

**ASSEMBLY AND INSTALLATION  
INSTRUCTIONS**



# 22XB

2 METER OSCAR BOOMER

144-148 MHz



951449 (10/98)

TA5FA

**WARNING**

THIS ANTENNA IS AN ELECTRICAL CONDUCTOR. CONTACT WITH POWER LINES CAN RESULT IN DEATH, OR SERIOUS INJURY. DO NOT INSTALL THIS ANTENNA WHERE THERE IS ANY POSSIBILITY OF CONTACT WITH OR HIGH VOLTAGE ARC-OVER FROM POWER CABLES OR SERVICE DROPS TO BUILDINGS. THE ANTENNA, SUPPORTING MAST AND/OR TOWER MUST NOT BE CLOSE TO ANY POWER LINES DURING INSTALLATION, REMOVAL OR IN THE EVENT PART OF THE SYSTEM SHOULD ACCIDENTALLY FALL. FOLLOW THE GUIDELINES FOR ANTENNA INSTALLATIONS RECOMMENDED BY THE U.S. CONSUMER PRODUCT SAFETY COMMISSION AND LISTED IN THE ENCLOSED PAMPHLET.

Your Cushcraft 22XB Boomer antenna is designed and manufactured to give trouble free service. This antenna will perform as specified if the instructions and suggestions in this manual are followed and care is used in the assembly and installation. When checking the components received in your antenna package use the parts listed beside each diagram. There is a master parts list on page 2. If you are unable to locate any tube or component, check the inside of all tubing. *IMPORTANT: Save the weight label from the outside of the carton. Each antenna is weighed at the factory to verify the parts count. If you claim a missing part, you will be asked for the weight verification label.*

**PLANNING**

Plan your installation carefully. If you use volunteer helpers be sure that they are qualified to assist you. Make certain that everyone involved understands that you are the boss and that they must follow your instructions. If you have any doubts at all, employ a professional antenna installation company to install your antenna.

**LOCATION**

Location of the antenna is very important. Surrounding objects such as trees, power lines, other antennas, etc. will seriously reduce efficiency. To minimize the effects of surrounding objects, mount the antenna as high and in the clear as possible. If metal guy wires are used, they should be broken with strain insulators. **EXTREME CARE MUST BE USED FOR YOUR SAFETY. YOU MUST INSURE THAT WHILE THE 22XB IS IN OPERATION NEITHER PEOPLE OR PETS CAN COME IN CONTACT WITH ANY PORTION OF YOUR ANTENNA. DEADLY VOLTAGES AND CURRENTS MAY EXIST. ALSO, SINCE THE EFFECTS OF EXPOSURE TO RF FIELDS ARE NOT FULLY UNDERSTOOD, LONG TERM EXPOSURE TO INTENSE RF FIELDS IS NOT RECOMMENDED. THERE IS A WARNING STICKER WHICH MUST BE ATTACHED TO THE BOOM AS SHOWN IN FIGURE G.**

**MOUNTING**

The mast mount bracket will accommodate up to 2" (5.1 cm) mast. A 1-1/2" (3.8 cm) or larger heavy wall mast should be used. A good heavy duty antenna rotator will provide the best service and longest life.

Mount your 22XB as high as possible with the boom-to-mast plate mounted as shown in figure G. The mast should be at a 45 degree angle to both element planes.

**SYSTEM GROUNDING**

Direct grounding of the antenna, mast and tower is very important. This serves as protection from lightning strikes and static buildup, and from high voltage which is present in the radio equipment connected to the antenna. A good electrical connection should be made to one or more ground rods (or other extensive ground system) directly at the base of the tower or mast, using at least #10AWG ground wire and non-corrosive hardware. For details and safety standards, consult the National Electrical Code. You should also use a coaxial lightning arrester. Cushcraft offers several different models, such as LAC-1, LAC-2 and the LAC-4 series

**ASSEMBLY**

Assemble your antenna by following the directions and illustrations in steps 1 through 5. After the antenna is completely assembled, verify dimensions and element spacings for accuracy. Then, return to the section below for final tuning.

**TUNING PROCEDURE**

The 22XB does not normally require tuning after assembly. However, if you wish to check the VSWR before installation, please observe the following procedures. To prevent detuning the antenna, it should be tuned in place or at least 7 feet (2.13 meters) above ground and clear of surrounding objects. Keep all metal obstructions such as guy wires and other antennas at least 10 feet (3.05 m) away since they will nullify any adjustment and degraded performance will result.

