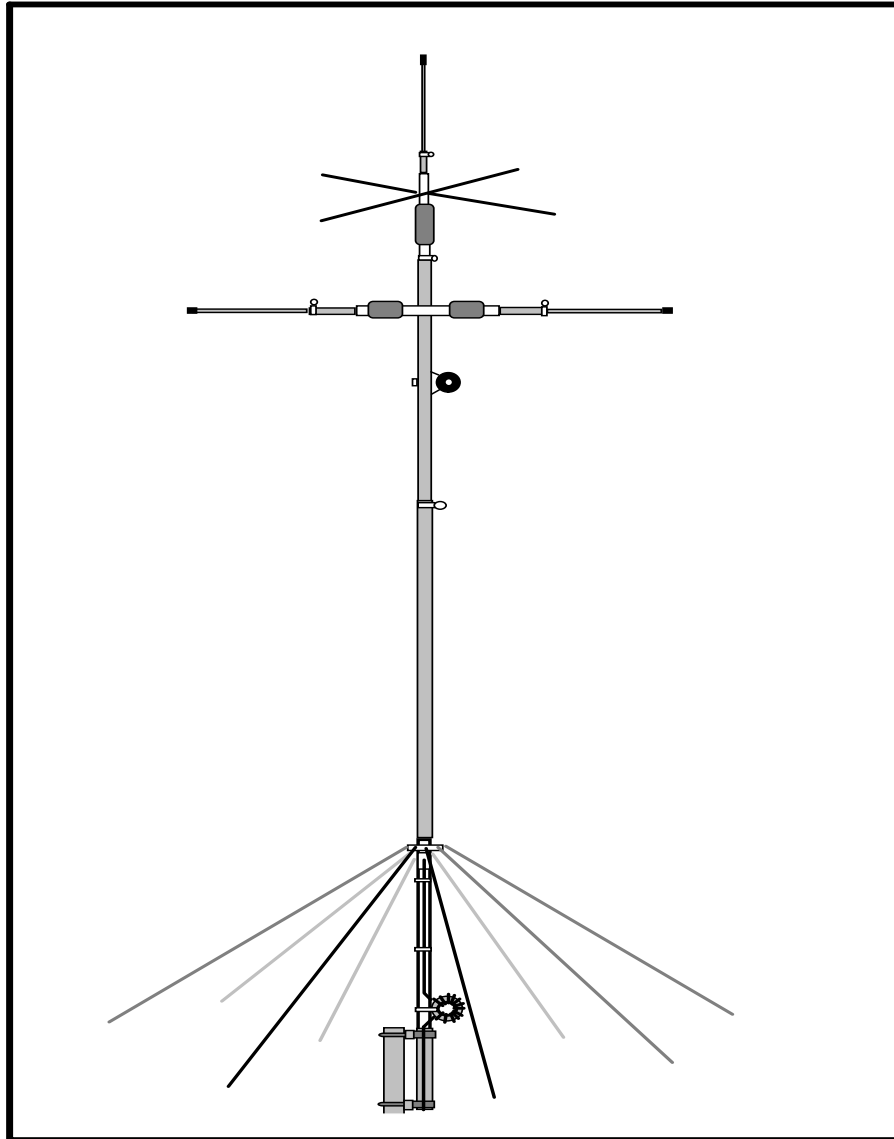


Assembly and Installation Instructions



Cushcraft MA5VA Five-Band HF Vertical Antenna For 20, 17, 15, 12, and 10 Meters

Cushcraft
Amateur Radio Antennas

958164_GF_AB

General Description: The MA5VA is a light-weight ground-independent HF vertical covering 20, 17, 15, 12, and 10 Meters. Parallel resonators provide automatic band switching and interaction-free tuning adjustments for each band. The MA5VA uses a unique OCFD (off-center fed dipole) configuration that delivers a 50-Ohm match on all bands without need for an external matching network or tuner. Weighing only six pounds, it transports easily and sets up quickly for portable use. At fixed locations, mounting high in the air with low-cost TV hardware allows it to outperform much heavier multi-band verticals installed close to the ground.

Before assembling, read this manual carefully to become familiar with all components and procedures. Also, please check package contents against the parts list below to ensure all items are included.

