

# hy-gain

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## CD-4511 / CD-4511X

Antenna Rotator CD-4511  
has 110 VAC Controller CD-  
4511X has 220 VAC Controller

# INSTRUCTION MANUAL

## GENERAL DESCRIPTION

The CD-45-II Rotator consists of a bell-type rotator, a metered control unit and the necessary mounting hardware. The rotator is designed to mount on a plate inside a tower or on a mast. The rotator unit must be wired to the control unit with a 7 or 8 wire cable. The control unit must be placed inside the house or another protected location.

The CD-45-II now features a NEW 8 pin connector on the rear panel of the control unit for easy connection to your cable.

Included with this product are the following:

- A. Instruction Manual
- B. Rotator Unit
- C. Controller Unit
  
- D. Mounting Hardware Pack E.

Due to the wide variety of towers available, each installation will have different requirements. The gauge of the cable to connect the control unit to the rotator depends upon the distance between the rotator and control. The longer the distance, the larger the diameter of the wire required. Various antennas or beams require different installation methods. For this reason, the owner must procure the remainder of the components after checking their compatibility. In general, these will be:

- A. The beam or antenna desired and a suitable antenna mast
- B. A tower or other mechanism to position the rotator and beam for safe and effective rotation (see CAUTIONS):
- C. 7-wire cable to connect the control to the rotator (see Section V).
- D. Coaxial cable to connect the beam to the communications equipment.
- E. Appropriate guy wires as required.
- F. Ground Hardware.

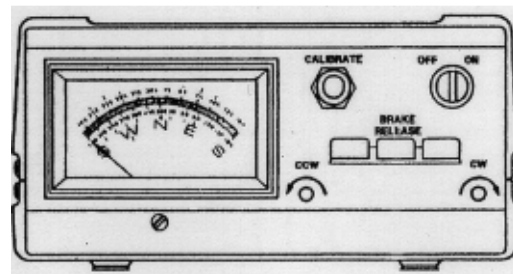
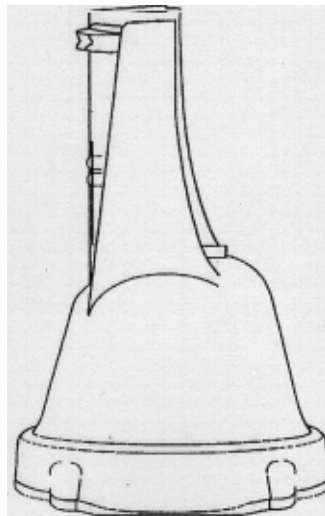


Figure 1

Rotator and Control Unit

## SPECIFICATIONS

Input Voltage	120 VAC 50/60 Hz
Optional	220 VAC 50/60 Hz
Motor	24 VAC, 2.25 Amp, split phase
Power Transformer	120 VAC/26 VAC
	10% duty, thermal switch protected
Optional	220 VAC/26 VAC
	10% duty, thermal switch protected
Meter Transformer	120 VAC/23 VAC
Optional	220 VAC/23 VAC continuous duty
Meter DC	Voltmeter 1000 ohms/volts
	1 MA full scale
Meter Scale	Direct Reading:
	North centered, 5 degree increments
Optional	Direct Reading:
	South centered, 5 degree increments
Maxumim Antenna Size:	
A. Tower mounted as per Figure 3	8.5 square feet (.79 sq. m) of wind surface area
B. Outside tower or mast mounted as per Fig. 5 or 7	5.0 square feet (.46 sq. m) of wind surface area
Operational Temperature Range	-30 degrees to 210 degrees F (-34 to 99 degrees Celsius)
Maximum Interconnect Cable Resistance:	
A. Terminal 1	1.0 ohms
B. Terminals 3, 4, 5, 6, 7, 8	2.5 ohms
Rotation Time	45-60 seconds with 60 Hz input
Brake	Automatic Disc Type
Rotator Size	8 inches (20 cm)
	Maximum diameter by 17 3/8 inches (44 cm) high
Maximum Antenna Mast Size	2 1/16" O.D. (52 mm)
Mounting Hardware	Plated Steel Hardware and Plated Steel Clamps
Control Unit Size	8.5 inches (21.6 cm) wide by 9.0 inches (22.8 cm) deep
Shipping Volume	2411.02 cubic inches (0.0395 cu. M)
Shipping Weight	22.0 pounds (9.98kg)

### CAUTIONS

- Towers, often the highest metal parts in the vicinity, require extreme caution during erection and placement. Extreme care must be taken during erection so that metal towers and beams do not contact power lines even if the beams slip or rotate, towers fall or fracture or metal wires blow in the wind. etc..
- Metal towers or other position mechanisms must be plated so that if they fracture or blow over in high winds, they cannot contact power lines, be a hazard to individuals, or endanger property.
- When not mounted within a tower with a thrust bearing as shown in Figure 4, the rotator must be DEBATED.

- Metal towers must be grounded properly at the tower location before the tower is erected. This is to minimize electrical hazard and the possibility of lightning damage. Do not bury bare aluminum wires or stakes in the ground. Use copper ground stakes. The service entrance ground should be checked. The household convenience outlet should be the 3-prong type (grounded back to the service entrance).
- The Control Box is not weatherproof and must be located in the house, ham shack or other protected location.

The CD-45II Rotator has been carefully designed and manufactured to give many years of trouble-free service when carefully and professionally installed. It consists of the strongest and best commercially available components.

## TYPES OF INSTALLATIONS

There are three general types of installation (see Figures 4, 6, and 7).

1. The recommended installation is an "Inside" Tower Mount, as shown in Figure 4, with a top bushing or bearing to provide lateral support and resist high wind loads.

When the rotator is properly mounted this way, it can be rotated to turn an antenna or beam of 8.5 square feet wind surface area. The wind loading during storms, the rotational inertia of the beam, and unbalanced weight are more important than the dead weight of the beam. It is important to minimize the height of the beam above the rotator to minimize the overturning force induced in a high wind ( see "Unbalanced Weight" and "Wind Pressure").

2. An "Outside" Tower Mount, as per Figure 7, is the best type of installation when not using an inside tower mount. The rotator is not as well protected but the installation is simpler.
3. A telescoping or other type mast, as shown in Figure 6, can also be used. The lower mast support is required for this installation.

There are variations of mounting, generally into one of the above categories. For example, the rotator may be mounted lower in the tower than shown in Figure 4. In that case, more than one bushing or thrust bearing for the beam mast may be required and longer coast down time allowed in operation. These factors are interrelated and the components must be matched together.

## UNBALANCED WEIGHT AND WIND

### PRESSURE

□

1. 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 rotator.

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 stress on the motor and gear train. Unbalanced weight becomes critical as the distance from the antenna boom to the clamping point at the rotator is increased.

2. 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 pressure the top mast should be as short and as strong as possible. In multiple arrays the heaviest should be closest to the rotator. In order to distribute the bending stress and prevent fracture of the mast, the CD-45-II Rotator includes two specially designed steel clamps to secure the mast to the rotator.

After procuring the type of tower or other positioning mechanism of the owner's choice, the next step is to wire the rotator to the control box and check out its operation prior to installation.

**WIRING AND CHECK-OUT**

A preliminary operation check should be made prior to installation. We recommend the following

NOTE: The CD-45-II requires only 7 wires to operate properly since Terminal 2 in the rotator is unterminated. However, if an 8-wire cable is used, the Ham IV rotator can be installed at a later time without changing the cable or control.

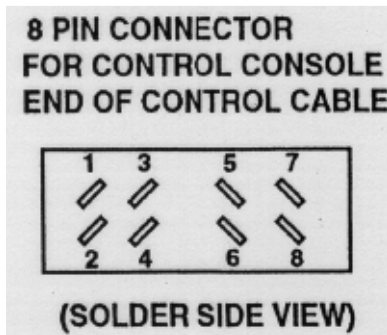
If the Hy-Gain Ham IV is required, due to a larger antenna being installed, it will only be necessary to purchase the Ham IV Rotator, Part Number 5137201. The control units and cable requirements are identical, therefore, only the installation of the heavier duty rotator will be necessary.

A. Decide the wire gauge (size) required and obtain the number of feet of the proper cable (see Table 1).

Maximum Length	Gauge for Terminals 1&2	Gauge for Terminals 3-8
125' (38 m)	#18 (1.19 mm)	#22 (.76 mm)
200' (61 m)	#16 (1.42 mm)	#20 (.97 mm)
300' (91 m)	#14 (1.75 mm)	#18 (1.19 mm)
500' (152 m)	#12 (2.12 mm)	#16 (1.42 mm)
800' (233 m)	#10 (2.95 mm)	#14 (1.75 mm)

**Table 1**

B. Strip and tin 3/8" on each wire end after removing about 4 inches of the jacket from one end of cable. Tinning can be accomplished, after twisting the strands together, with an ordinary soldering iron and radio solder, being careful not to melt the insulation. On the end to be connected to the control unit, strip the jacket about 2 inches and strip the insulation from each wire end 3/8".