Run the coax cable from your transmitter to the area in which the antenna is going to be tested. The length of this cable or your feedline is not critical. Connect a good quality VSWR bridge to the end of this cable. Connect a short length of cable [10 ft. (305 cm) or less] from the VSWR bridge to the antenna. Set the transmitter to your center operating frequency. When you read VSWR, be sure you move far enough away from the antenna so that your body does not effect the reading.

Measure the VSWR. If it is high, move both T-Match straps on both driven elements (125) by 1/4" (.6 cm) either inward or outward and check the VSWR. Both T-match straps on each driven element should be the same distance from the center of the driven element. If the VSWR improved, then continue moving the T-Match straps in the same direction. If the VSWR deteriorated then move the T-Match straps in the opposite direction. Repeat this procedure until no further improvement can be made. You have matched your antenna. Then tighten all connections on the T-Match driven element assembly. Tape the feedline to the boom and mast.

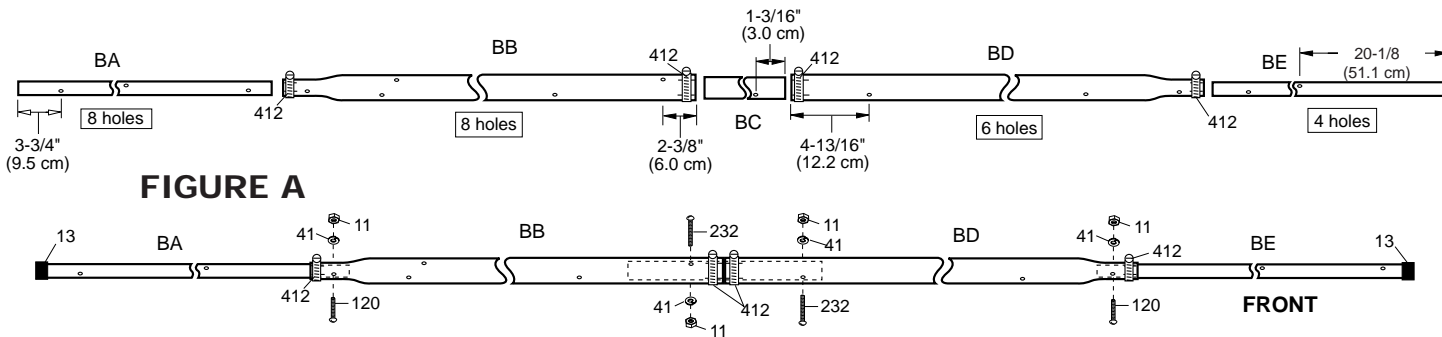
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# MASTER PARTS LIST

KEY	P/N	DESCRIPTION	QTY	KEY	P/N	DESCRIPTION	QTY
11	010011	8-32 stainless steel hex nut	38	404	010404	2-1/2" x 3" (5.5 x 7.6 cm) stainless steel U-bolt	2
13	050013	1-1/4" (3.2 cm) black plastic cap	2	412	030412	1-1/2" (3.8 cm) stainless steel worm clamp	4
26	190026	7/8" (2.2 cm) formed aluminum bracket	22	BA		1-1/4" x 48" (3.2 x 121.9 cm) aluminum tube, 8 holes	1
28	190028	Aluminum half washer	20	BB		1-1/2" x 72" (3.8 x 182.9 cm) aluminum tube, 8 holes slotted both ends	1
41	011941	No. 8 split lock washer	38	BC		1-3/8" x 12" (3.5 x 30.5 cm) aluminum tube, 2 holes	1
53	050053	1/2" (1.27 cm) black plastic cap	4	BD		1-1/2" x 72" (3.8 x 182.9 cm) aluminum tube, 6 holes slotted both ends	1
70	190070	4" x 6" (10.2 x 15.2 cm) formed mounting plate	1	BE		1-1/4" x 48" (3.2 x 121.9 cm) aluminum tube, 4 holes	1
79	010079	8-32 x 1/2" (1.3 cm) stainless steel machine screw	8	BN		29" (73.7 cm) Coaxial balun	2
84	010084	1/4" (.64 cm) stainless steel lock washer	4	DC		Connector bracket assembly	2
85	010085	1/4" (.64 cm) stainless steel hex nut	4	EA		40" (101.6 cm) aluminum rod	2
104	010104	1/4" (.64 cm) stainless steel flat washer	4	EB		1/2" x 39-1/2" (1.3 x 100.3 cm) aluminum tube	2
109	353109	Phono plug male	1	EC		37-1/4" (94.6 cm) aluminum rod	2
115	050115	Vinyl Boot	1	ED		36-3/4" (93.3 cm) aluminum rod	2
116	240116	Silicone Package	3	EE		36-3/8" (92.4 cm) aluminum rod	2
118	010118	5/16" (.79 cm) stainless steel hex nut	4	EF		35-7/8" (91.1 cm) aluminum rod	2
119	010119	5/16" (.79 cm) stainless steel lock washer	4	EG		35-1/4" (89.5 cm) aluminum rod	4
120	010120	8-32 x 2" (5.1 cm) stainless steel machine screw	10	EH		35" (88.9 cm) aluminum rod	2
124	190124	Connector strap 1" (2.5 cm)	1	EI		34-3/4" (88.3 cm) aluminum rod	4
125	200125	Tuning strap	4	ET		3/8" x 10" (1 x 25.4 cm) T-match tube	4
232	010232	8-32 x 2-1/2" (6.4 cm) stainless steel machine screw	14	FL		Phase harness assembly with T-connector	1
251	050251	3/8" (1 cm) white plastic cap	4	PS2		Polarity switcher assembly	1
326	290326	Danger label	1				
401	010401	1-1/2" x 3" (3.8 x 7.6 cm) stainless steel U-bolt	2				

