

CDE HAM III

ROTOR SYSTEM

Owner's Manual



THE HAM III IS RATED FOR ANTENNAS WITH
UP TO 12.5 SQUARE FEET OF WIND SURFACE
AREA WHEN PROPERLY MOUNTED IN A TOWER.



CORNELL-DUBILIER ELECTRONICS
DIVISION OF FEDERAL PACIFIC ELECTRIC COMPANY
Rotor Department
Fuquay-Varina, North Carolina 27526

Rotor Installation

The Ham III rotor is engineered to handle relatively heavy antennas including multiband arrays having traps at the extremes of the elements. Long and trouble free performance of the system depends on making the installation to properly handle the stresses involved. **CAUTION:** THE ROTATOR IS DESIGNED FOR VERTICAL OPERATION WITH THE BELL SHAPED HOUSING IN THE UP POSITION. Water and other contamination will get into the motor unit if mounted horizontal or up-side-down.

In order to reduce the chance of slippage between the antenna mast and clamp plate. A bolt and locking nut are provided in the hardware kit. The bolt is to be inserted into the tapped hole in the clamp plate.

On any inside tower installation, care must be exercised to get the top mast shimmed to the exact rotational center of the rotator upper mast support. The geometry is such that a mast of 52mm (2.062 inches) will be exactly centered. For each 1.6 mm (.0625 inches) less mast diameter used, .8 mm (.031 inches) of shim must be wrapped around the mast at the clamping points.

Unbalanced Weight

Weight should be as closely balanced as possible. Unbalanced weight creates a bending moment of force which is concentrated on the mast at the point where it is clamped to the top of the rotor.

This moment tends to strain the mast at that point and also to bind the ball bearings by creating excessive downward pressure on one side and upward pressure on the other. Such unbalance places additional stresses on the motor and gear train. Unbalanced weight becomes critical as the distance from the antenna boom to the clamping point at the rotor is increased.

Wind Pressure

Wind pressure against the boom and elements produces a bending force on the mast which can cause the same stresses as unbalanced weight. To strengthen the installation to withstand unbalanced weight and wind pressure, the top mast should be as short as possible. In multiple arrays the heaviest sections should be closest to the rotator. In order to distribute the bending stress and prevent fracture of the mast, the HAM rotor includes a specially designed steel clamping plate. It is recommended that the mast be reinforced in the area where it is clamped by driving a hardwood dowel of proper size into the end of the mast.

Mechanical Description

The motor drives a train of stainless steel spur and pinion speed reduction gears which in turn drive the ring gear. The ring gear drives the bell shaped upper mast support, into which the antenna mast is mounted in rigid central alignment. A boss is cast on the under side and in the center of the cavity of the upper mast support, which engages the serrated edge of the potentiometer moving arm which is mounted on the top of the inner mechanism.

Maximum support and low frictional loss between the rotating upper mast support and the inner mechanism is assured by the use of two groups of 49 steel balls each riding in the bearing races between the two assemblies, and held in special nylon retainers.

Mechanical stops along with electrical limit switches are built into the rotor mechanism to provide accurate and complete 360 degree rotation.

The brake assembly is released by a 24 volt AC solenoid, the plunger of which is mechanically attached to the wedge. When the wedge is positioned for braking, a cam latch locks the wedge in the teeth of the lower housing. To release the brake, the solenoid is energized. This unlocks the latch automatically and retracts the wedge from the teeth in the housing.

Circuit Description

Two transformers are mounted in the control unit. The power transformer supplies approximately 30 VAC for releasing the brake and operating the motor when control levers are depressed. Overheating of the transformer from prolonged operation or possible short circuit is prevented by a thermal cut-out switch in the primary winding.

The motor is a two-phase device with the first winding being supplied AC direct from the transformer while the second has a 120-140 MFD. capacitor in series in order to shift the phase and provide forward rotational torque. To reverse, the capacitor is switched in series with the first winding, while the second is directly supplied from the transformer.

The solenoid which releases the brake operates from the same transformer that supplies power to the motor.

The meter transformer is energized as the on-off control is switched to the "on" position. This illuminates the meter dial and the meter indicates the position of the antenna. 13 VDC is supplied to the 500 OHM potentiometer in the rotator through a zener regulated supply.

The meter is a high quality DC instrument requiring 1 MA for full scale deflection. It is connected through the 10 K multiplier to the plus side of supply and potentiometer, which is protected by a $\frac{1}{8}$ AMP fast blow fuse. The meter circuit is completed through the 5000 OHM calibrated control and operate/calibrate switch to ground. The operate/calibrate control is located on the front panel. With the zener controlled supply the 5K calibrate control will be set at approximately 3000 OHMS which will give 13,000 OHMS in series with the meter to allow for 1 MA deflection at full scale.

Two electrical limit switches in the rotator remove the motor power just before the rotation reaches the extremes. A fuse, located on the rear panel is also included on one side of the AC power line.

Checking Control Unit

To check the control unit, plug the line cord into 120 volt AC power. With no connections to the terminals turn the on-off switch to the "on" position, the meter light will illuminate. The meter needle will remain on left hand "S".

To check the power circuit connect an AC voltmeter between terminals No. 1 and No. 2 on the rear panel and see that approximately 30 volts is indicated when the brake release lever is depressed. Connect the meter leads between terminals No. 1 and No. 5 and read approximately 30 volts with brake release lever and clockwise lever depressed. Now connect the meter leads between terminals No. 1 and No. 6 and read approximately 30 volts with the brake release lever and counter-clockwise lever depressed.

Checking Rotator From the Ground

You may possibly avoid bringing the rotator down from the mast by making electrical checks from the control box position. This is done by disconnecting the eight wires from the screw terminals and tagging them carefully No. 1 through No. 8 to correspond with the terminal numbers from which they were removed. From the schematic diagram it is apparent that the resistance of the lead wires will be added to the resistance of the motor windings and potentiometer strip in making the resistance checks.

Leads No. 1 and No. 2 of No. 18 AWG have approximately 0.64 OHM resistance per 100 feet and leads No. 3 through No. 8 of No. 22 AWG have approximately 1.6 OHMS resistance per 100 feet. Use a low resistance ohmmeter to check the values shown in Table 1 to an accuracy of 10 percent after adding the resistance of the leads involved.