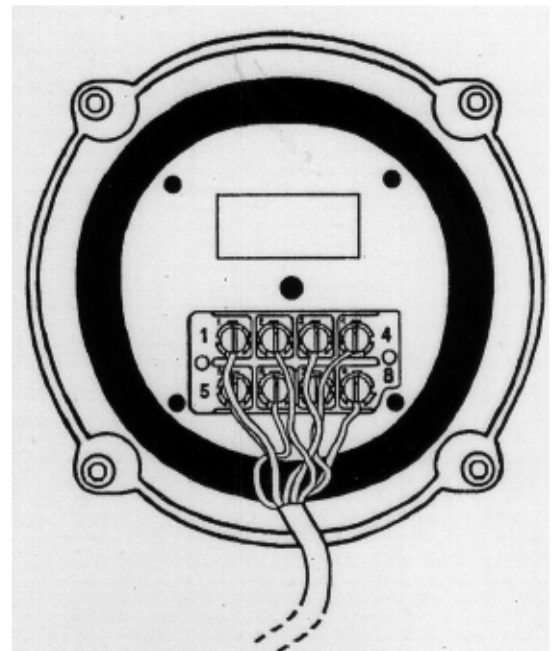
**Figure 2 Rotator Wiring (control)**

C. With the Control Unit and Rotator on the work table, connect the cable between the Rotator and Control Unit using the full length of cable that will be used in the installation. *It is important that Terminal #1 on the Rotator is connected to Terminal #1 on the Control Unit and so on. Attach and solder the ends of the cable to the 8 pin connector supplied in the connector parts pack Plug this connector into the control unit when done.*

NOTE: The specifications call for heavier gauge wire on Terminal #1. Lead #1 must be heavier gauge and less total lead resistance (see Specifications, page 2). Wire the control to the rotator as shown in Figure 3.

**CAUTION**

Shorts between terminals or grounded leads may damage the rotator.



**Figure 3 Rotator Wiring (Base)**

- D. Install four 1/4"-20x 11/4" bolts in the four mounting holes in the bottom of the bell housing. Run them in about a 1/2" and leave them as close to equal length as possible.
- E. With the rotator sitting in the upright position, resting on the four 1/4"-20 x 1 1/4" bolt heads and connected to the control unit by the cable, plug the power cord into a 120 VAC 50/60 Hz or 220 VAC 50/60 Hz wall socket, depending on which unit you have.
- F. Turn the power switch on. The meter should be illuminated.
- G. Depress the "Brake Release" (Center) lever, hold it, and simultaneously depress the CCW direction switch (left). The rotator should turn CCW (looking from the top). This is S-E-N-W-S: Release the CCW direction switch; the rotator will coast down and stop. Now release the brake switch. The rotator is now locked into position.
- H. Repeat Step G for CW direction by depressing the brake switch first, then the CW direction switch (Right).

**CAUTION**

It is best to release the direction switch just prior to the end of rotation (extreme CW or CCW position) in order not to cause undue stress on the stop arm and/or the gears.

- I. Return the rotator to full CW position.

**FOR CUSTOMER'S USE ,**

Enter the number/color of each lead connected to the terminals, and pins of the plug.

1	2	3	4
5	6	7	8

**MOUNTING INSIDE THE TOWER**

**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** it is mounted horizontally, at any angle, or upside down.

The rotator is mounted inside a tower (see Figure 3) to the flat tower plate by means of four bolts furnished in the hardware kit. Use the following procedure:

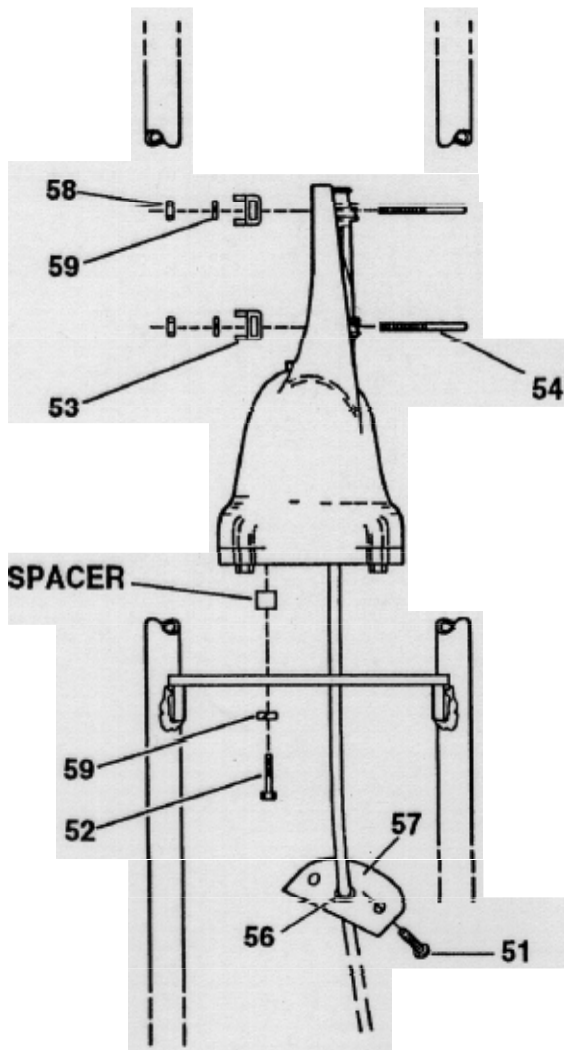
1. Locate the rotator in the tower directly under the bushing. Note that the tower plate must be cut out to allow the connecting cable to pass through the plate
2. Reattach the wires in the same manner as used in the trial assembly and secure the wires to the tower in such a manner that the wires will not be strained.
3. The rotator is attached to the tower plate by means of fourbolts and lockwashers (see Figure 3). Spacer washers must be used between the rotator and plate for clearance of the rotator housing bolt heads. The flat tower plate must be drilled in four places using the template provided with this manual unless the tower plate is already properly drilled. A fifth hole must be drilled or cut to clear the control cable.
4. Tighten the four bolts, but not to final tightness. Observe how the rotator turns. It must rotate in such a manner as to turn the mast concentrically to the top bushing.
5. Trial assemble the mast to the top of the rotator using the U-bolts, nuts and lockwashers through the rotator and clamps as shown in Figure 3. The maximum mast diameter that may be used is 2 1/16" O.D.. We recommend 1 1/2" nominal steel pipe with 1/9" O.D. in standard wall thickness of .145". For stacked arrays or very large beams, we recommend extra heavy-duty wall thickness.200". Both steel pipes can be purchased to specification ASTM-120.

On any inside tower installation, care must be exercised to get the antenna mast shimmed to the exact rotational center of the rotator. The geometry is such that a mast of 2.062" (21/16") (52 mm) O.D. pipe will be exactly centered. If the O.D. of your mast is less than this, you should shim out to these dimensions.

6. If the rotator, top bushing and mast are properly aligned, there should be unrestricted rotation through 360°. If not, the rotator may have to be moved slightly on the flat plate. If a high quality bearing is used in the top of the tower (*recommended*), the shimming procedure must be done more carefully as closer tolerances are required. *It is important that the rotator does not try to turn the mast eccentrically with the top bushing or bearing.*

7. Tighten the four bolts carefully-to approximately 100 inch-pounds of torque.

8. Return the rotator to the full CW "S" position. Mount the beam pointing South. The coaxial cable should be looped in such a manner that it will not foul or tangle when the beam turns around in a circle to the full 360° counterclockwise position. (The antenna rotates "S" to "F" [counterclockwise] on the first turn, therefore slack should wrap counterclockwise around the mast.) Tighten the U-bolts *securely*.