Hardware

[]	5	030407	Small worm clamp
[]	2	030411	Large worm clamp
[]	8	010009	5/8" x 8-32 screw
[]	2	010229	1" x 8-32 screw
[]	2	010040	1-1/4" x 8-32 screw
[]	3	010123	1-1/2" x 8-32 screw
[]	15	014941	#8 lock washer
[]	17	010011	8-32 nut
[]	2	360941	#10 flat aluminum spacer washer
[]	2	010405	5/16" – 18 x 2-1/8" x 4-1/2" U-bolt
[]	8	010119	5/16" lock washer
[]	4	013402	5/16" flat washer
[]	12	010118	5/16" nut

Components

[]	4	195548	Base bracket
[]	2	195726	V-bracket
[]	2	194174	8-rod radial ring plate
[]	2	196242	Radial ring support bracket
[]	1	MA5VAFL	9' RG-58 feedline assembly
[]	1	350866	2.4" OD #61 mix balun core
[]	1	100432	UHF Barrel Connector
[]	5	031150	Plastic tie wrap
[]	5	050077	3/8" vinyl end cap

Tubes and Rods

[]	1	MA5VBA	1-1/8" OD x 12" aluminum base tube
[]	1	MA5VABB	1" OD x 54" insulated fiberglass base tube
[]	1	MA5VBC	1-1/8" OD x 48" aluminum element tube
[]	1	MA5VBD	1" OD x 48" aluminum element tube
[]	1	MA5VEA	3/8" OD x 6" resonator tube
[]	1	MA5VEB	3/8" OD x 12" resonator tube
[]	1	MA5VEC	3/8" OD x 14" resonator tube
[]	1	MA5VED	3/8" OD x 18" resonator tube
[]	1	MA5VEE	3/8" OD x 21" resonator tube
[]	2	XHR12	12" X-hat rod
[]	8	228161	48" stainless radial rod with 35° degree bend

Resonator Assemblies

[]	1	MA5VRA	10 / 12 Meter resonator assembly
[]	1	MA5VRB	15 / 17 Meter resonator assembly
[]	1	MA5VRC	20-Meter resonator assembly

Assembly Instructions – MA5VA

[] Step 1: Install Base Tube on Insulator

Parts

1	MA5VBA	1-1/8" x 12" aluminum base tube
1	MA5VABB	1" x 54" insulated fiberglass base
2	010040	1-1/4 x 8-32 screw
2	010011	8-32 hex nut

Procedure

- [] Identify the base end of the insulator tube (two sets of mounting holes 2-3/4" apart)
- [] Install the 12" aluminum the base tube so mounting holes line up as shown in Fig-1
- [] Install a 1-1/4" x 8-32 screw at **A** and secure with a 8-32 nut
- [] Install a 1-1/4" x 8-32 screw at **B** and secured with a 8-32 nut

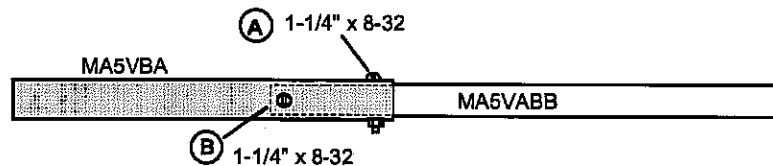


FIG 1: Base Insulator Assembly

[] Step 2: Install Mast Mounting Hardware

Parts

12	010118	5/16" nut
8	010119	5/16" lock washer
2	010405	U-bolt
2	195726	V-bracket
4	195548	Antenna Base Bracket
4	013402	Flat Washer

Procedure

- [] Find a U-bolt and install a V-bracket in opposing fashion to form a mast opening (**A**)
- [] On each U-bolt leg, install a 5/16" flat washer, lock washer, and nut. Spin nuts to expose 2" of thread (**B**)
- [] On each U-bolt leg, install a second nut. Spin nuts to expose 1-1/8" of thread (**C**)
- [] Install two opposing base brackets to form a clamp for the antenna base (**D**)
- [] Loosely install the mast mount assembly at position (**E**) using lock washers and nuts
- [] Repeat the assembly procedure for a second mounting assembly and install at (**F**)
- [] Align clamp assemblies by placing base on a level surface so all four U-bolt legs make contact
- [] Tighten end nuts to secure each base clamp firmly in position