To Check	Read Resistance	Between TERMINALS
Brake Solenoid	.75 ohms + leads	1-2
1/2 Motor Winding	2.5 ohms + leads	1-8
1/2 Motor Winding	2.5 ohms + leads	1-4
1/2 Motor + Switch	2.5 ohms + leads	1-5
1/2 Motor + Switch	2.5 ohms + leads	1-6
Entire Motor	5 ohms + leads	8-4
Right Limit Switch	0 ohms + leads	8-5
Left Limit Switch	0 ohms + leads	4-6
Entire Pot Switch	500 ohms	3-7
Pot Arm to + End	0 to 500 ohms	3-1
Pot Arm to — End	0 to 500 ohms	1-7

Table 1

Servicing the Control Unit

Disconnect the AC power source and remove the eight wire control cable. Be sure to tag each wire with the corresponding terminal number.

The control box can be checked without removing the cover by using a volt-ohmmeter to check values across terminals. Resistance across terminals No. 1-2 should read .4 Ohms. Read same value across terminals No. 1-5 with clockwise switch lever (right-hand) depressed and across terminals No. 1-6 with counter clockwise switch lever (left-hand) depressed. Resistance across input line cord with on-off switch in the "on" position and the brake lever depressed should read 3.8 Ohms.

With power cord connected and on-off switch in the "on" position and brake release lever depressed read approximately 30 VAC across terminals No. 1-2. With on-off switch in "on" position read $13 \pm 10\%$ VDC across terminals No. 3-7.

CONSTRUCTION NOTES

- Tape cables securely to mast.
- Provide slack for rotation and drip loop.
- Anchor securely to standoff to prevent strain on connectors and slipping of cable.