Item No.	Description	Qty
51	Screw, Pan head, 6-32 x 3/8"	2
52	Bolt, 1/4 - 20 x 1 1/4"	4
53	Clamp	4
54	U-bolt	4
55	Flat washer	4
56	Grommet	1
57	Terminal cover	1
58	Nut, 1/4" - 20	8
59	Lockwasher, split, 1/4"	1

Figure 4  
Rotator Mounted Inside Tower

## MAST MOUNTING

1. Mount the rotator to the lower mast support and to the mast. (See Figures 5 & 6.)
2. Attach one end of the control cable to the rotator terminals. Use the same sequence as used on the pre-installation check. The cover and grommet must be slipped over the cable prior to attaching it to the terminals on the rotator. (See Figure 4.)
3. Tape the rotator control cable to the mast at points 18" to 24" apart.
4. Connect the antenna cable to the antenna (follow manufacturer's recommendation). Make sure you have enough slack for the 360° rotation. (The antenna rotates "S" to "E" [counterclockwise] during its first turn, therefore, slack should wrap counterclockwise around the mast.) See Figure 6.
5. Attach the mast guy wires to the rotator lower mast support or mast ring

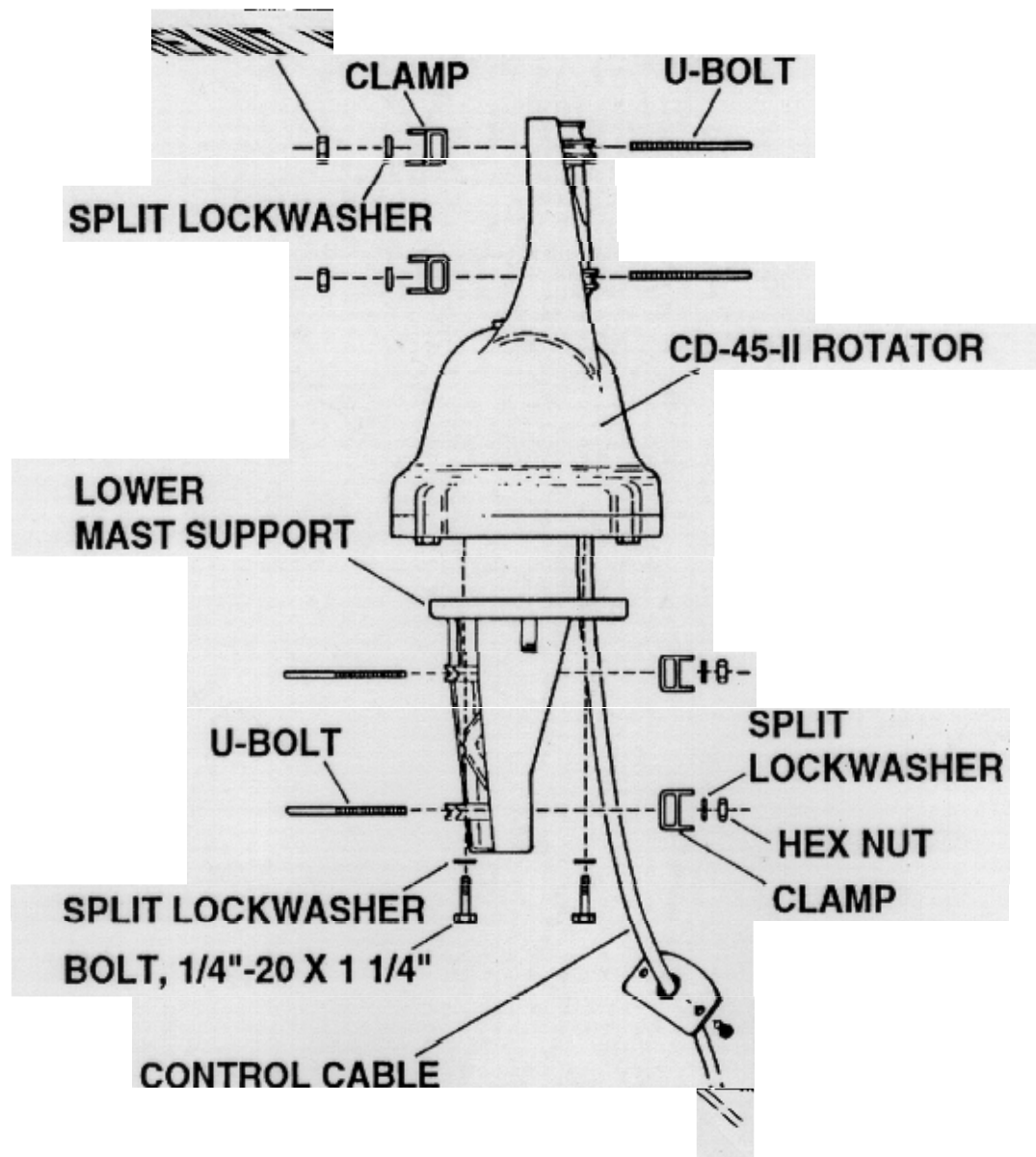
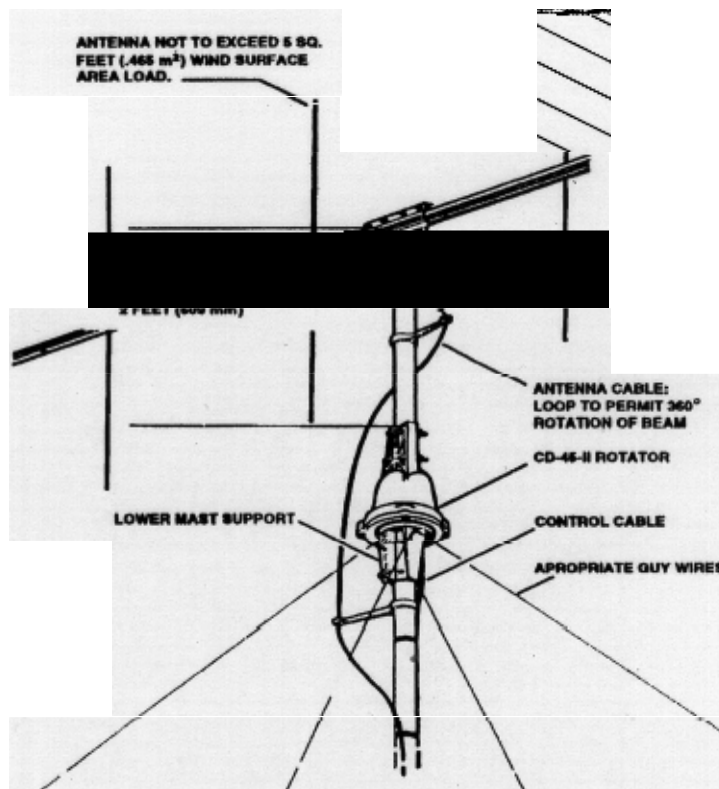
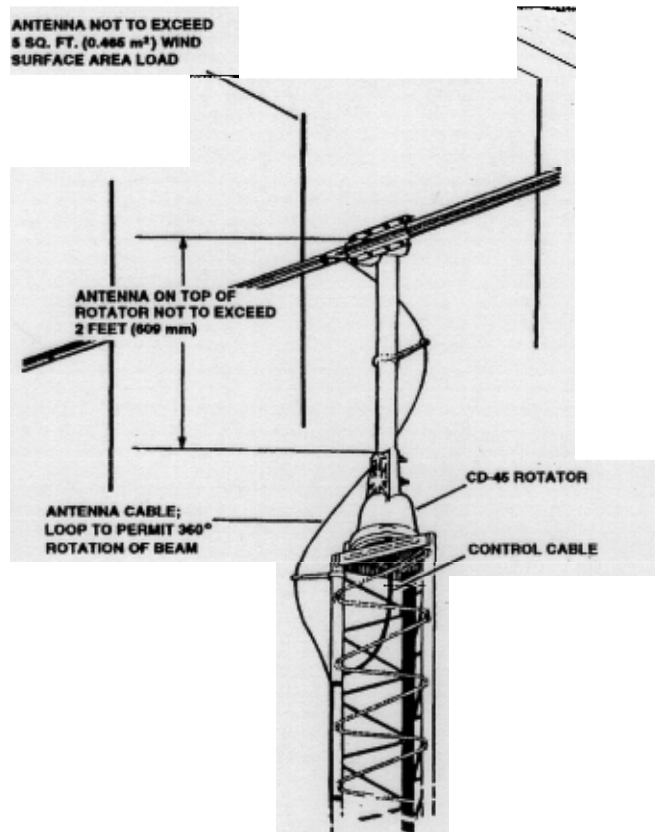


Figure 5  
Rotator Mounting with Lower Mast Support



**Figure 6 Mast Mounted Rotator**



**Figure 7 Rotator Mounted on Tower Top Plate**



6. Raise the mast into position. Rotate the mast by hand until the antenna director is headed North. Tighten the base clamp. Line up the mast in the vertical position and tighten the guy wires.