## #1 - ASSEMBLE BOOM

Slide worm clamps (412) onto the non-swaged ends of tubes BB and BD (figure A). Locate the short tube BC and insert end with hole closest it into tube BD. Align the hole through BC with the first hole in BD. Temporarily pin tube BD to tube BC with screw (232) and nut (11). This screw will be removed later to install the elements. Slide tube BB over the free end of tube BC aligning holes and temporarily pinning in place with screw (232) and nut (11). Slide both worm clamps (412) over slots in tube BB and BD and tighten. Slide worm clamps (412) over the swaged ends of tubes BB and BD. Referring to figure A, insert the correct end of tube BA into tube BB until the first set of holes align. Permanently install screw (120), washer (41) and nut (11). Insert the correct end of BE into tube BD until the first set of holes are aligned. Permanently pin tubes together with screw (120) and nut (11). Tighten clamps (412). Push the end caps (13) onto the boom ends.



KEY	P/N	DESC.	SIZE	QTY
BA		ALUM TUBE (8 holes)	1-1/4" x 48" (3.2 x 121.9 cm)	1
BB		ALUM TUBE (8 holes)	1-1/2" x 72" (3.8 x 182.9 cm)	1
BC		ALUM TUBING	1-3/8" x 12" (3.5 x 30.5 cm)	1
BD		ALUM TUBE (6 holes)	1-1/2" x 72" (3.8 x 182.9 cm)	1
BE		ALUM TUBE (4 holes)	1-1/4" x 48" (3.2 x 121.9 cm)	1
11	010011	SS HEX NUT	8-32	4

