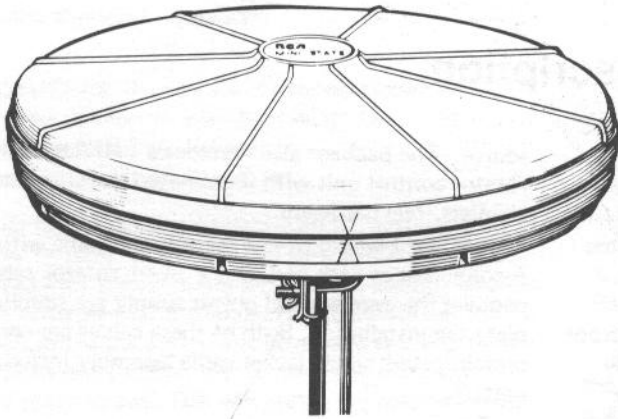


WARNING: INSTALLATION OF THIS PRODUCT NEAR POWER LINES IS DANGEROUS. FOR YOUR SAFETY, FOLLOW THE INSTALLATION DIRECTIONS.

Before you do anything else, read the booklet on safety precautions, "How To Install Your Own Antenna" which is packed in the carton with this antenna.

RCA

AC-DC Mini-State Antenna System



**VHF-UHF
Model 5MS550**



Figure 1. Typical Antenna Locations.

Items Supplied

The following items are included in the 5MS550:

QUANTITY	DESCRIPTION	QUANTITY	DESCRIPTION														
1	Radome Unit with VHF and UHF antennas, amplifier and rotator	3	Hairpin Mounting Legs for indoor use of antenna														
1	Rotator Control Unit with 8' cable	1	30' Combination Coaxial/3-Wire Rotator Cable														
1	120 VAC/12 VDC (Negative Ground) Power Supply Unit with VHF/UHF Band Separator attached	<table border="1"> <thead> <tr> <th colspan="2">OPTIONAL ACCESSORIES</th> </tr> </thead> <tbody> <tr> <td>Combination Coaxial/3-Wire Rotator Cable, 60'</td> <td>5MS404</td> </tr> <tr> <td>80'</td> <td>5MS403</td> </tr> <tr> <td>Offset Mast for use with wall, chimney or window mounting brackets</td> <td>5MS501</td> </tr> <tr> <td>Fold-Down RV Antenna Mount</td> <td>5MS502</td> </tr> <tr> <td>Tri Mount Kit (tripod for roof mounting)</td> <td>10Y514</td> </tr> <tr> <td>Two-Set Coupler</td> <td>10G217</td> </tr> </tbody> </table>		OPTIONAL ACCESSORIES		Combination Coaxial/3-Wire Rotator Cable, 60'	5MS404	80'	5MS403	Offset Mast for use with wall, chimney or window mounting brackets	5MS501	Fold-Down RV Antenna Mount	5MS502	Tri Mount Kit (tripod for roof mounting)	10Y514	Two-Set Coupler	10G217
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Tri Mount Kit (tripod for roof mounting)	10Y514																
Two-Set Coupler	10G217																
1	DC Power Cord																
1	Bracket and 2 screws for mounting Power Supply																
1	All stainless steel Mast Mounting Bracket and hardware, (4 screws, 4 lockwashers, 1 U-bolt, 2 nuts)																

Description

The RCA AC-DC Mini-State 5MS550 is a completely new type of TV antenna system designed for use on recreational vehicles, boats and residential dwellings. Under average conditions, the reception range of the antenna is 35 miles from the TV transmitter antenna. The system contains a miniaturized unidirectional antenna, special solid state amplifier and an electrical rotating mechanism, all housed inside a weatherproof "radome". The remote power supply is designed to operate from either a 120 VAC or 12 VDC (negative ground) power

source. The package also includes a VHF/UHF band separator, rotator control unit with illuminated direction indicators, and stainless steel hardware.

A 30-foot length of low loss coaxial cable with a screw-type F-connector at each end, and a 3-wire rotator cable to interconnect the antenna and power supply are supplied to complete the installation. Both of these cables are contained in a prefabricated, single jacket cable assembly included with this unit.

Installation

ANTENNA UNIT

CAUTION: During the installation of the 5MS550 Mini-State Antenna make sure the antenna and mast cannot accidentally come into contact with any power line. CONTACT WITH POWER LINES COULD RESULT IN SERIOUS INJURY OR DEATH.

For protection against electrical static charge build-up during thunder storms, it is recommended that the antenna mast be properly grounded using at least #10 AWG copper or #8 AWG aluminum wire.

Recreational Vehicles and Boats

For best performance on vehicles and boats, the 5MS550 antenna should be mounted as high as practical and as far away from metal objects as possible. If the interior areas of the

vehicle or boat are substantially enclosed or surrounded by metal surfaces, an exterior mounting location must be selected for the antenna. For recreational vehicles with metal roofs, the antenna should be mounted at least two feet above the roof surface. For boats, best reception will normally be obtained if the antenna is mounted above the boat's highest deck or cabin structure. However, it is possible that other mounting locations may also provide satisfactory reception. It is recommended that several mounting locations be tried to find the one that provides optimum performance before a permanent installation is made.

