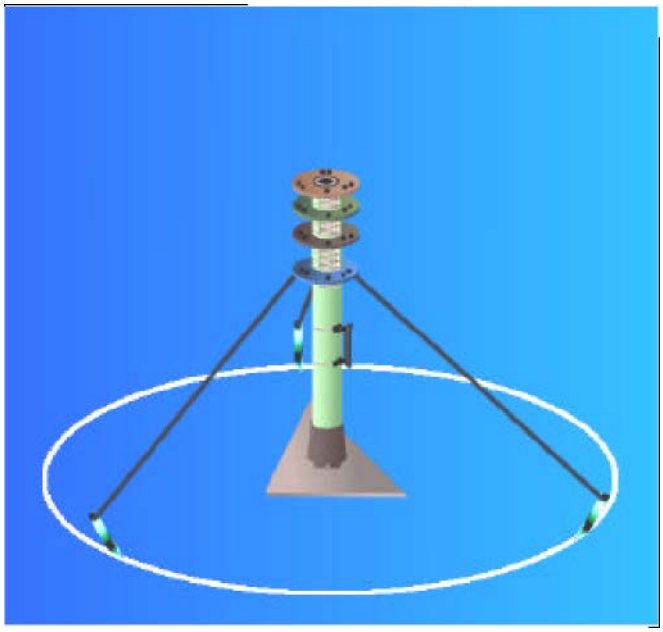
Place the first stake on line with the corner of the base plate, about 4 feet out from the center of the base plate.

NOTE

Drive the stakes about half way in and at a 30-degree tilt away from the mast.

NOTE

These stakes and guy ropes are all that will support the mast until it is fully extended. Ensure that additional personnel are provided and briefed on their duty in high wind situations.



Locate the reel of guy ropes and remove the first three guys marked with a blue band. Clip the fixed ends to the stakes and the other end to the blue stay plate on the mast. Use the three holes which are spaced 120 degrees apart.

Use the guy adjusters and the level on the handle of the mast to coarse level the mast. Fine level the mast by driving the stakes further into the ground.

Rotate the mast handle to face downwind.

Rotate the cam clamps on the mast sections above the lowest mast section (handle section) to face upwind.

Drive pin through hole in rear of the mast base.

4.3 LAY OUT OUTER STAKES

Pick up two 15-inch stakes, and a hammer for the next steps.

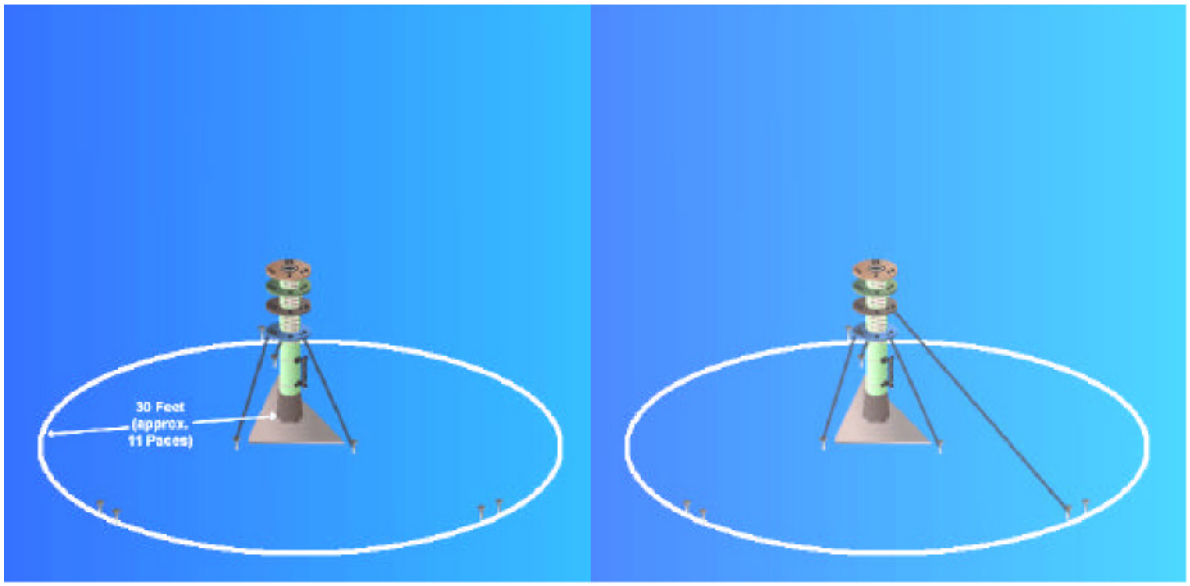
Attach black (no tensioner) guy rope clip to the black guy plate: pick up a hammer and 2 stakes; start out along the line of the base plate/blue 1st guy rope until a red band is found on the rope.

NOTE

The ropes used for the black guy plate are the only ropes with a stake-positioning (red) band.

This is the proper place for the 1st stake; drive the stake in with a 30-degree tilt away from the mast.

Drive a second stake one pace beyond, and to the right or left of the first stake with a 30-degree tilt, away from the mast.



NOTE

Use the same 30-degree tilt away from the mast for all stakes.

Disconnect the two snap links from each other.

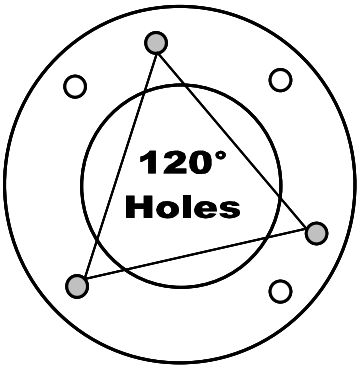
Attach the running end snap link to the bottom hole of the stake.

Attach the next running end of a guy rope (green) to the top hole of the stake.

4.4 ADD GUY ROPES

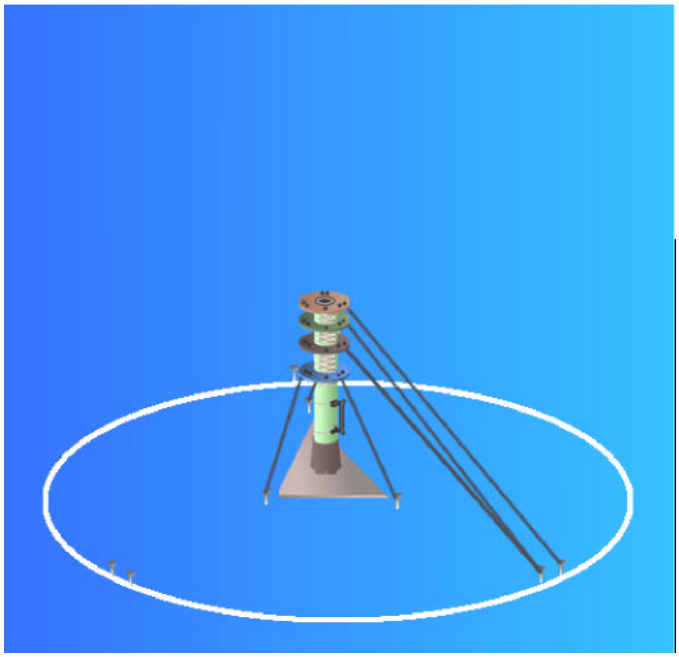
Return to the mast. When you reach the mast, continue unreeling the guy rope until you find two fixed snap links (green and brown).

Separate the snap links (fixed ends) from each other and attach the green rope fixed snap link onto the green stay plate at one of the 120-degree holes.



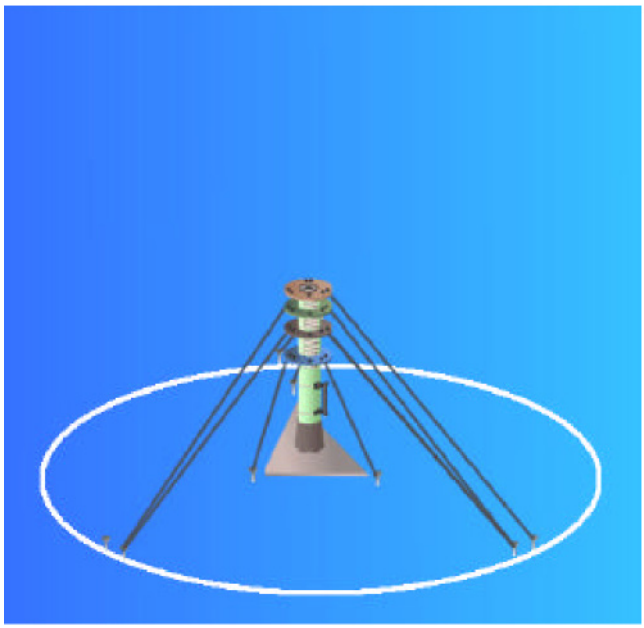
4.5 ADD GUY ROPES 2ND

Attach the fixed end snap link (brown) to the top (brown) stay plate 120-degree holes. Walk out to the far guy stake, reeling extra line off until the end of the rope appears, then snap the tensioner end (running end) onto the upper hole of the second, or farthest stake from the mast.