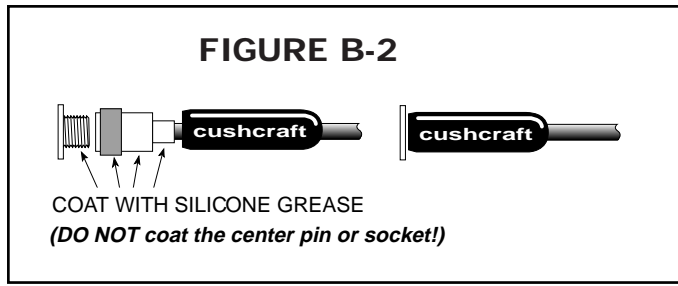
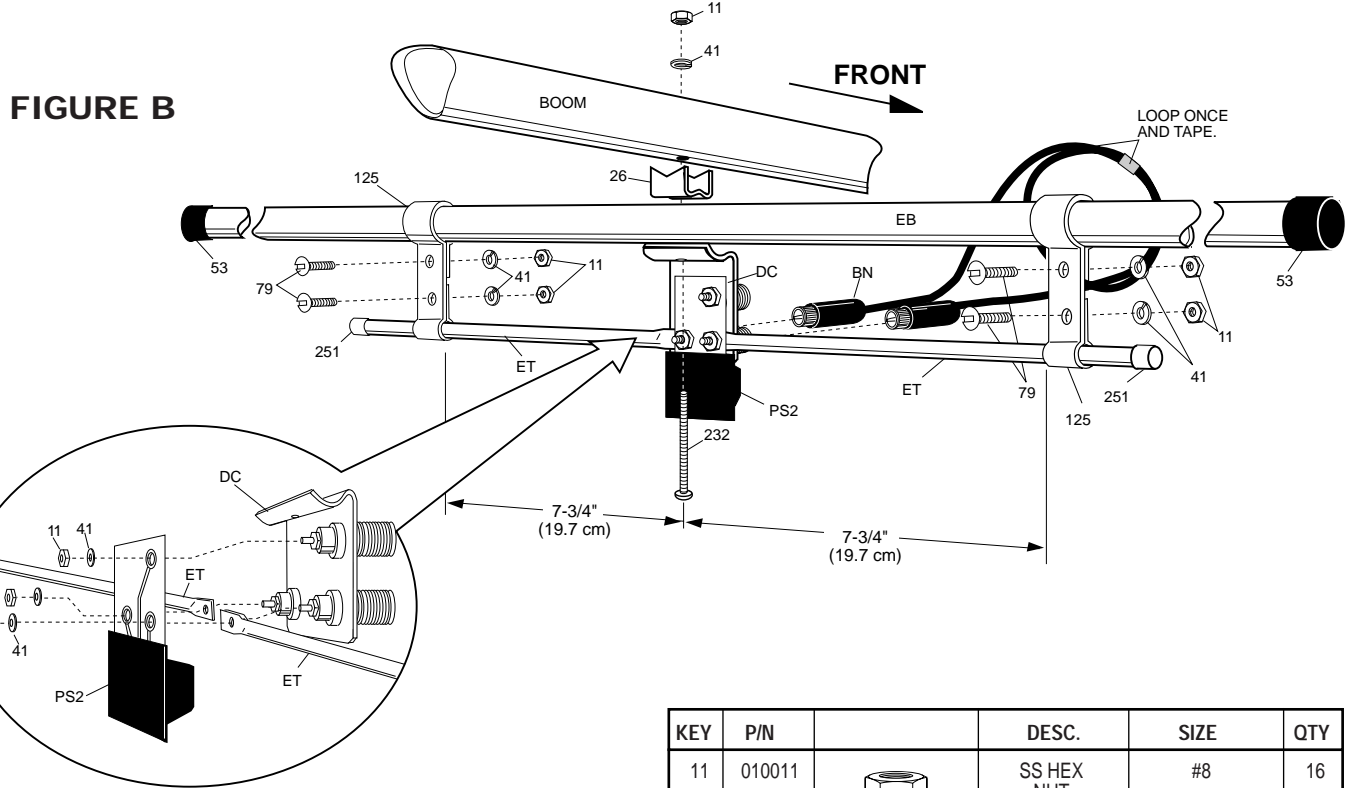
KEY	P/N	DESC.	SIZE	QTY
13	050013	PLASTIC CAP	1-1/4" (3.2 cm)	2
41	011941	SS LOCK WASHER	#8	2
120	010123	SS SCREW	8-32 x 2" (5.1 cm)	2
232	010232	SS SCREW	8-32 x 2-1/2" (6.4 cm)	2
412	030412	SS WORM CLAMP	1-1/2" (3.8 cm)	4

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## #2 - ASSEMBLE DRIVEN ELEMENTS

Assemble the T-match and polarity switcher (PS2) to the first driven element (EB) as illustrated in figure B. Refer to figure E and F and attach driven element at the second hole in from the rear of the boom using bracket (26), screw (232), washer (41) and nut (11). The connector bracket should face the front of the antenna. Connect T-match tubes (ET) to driven element using strap (125) and hardware. Set the spacing between the straps and brackets. Install coax balun (BN) across the T-match (figure B) and weather proof with silicone as shown in figure B-2. Tighten hardware and press on endcaps (251) and (53).

Assemble other driven element as illustrated in figure C. Locate position of element from figure E. Note that the element will be 90 degrees (figure F) from the other driven element and the connector bracket will face the rear of the antenna. Attach driven element assembly to boom as outlined above using hardware as shown in figure C. Install coaxial balun (BN) to connector bracket and weatherproof with silicone (figure B-2). Tighten all hardware and press on endcaps (251) and (53).