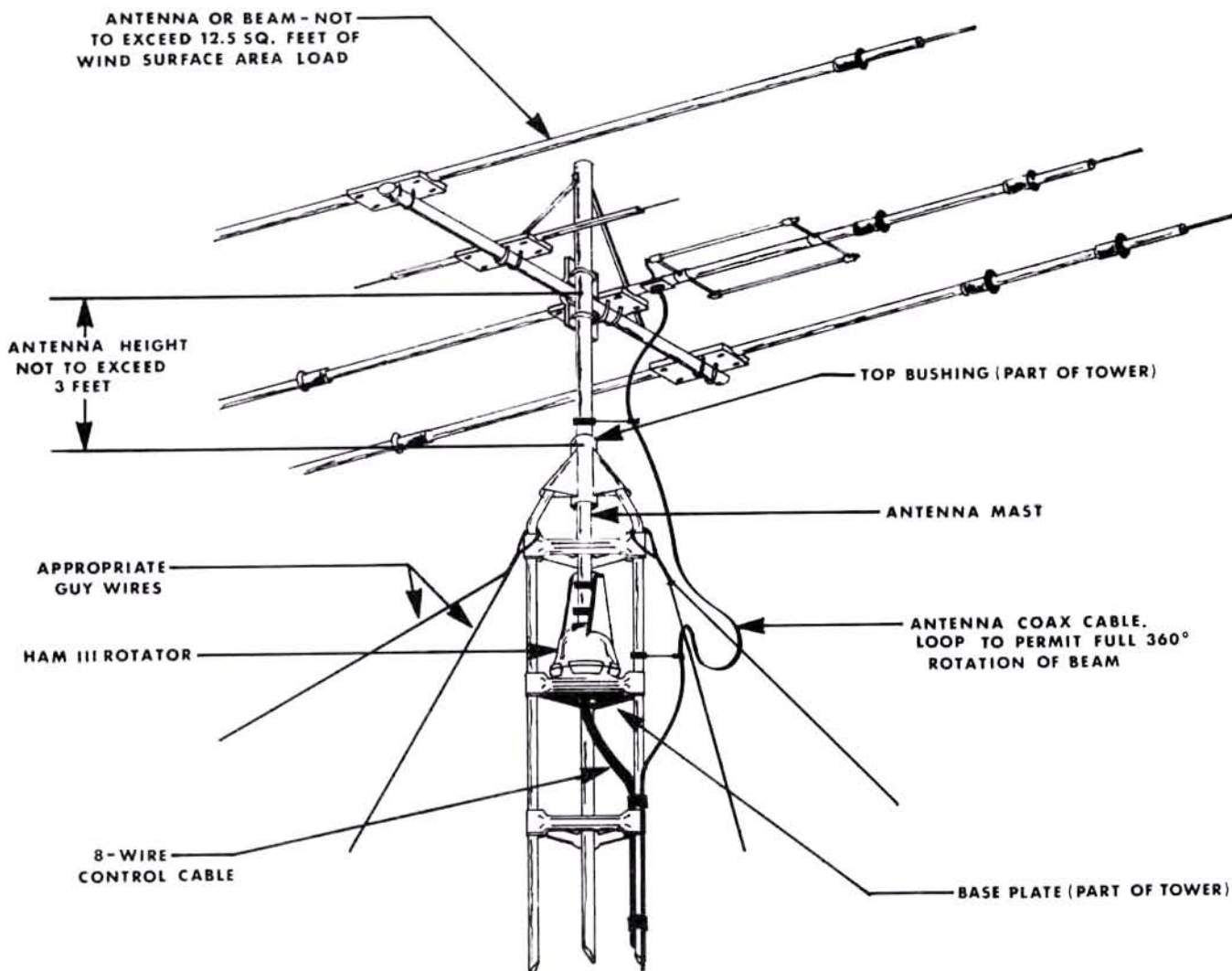


Fig. 1 — INSTALLATION

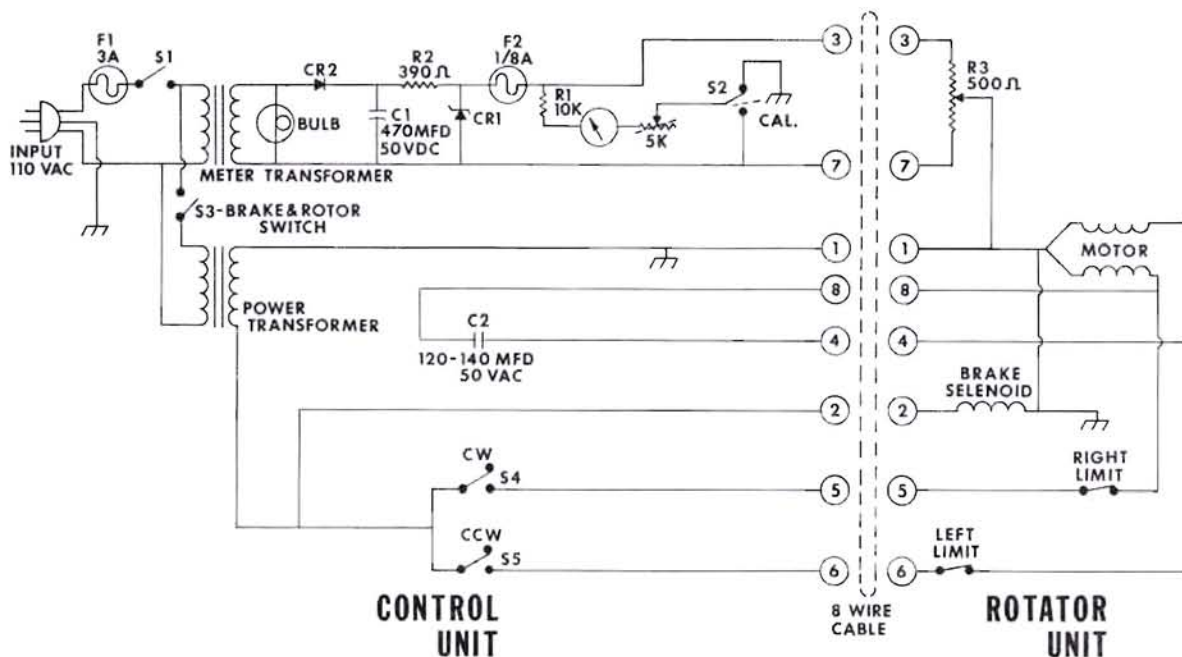


FIGURE 2

NOTE: RECOMMENDED CABLE: SEE SPECIFICATIONS, PAGE 11

Disassembly of Rotator

1. Set the rotator on a flat surface.
2. Remove the four screws and carefully raise the top casting to expose the potentiometer and drive mechanism.
3. Carefully remove the upper ball retaining ring. Keep it circular, and lay it on clean paper.
4. See that the potentiometer strip is clean and not burned at either end. See that the potentiometer body is secure and that the arm is clean at the point of contact. Use only fine rough cloth to polish the contact arm. Check the limit switch to see if the wires are secure and that the insulation is undamaged. Contacts should be clean. Check for 1/32" clearance between the switch blades and the motor—particularly alongside of the lockwasher under the motor fastening.
5. If the drive ring happens to be near the end of rotation, hold the unit horizontal, operate the top spur gear to rotate the mechanical stop on the drive ring away from the area of the limit switch. See that the mechanical stop lever (which is positioned between the two limit switches) will open each electrical contact before it hits the corresponding mechanical stop. Also see that the stop lever has not been deformed and that the electrical contacts are clean and uncorroded. Rotate the top spur gear several revolutions to determine that the motor and its bearings are operating freely. Look for broken teeth in any of the gears.
6. Lift the motor and brake mechanism out of the brake

- housing. Carefully remove the lower ball bearing retainer and place it on a clean piece of white paper.
7. Remove the ring gear from the motor base. This is accomplished by first pulling up on the side opposite the gear train. Then raise the entire ring slightly upward with the side away from the gear train higher so that it will slide out from under the gears. Examine closely for evidence of broken or worn teeth.
8. Examine the inside of the screw terminal strip to see that there is proper clearance between the solder lugs and frame and that there are no breaks in the insulation. Pay particular attention to the insulation at the point where the wires are held in the metal clip.
9. Examine the teeth in the brake casting.
10. To separate the motor, pot, and gear assembly from the brake assembly, unsolder the solenoid leads from terminals 1 and 2. Remove the screws holding the terminal board to the casting. Then remove the four large screws in the base. Be careful to clear the wires and the terminal strip through the opening.
11. The latch mechanism, accessible only after step 10, slides down into grooves in the casting and provides the top retainer for the brake wedge. The latch itself, which is held down by the compression springs, should prevent the brake wedge from being fully disengaged from the teeth in the brake housing. When the plunger is retracted by pressure applied on the latch pin, where the springs are attached, the wedge is disengaged from the brake housing.

12. To remove the potentiometer, remove the hex nuts and unsolder the leads. The mounting studs are integral to the motor end bell. In replacing the pot be sure the connections are on the side which overhangs the motor.
13. To replace the motor, first remove the pot per Paragraph 12, then unsolder the black motor lead from screw terminal 1, the red lead from the inside left limit switch lug, and the blue lead from inside the right limit switch lug. The fastenings holding the motor on the studs may then be removed and the motor pulled up and out. In replacing a motor, be sure to see that the round hole in the motor is next to the limit switch. Use a double lock nut on this stud near the limit switch, to provide clearance with the leads. Use special internal-external lockwasher over the stud that works in the slotted hole in the motor. Be sure that the pinion is snug against the spur gear before tightening this fastening over the slot.
14. When it is necessary to closely inspect or replace gears, it is possible to remove the motor, limit switch, pot, and terminal strip without unsoldering more than the solenoid leads from terminals 1 and 2. Remove the motor fastenings from the mounting studs. Work the motor up and out, exercising care in pulling the leads and terminal strip through the window in the gear housing. Remove the plate to expose the gears. Carefully note the positions for proper replacement.

Final of Rotator Reassembly

It is assumed in the following instructions that the brake mechanism is assembled and operative. The motor and gear train along with the potentiometer and the limit switches are likewise assembled and wired and operative.

It is not likely that the brake wedge will be exactly positioned in relation to the teeth in the brake housing to permit proper assembly unless the brake mechanism is retracted. For this reason it is necessary to operate the brake mechanism electrically during step 8 of the assembly of the rotator unit.