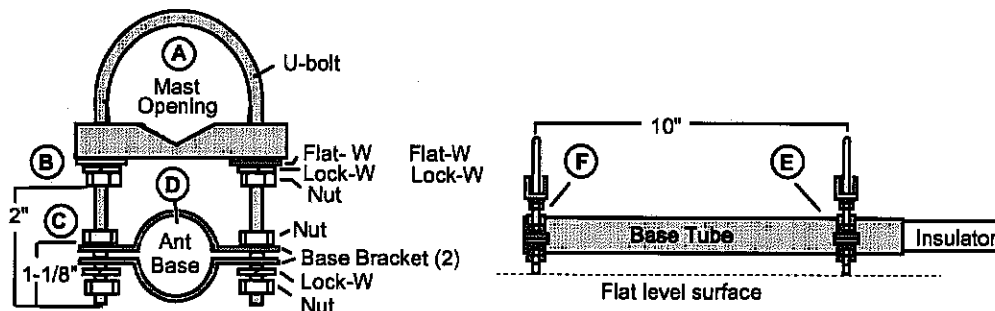


Fig 2: Mounting Clamp Assembly

[] Step 3: Pre-assemble Radial Ring

Parts

2	194174	8-rod radial ring
2	196242	Radial-ring support bracket
8	010009	5/8" x 8-32 screw
2	360941	#10 aluminum spacer washer (thicker than #8 SS flat washers)
8	011941	#8 lock washer
8	010011	#8 nut

Procedure

- [] Locate two radial rings and place together so cupped grooves oppose
- [] Install two 5/8" screws from top to bottom, as shown at A
- [] From bottom side, install a #10 spacer washer (B) and a ring-support bracket on each screw (C)
- [] Secure assembly using lock washers and nuts (finger-tighten only for now)
- [] Install six 5/8" screws in remaining holes (D), securing with lock washers and nuts
- [] Set assembly aside for later installation on antenna

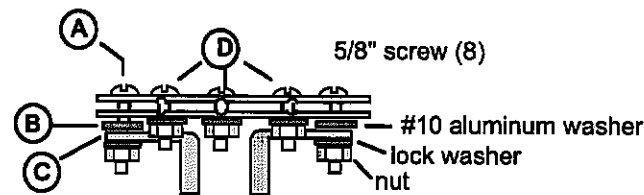


FIG 3: Assembly Detail, Radial Ring

[] Step 4: Prepare Feedline Choke

Parts

1	MA5VAFL	Feedline Assembly
1	350866	2.4" #61 balun core (FT-240-61)
2	031150	Plastic tie-wrap

Procedure

- [] Find the PL259 end of the feedline assembly. Measure down 38" and mark cable.
- [] At 38", wind 2 turns of coax tightly around balun core and secure in place with a tie-wrap (A)
- [] Continue winding for a total of 14 turns and capture the last two turns with a tie-wrap (B)
- [] Arrange turns as needed for even distribution, as shown

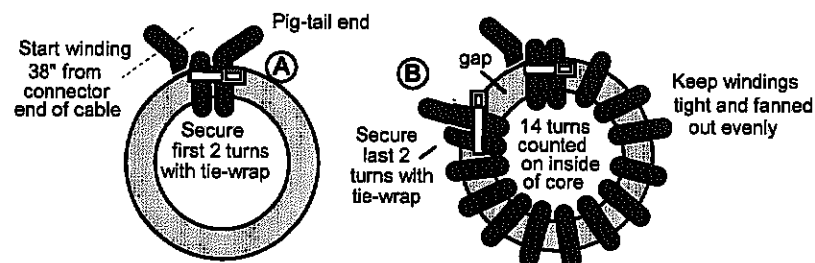


FIG 4: Preparation of Balun

[] **Step 5: Install Radial Ring, Lower Radiator Tube, Coax Feed.**

Parts

1	pre-assembly	Feedline and balun
1	pre-assembly	Radial ring assembly
1	MA5VBC	1-1/8" x 48" aluminum tube
3	010123	1-1/2" x 8-32 screw
3	011941	#8 lock washer
3	010011	8-32 nut
3	031150	Plastic tie wrap