#### TOP OF TOWER INSTALLATION

1. Mounting the rotator on top of a tower is similar to the mast mounting except the lower mast support is not used. (See Figure 8.)
2. The rotator is attached to the tower plate by means of four bolts and lockwashers (see Figure 7). Spacer washers must be used between the rotator and plate for clearance of the rotator housing bolt heads. The flat tower plate must be drilled in four places using the template provided with this manual unless the tower plate is already properly drilled. A fifth hole must be drilled to cut to clear the control cable.

3. Connect the control cable to the rotator after passing it through the tower plate. Tighten the mounting bolts securely.
4. Assemble the mast and antenna to the top of the rotator using the U-bolts, nuts and lockwashers through the rotator and clamps as shown in Figure 7. The maximum mast diameter that may be used is 2 1/16" O.D.. Turn the antenna by hand until the director is pointed North, then tighten the U-bolts securely.
5. Tape the rotator control cable to the tower at points 18" to 24" apart.
6. Connect the antenna cable to the antenna (follow manufacturer's recommendation). Make sure you have enough slack for the 360° rotation. (the antenna rotates "S" to "E" [counterclockwise] on the first turn, therefore, slack should wrap counterclockwise around the mast.) See Figure 7.

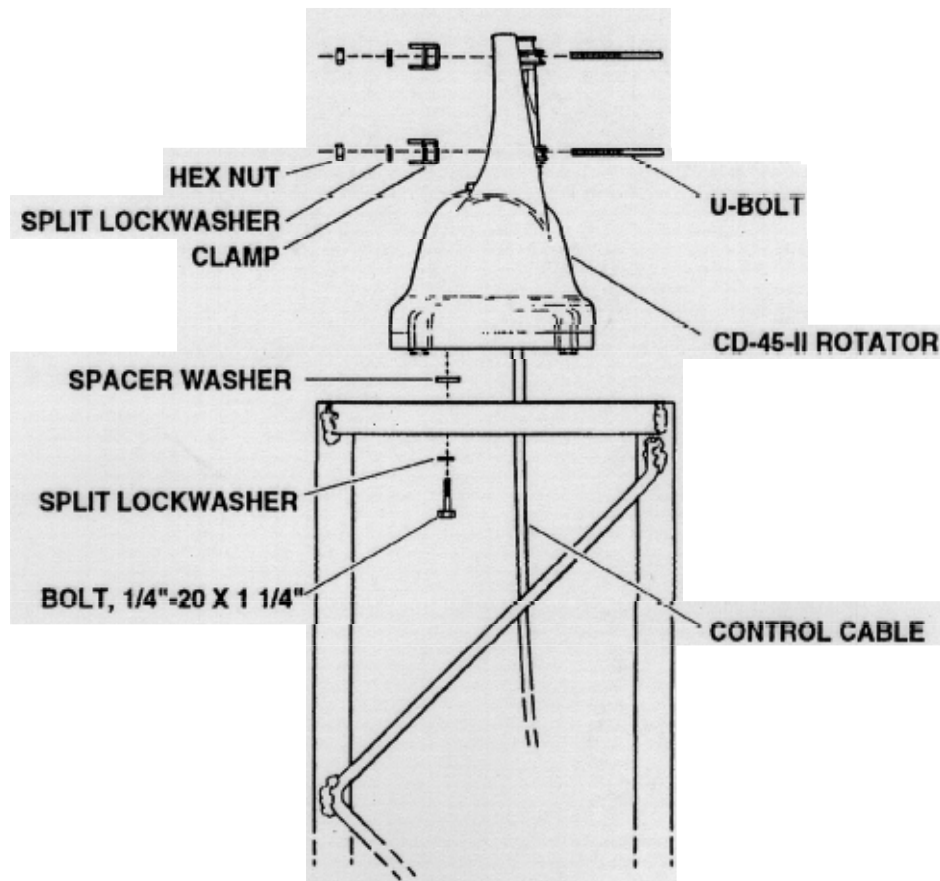


Figure 8  
Rotator Mounting on a Tower Top Plate

## OPTIONAL ACCESSORIES

Product 121B is a thrust bearing that utilizes a bronze/oil bearing. It will clear up to a 2 3/16" diameter mast. It can be bolted to all Hy-Gain crank-up towers when the rotator is mounted inside the tower.

The Tower Mounting/Spacing Kit is a flat plate equipped with four 0.5 inch standard bushings drilled to match the hold-down screw holes in the bottom of a Hy-Gain bell type rotator.

The plate is designed to allow enough clearance under the bottom of the rotator to clear the rotator housing bolt heads and control cable.

## PRELIMINARY

### CHECK AND CALIBRATION

#### IMPORTANT

**THERMAL PROTECTION:** If the rotator fails to turn after 4 or 5 minutes of continuous operation, the thermal switch comes into play. This protective device in the transformer automatically shuts off power if the rotator is used continuously for too long. It will automatically reset after 10 minutes.

1. Turn the Control Unit Power "ON" with the upper right "ON-OFF" switch. The meter should be illuminated and the needle should be to the right.
2. Depress the brake lever (center) and hold. Depress the CCW lever (left) and operate the rotator to its full CCW position. Observe the antenna cable on the first rotation to insure it does not get fouled.

3. With the rotator in its full CCW position, if the meter is not at its full left position, carefully adjust the zero (CCW South) position with the screw directly under the meter to exactly South.
4. Meter Calibration Procedure: Operate the rotator to its full clockwise position. Adjust the calibration potentiometer until the meter indicates full scale to the right. The meter is now calibrated. Do not adjust the calibration potentiometer when the rotator is in any position other than full clockwise.

When the control unit is turned "OFF", the meter needle will fall to the left "S" position and return to indicate the rotator position as soon as the control unit is turned "ON" again. It will not damage the unit to leave it turned "ON" for extended periods.

To operate this rotator, depress the brake lever, then depress either the CCW lever or CW lever. Hold both levers down until the antenna reaches the desired heading. Release the direction lever, then the brake lever.

#### GROUNDING

The tower, or other metal support device, must be grounded to an **earth** ground at its location. Use heavy copper cable looped so that if the tower comes down for any reason, there will be adequate slack to prevent the ground wire from breaking. Use one or more 8 foot copper clad steel stakes driven into the moist earth and fasten the wire securely at the stake and at the tower.

As mentioned in the "Cautions" portion, the steel chassis of the control box should be either grounded to a metal cold water pipe in the house or back to the electric service entrance box where the power comes into the house. This normally is accomplished with the wire of the 3-prong plug which then depends on the wall outlet being adequately grounded back to the service entrance as to the utility ground. If there is any doubt, have this checked by a licensed electrician.

## SOUTH CENTERED METER SCALE COVERSION

The stock CD-45-II Control Unit is shipped with the meter scale installed for "North" center operation; ends of rotation are at the "South" position. Some geographic locations and/or popular working areas may favor having the meter "South" center; ends of rotation are at the "North" position. We have provided the CD-45-II with an interchangeable meter scale. See the note following Step #11.

We recommend the following

1. Disconnect the power
2. Remove the control cable, carefully label' g each wire with its corresponding terminal number. This operation may be omitted if the control box can be worked on easily without removing the leads.
3. Remove the top and bottom covers.
4. Slip the lamp and holder off the lamp holder bracket. Loosen the hex nut on the transformer that is holding the lamp holder bracket and swing the bracket clear of the wires leading to the printed circuit board.
5. Carefully remove the hex nuts on the meter studs to free the printed circuit board. Slip the P.C. Board off the studs and pull it down under the chassis.

### CAUTION

It is good practice to use a short test lead or jumper wire to short the meter studs when it is not in the circuit.

6. Loosen the meter retaining clips and remove the meter from the chassis.
7. Insert a small knife blade between the clear meter cover and black housing at either corner of the top edge and gently pry the cover loose from that corner. Repeat for the other corner. The meter cover should pop off.

8. Carefully slip a knife blade under each corner of the lower edge of the white meter scale and twist slightly until the scale clears the two small indexing pins. Remove the scale and install the new one. Make sure the scale fits over the indexing pins and that it is flush and tight against the black housing. This will assure free movement of the indicator needle.
9. Reinstall the meter (remove the temporary jumper), the P.C. Board and lamp hardware. Check for pinched, shorted end, or over-stressed wires.
10. Reinstall the top and bottom
11. Reconnect the control cable in the exact sequence as they were removed.

If your beam was installed originally using the CD-45II with a "North" center scale, the antenna mast must be loosened and repositioned. In order for the meter to indicate properly, the front of your beam must point "North" when the rotator is at the ends of rotation.

Recalibrate the meter.