4.6 ADD GUY ROPES 3RD

Repeat this procedure for the remaining two guy lanes of the mast. Ensure that all guy line tension adjusters are fully backed off. This ensures enough slack in the guy lines to fully extend the mast without having to stop and adjust the guy ropes.

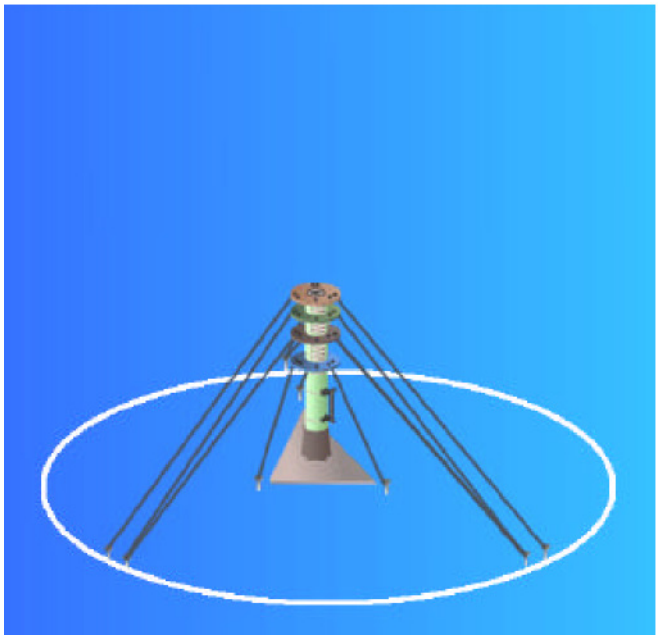


NOTE

It is important that all tensioners at the stake ends of the guy ropes are fully backed off before attempting to raise the mast in the next steps.

4.7 ATTACH HALYARD TO MAST

Locate and attach the halyard pulley end, clip into the top (brown) guy plate, down wind side also, twist the locking clamps on the mast to the upwind side to avoid catching the halyard on the clamp possibly flipping it open.



4.8 PUSH MAST UP

Using two people, loosen the topmost cam clamp and push the tube up. Close the clamp. Loosen the next clamp and repeat this process until all tubes are fully extended. Two persons should now push up the mast by opening a clamp, pushing up a section, and re-closing the clamp. If there is a serious wind you may need to station someone directly upwind to provide a counter pull to the winds push. He will assist by pulling against the wind with the loose guy ropes. After pushing the mast all the way up, one person should stay at the base of the mast and make corrections on the desired "straight up" condition of the mast while the other moves to each level of guy ropes, beginning with the 2nd level (black), and tightening each trio, then moving up (to brown, then to green) until the mast is fully snug and secured.

WARNING

Two personnel are required to perform the task of raising the mast. More personnel are required in windy weather. The additional personnel will use the guy ropes to provide a counter pull to the wind.

NOTE

Gloves should be worn for these steps to prevent pinching hands and to provide a firm grip on the mast as it is raised.

Attach the balun to the fixed hook on the halyard.

DO NOT HOIST THE BALUN AT THIS TIME.

Connect the antenna cable to the balun by removing the screw on cap on the RF connector on the bottom of the balun then screwing the RF connector on the end of the RF cable with the strain relief stocking onto the RF connector of the balun. Twist the cable to form a 6 to 8 inch loop of cable with the strain relief below the loop. Connect the snap link of the strain relief to the cup hook on the balun. This will ensure that the RF connector on the cable is not supporting its own weight.

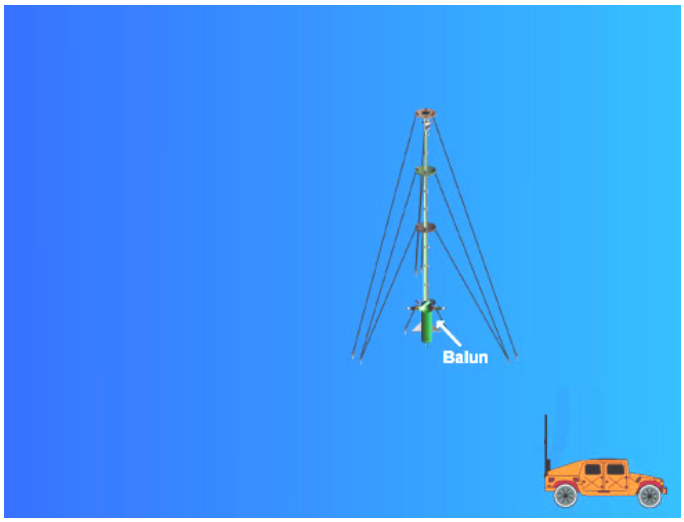
4.9 ATTACH BALUN/ANTENNA

NOTE

In the following steps one of the individuals will walk out around the down wind stake with the two guy ropes connected to it and proceed in a direction which will place him at the landing point for the ends of the antenna elements.

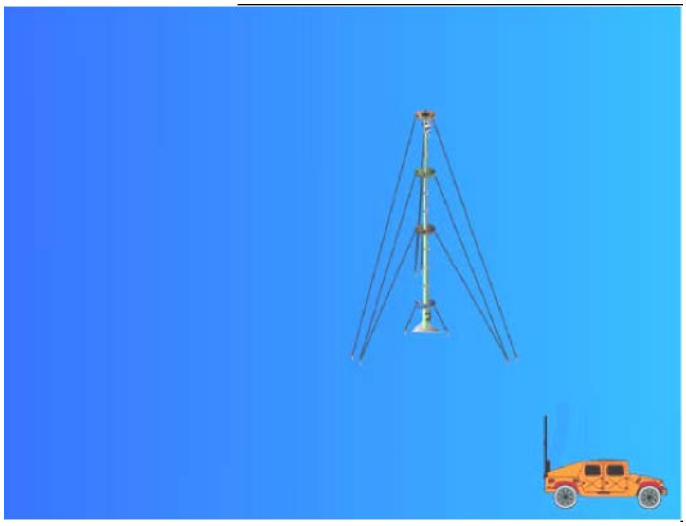
NOTE

Define down wind: (1) in the same direction that the wind is blowing (2) on or toward the lee side (3) with or in the direction of the current or stream of air. Face away from the wind. This is the down wind direction.



5 ANTENNA

Begin Adding Antenna Wires. Attach the first wire end to a solid point at the base of the mast. This wire should have a white band with the number "1" on it.

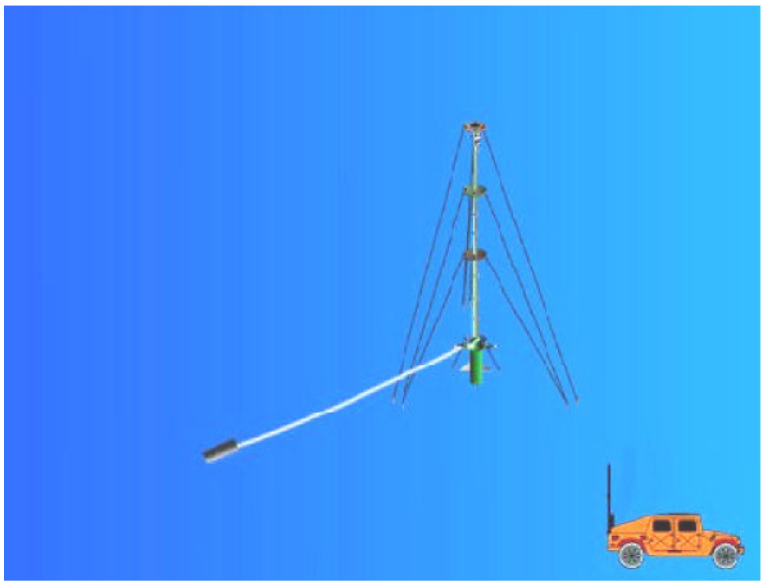


CAUTION

The wire may hang up in the connector clips occasionally, and loose ends of the wire with connectors will whip around the reel and strike the operator of the reel possibly causing painful injury(s). Wear gloves and exercise caution to prevent this kind of injury.