1. See that a small amount of low temperature, high quality, light weight grease is conservatively distributed around the ball bearings, ring gear, and spur gears. Only an even film of grease is desirable (approximately one thimbleful of grease should be used to lubricate a completely dry rotator). Excessive grease will only run out in high temperatures or cause power loss in low temperatures.
2. Rotate the upper spur gear until the inwardly protruding mechanical stop on the ring gear engages the channel shaped stop lever and pushes it far enough to the right to just open the right hand limit switch contact (it is assumed that the rotator is viewed from the side of the limit switch). This situation represents the extreme counterclockwise end of rotation. The potentiometer arm must then be rotated to its extreme counterclockwise position against the top stop.
3. Secure the upper bell housing upside down by the mast support in a vise with the open end of the "V" toward the bench. The boss which drives the potentiometer arm which is located in the bottom part of the bell housing will then be to the left of center.
4. Clean the inner portion of the housing and apply a small amount of grease to the ball race. Then carefully insert one ball bearing assembly with the flanged rim up and against the outer edge of the casting.

5. Grasp the operating mechanism by the flat base, steady the ring gear, invert the mechanism and lower it into the housing. In doing this, note that the serrated portion of the potentiometer arm must engage the driving boss in the housing and that the three driving bosses on the ring gear must engage into the mating recesses in the top housing. This situation will result automatically if the previous instructions have been followed.
6. Clean the exposed bearing race and apply a film of grease. Then apply the top bearing assembly to the race with the rim downward.
7. Clean the brake housing and bearing race and apply a light film of grease.
Lower the brake housing into place so that the assembly holes will approximately line up with the threaded holes in the bell housing. **DO NOT MECHANICALLY FORCE AN EXACT ALIGNMENT OF THESE HOLES WITHOUT ELECTRICALLY RELEASING THE BRAKE MECHANISM.**
8. Connect the control terminals No. 1 and No. 2 only to the corresponding terminals on the rotator while it remains clamped in the vise. Momentarily operate the lever on the control box to retract the brake. This will permit the brake housing to be freely rotated for exact alignment of the holes. We recommend that "studlock" or "locktite" be applied to the threads. With the power applied to the brake, insert the 4 assembly screws and run them down to a reasonably tight position. Keep the brake retracted electrically while all 4 screws are being tightened. Release the brake electrically and use a heavy screwdriver with wrench to completely tighten the 4 assembly screws. Torque to 85 inch pounds.
9. It is suggested that all 8 wires be connected from the control box while the rotor is still on the bench and that its complete operation be checked.

TROUBLE SHOOTING SUGGESTIONS

Field experience has shown that most operational difficulties with the HAM rotor are traceable to broken, shorted, or grounded wires—usually at the terminal strips. Time spent in cutting the leads to exact lengths, tinning, forming, and wrapping around terminals, cutting insulation to exact length, and clamping to prevent strain on any single wire, will pay big dividends in long and trouble-free performance. Put it up right—and leave it up!

Should trouble occur, first follow the suggestion on Page 4 for "Servicing Control Unit" and "Checking Rotator From Ground". Compare resistance values with Schematic Diagram to localize trouble. The following "symptoms" and "treatments" may also be helpful.

Mechanical Play

To prevent binding under adverse operating conditions, a small amount of play is designed into the rotor. Even a degree or so of rotary play will permit several inches movement at the end of a wide antenna boom, or at the tips of the elements. Frequently the slight motion of the antenna array in gusts of wind is due more to the natural flexing of the elements and mast than it is due to actual play in the rotor mechanism.

Antenna Rotates in Heavy Wind

This is usually a matter of the mast slipping in the support. For large arrays it is often necessary to drill a $\frac{1}{8}$ " hole through clamping plate, mast and mast supports and pin them together with a non-corrosive fastening. If "slipping" or "turning" is suspected, return the rotator to the end of rotation and visually check to be sure that the antenna is in the original stop location as installed. If it is, then it must be assumed that the rotor is actually turning and the brake latch is not engaging properly. Since it is pulled into place by springs and only retracted electrically, it will be necessary to disassemble the rotor per instructions on page 5 and follow suggestions of step 11 regarding the latch mechanism.

Lack of Power

If the antenna rotation is slow or sluggish or hard to start, check for proper voltages as stated under "Servicing The Control Unit". If the voltages are correct, experience has indicated that the 120-140 MFD motor start capacitor could be at fault. As capacitors are difficult to check without proper test equipment, it is recommended that a new capacitor be tried before further action is taken.

If the electrical circuit is OK, then check for mechanical binding. Pay particular attention to bearings and alignment of shaft on an inside tower mount. On any inside tower installation, care must be exercised to get the top mast shimmed to the exact rotational center of the rotator upper mast support. The geometry is such that a mast of 52 mm (2.062 inches) will be exactly centered. For each 1.6 mm (.0625 inches) less mast diameter used, .8 mm (.031 inches) of shim must be wrapped around the mast at the clamping points. As a last resort, dismantle the rotor to check gears, bearings, etc.

Meter Indication Improper

The brake and motor operate independent of the indicating system. If the pilot light burns at proper brilliancy, the instrument transformer is OK and output is not shorted. Check the $\frac{1}{8}$ AMP meter circuit fuse with an ohmmeter. Check for about 13 VDC across terminals No. 3 and No. 7 with the switch operated. If the proper voltage is not obtained, check the individual components in the meter circuit. If the 13 VDC is present, check for 500 ohms across these leads to rotor (disconnected at control box). If 500 ohms is present from No. 3 and No. 7, see if the readings from No. 3 to ground and No. 7 to ground total 500 ohms. If this is so, connect an auxiliary meter from terminal No. 3 to ground and see that voltage runs from zero to about 12 volts as antenna is rotated from left to right extremes.

NOTE: If the needle remains in the right hand "S" position check to be sure the calibration switch is not in the "calibrate" position. This is done by pushing on the calibrate knob.

No Rotation—Indication O K

Either the thermal cutout in the power transformer has opened to protect the system from excessive heat of prolonged operation or there is actually trouble in the motor circuit. After allowing time for the thermal cutout to restore service, proceed to "checking rotator from ground" and "checking control unit".