NOTE: In the past, the South Centered meter scale was on the reverse side of the factory installed North Center scale. The unit is now provided with a separate South Centered scale. This will help to avoid damage to the face of the meter scale during removal of the North Centered scale.

## ROTATOR CONSTRUCTION

(Refer to Figures 12)

1. Outer Housing: The upper mast support (Bell) and the brake housing are cast aluminum. The upper mast support is secured to the brake housing by four #12-24 x 3/4" self-tapping hex head screws.
2. Position Sensor: The position sensing potentiometer is located in the top of the bell casting.
3. Drive: A low voltage AC motor and its associated gears drive the output ring gear at about 1 RPM. The ring gear in turn is mechanically interlocked in the upper mast support (Bell).
4. Brake: The brake is a disc type which is an integral part of the motor armature. When power is applied to the motor, the armature lifts pulling the two disc pads apart which allows the gear train to operate freely. With no power applied, the weight of the motor armature forces the two brake pads together which in turn brakes the rotator.
5. Rotation Limits: Activated by the stop arm are two electrical end of rotation switches which disconnect the motor power just before the rotating bell housing reaches its full CW (0°) or CCW (360°) positions.
6. Bearings: Two rows of ball bearings are provided. Lubricate sparingly with factory approved special low temperature grease. This grease allow normal operation to -30°F (-34°C).

### CAUTION

This unit has been thoroughly tested and cycled before shipment. Follow the terminal board wiring carefully between Rotator and Control Box. Incorrect wiring will burn out the rotator potentiometer and void the warranty.

Be sure Rotator and Control Units are compatible. Do not intermix models with different operating voltages. This results in sluggish or non-operating performance, burned out motors, overheated transformers and burned out rotator potentiometers, etc.

## TROUBLESHOOTING

Most operational difficulties with rotators 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 lengths, and clamping to prevent strain on any

### MECHANICAL PLAY

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 rotator mechanism. A slight amount of "play" is built into the rotator to avoid binding due to environmental changes.

### ANTENNA ROTATES IN HEAVY WIND

This is usually a matter of the mast slipping in the support. 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. Check the nuts on the U-bolts to insure that they are tight.

### LACK OF POWER

If the antenna rotation is slow or sluggish or hard to start, check for proper voltages. If the voltages are correct, the 140 MFD motor start capacitor could be at fault. It is recommended that a new capacitor be tried before any other action is taken. If the electrical circuit is okay, then check for mechanical binding. Pay particular attention to bearings and alignment of the 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. If temperatures are at -30°F (34°C) or lower, operation will be slow or sluggish. This is normal!

## IMPROPER METER INDICATION

The brake and motor operate independently of the indicating system. If the pilot light burns at proper brilliancy, the instrument transformer is okay and the output is not shorted. Check the 1/8 amp meter circuit fuse with an ohmmeter. Check for about 13 VDC across Terminal 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 rotator leads No. 3 and No. 7. 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.

NOTE: 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 cause of such trouble may be localized by placing a test DC meter across Terminal No. 1 and No. 3 or No. 1 and No. 7 comparing the action of the test meter with the panel meter.

## NO ROTATION - INDICATION OK

Either the thermal cut-out in the power transformer has opened or there is actually trouble in the motor circuit. After allowing time for the thermal cut-out to restore service, proceed to "Checking the Control Unit" and "Checking the Rotator from Ground".

## GROUND WIRES

Grounds on cable leads can bum out either the line fuse or the small fuse in the meter circuit. 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 1/8 amp fuse blows. For full explanations, refer to Figure 8

## HELPFUL SUGGESTIONS

Be sure to check your rotator cable for shorting, open circuits, incorrect wiring, intermittent connections, shorted terminals, poor lead dress at terminals, rodent damage, and mast support or thrust

## CHECKING THE CONTROL UNIT

### 1. Voltages with Unit Plugged In.

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

Connector pins 1 and 2 should show 30 volts AC (approximately) when the brake lever is depressed.

Connector pins 1 and 5 should show 30 volts AC with brake release lever depressed and CW lever depressed.

Connector pins 1 and 6 should show 30 volts AC with brake release lever depressed and CCW lever depressed.

Connector pins 3 and 7 should show approximately 13 VDC.

### 2. Resistances with Unit Not Plugged In.

Disconnect the AC power source and remove the control cable.

The control box can be checked without removing the cover by using a volt-ohmmeter to check values across connector pins. Resistances across Connector pins 1 thru 5 with clockwise switch lever (right hand) depressed and across Connector pins 1 thru 6 with counterclockwise switch lever (left hand) depressed. Resistance across input line cord with on-off switch in the "ON" position and the brake lever depressed

## CHECKING THE ROTATOR FROM THE GROUND

You may possibly avoid bringing the rotator down by making electrical checks from the control box position. This is done by disconnecting the cable connector from the control unit. 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 as shown in Table 2.

To Check	Read Resistance	Between Terminals
1/2 Motor Winding	1.5 ohms	1-8
1/2 Motor Winding	1.5 ohms	1-4
1/2 Motor + Switch	1.5 ohms	1-6
Entire Motor	3.0 ohms	4-8
Right Limit Switch	0 ohms + leads	8-5
Left Limit Switch	0 ohms + leads	4-6
Entire Pot Strip	500 ohms	3-7
Pot Arm to + End	0 to 500 ohms	1-3
Pot Arm to - End	0 to 500 ohms plus leads	1-7

Table 2

ADDITIONAL CHECK LIST

1. Check continuity of control wires for loose connections caused by wind.
2. Tape down control cable securely all the way to rotator.
3. Check motor winding through control cable as outlined in Table 2
4. Check cable between leads. Static lightning charges or direct hits will cause carbon arcs in control cable at numerous spots along the cable that cannot be seen. This resistive path will break down with voltage applied to rotator (Replace cable.)
5. Check both control and rotator terminal strips for shorts.
6. Rotation in one direction usually indicates a loose or broken cable wire, bad relay, and bad sensing transistors in some units.
7. Be sure cable is of proper size for length used. Refer to Table 1.
8. Substitute a 3 foot piece of new rotator cable to bench test unit. Proper operation will indicate a defective rotator cable on the mast or tower, or a cable not large enough to create proper turning torque.
9. Low line voltage and cold weather will slow rotation. Using an extra long or small wire extension cord can lower line voltage.

10. Sandpaper or wire brush the terminal strip. Rust causes high resistance causing control/rotator not to work properly.

Service Information

If you are encounter technical problems and need assistance, you should contact Hy-Gain Customer Service Department.

All requests, inquires, warranty claims, or for ordering replacement parts, contact:

Hy-Gain

308 Industrial Park Road Starkville,  
Mississippi 39759 USA Phone:  
662-323-9538

# PARTS LIST

## CD-45-II Control Unit Replacement Parts

Item	Part	
1	5156502	Control Unit, 220VAC, complete .....1
2	5156500	Control Unit, 120VAC, complete .....1
3	5139000	Printed Circuit Board .....1
4	55135200	Capacitor, 470 mfd, 50V, C-1..... 1
5	5051314	Resistor, 390 ohms, 5% 2W, R-1..... 1
6	5015300	Diode, Zener, VR-1.....1
7	85759002	Diode, CR-1.....1
8	52154257	Resistor, IOK olun, 1/4 W, R-2..... 1
9	5056300	Fuse, 1/8 Amp, F-1 .....1
10	52874001	Holder Fuse.....2
11	1034403	Fuse, 3 Amp, F-2 (110V version) ..... 1
12	5089501	Bulb, Meter, #1819 .....1
13	710053	Fuse, 1 Amp, S16-Blo, F-2 (220V version) ..... 1
14	5138600	Switch, Snap, S03, S-4, S-5 ..... 1
15	5141100	Cover, Top .....1
16	5141200	Cover, Bottom.....4
17	5152700	Pads, Skid.....9
18	520057	Screw, #6-32 x 3/8", Pan Head ..... 1
19	567105	Washer.....1
20	640076	Socket, 8-pin.....1
21	5088400	Lever, Switch, for S-3, S-4 & S-5..... 1
22	450403	Relief, Strain, Heyco 3772 (220 V version) ..... 2
23	506665	Screw, #6-32 x 1/4", round head ..... 2
24	560068	Washer, Back-up (220V version).....1
25	1073501	Transformer, Power (220V version) . .....1
26	1073301	Transformer, Power (120V version) .....1
27	5020200	Transformer, Meter (220V version) ..... 1
28	5017700	Transformer, Meter (120V version) ..... 1
29	5151501	Capacitor, Motor Start..... 1
30	5086100	Cord, Line, 3-wire (120V version) ..... 1
31	450431	Relief, Strain, Heyco 1217 (120V version) ..... 1
32	5079800	Cord, Line, 3-wire (220 VAC; European Plug) ..... 1
33	5147702	Meter.....1
34	5175200	Switch, On/Off S-1 .....1
35	723406	Potentiometer.....1
36	1056300	Holder, Fuse, for F-2; (120V version) ..... 1
37	710054	Holder, Fuse, for F-2; (220V version) ..... 1
38	5156100	Plate, Face.....1
39	5089103	Chassis.....1