5.1 ANTENNA WIRES

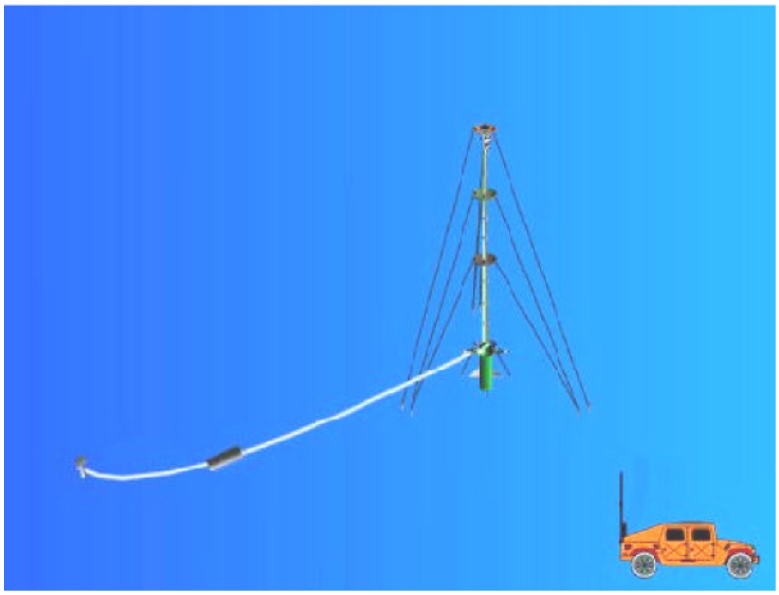
Connect the first end of the antenna wire (marked with a white band which has the number 1) to a solid point on the mast. Walk away from the mast along the orientation axis (long) of the antenna while unrolling the first wire marked 1 - 2.



5.2 INSERT A LOAD RESISTOR

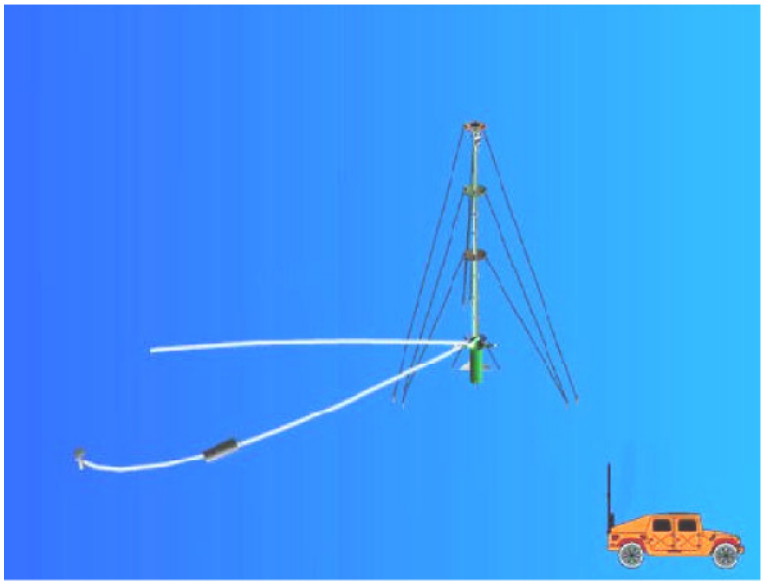
While unrolling the wire, watch for a set of snap links. When you find them STOP, unhook the snap links from each other. Insert a load resistor by connecting the snap links onto the strong points of the load resistor, one to each end of the resistor. Slide the "O" rings on the antenna wires toward the snap link. Connect the spade lugs to the binding posts, one to each end of the load resistor. Finish First Wire Continue unrolling the antenna wire until you encounter the next set of snap links. Disconnect the links and connect the snap link marked with #2 to the side of the multi connector, with the unused bow shackle.

Pick up the stake and stretch the antenna element, resistor, multi connector, rope, and stake until the antenna element is straight and lies in the intended direction of antenna orientation. DO NOT DRIVE THE STAKE INTO THE GROUND AT THIS TIME. Return to the base of the mast.



5.3 LAY OUT SECOND ANTENNA WIRE

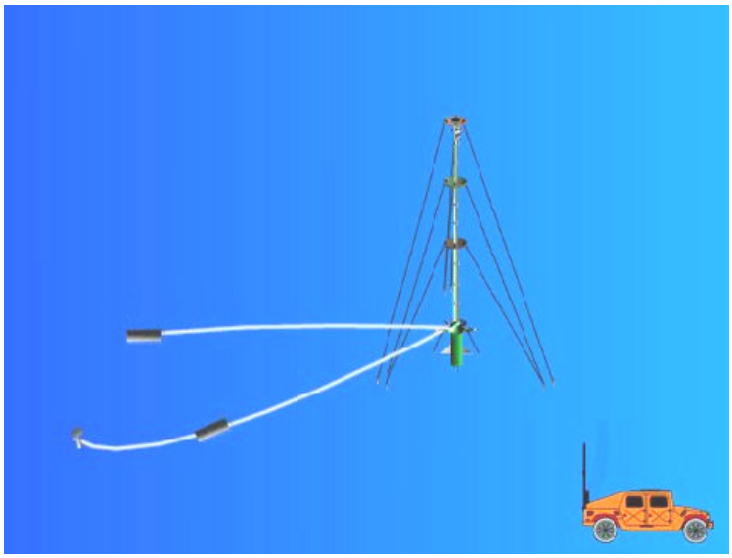
Attach the end of the next wire to the base of the mast as you did for the first wire. Unroll the wire until you find two snap links connected together.



Return to the mast and take the next wire element (#3-4) at the #3 point and secure it to the mast or balun as you did for the #1-2 wire. Pick up another resistor, and a plain 15-inch stake, and begin walking at about a 20-degree angle off to one or the other side of the center wire.

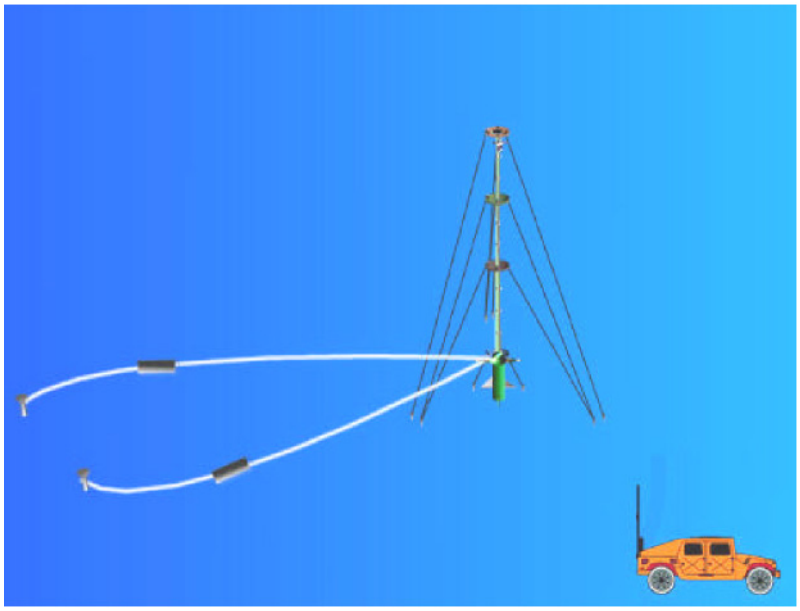
5.4 ADD A SECOND RESISTOR

Insert a load resistor.



5.5 CONTINUE SECOND WIRE

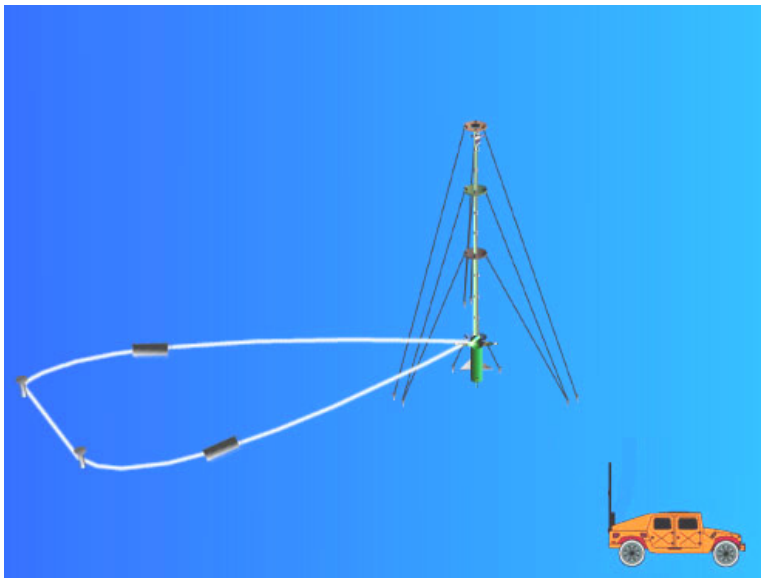
Continue to unroll the wire until you come to a snap link. Attach the snap link to a stake. Drop the stake on the ground. Stretch the wire out until it is straight.