Procedure

- [] Slide radial ring assembly onto insulator tube and position, as shown (A)
- [] Identify the mounting-hole end of the 48" aluminum tube and position at B, aligning mounting holes
- [] Find pigtail (lug) end of Feedline. Also, find two 1-1/2" screws plus nuts and lock washers
- [] Secure feedline shield and radial ring assembly to the insulator tube at C
- [] Secure feedline center conductor and aluminum radiator tube BC to the insulator at D
- [] Using three plastic tie wraps, secure the coax and balun to the base insulator as shown in E
- [] Install the remaining 1-1/2" screw and hardware at F and secure

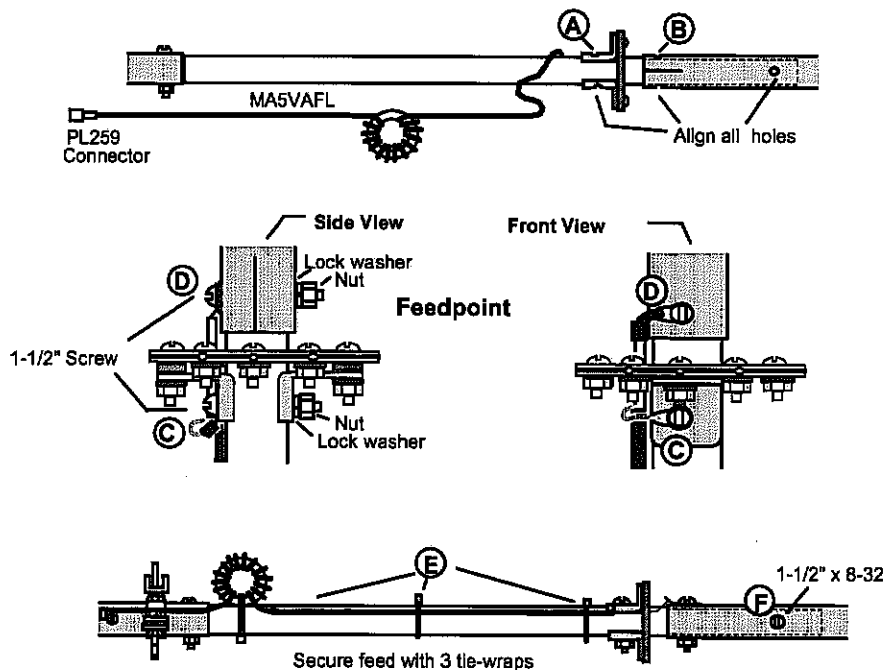


Fig 5: Base Assembly and Coax Feed Connection

[] **Step 6: Assemble and Pre-adjust 20-Meter Resonator.**

Parts

1	MA5VRC	20-Meter resonator assembly
1	MA5VEE	3/8" x 21" resonator tube
2	HXR12	12" X-hat rod
2	010229	1" x 8-32 screw
2	011941	#8 lock washer
2	010011	8-32 nut
1	030407	Small worm clamp
1	053368	vinyl end cap, 3/8"
4	053368	vinyl end cap, 1/8"

Procedure

- [] Install a 12" X-hat rod (A) as shown and secure with a 1" x 8-32 screw and hardware
- [] Install the second X-hat rod in similar fashion
- [] Place a small worm clamp on the MA5VRC as shown (B)
- [] Install the 21" resonator tube (C). Extend 16" and secure in place with worm clamp
- [] Install the 3/8" vinyl cap on end of resonator tube at D