## HAM IV/CD-45-II Control Unit Replacement Parts (Continued)

Item No.	Part No.	Description	Qty
40	506325	Bolt, Hex Head, 1/4"-20 x 3/4"	1
41	567110	Lockwasher, Int. 1/4"	2
42	567120	Flatwasher, 1/4"	2
43	556960	Nut, Hex, 1/4"-20	1
44	550029	Nut, Wing, 1/4"-20	1
45	710083	Holder, Bulb	1
46	.567125	Lockwasher, #10 Internal	4

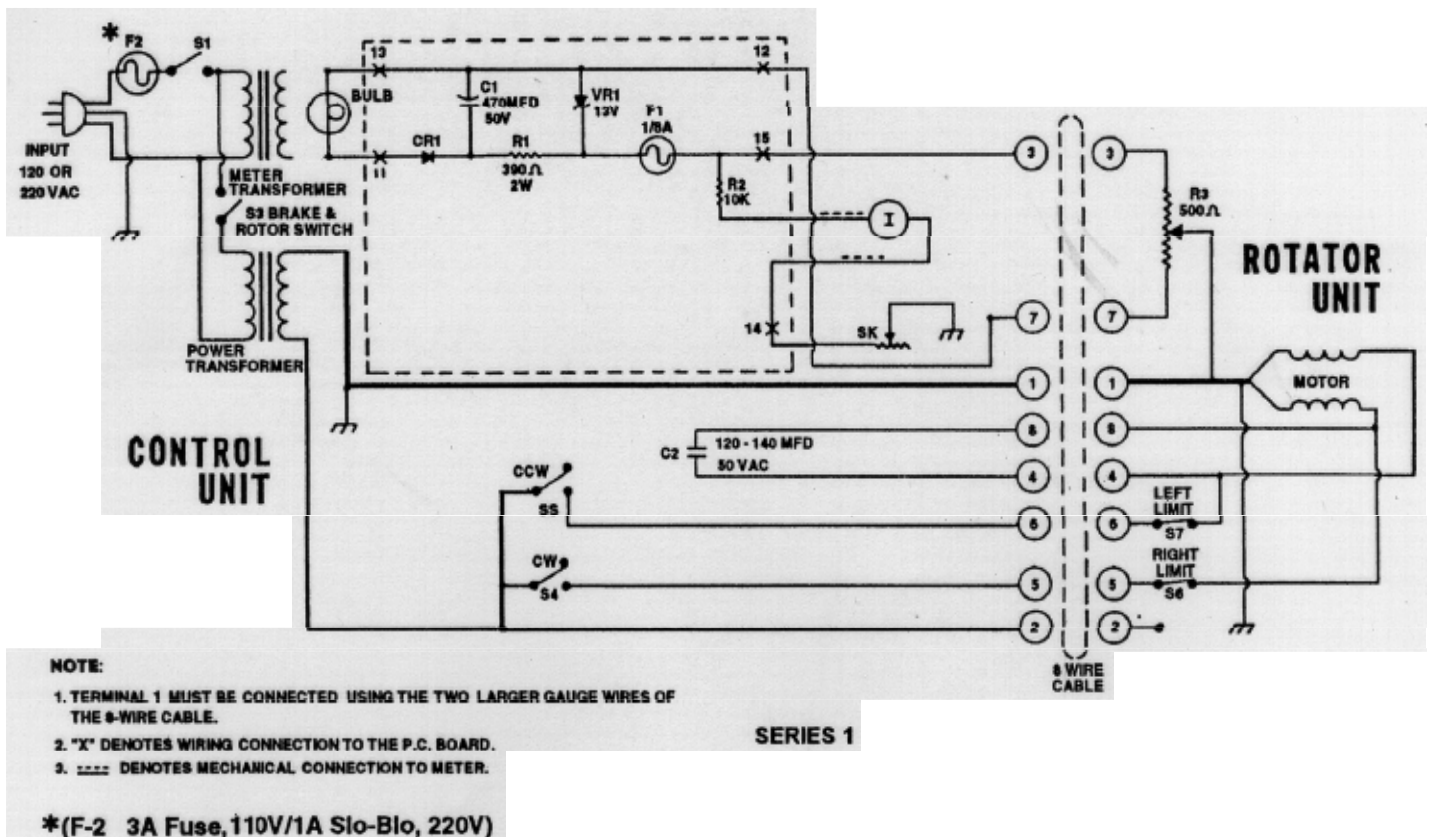


Figure 9  
Wiring Schematic



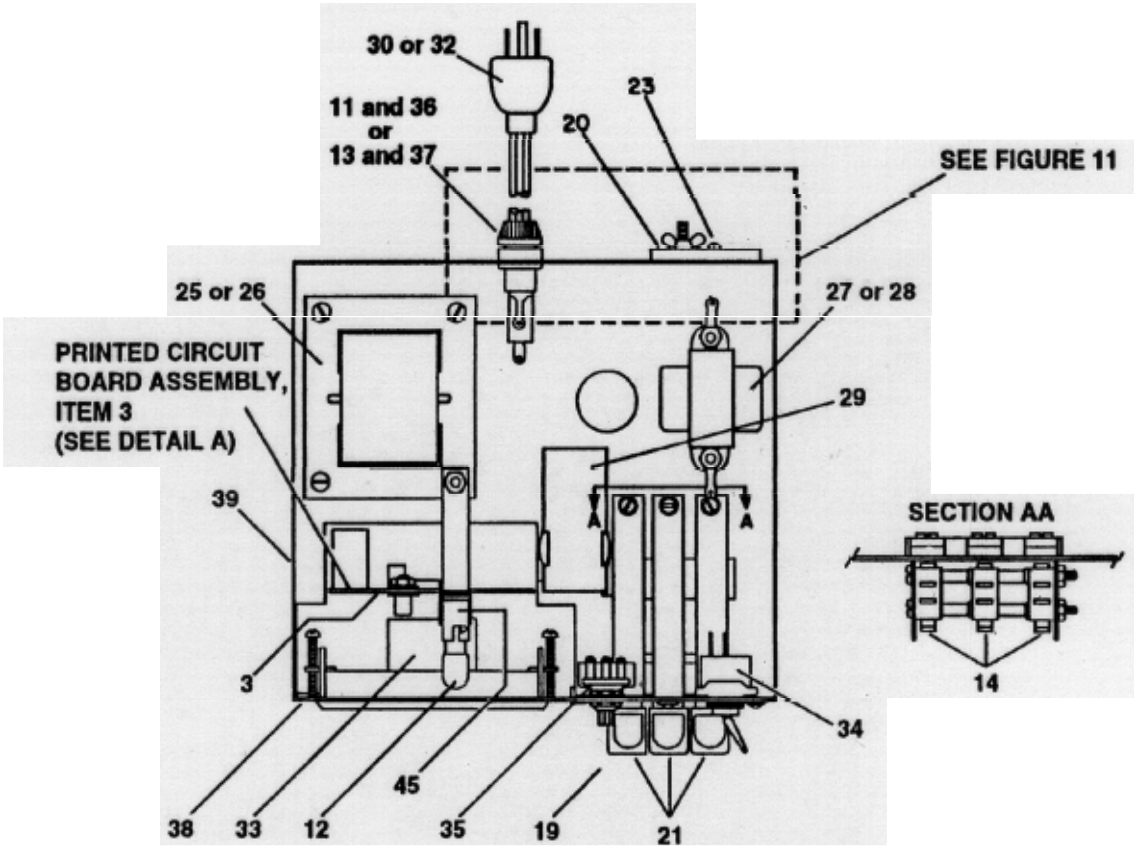


Figure 10  
Control Unit-Top View

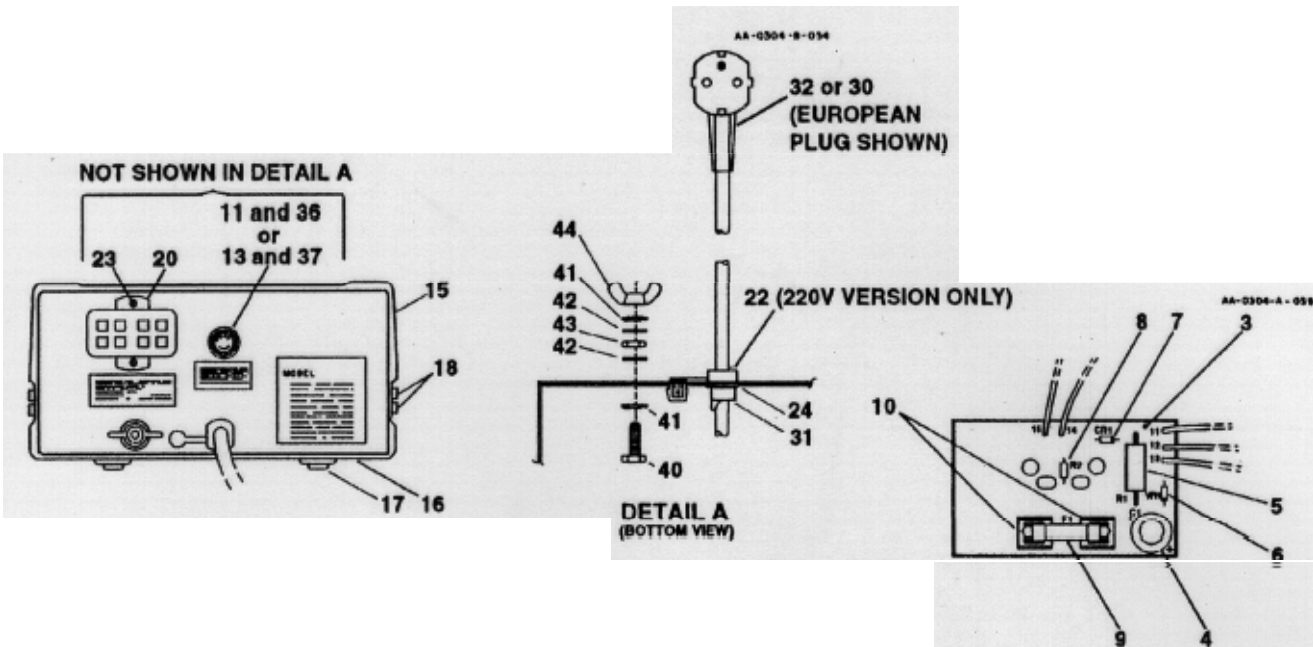


Figure 11  
Control Unit-Back View

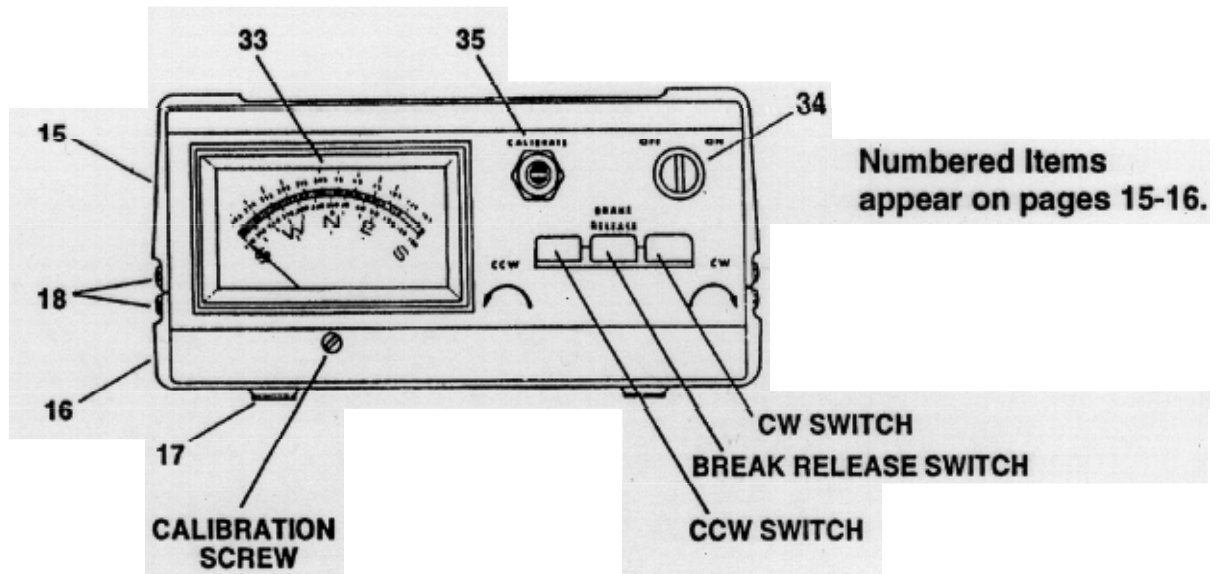


Figure 12  
Control Unit - Front Panel

### CD-45-II Rotator

Item No.	Part No.	Description	Qty
7	5011300	Retainer, ball bearing .....	2
11	5023100	Potentiometer Assy. ....	1
12	-5030400	Support, upper mast (bell casting) .....	1
13	5030600	Ring, retaining.....	1
15	5031300	Gear, driving .....	1
16	5033501	Bearings, ball .....	50
24	5037406	Motor Assy.....	1
25	5039800	Board, Terminal .....	1
30	5105700	Screw, #12-24 x 3/4" .....	4
	5042510	Accessory Kit.....	1
51	107632061	Screw, round head.....	2
52	110820035	Bolt, 1/4-20 x 1 1/4" .....	4
53	-5035100	Clamp, mast.....	4
54	5035200	U-bolt.....	4
55	5050200	Flat washer.....	4
56	5091400	Grommet.....	1
57	5033900	Terminal cover.....	1
58	556960	1/4"-20, Nut .....	8
59	567115	1/4", split lockwasher.....	12
60	640077	Plug, cinch, 8 pin .....	1