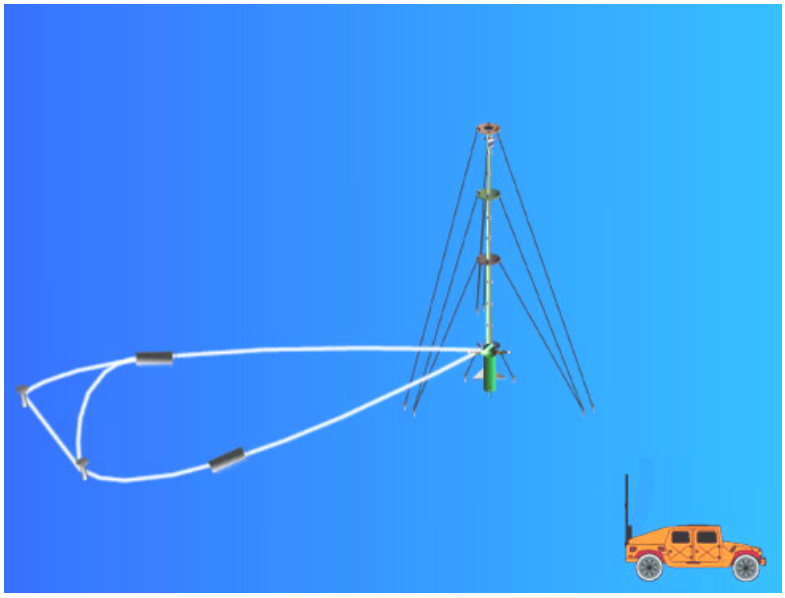
5.6 CONTINUE SECOND WIRE 2ND

Walk toward the first stake until you come to a snap link.

Connect the snap link to the bow shackle you connected the first wire to.



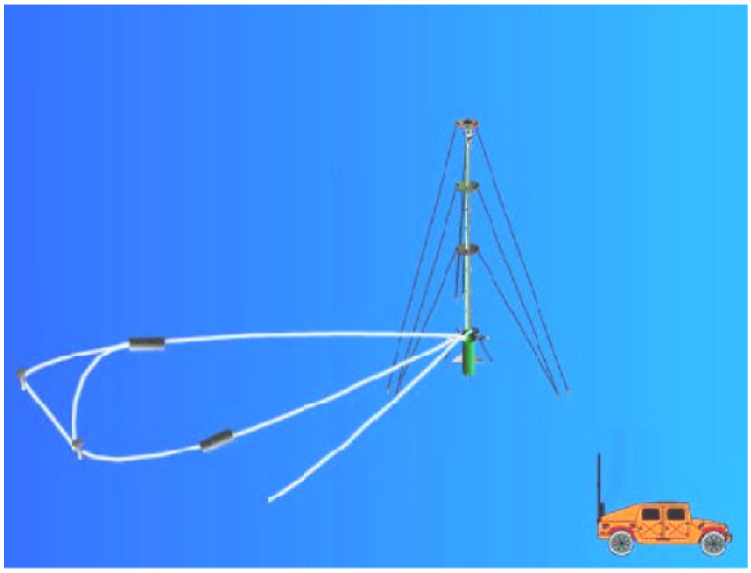
5.7 CONTINUE SECOND WIRE 3RD



Turn outward and face the load resistor in the outer antenna element wire. Unroll wire while walking toward that outer resistor. The snap link end will appear, with only a drop lead and the number 4 on the white band. Put the spool down and connect the snap ring to the bottom (downstream) side of the resistor strong point. Now connect the upstream spade lug and then the two downstream spade lugs at the binding post connections on the resistor (one upstream, and two downstream). Return to the base of the antenna mast.

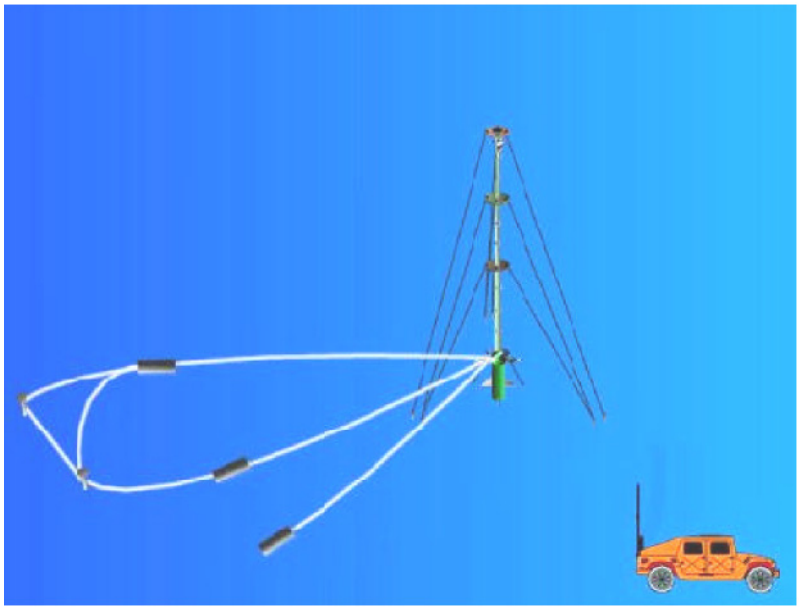
5.8 LAY OUT THIRD WIRE

Take the next wire element (#3-4) at the #3 point and secure it to the mast or balun as you did for the #1-2 wire. Both personnel should pick up another resistor, and a plain 15-inch stake, and begin walking in opposite directions to each other at about a 20-degree angle off to one or the other side of the center wire.



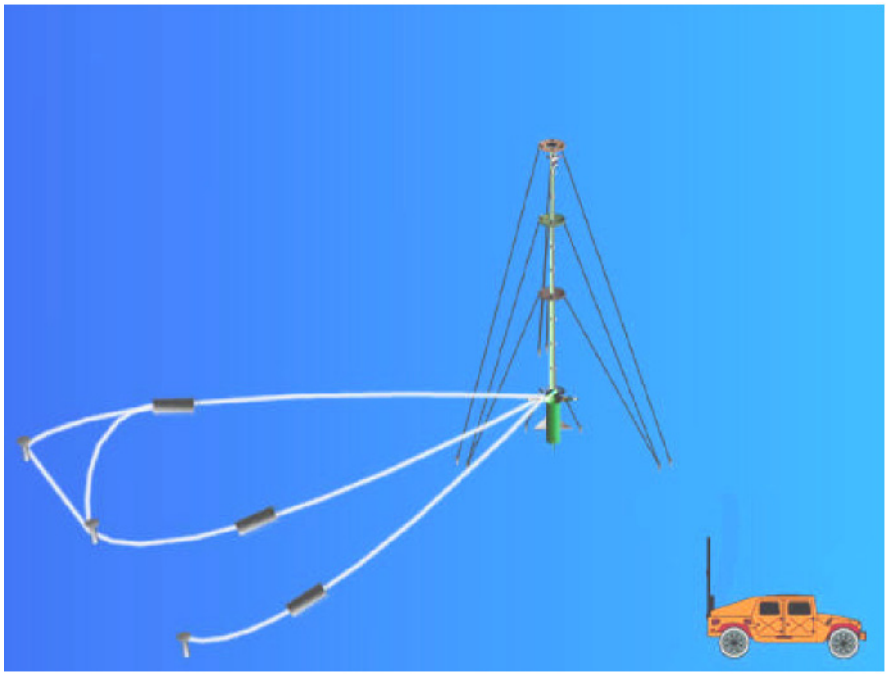
5.9 INSERT LOAD RESISTOR

Insert a load resistor as you did in the first wire.



5.10 CONTINUE THIRD WIRE

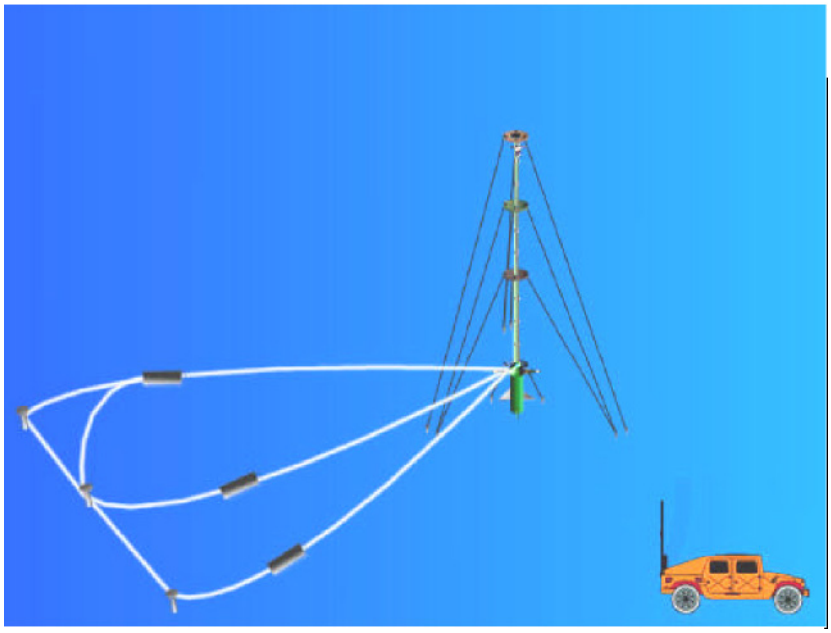
Continue unrolling the wire until the next snap link is found in the wire. Connect the snap link to the stake. Stretch the wire straight then drop the stake on the ground.