Grounded Leads Grounds on cable leads can burn out either the line fuse or the small fuse in the meter circuit. For full explanations, refer to Schematic. If lead No. 3 or lead No. 7 is grounded, it shorts out part of the potentiometer, so that as rotation progresses to the other end, the full DC voltage is applied across a decreasing portion until current becomes so high that the potentiometer burns out. Note also that any grounds may put an overload on the power transformer which could cause the line fuse to blow, or overload the rectifier circuit so that the $\frac{1}{8}$ amp fuse blows.

Meter Fluctuation

An intermittent condition in any component in the rectifier or meter circuits within the control box, as well as in the cable or potentiometer circuit in the rotator itself can cause meter fluctuation or error. Possible causes of such trouble may be localized by placing a test DC meter across terminals No. 1 and No. 7, or No. 3 and comparing the action of the test meter with the panel meter.

If the test meter fluctuates along with the panel meter, either a component in the rectifier circuit is intermittently defective, or an intermittent trouble-ground is drawing excessive current. To further localize such a condition, leave the meter on terminals No. 1 - No. 7, or No. 3 and remove the corresponding leads to the rotator. This removes the load from the DC circuit so the test meter will show about 13 volts. The panel meter sensitivity will be cut about in half, so it will show about $\frac{1}{2}$ scale. Fluctuation of the test and panel meters will now point to trouble in the DC rectifier circuit. Fluctuation of panel meter only, will point to intermittent trouble in the meter, multiplier resistors, or the calibration potentiometer.

If the meters are steady in the preceding tests, and there is fluctuation with rotator leads connected, it indicates trouble in the lead wires or rotator itself. The resultant fluctuations usually cause the meter to pulse UPWARD from a given reading. Any dirt, grease or corrosion that breaks or interferes with the ground return from the potentiometer slide will cause the needle to fluctuate from a true reading toward a center scale point. In such cases it is necessary to open the rotator per instructions on page 5.

The ground connection is carried through the potentiometer pivot directly to the rotator bell housing which is common to terminal No. 1.

LIMITED WARRANTY

CORNELL-DUBILIER ELECTRIC CORPORATION (CDE) warrants that your new ROTOR has been manufactured free of defects in design, material and workmanship. If this product fails to give satisfactory service due to defects covered by warranty, including any warranty implied by law such as WARRANTIES OF MERCHANTABILITY OR FITNESS, for a period of ONE YEAR FROM THE DATE OF PURCHASE, CDE will, at its option, replace or repair the unit, or any defective part free of charge.

To obtain warranty service, return the ROTOR to your dealer, or pack it securely, and send it with proof of purchase date and a letter explaining the problem, shipping cost prepaid, to: CORNELL-DUBILIER ELECTRIC CORPORATION, WARRANTY REPAIR DEPARTMENT, 118 E. JONES ST., FUQUAY-VARINA, N.C. 27526.

IMPORTANT

Warranty service covers repair or replacement of the ROTOR only. CDE is not responsible for costs of removal or reinstallation, or shipping to the place of repair. The warranty period is not extended due to repair or replacement. CDE reserves the right to make reasonable charges for service if there is evidence of damage due to alteration, misuse or installation not according to the enclosed instructions.

CDE IS NOT RESPONSIBLE FOR DAMAGE TO OTHER EQUIPMENT OR PROPERTY OR FOR ANY OTHER CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY KIND, WHETHER BASED ON CONTRACT, NEGLIGENCE OR STRICT LIABILITY. MAXIMUM LIABILITY SHALL NOT, IN ANY CASE, EXCEED THE PURCHASE PRICE OF THE UNIT.

(Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusion may not apply to you.)

(This warranty gives you specific legal rights. You may also have other rights which may vary from state to state.)