KEY	P/N		DESC.	SIZE	QTY
11	010011		SS HEX NUT	#8	16
26	190026		ALUMINUM BRACKET	7/8" (2.2 cm)	2
41	011941		SS LOCK WASHER	#8	16
53	050053		PLASTIC CAP	1/2" (1.3 cm)	4
79	010079		SS MACHINE SCREW	8-32 x 1/2" (1.3 cm)	8
116	240116		SILICONE PACKAGE		2
125	200125		TUNING STRAP		4
124	190124		CONNECTOR STRAP	1" (2.5 cm)	1
232	010232		SS MACHINE SCREW	8-32 x 2-1/2" (6.4 cm)	2
251	050251		WHITE CAP	3/8" (1 cm)	4
BN			COAXIAL BALUN	29" (73.7 cm)	2
DC			CONNECTOR BRACKET ASSY		2

KEY	P/N		DESC.	SIZE	QTY
ET			T-MATCH TUBE	3/8" x 10" (1" x 25.4)	4
PS2			POLARITY SWITCH ASSY		1

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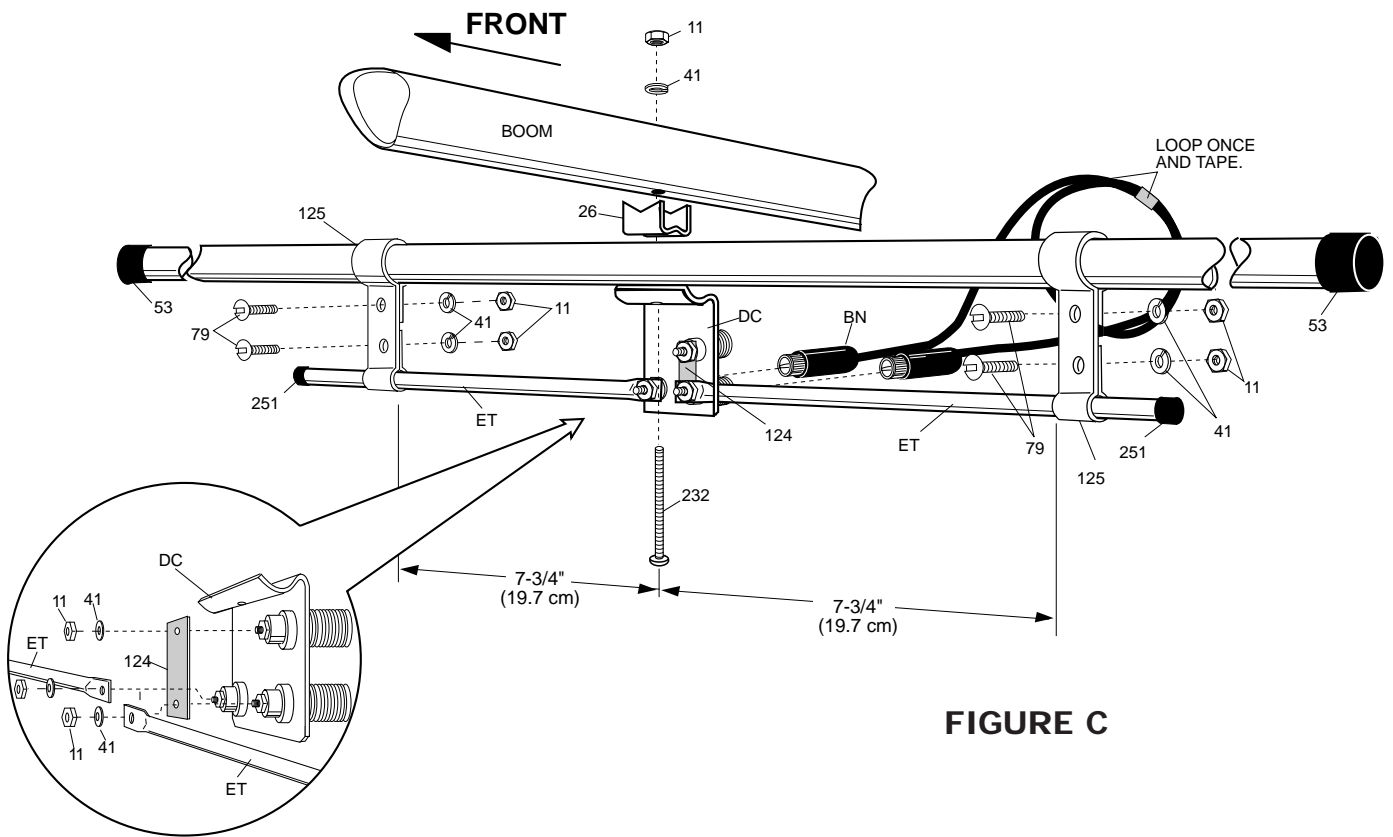