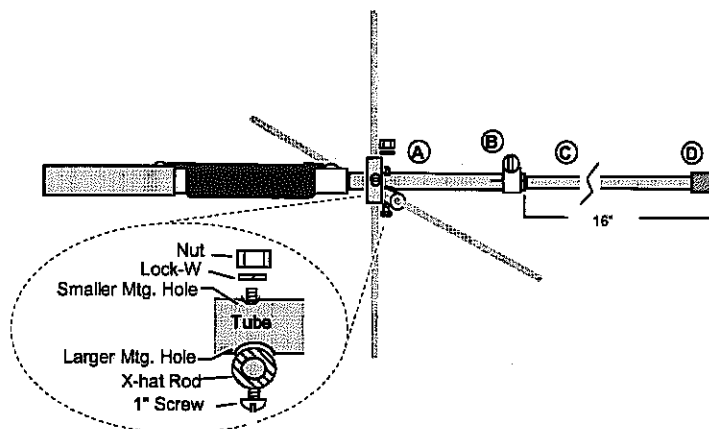


FIG 6: 20-Meter Resonator Assembly

[] Step 7: Install and Pre-adjust 17,15,12, 10-Meter Resonators

Parts

1	MA5VRA	10 / 12 meter resonator assembly
1	MA5MRB	15 / 17 meter resonator assembly
1	MA5VEA	6" resonator tube
1	MA5VEB	12" resonator tube
1	MA5VEC	14" resonator tube
1	MA5VED	18" resonator tube
4	030407	small worm clamp
4	050077	vinyl end cap

Procedure

- [] Position a small worm clamp at the slotted end of each resonator assembly.
- [] On MA5VRA, find 10-meter side and install 6" tube. Extend 3-3/8" and tighten clamp.
- [] On MA5VRA, find 12-meter side and install 12" tube. Extend 8-1/4", and tighten clamp.
- [] On MA5VRB, find 15-meter side and install 14" tube. Extend 10" and tighten clamp.
- [] On MA5VRB, find 17-meter side and install 18" tube. Extend 13-1/4" and tighten clamp.
- [] Install a vinyl end cap on each tube (4 total).

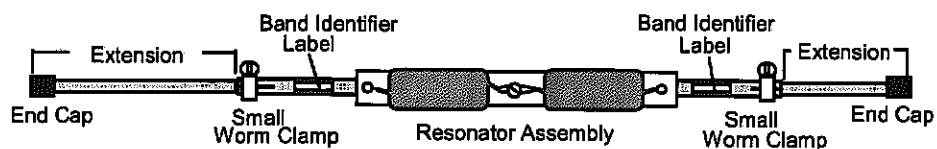


FIG 7: Assembly of 10/12 and 15/17 Meter Resonators

[] Step 8: Assemble Upper-Radiator

Parts

1	MA5VBD	1" x 48" upper-element aluminum tube
1	030411	Large worm clamp
2	011941	Lock washer
2	010011	8-32 nut
1	pre-assembly	20-Meter resonator
1	pre-assembly	15 and 17-Meter resonator
1	pre-assembly	10 and 12-Meter resonator

Procedure

- [] Find the 1" x 48" aluminum tube BD and install a large worm clamp (loosely) on the slotted end (C)
- [] Find 10/12-meter resonator, install in hole furthest from slotted end (A). Secure with lock washer and nut
- [] Find 15/17-meter resonator, install in hole nearest slotted end (B). Secure with lock washer and nut
- [] Insert the base of the 20-meter resonator into the slotted end of tube at C
- [] Set resonator for 4-1/2" of exposed aluminum tube, secure in place with large worm clamp