5.11 EXTEND THIRD WIRE

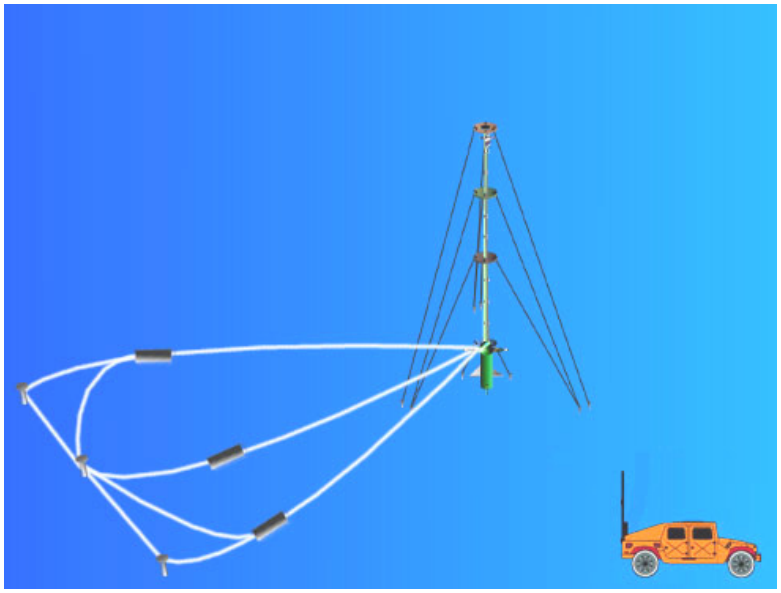
Turn toward the multi connector in the center antenna wire and keep unrolling the wire. A snap link and drop wire will appear. Connect the snap link to the bow shackle. You should now have three snap links in one bow shackle.

Connect all of the spade lugs on the drop wires to the binding posts on the multi connector.



5.12 ONE SIDE OF ANTENNA FINISHED

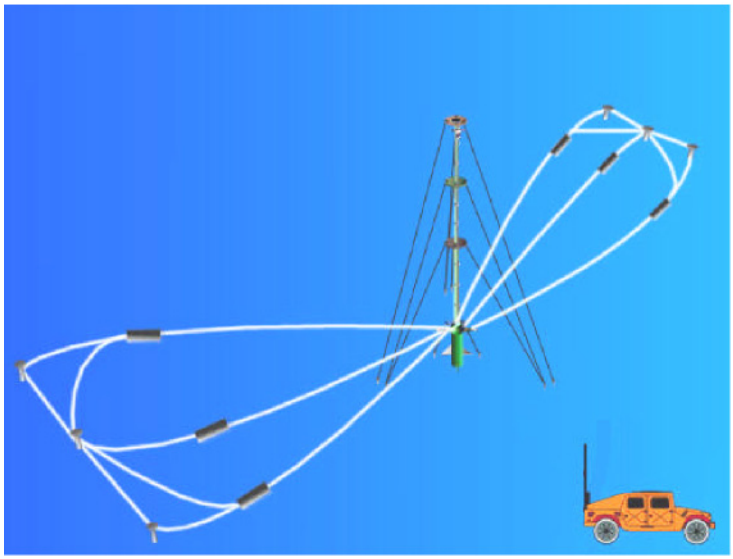
Turn outward and face the load resistor in the outer antenna element wire. Unroll wire while walking toward that outer resistor. The snap link end will appear, with only a drop lead and the number 4 on the white band. Put the spool down and connect the snap ring to the bottom (downstream) side of the resistor strong point. Now connect the upstream spade lug and then the two downstream lead spade lugs at the binding post connections on the resistor (one upstream, and two downstream).



This is what the layout of the first side of the antenna should look like at this point in time.

5.13 THE OTHER SIDE OF THE ANTENNA

Process Is Paralleled. The installation of this side of the antenna will vary in that the antenna elements are walked out around the close outer guy stake and inside the outer guy stake. The antenna element end points will be approximately inline with the unbent side. During hoisting of the balun, the second person will guide the antenna elements and balun with the coaxial cable.

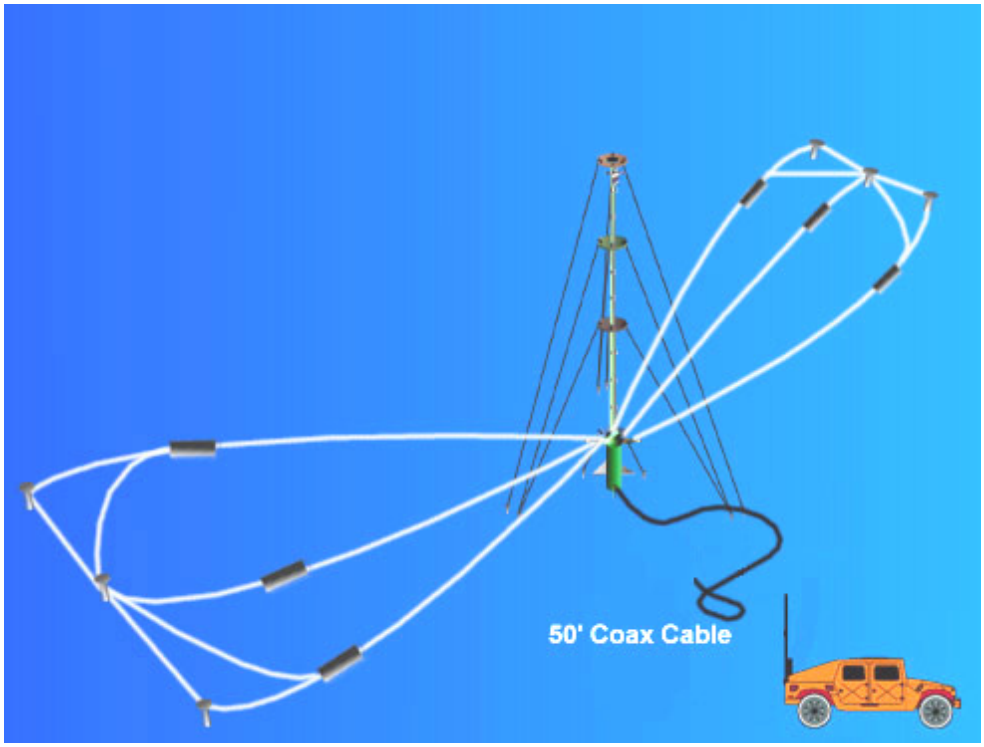


5.14 ATTACH COAXIAL CABLE

Attach the 50-foot piece of coaxial cable to the bottom of the balun leaving a 6 - 8 inch loop of cable and connect the free end of the strain relief to the cup hook on the balun. Attach all of the snap links to the balun bow shackles. Keep snap links on the same side of the balun as the wires.

NOTE

Ensure that the strain relief is supporting the cable NOT the cable connector.



5.15 HOIST THE BALUN

Fasten 12-inch rope loop of Weak Link to mast carrying handle. Attach balun to fixed hook of halyard and hoist carefully and slowly. Use the coaxial cable to guide the balun. Tie a noose in the down line of halyard so that the second Weak Link snap hook just reaches it. Snap Weak Link to the noose. Tie the up line to the mast handle so that there is a slack loop of about 5 feet below the Weak Link.

During hoisting of the balun, the second person will guide the antenna elements and balun with the coaxial cable.

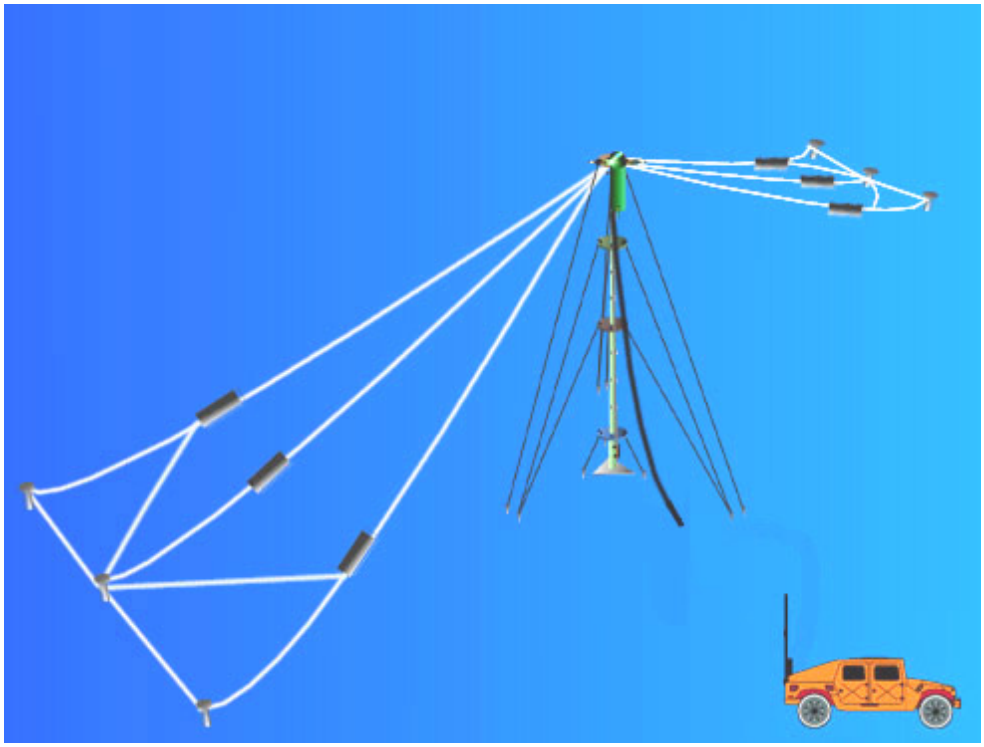
Hoist the balun, coax, and wires, slowly, ensuring that nothing is caught while performing hoisting operations on the balun.