FIGURE C

KEY	P/N		DESC.	SIZE	QTY
11	010011		SS HEX NUT	8-32	20
26	190026		ALUMINUM BRACKET	7/8" (2.2 cm)	20
28	190028		ALUM HALF WASHER		20
41	010941		SS SPLIT WASHER	#8	20
120	010120		SS MACHINE SCREW	8-32 x 2" (5.1 cm)	8
232	010232		SS MACHINE SCREW	8-32 x 2-1/2" (6.4)	12

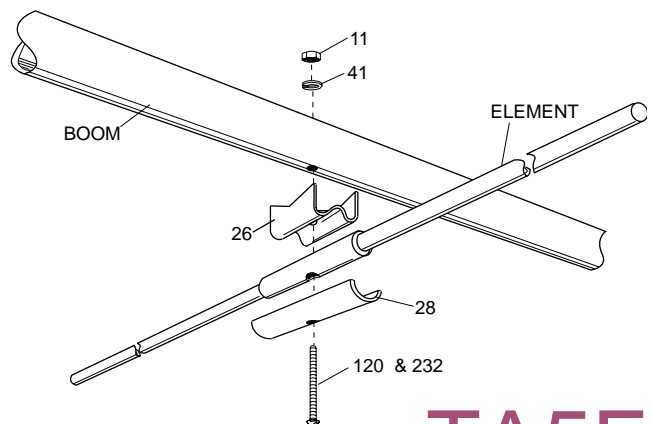
TABLE A  
Element Lengths

Key	Element #	Inches	CM
EA	1	40	101.6
EB	2	39-1/2	100.3
EC	3	37-1/4	94.6
ED	4	36-3/4	93.3
EE	5	36-3/8	92.4
EF	6	35-7/8	91.1
EG	7, 8	35-1/4	89.5
EH	9	35	88.9
EI	10, 11	34-3/4	88.3

### #3 - MOUNT ELEMENTS

Sort solid rod elements by length using Table A. Group into two separate sets, one for each plane of the antenna. Refer to figures D and E as guides in mounting elements. Install the element (EA) using the hole closest to the rear. The next hole along the boom is for a the driven element with the polarity switcher (figure B). Install the progressively shorter elements working towards the front of the boom. Remove temporary pins as you proceed and replace with elements. Use screw 120 on sections BA and BE. Use screw 232 on tubes BB and BD. Note: the pins joining the rear boom BA to the boom BB and front boom BE to BD should not be removed. After completion of one plane of elements, repeat the installation of elements for the other plane.

FIGURE D



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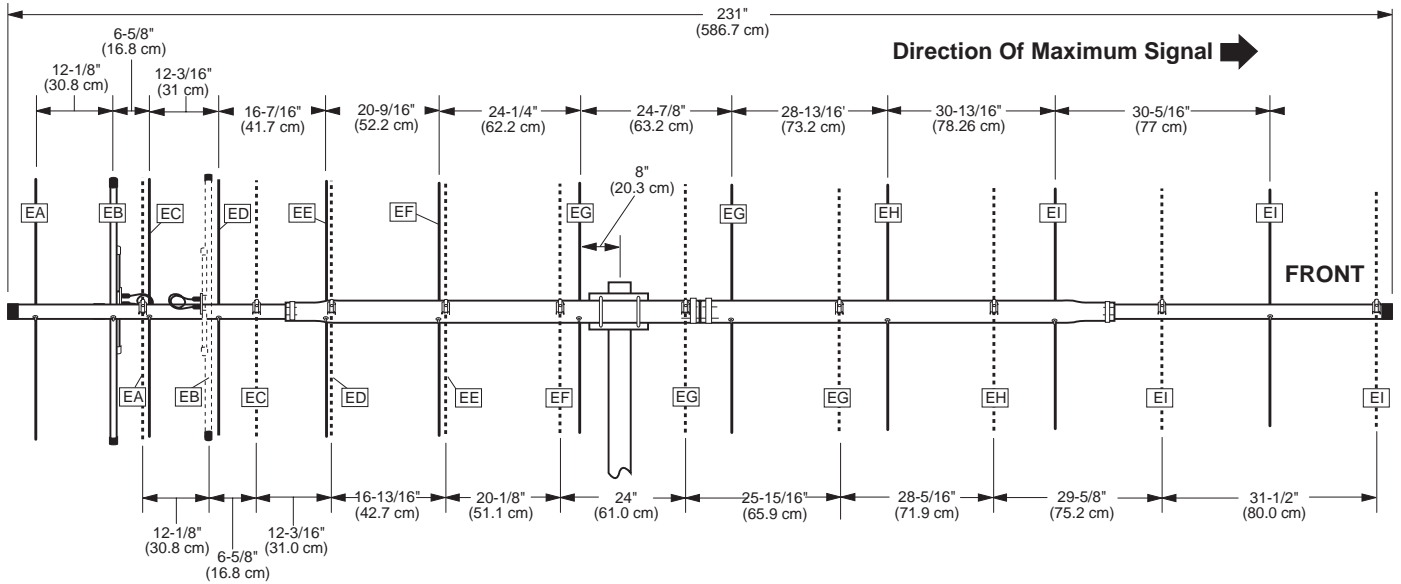