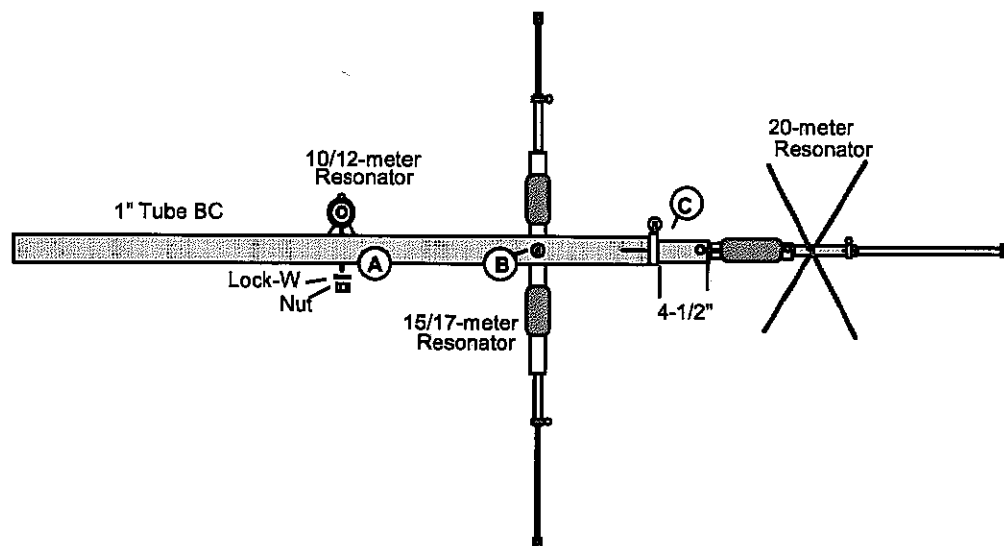


FIG 8: Mounting Resonators

[] Step 9: Join Upper and Lower Antenna Sections

Parts

1	pre-assembly	Antenna top section
1	pre-assembly	Antenna base section
1	030411	large worm clamp

Procedure

- [] Find top-section, measure 8" up from lower (un-slotted) end, and place reference mark.
- [] Loosely install a large worm clamp at A on lower section.
- [] Insert top section to 8" mark and tighten the worm clamp securely.

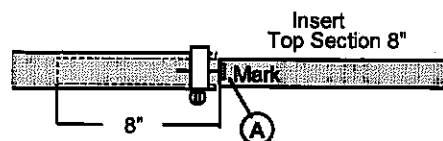


FIG 9: Joining antenna sections

[] **Step 10: Install Radial Rods.**

Important Warning: When working with stainless steel radial rods, always wear protective eyewear to prevent accidental eye injury.

Assembly Note: It is generally easier to install radial rods with the antenna supported upright. This orientation allows gravity to hold them in a "drooped" position while tightening screws.

Parts

8 228161 48" stainless steel radial rod with 35° bend

Procedure

- [] On the radial ring, loosen all eight 5/8" screws.
- [] Insert radial rods between plates (A), installing so that rod tips droop toward ground.
- [] Loosely re-secure screws.
- [] Arrange rod tips for symmetrical spacing all around and tighten hardware securely.

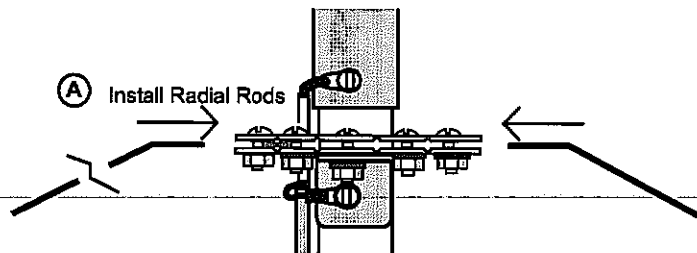


FIG 10: Inserting radial rods

[] **Step 11: Mounting Antenna On Mast**

Procedure

- [] Spin nuts supporting V-bracket counter-clockwise to enlarge U-bolt mast opening (A)
- [] Drop antenna onto mast, as shown (B)
- [] Used open-ended wrench to tighten nuts securely, locking antenna in place (C)

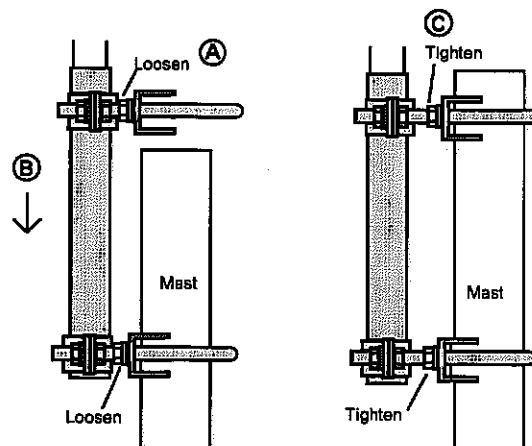


FIG-11: Mounting Antenna onto Mast

General Setup and Installation Recommendations

[] **RF-Exposure:** Never mount your MAV5A where humans or pets can make accidental contact. Angular parts can cause skin injury and RF-energized metal surfaces may inflict severe RF burns. Also, note that transmitting may expose nearby humans to intense RF fields, the medical effects of which are unknown but may be harmful. U.S. amateurs are required to comply with FCC exposure-safety guidelines. For more information, see the FCC web site at www.fcc.gov/oet/rfsafety and the ARRL web site at www.arrl.org/news/safety. Amateurs in other countries may also be subject to local regulatory standards.