Weak Link will snap at about 100 lbs (heavy ice/wind) causing a drop of balun/antenna elements of about 5 feet. Weak Link designed to provide two uses. Now you are ready to tension the wires, using a mirror image technique.

NOTE

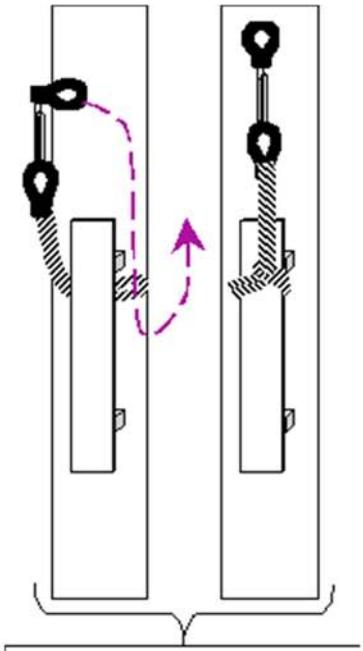
In the following steps, it is not necessary, nor is it required that the antenna elements be stretched tight. The normal tension on the elements is about 10 - 20 lbs of tension. Some sag in the elements is desired.

Each individual should walk out to the stake at the #2 point (stake/rope/multi connector) and while walking slowly backwards and away from each other, pull the center (#1 - 2) wire snug. Drive in the stake (the one with the multi connector and rope tensioner). Each individual should move to a diagonally opposite outer wire. There should already be a stake attached to the antenna element wire there. Pick the stake up, pull against each other and away from the center stake you just drove in. Positioning for the corner stake will become obvious, as far away from the mast and from the center stake as you can comfortably tension it (remember, 10 - 20 lbs of tension).

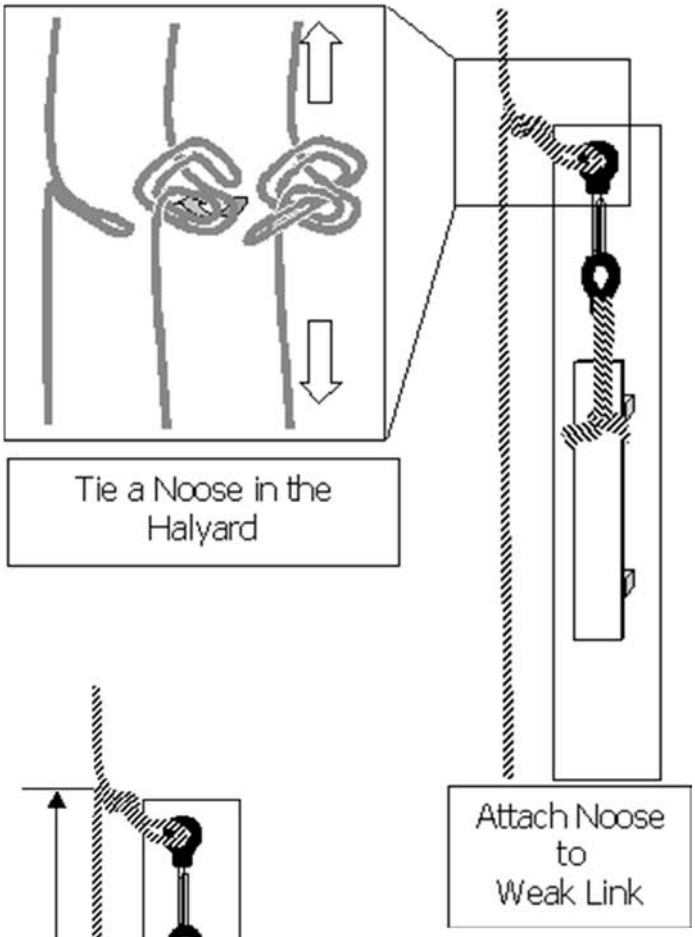


5.16 THE WEAK LINK

Fasten 12-inch rope loop of Weak Link to mast carrying handle. Attach balun to fixed hook of halyard and hoist carefully and slowly. Use the coaxial cable to guide the balun. Tie a noose in the down line of halyard so that the second Weak Link snap hook just reaches it. Snap Weak Link to the noose. Tie the up line to the mast handle so that there is a slack loop of about 5 feet below the Weak Link.

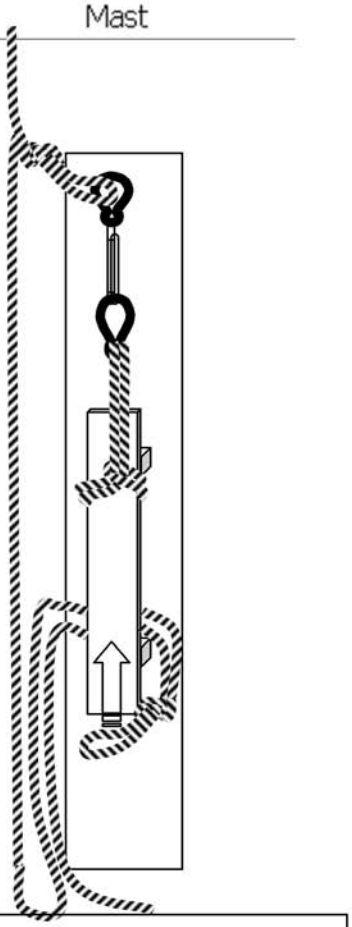


Attach Weak Link to Mast

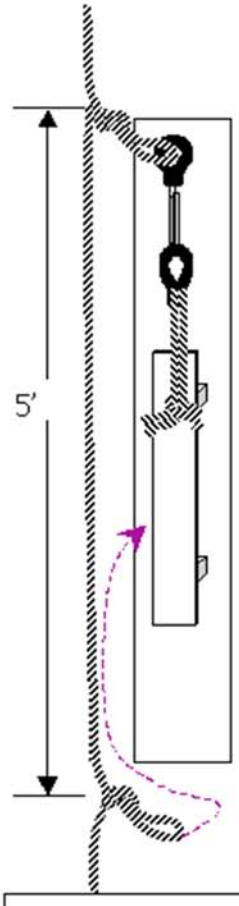


Tie a Noose in the Halyard

Attach Noose to Weak Link

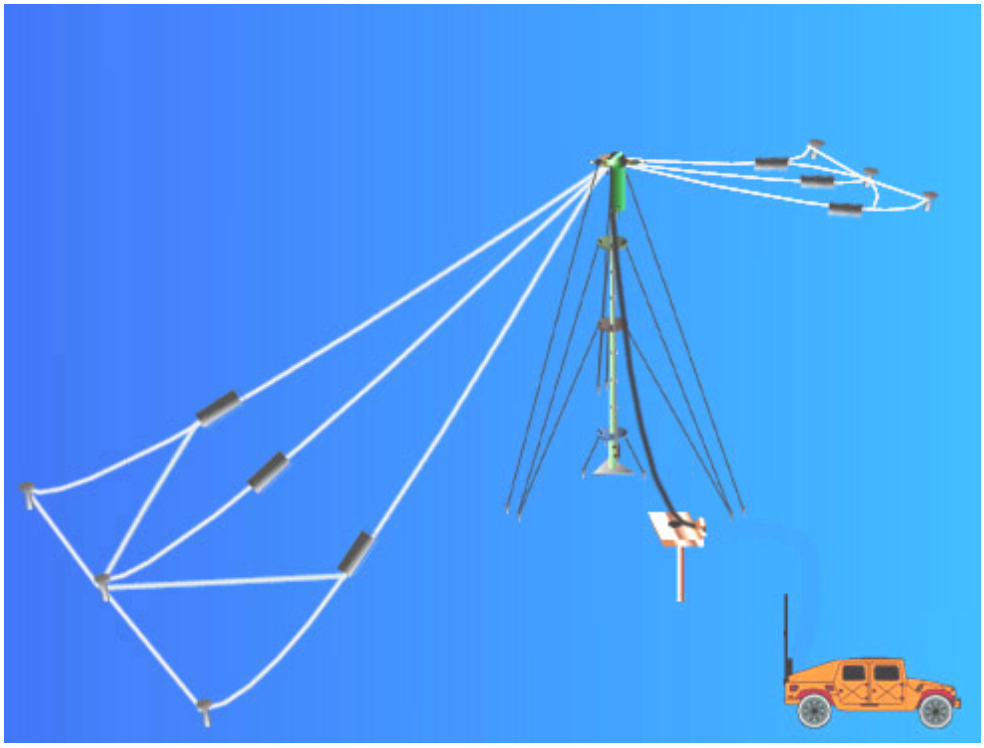


Attach second noose to mast carry handle



Make second noose

5.17 LIGHTNING ARRESTOR



Install the lightning arrestor.