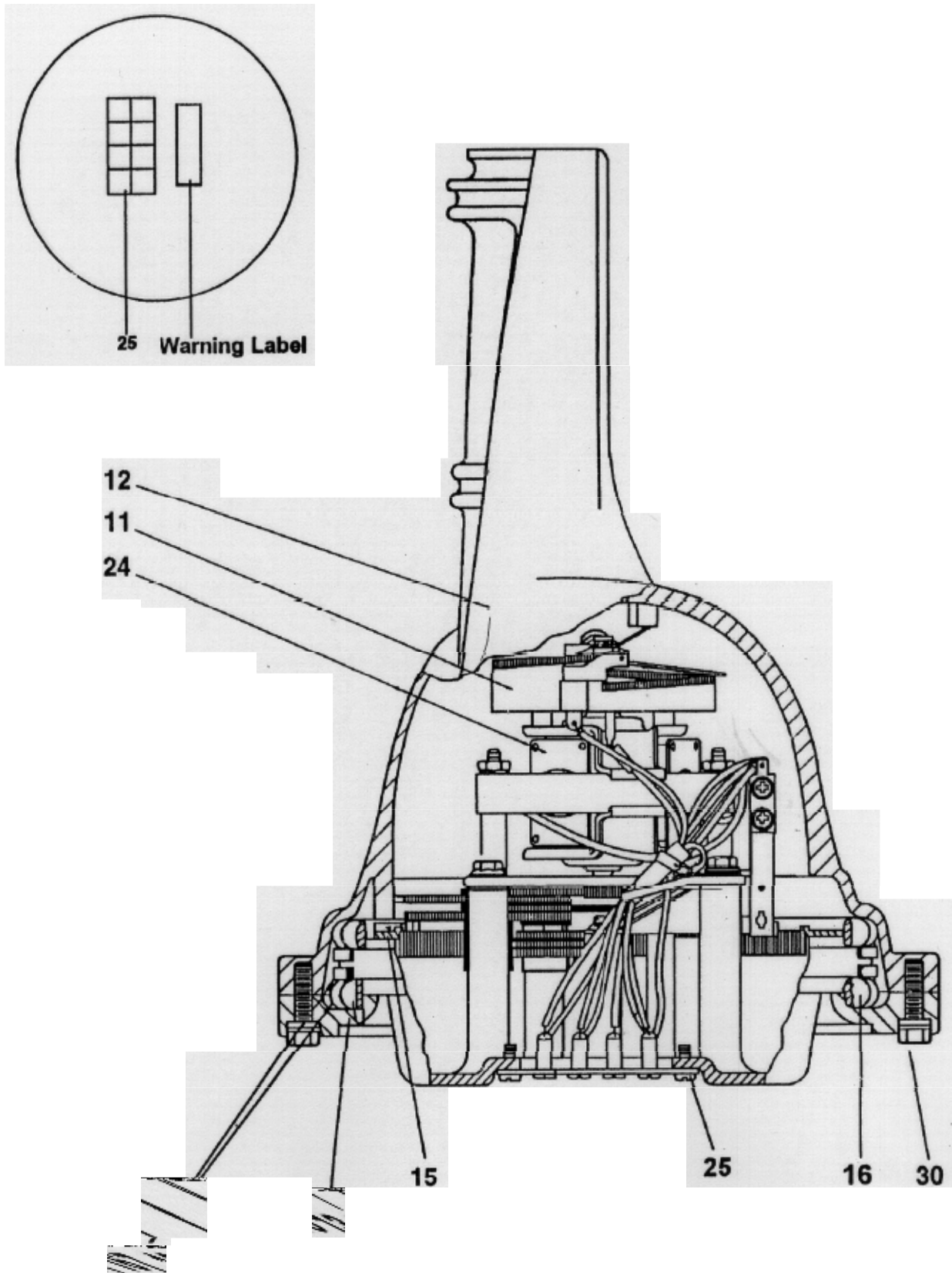


Figure 13

Overall View of CD-45II Rotator

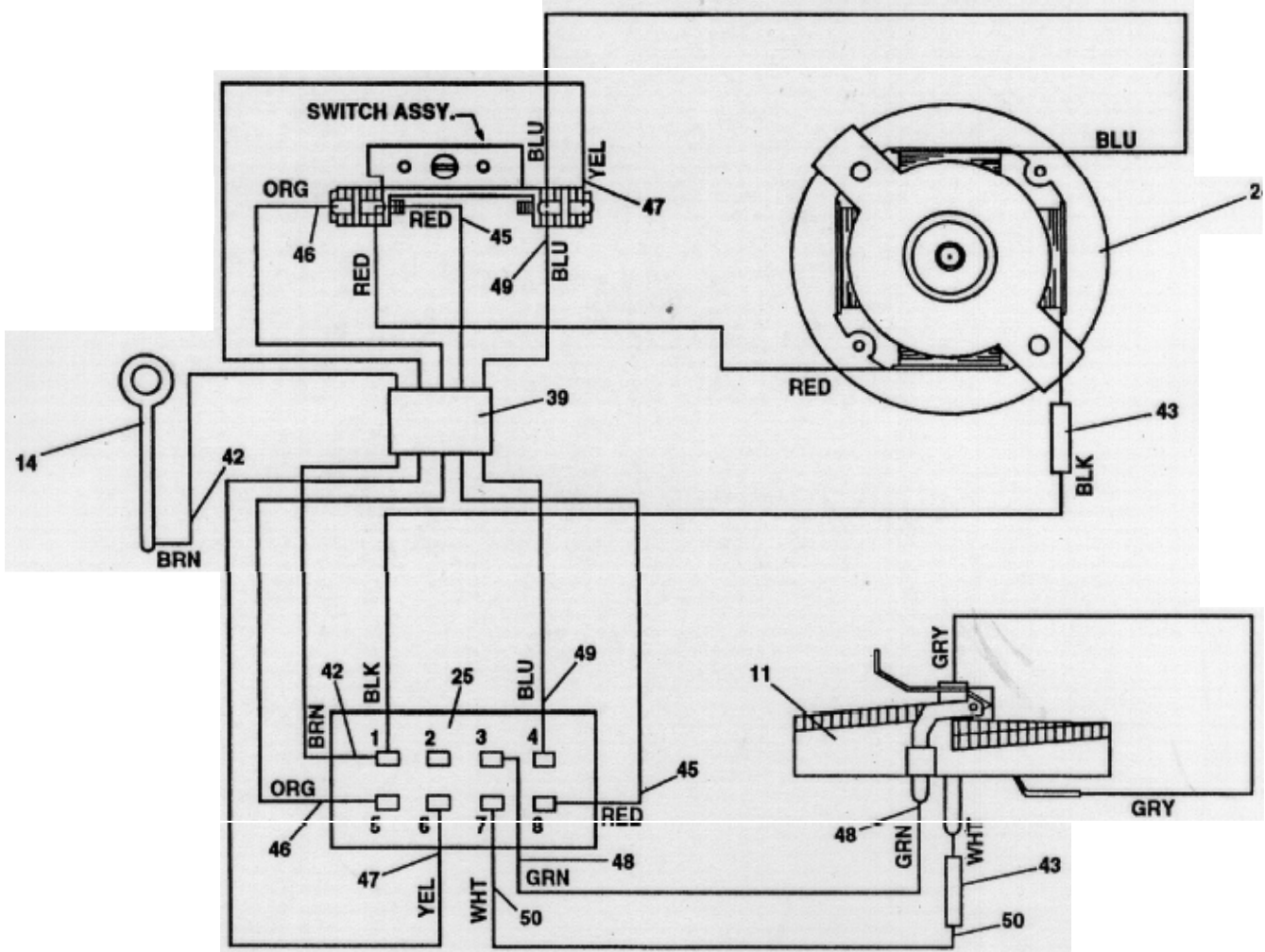
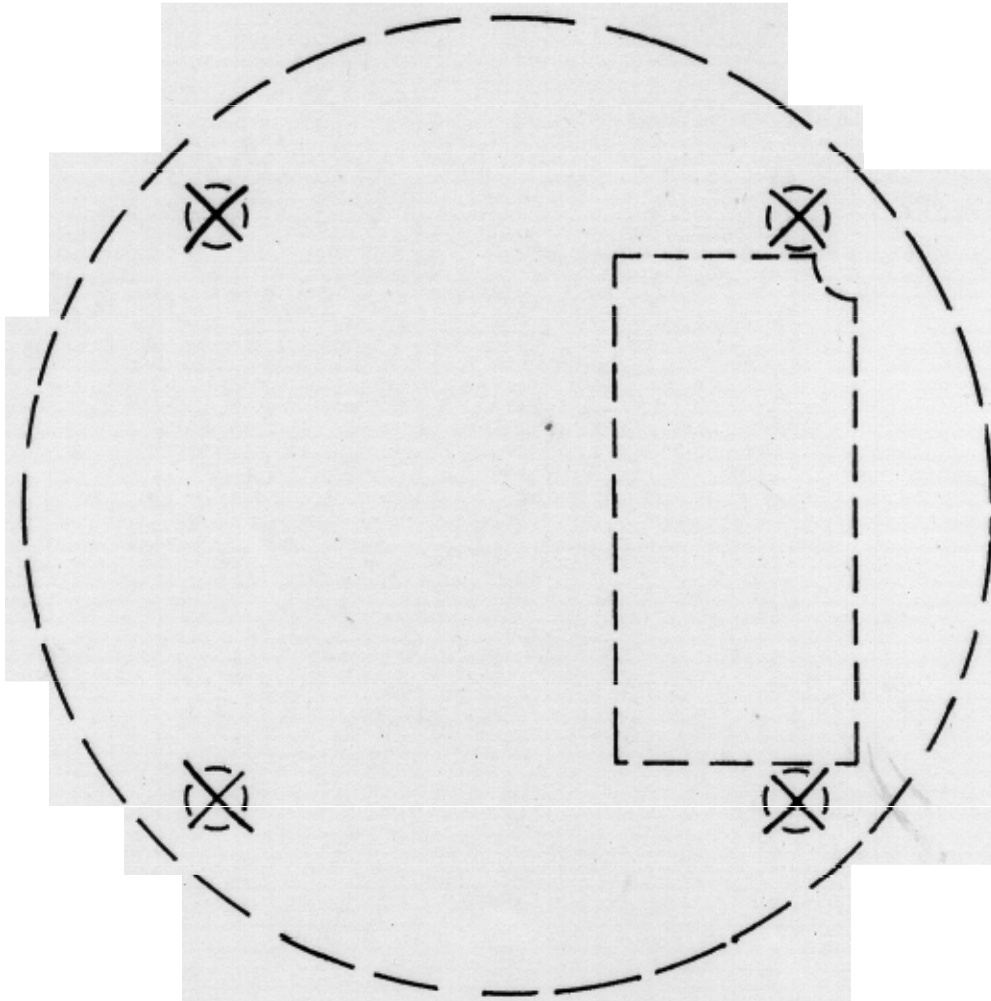


Figure 14  
Wiring Diagram

HOLES TO BE 17/64" CLEARANCE DRILL



### Tower Drilling Template

This information is believed correct, but no warranty is given or implied and no liability is assumed by Hy-Gain as to its accuracy or completeness. Changes maybe made from time to time so the user should verify all factors that may be critical. This information is not to be construed as to authorizing or advising use of any patented invention.