[] **Mounting:** Unlike vertical monopoles that rely on ground radials, the MA5VA is a *ground-independent vertical dipole* and *mounting it too close to the ground could seriously degrade performance*. For best results, mount with the counterpoise rods elevated a minimum of 12 feet off the ground or higher. Because the antenna is light in weight, positioning well above the roofline is usually possible using low-cost TV-antenna mast and hardware. Avoid mounting near parallel conductive surfaces such as metal buildings, towers, hanging feedlines, etc. If guys are required to stabilize the mast, we recommend Phillystran® or a similar UV-stable non-conductor. Do not install metallic guy lines directly under the antenna. Plan installation work carefully and use only qualified persons to monitor or assist. When in doubt, obtain the services of a professional installer.

Important Warning: *Never install any antenna where it could fall and contact power or entrance lines. Also, never assemble an antenna or handle metallic antenna components in the vicinity of power lines. Death or severe injury can result from accidental contact with wires carrying electrical power.*

[] **Lightning Protection:** Nothing will protect your equipment from a direct lightning strike when the feedline is connected, so always disconnect it from the building when your radio is not in use. Also, be sure to ground the low end of any supporting mast using at least two 4' rods and heavy-gauge wire. Never attach a lightning-ground directly to the antenna feedpoint – doing so will bypass the balun choke and degrade performance. For secondary equipment protection from unexpected nearby lightning strikes, install a quality in-line arrester such as the Cushcraft LAC4.

[] **Feedline Selection:** RG-58 works well for short runs, RG-8X (Mini-8) is okay up to 60 feet. For longer runs, use RG-8, RG-213, LMR-240, or LRM-400 to minimize loss. The supplied UHF barrel connector may be used for connecting male cable ends to the MA5VAFL male coax pigtail.

[] **Tuning Procedure:** Our recommended resonator settings were gathered on an antenna range using a sample MA5VA tuned to **14.175**, **18.110**, **21.225**, **24.930**, and **28.500** MHz. Your settings could vary depending on antenna location, operating preferences, and normal manufacturing tolerances. When fine-tuning, note that extending the resonator tube lowers resonant frequency and collapsing it raises frequency. Make small adjustments (1" or less) and avoid over-tighten and damaging the small worm clamps. For best results, tune during dry weather conditions with the antenna positioned as close to its final operating position as possible.

[] **Precipitation Loading:** A buildup of rain droplets, ice, or snow will cause SWR curves to shift lower in the band. Precipitation detuning affects all antennas, but it is normally more pronounced for compact radiators like the MA5VA. If SWR should exceed 2:1 on your operating frequency because of inclement weather, you may use any ATU to temporarily compensate for the condition without harming the antenna. The impact on on-air performance will be minimal.

Important Warning: *The MA5VA is rated for 250 Watts PEP. Attempting to use a high-power linear amplifier may result in permanent damage to epoxy-encapsulated resonator coils. The MA5VA warranty will not cover resonator damage resulting from the application of excessive RF power.*

MA5VA Specifications

Frequency Coverage:	20, 17, 15, 12, 10 Meters
Impedance:	50-Ohms
Gain:	1-2 dBi
Minimum SWR:	1.2:1 typical at resonance
Power Rating	250 Watts PEP
Wind Survival	80 mph
Mast Size:	1-1/4" – 2-1/8" (3.18–5.39 cm)
Height	14' 7" (4.48m)
Weight:	5.8 lbs (2.63 kg)
2:1 Bandwidth (kHz)	20m(200), 15m(350), 10m(350) 17m & 12m (full band)

LIMITED WARRANTY

Cushcraft Amateur Radio Antennas, 308 Industrial Park Rd., Starkville, MS 39759, warrants to the original consumer purchaser for one year from date of purchase that each Cushcraft antenna is free of defects in materials or workmanship. If, in the judgment of Cushcraft, any such antenna is defective, then Cushcraft Amateur Radio Antennas 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 Amateur Radio Antennas shall not be liable for any incidental or consequential damages that 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 that vary from state to state. This warranty does not extend to any products that have been subject to misuse, neglect, accident or improper installation. Any repairs or alterations outside of the Cushcraft factory will nullify this warranty.

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