Connect the 50-foot coaxial cable to the top of the lightning arrestor, and the 100-foot coaxial cable is connected to the radio.

Tape the 50-foot coaxial cable to the bottom of the mast. Also tape the coaxial cable connections at the lightning arrestor to waterproof them.

Prepare the ground rod by screwing the section with a point into the driving cap. Hammer the rod into the ground until the bottom of the driving cap is 1-2 inches from the ground. Unscrew the cap from the ground rod and replace it with the coupler. Screw the other ground rod into the top of the coupler and the driving cap onto the top of the second ground rod section. Continue driving the ground rods into the ground until the bottom of the driving cap is 6 - 8 inches from the ground. Remove the driving cap from the ground rod and replace it with the lightning arrestor assembly. Screw it fully onto the ground rod.

WARNING

Never use the lightning arrestor as a driving cap for the ground rod. This will damage the lightning arrestor and present an electrocution hazard to personnel.

Attach the coaxial cable coming down from the balun to the top of the lightning arrestor and tape the connection to prevent the entry of water. Also tape the coaxial cable to the base of the mast at a level about 3 feet above the ground. The transmitter side of the radio is connected to the bottom side of the lightning arrestor assembly and the connection is taped to waterproof the connection.

6 EQUIPMENT RECOVERY

6.1 RECOVERY

NOTE

When preparing to recover the antenna wire elements, unclip them from the balun and clip them to the mast, or a stake, so you have something to give you tension to pull or roll against. Preparation for movement is the exact reverse sequence of erection. Lower the balun slowly, because there is a heavy mass of wires, coax, etc. If time permits, they should be let down some, and then pulled away some more. The wire sequence of rollup is 4 -3, 4 -3, 2-1 on each of the reels.

NOTE

The halyard and weak link can be rolled right over the top of the wires on one of the antenna element spools.

6.2 PERFORM AFTER A LIGHTNING STRIKE

The following steps are necessary to ensure that the radio, transmission line, and antenna are in operable condition after a lightning strike.

1. Make a continuity check of the lightning arrestor using an ohmmeter set to the highest range: (a) From the shell to the center conductor of each side of the arrestor - Open Circuit. (b) From the center of one to the center of the other connector - Open Circuit.

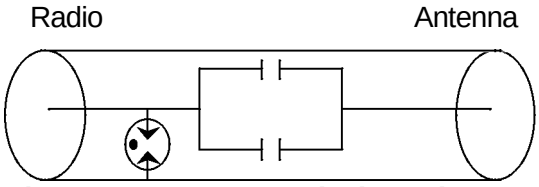


Figure 1. Arrestor Equivalent Diagram

2. The next step is to test the radiating elements of the antenna.
3. Lower the Balun and disconnect the radiating elements from one side.

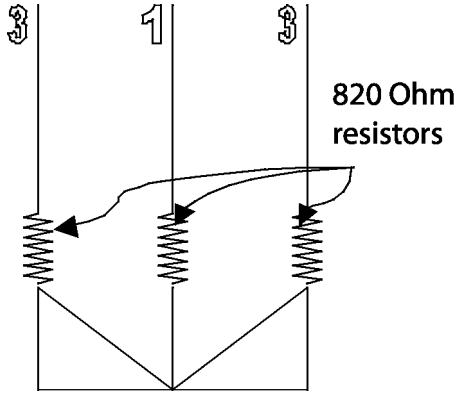


Figure 2. Antenna radiating element electrical diagram.

4. Locate the two elements that have the white band marked "3" along with the element marked with a "1" (see fig. 2).
5. Check continuity from the metal clip on the element marked "1" to one of the elements marked "3". The resistance should be 1640 Ohms. Record the reading.
6. Repeat this procedure with the remaining element marked "3". Record the reading.
7. Repeat this procedure with the elements on the other side of the balun.
8. If the resistance readings are not 1568 to 1722 ohms then you need to perform the next procedure. If the readings are within 1568 to 1722 ohms then skip the next step.
9. With the ends still disconnected from the balun, check the appropriate resistors (see fig. 2) in the failed legs. Check resistance across the resistor terminals with the wing nuts on them using an ohmmeter. They should read 779 to 861ohms. If they are not within spec, replace the resistor that is not within specification then perform step 3 again.
10. Make the following resistance readings on the balun using an ohmmeter set to the lowest range (See Figure 3).

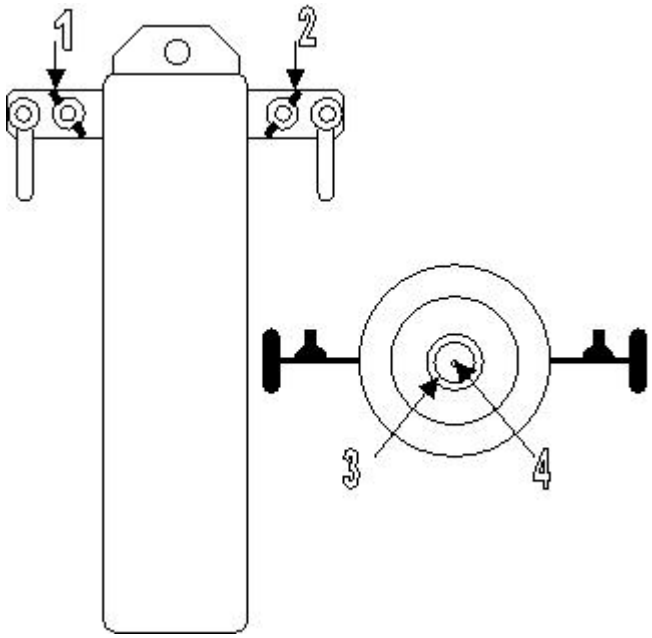


Figure 3. Balun Side and Bottom Views

11. From point 1 to point 2: 1 to 2 ohms or less.
12. From point 1 to point 3: 1 to 2 ohms or less.
13. From point 1 to point 4: 1 to 2 ohms or less.
14. From point 2 to point 3: 1 to 2 ohms or less.
15. From point 2 to point 4: 1 to 2 ohms or less.
16. From point 3 to point 4: 1 to 2 ohms or less.
17. Disconnect both of the coaxial cables from the balun, the lightning arrestor, and the radio set.
18. Make the following resistance checks on the cables
19. From the center conductor to the center conductor on the other end of the cable: 0 to 1 ohm or less (use lowest ohm scale).

20. From the shell to shell on the other end of the cable: 0 to 1 ohm or less.
21. From the center to the shell of either end of the cable: infinite resistance (use highest ohms scale).
22. Perform a visual check of the cable for obvious burn through, or other damage.

NOTE

Use caution when performing this step as the cable may have sharp burrs or wires protruding from the cable. Wear gloves and use a rag to clean the cable. Wires protruding from the cable will snag the rag and not your hand.

23. If the cable is not within these specifications contact your maintenance facility to arrange for repair or replacement.

NOTE

Cables are assembled from the following parts. Cable RG-213, NSN 6145-00-660-8711 50 or 100 feet, and connector UG-218U NSN 5935-00-666-1656 - two each per cable.

24. Repeat steps 18 through 23 for the other cable.
25. Re-install all components of the antenna system if all checks have passed.
26. Reconnect the antenna system to the radio.
27. At the VRC-100
    a. Turn on the appropriate input power to the radio.
28. At the RSC
    a. Set the RSC function switch to "STBY".
    b. Press the "SETUP" button.
    c. Press the "TEST" button.
    d. Press the "BIT" button.
    e. Press the "T/R" button.
29. After 15 seconds the display on the RSC should show the following information

    T/R TEST

    PTT FOR XMT BIT RCV BIT - GO RTN
30. If the "RCV BIT - GO" is not showing contact maintenance personnel for assistance, otherwise press the "Push To Talk" button on the handset.
31. The transmitter should start clicking for about 15 seconds while tuning. At the end of this time, it should show the following information on the RSC display.