FIGURE E

## #4 - INSTALL PHASE CABLE

Route phase cable assembly (FL) to driven elements (figure F). Apply silicone (116) to outer threads of UHF connectors on both driven elements (EB). Do not coat center pins! Thread on connectors and coat outer shell of connectors with remaining silicone. Slide vinyl boots (115) over connectors until they butt up against connector brackets (DC). Attach two conductor wire to phono plug (109). Without power applied to the polarity switch, the antenna has LEFT circular polarization. With +12 Volts DC applied polarity switches to RIGHT circular. Do not switch while transmitting. Run switch wire along side the phase harness. Tape feedline and power cable in place.

KEY	P/N	DISPLAY	DESC	SIZE	QTY
109	353109		PHONE PLUG		1
115	050115		VINYL BOOT		1
116	240116		SILICONE PACK		1
FL			PHASE CABLE w/T CONN.		1

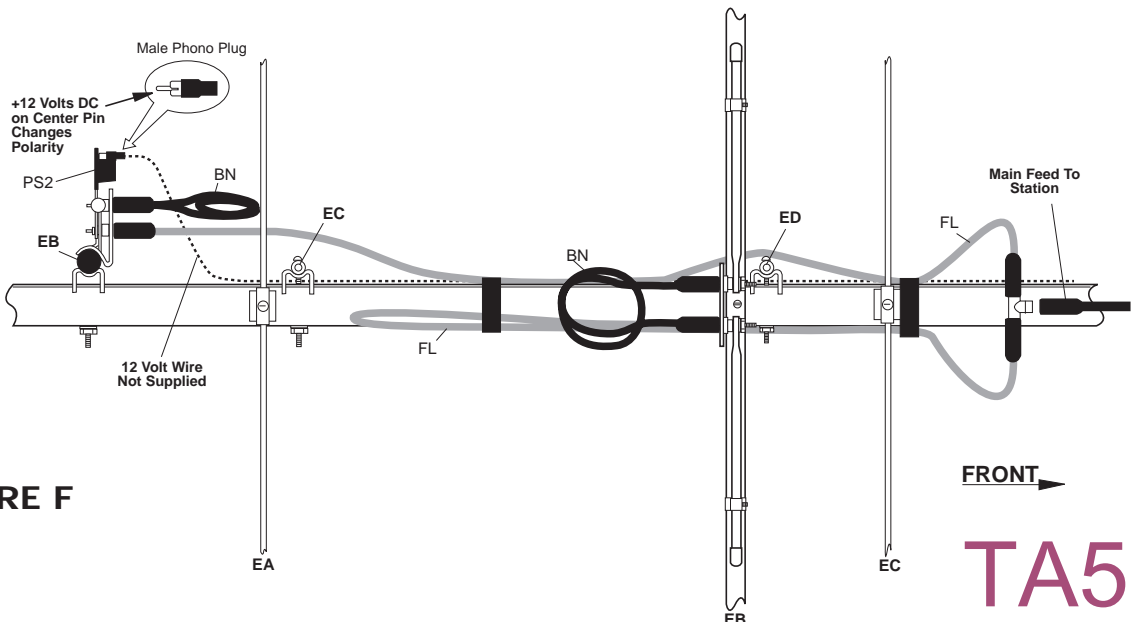
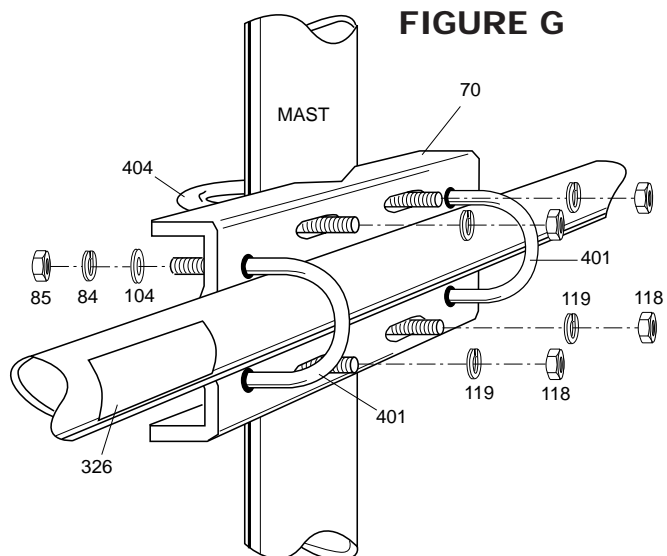