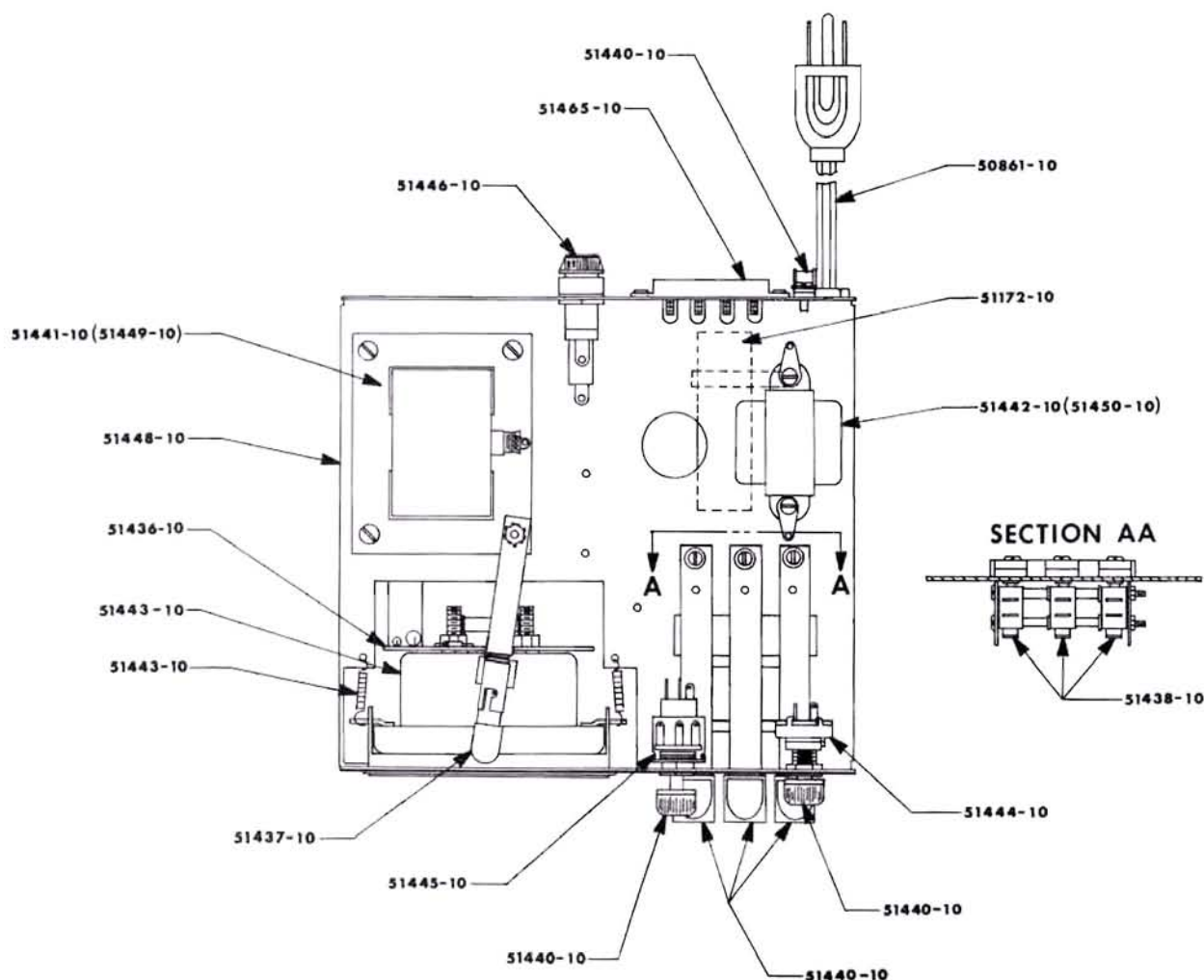


Fig. 3

ACCESSORY KITS

ALTERNATE METER SCALE

50924-10 South Centered Meter Scale Kit 3.00

SOUTH CENTER SCALE KIT

The stock HAM III/CD 44 control unit is produced with a North Centered meterscale. Since some locations and/or popular working areas may favor rotation stops at North, we provide a South Centered meter scale kit for field modification.

51467-10 Heavy Duty Lower Mast Support Kit 29.95

The stock HAM III is intended for in-tower mounting on the base plate which is part of the tower. However, in some instances, mast mounting is desired. The lower mast support kit, P/N 51467-10, contains a lower mast support and the necessary hardware to facilitate mounting the HAM III ROTATOR on top of a mast. **CAUTION: When using the lower mast support, antenna size is restricted to 7.5 square feet of wind surface area.**

INSIDE TOWER MOUNTS

50559-10 Tower Spacing Plate Kit 4.50

The tower mounting plate is a flat plate equipped with four .5 inch standoff bushings drilled to match the hold down screw holes in the bottom of a CDE Bell type rotator. The plate essentially is designed to allow enough clearance under the bottom of the rotator to permit the rotator to turn without touching the 8-wire control cable.

On any inside tower installation, care must be exercised to get the top mast shimmed to the exact rotational center of the rotator upper mast support. The geometry is such that a mast of 52 mm (2.062 inches) will be exactly centered. For each 1.6 mm (.0625 inches) less mast diameter used, .8 mm (.031 inches) of shim must be wrapped around the mast at the clamping points.

PARTS AND PRICE LIST

CONTROL UNIT HAM III/CD-44 (SERIES 2)

PART NUMBER	DESCRIPTION	PRICE
51435-10	Control Unit, 120 VAC, Complete	\$89.95
51436-10	Printed Circuit BD. Assy., Complete	12.50
	C-1 Capacitor 470 MFD 50V (1)	
	R-2 Resistor 390 OHM 2W (1)	
	D-1 Diode, Zener (1)	
	D-2 Diode (1)	
	R-1 Resistor 10 K OHM 1/4 W (1)	
	F-2 Fuse 1/8 AMP (1)	
51437-10	Expendable Parts Kit	3.00
	F-1 Fuse, 3 AMP (2)	
	F-2 Fuse, 1/8 AMP (2)	
	Bulb, Meter (2)	
51438-10	Switch Kit	4.80
	Switch, Micro, S-3, S-4, & S-5 (3)	
51439-10	Cover Kit	8.50
	Cover, Top (Black)	
	Cover, Bottom (Tan)	
	Screws (12)	
	Bumper Feet, Rubber (4)	
51440-10	Miscellaneous Hardware Kit	3.00
	Knob, On/OFF Switch (1)	
	Knob, Calibration Switch (1)	
	Bumper Feet, Rubber (4) and Screws (4)	
	Terminal Board Assy. (8 terminals) and Screws (2)	
	Lever, Switch (for S-3, S-4, & S-5) (3)	
51441-10	Transformer Kit (Power) 120 VAC	14.50
51442-10	Transformer Kit (Meter) 120 VAC	7.00
51172-10	Capacitor Kit Motor Start (C-2)	2.50
50861-10	Line Cord Kit, 3 wire	2.00
51443-10	Meter Kit ("N" Center)	24.00
	Bulb Holder (1)	
	Bezel (1)	
	Mounting Hardware	
51444-10	Switch Kit, On/Off (S-1)	2.00
51445-10	Switch Kit, Calibration (S-2)	5.60
51446-10	Fuse Holder Kit, F-1	1.90
51447-10	Face Plate Kit	3.10
51448-10	Chassis Kit	6.00

*Note: 115 VAC control unit can be converted to 220 VAC by installation of the 220 VAC power and meter transformers.

51449-10 Transformer Kit (Power) 220 VAC

51450-10 Transformer Kit (Meter) 220 VAC

To order parts, remit check or money order for total parts costplus \$1.00 for postage and handling to: CORNELL-DUBILIER ELECTRONICS, Department "C", 118 E. Jones Street, Fuquay-Varina, North Carolina 27526.

PRICE SCHEDULE AS OF AUGUST 1977

CDE reserves the right to change prices at its option. Current prices may be obtained by calling or writing the factory. Please send self addressed stamped envelope.