    T/R TEST XMT BIT - GO

    RTN
32. Press the RTN Button if there are no faults shown.
33. The radio should be safe to operate, shut the radio off and restart as you would for Normal Operations.
34. If the radio set failed at any step above contact your maintenance personnel.

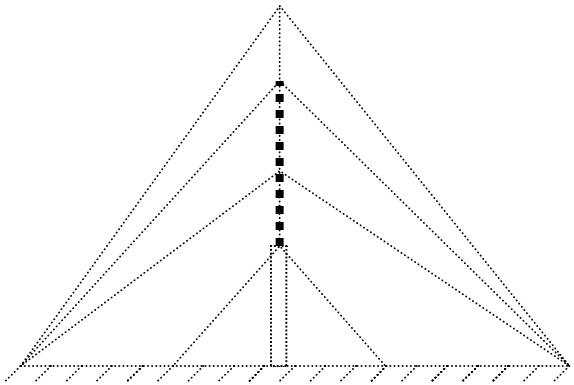
-end-

HF Antenna System

FIELD INSTRUCTIONS

LIGHTWEIGHT TELESCOPIC MAST

CTM15 50FT



BE SURE TO READ THE ESSENTIAL WARNINGS AND GENERAL INSTRUCTIONS ON PAGE 2

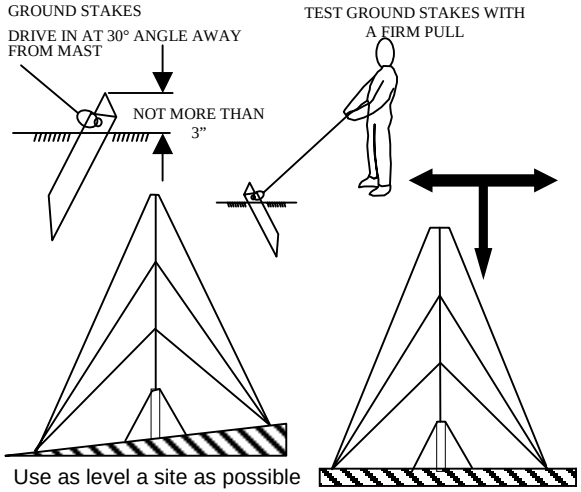
INSTRUCTIONS TO USERS

WARNINGS:

- DO NOT ERECT MAST NEAR POWER LINES
- DO NOT ERECT THE ANTENNA LESS THAN 7000 FEET FROM A REARMING POINT
- DO NOT ERECT THE ANTENNA LESS THAN 150 FEET FROM A REFUELING POINT
- DO NOT ERECT MAST DURNING THUNDER STORMS
- SO NOT ALLOW VEHICLES NEAR ANTENNA SITE
- DO NOT LEAVE A MAST "FREE STANDING" ON ITS BASE
- IN WINDY CONDITIONS ANOTHER PERSON MUST CONTROL THE GUYS TO KEEP THE MAST STRAIGHT
- OPERATORS SHOULD FAMILIARIZE TEMSELVES WITH THE TECHNICAL MANUAL BEFORE RIGGING AND RAISING THE MAST

THINK  **SAFETY**

SAFETY INSTRUCTIONS



Use as level a site as possible
- Avoid rigging on steep slopes -

ALWAYS KEEP MAST CLAMPS LATCHED IN THE CLOSED POSITION (EXCEPT WHEN RAISING OR LOWERING A SECTION)

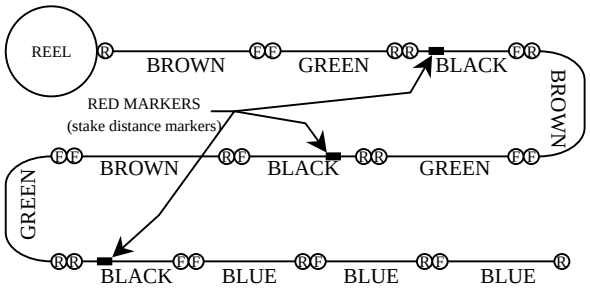
PARTS CHECKLIST

EQUIPMENT	QTY
CARRYMAST	1EA
ACCESSORY BAG	1EA
SPANNER	1EA
STAKES	9EA
GUY REEL	1EA
GROUND SPIKE	1EA
LUMP HAMMER	1EA
PEG	1EA

OPTIONS AVAILABLE:
HALYARD: 12M
15M

Field Repair &
Maintenance Kit
Mast Head Adapters
Various Stakes

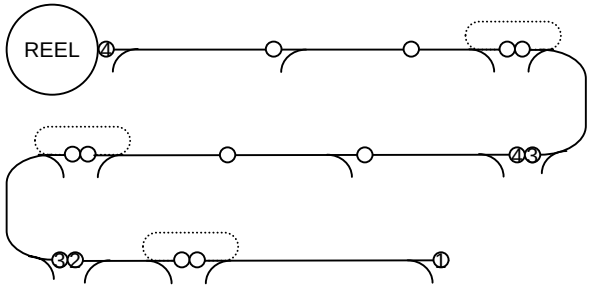
MAKEUP OF GUY REEL
(Guys are identified by color of sleeves near fixed hooks)



R = RUNNING HOOK
F = FIXED HOOK

DAILY CHECK: - STRAGHTNESS OF MAST
- SECURITY OF GUY STAKES

Antenna Reel Wire Sequencing



Antenna System Inventory Listing

CTM15/LFH230KIT AN/VRC-100 Antenna System NSN:5985-01-455-9286

Part Number	Nomenclature	NSN	QTY
SL33150	Reel Assy	5985-01-371-5739ZX	2EA
SL33774	Inner Aerial Wire Assy		2EA
SL33771	Outer Aerial Wire Assy	5985-01-371-5747ZX	4EA
SL33812	Load Assy	5985-01-371-5744	6EA
DG33779	Ground Peg Assy		4EA
SL31992SH1	Balun		1EA
SL33776	Inner Tensioner	4030-01-372-4417ZX	2EA
SL30082-50	Coaxial Feed Wire 50 Foot	5992-01-371-6667ZX	1EA
SL30082-100	Coaxial Feed Wire 100 Foot	5992-01-371-6667ZX	1EA
DG31172	Coupling Piece	5985-01-371-5743	6EA
A450	Pouch 5985-01-371-5889ZX		1EA
33198/4	Guy Rope Assy, Top (Brown)		3EA
33198/3	Guy Rope Assy, Intermediate (Green)		3EA
33198/2	Guy Rope Assy, Intermediate (Black)		3EA
33198/1	Guy Rope Assy, Bottom (Blue)		3EA
33150	Reel Assy		1EA
34385	Ground Spike Assy, Tiangular	4030-01-412-8739	1EA
Q76	Hammer		1EA
A424	Bag Stowage	5985-01-371-5891	
32223	15"Ground Stake, Steel	4030-01-369-7218	9EA
33117	(CTM15)Mast Assy		1EA
31340	15MHalyard		1EA
33784	Weak Link		1EA
BP162	Box Wrench 5120-01-113-7134		1EA
DG3221	"L" Pin		1EA
JH10	Lightening Protection Assy		1EA
JH11	Upper Grounding Rod		1EA
JH12	Lower Grounding Rod		1EA
JH13	Grounding Rod Connector		1EA
JH14	Grounding Rod Driving Cap		1EA
WK-1	Water Proof Sealant		6IN

ASSOCIATED PUBLICATIONS

TM-1099	Operation and Maintenance Manual
EL 1142-A	Illustrated Parts list (Manual)
LPK1, 1KW	Lightning Protection Kit (Manual)
TM-H2270/2	CSA Carrymast CTM-15 (Manual)
EL 1128-A	Carrymast Field Instructions (Manual)

USER NOTES:

TEAR ALONG DOTTED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

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Commander
Stateside Army Depot
ATTN: AMSTA-US
Stateside, N.J. 07703-5007

DATE SENT
10 July 1975

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5840-340-20	23 Jan 74	Radar Set AN/PRC-76

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:
2-25	2-28			Recommend that the installation antenna alignment procedure be changed throughout to specify a 20 IFF antenna lag rather than 10. REASON: Experience has shown that with only a 10 lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 20 without degradation of operation.
3-10	3-3		3-1	Item 5, Functional column. Change 2 dB" to 3 dB". REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 dB (500 watts) adjustment to light the TRANS POWER FAULT indicator.
5-6	5-8			Add new step f.1 to read, Replace cover plate removed in step f.1, above." REASON: To replace the cover plate.
		FO-3		Zone C 3. On J1-2, change +24 VDC" to +5 VDC". REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER
SSG I. M. DeSpiritof 999-1776

SIGN HERE

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Fort Monmouth, New Jersey 07703-5006

By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

Official:

SANDRA R. RILEY
Administrative Assistant to the
Secretary of the Arm
0535604

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