FIGURE F

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## #5 - BOOM TO MAST ASSEMBLY

Assemble and mount the boom to mast clamp (70) between elements 7 and 8 with U-bolts (401) as shown in figure E and G. Rotate mast clamp so that it makes a 45 degree angle between both sets of elements. Secure with flat washers (104), lock washers (84) and nuts (85) in that order. Note that the center of the mast must be 8" (20.3 cm) away from element 7. Tighten hardware using care not to crush the boom. You are now ready to mount the antenna to your mast using U-bolts (404). Secure with lock washers (119) and nuts (118). Affix warning label (326) to boom (figure G).



KEY	P/N	DISPLAY	DESC	SIZE	QTY
84	010084		SS LOCK WASHER	1/4" (.64 cm)	4
85	010085		SS HEX NUT	1/4" (.64 cm)	4
104	010104		SS FLAT WASHER	1/4" (.64 cm)	4
118	010118		SS HEX NUT	5/16" (.79 cm)	4
119	010119		SS LOCK WASHER	5/16" (.79 cm)	4
401	010401		SS U-BOLT	1 1/2" x 3" (3.8 x 7.6 cm)	2
404	010404		SS U-BOLT	2 1/2" x 3" (5.5 x 7.6 cm)	2
70	190070		MOUNTING PLATE	4" x 6" (10.2 x 15.2 cm)	1
326	290326		DANGER LABEL		1

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## SPECIFICATIONS

<b>MODEL</b>	<b>22XB</b>
Frequency, MHz	144-148
No. Elements	22
Forward Gain, dBdc	14
Front to Back Ratio, dB	25
Ellipticity dB at boresight	2
SWR 1.2:1 Typical	
2:1 Bandwidth, MHz	4
Power Rating, Watts PEP	600
3dB Beamwidth, Degrees	
E Plane	30
Boom Length, ft (m)	19.33 (5.9)
Longest Element, in (cm)	39.19 (99.6)
Turning Radius, ft (m)	11 (3.35)
Mast Size Range, in (cm)	1.5-2.0 (3.8-5.0)
Wind Load, ft <sup>2</sup> (m <sup>2</sup> )	2.6 (.24)
Weight, lb (kg)	11 (5)
Polarity switch	Included

### LIMITED WARRANTY

Cushcraft Corporation, P.O. Box 4680, Manchester, New Hampshire 03108, warrants to the original consumer purchaser for one year from date of purchase that each Cushcraft antenna is free of defects in material or workmanship. If, in the judgement of Cushcraft, any such antenna is defective, then Cushcraft Corporation will, at its option, repair or replace the antenna at its expense within thirty days of the date the antenna is returned (at purchasers expense) to Cushcraft or one of its authorized representatives. This warranty is in lieu of all other expressed warranties, any implied warranty is limited in duration to one year. Cushcraft Corporation shall not be liable for any incidental or consequential damages which may result from a defect. Some states do not allow limitations on how long an implied warranty lasts or exclusions or limitations of incidental or consequential damages, so the above limitation and exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. This warranty does not extend to any products which have been subject to misuse, neglect, accident or improper installation. Any repairs or alterations outside of the Cushcraft factory will nullify this warranty.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE



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