PARTS AND PRICE LIST

HAM - III ROTATOR

PART NUMBER	DESCRIPTION	PRICE
51451-10	Rotator, Complete With Hardware.....	\$83.95
51452-10	Upper Mast Support Kit (Bell Casting).....	8.00
51453-10	Brake Housing Kit (Lower Casting).....	8.50
51454-10	Ball Bearing Kit (2-Required)..... Ball Bearings (49) Bearing Retainer (1)	7.00
51455-10	Brake Support Casting Kit.....	7.50
51456-10	Gear and Pinion Kit..... Gear & Pinion (1st, 2nd, & 3rd from motor) (3) Gear & Pinion (Thick Pinion 4th from Motor) (1) Small Gear Spacer (1) Large Gear Spacer (1) Washer (3)	10.00
50313-10	Ring Gear Kit.....	2.50
51457-10	Final Spur Gear Kit..... Final Spur Gear (2) Bushing For Spur Gear (1)	9.50
50423-10	Stop Arm Kit.....	1.00
50370-10	Base Casting and Gear Shaft Assembly Kit.....	6.00
51459-10	Motor Mounting Plate Kit.....	3.00
51470-10	Motor and Pinion (Brass) Kit.....	18.10
51461-10	End of Rotation Switch Assembly Kit..... Switches (2) Bracket (1)	3.50
51460-10	Potentiometer Kit (R-3).....	9.60
51462-10	Solenoid (Brake) Kit.....	9.10
51463-10	Solenoid Hardware Kit..... Solenoid Pin (1) Solenoid Pin Spacer (3) Solenoid Retaining Ring (2) Solenoid Retaining Springs (2) Retracting Spring Clip (2)	3.00
51464-10	Brake Wedge Kit..... Brake Wedge (1) Connecting Links (2) Connecting Link Pin (1) Brake Wedge Support (1) Brake Latch (1) Latch Pin (2) Latch Pin Retainer (2) Latch Spring (2)	8.00
51465-10	Terminal Board Assy (8 terminals) Kit..... Terminal Board (1) Screws (2)	1.00
51466-10	Hex Head Screw Kit..... Screw, 12-24 x 3/4 (Taptight) (4)	1.00
51415-10	Mounting Hardware Kit..... 50115-00 Mast Clamp (1) 50382-00 "U" Type Bolt (Stn. Stl.) (2) 50502-00 Spacer (4) Screw, Hex Hd. 1/4-20 x 1 1/4 (5) Hex Nut 1/4-20 (Stn. Stl.) (5) Lockwasher, Split 1/4" (9)	5.00

To order parts, remit check or money order for total parts cost plus \$1.00 for postage and handling to: CORNELL - DUBILIER ELECTRONICS, Department "C", 118 E. Jones Street, Fuquay-Varina, North Carolina 27526.

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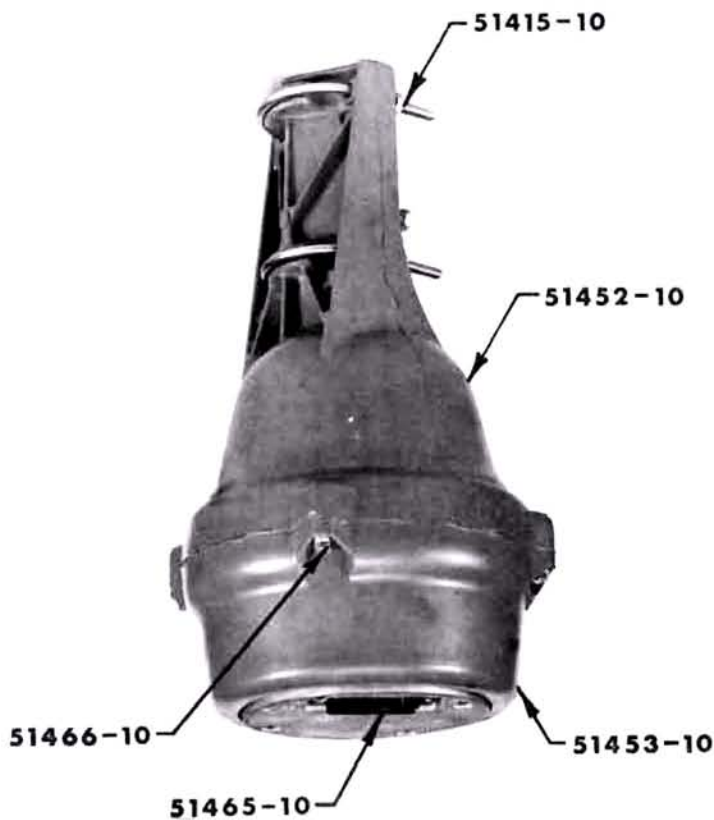


Fig. 4

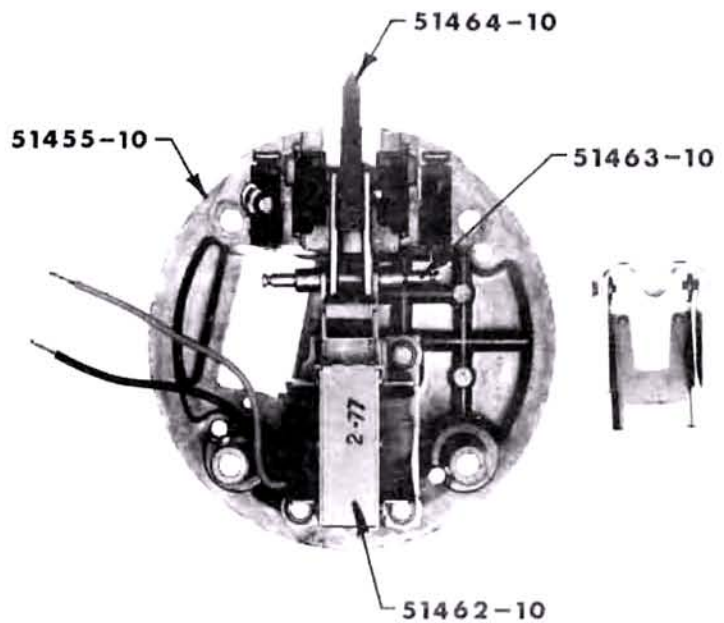


Fig. 5

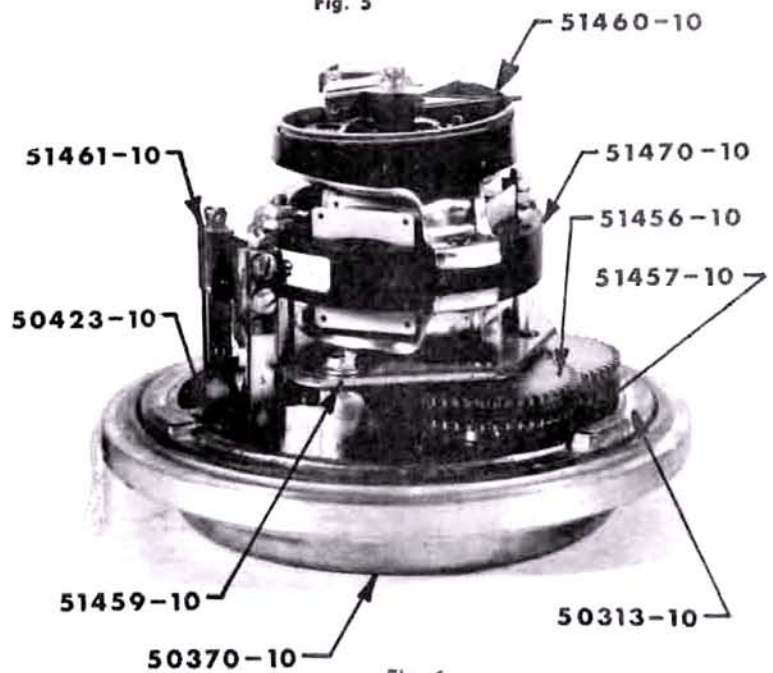


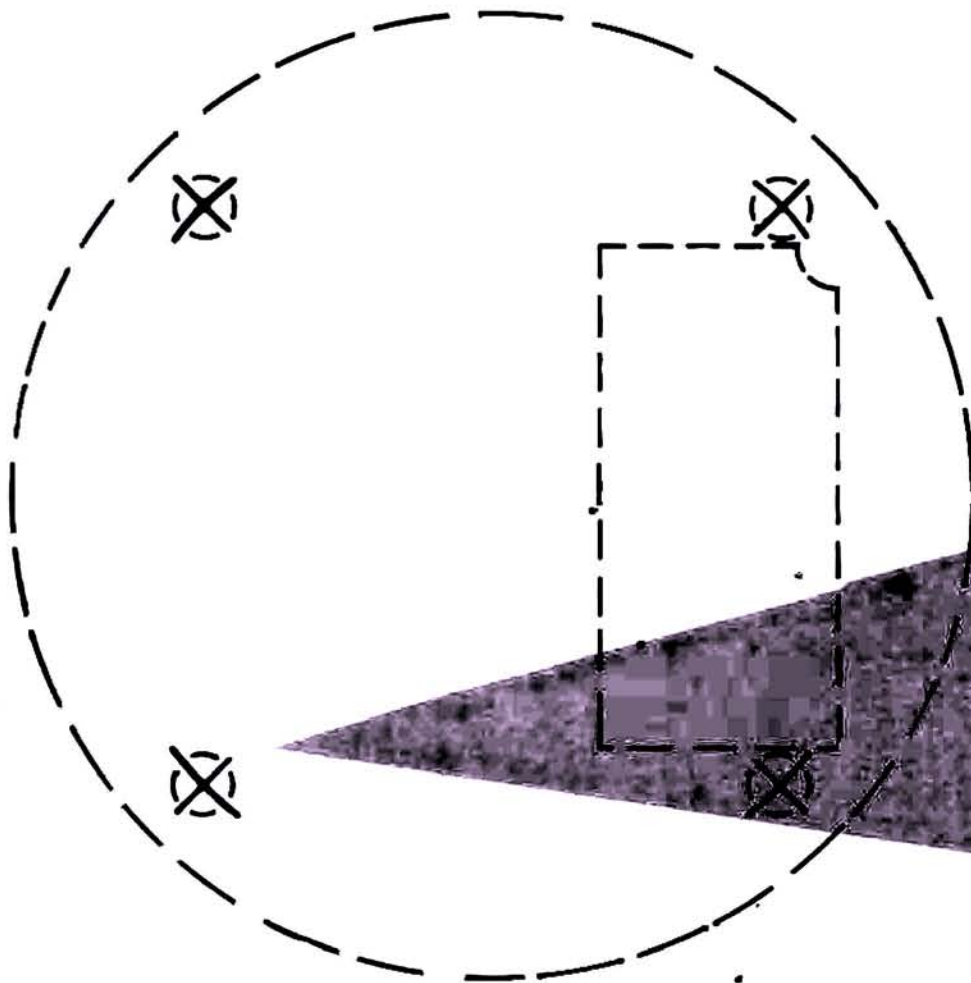
Fig. 6

HAM III SPECIFICATIONS

- Input Voltage: 115 VAC 50-60 HZ
Optional: 220 VAC 50-60 HZ
- Motor: 24 VAC, 2.25 Amp, Split Phase
- Power transformer: 115/26 VAC, 10% duty, thermal protected.
Optional: 220/26 VAC
- Meter transformer: 115/23 VAC, continuous duty.
Optional: 220/23 VAC.
- Meter: D. C. voltmeter 1000 ohms/volt
- Meter scale: Direct reading, North centered. 5° increments.
Optional: South Centered.
- Recommended cable:
 - 125' 2 ea #18 - 6 ea #22 (Belden 8448)
 - 200' 2 ea #16 - 6 ea #20
 - 300' 2 ea #14 - 6 ea #18

- 500' 2 ea #12 - 6 ea #16
- 800' 2 ea #10 - 6 ea #14
- Maximum Cable Resistance: Not over .8 ohm for conductors 1 and 2. Not over 2.0 ohms for conductors 3 through 8.
- Rotation time: 45-60 seconds with 60 HZ input.
- Brake: Positive, electrically operated wedge. 75 segments spaced 4° 48' apart.
- Rotator size: 20 cm (8") maximum diameter by 34 cm (13.5") high.
- Permissible mast size: From 35mm (1.37") to 52mm (2.062").
- Control box size: 20.5 cm (8.125) wide x 21 cm (8.25") deep x 10.5 cm (4.125") high.
- Mounting hardware: Stainless steel.
- Shipping volume: 37,350 cu. in. (2280 cu. in.).
- Shipping weight: 12.2 kg (27 pounds)

CLEARANCE HOLES TO BE 17/64



TOWER DRILLING TEMPLATE