Mounting instructions using standard hardware are given in the following paragraphs. Instructions for installing special mounting hardware (available as optional equipment) are provided with each special hardware package.

Residential Dwellings

Due to its small size, the AC-DC Mini-State Antenna will mount in a variety of places. While a rooftop installation is preferred for residential dwellings, the antenna will usually

perform well on an outside wall, window frame, or in high indoor locations such as attics, overhead crawl spaces, or on the shelf of an upstairs clothes closet. In difficult reception areas, it may be worthwhile to experiment with different locations to find the one that provides the best TV picture.

Mounting Position

For proper operation, the antenna must always be mounted with the radome in a horizontal plane. In exposed outdoor locations, it should be mounted with its top side up. When used indoors, it may be mounted in an inverted position with no sacrifice in performance; however, the direction of rotation indicators on the control unit will be reversed.

Coaxial Cable/Rotator Wire Connections (Figure 2)

Loosen the two screws and remove the terminal board cover from the underside of the radome housing. This will expose a threaded coaxial receptacle and 3 special screw type Terminals. Screw the coaxial connector on one end of the lead-in cable firmly onto the threaded receptacle.

CAUTION: Be sure the center conductor of the connector is in the hole of the receptacle before tightening.

Fasten the yellow rotator control wire to Terminal 1, the black wire to Terminal 2, and the red wire to Terminal 3. Insert the wire into the clamping terminals as shown. Replace the terminal cover so that the coaxial cable comes out the elongated slot in the bottom of the cover and the rotator control cable comes out through the notch in the side. Tighten the terminal cover screws. This will clamp the rotator cable.

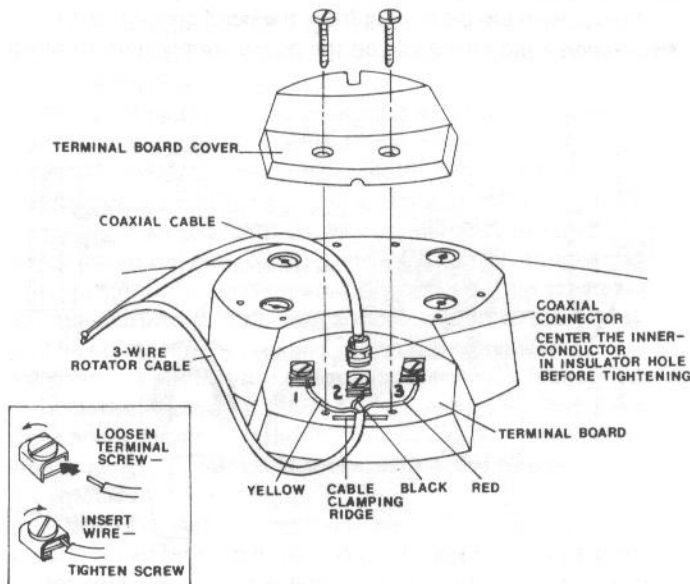


Figure 2. Connections to Antenna Terminal Board.

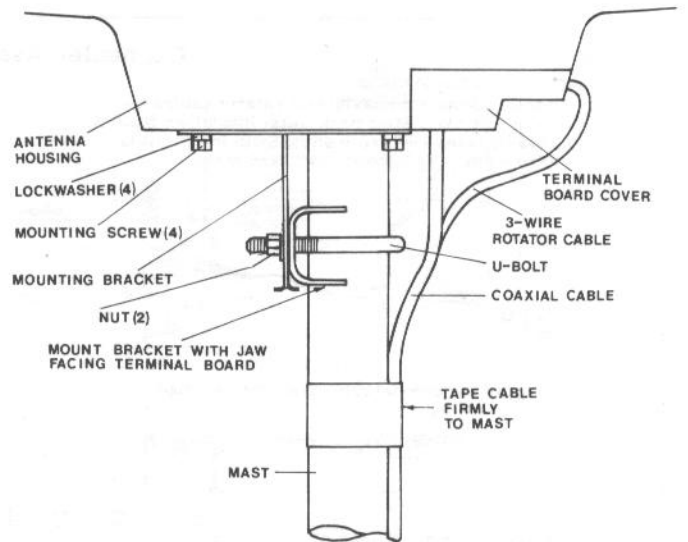


Figure 3. Mast Mounting of Antenna.

Floor or Shelf Mounting

Insert the 3 hairpin type legs into the pairs of matching holes on the underside of the antenna housing so that they angle outward to form a tripod support.

Mast Mounting (Figure 3)

A stainless steel mounting bracket is provided for mounting the antenna to a standard TV mast. Attach this bracket to the bottom of the antenna housing using the 4 screws and lockwashers provided. These screws thread into 4 slotted metal inserts. Orient the bracket as shown, so that the pipe jaws of the bracket face toward the terminal cover.

NOTE: Do not attempt to unscrew the metal inserts because these hold the internal mechanism in place.

Clamp the bracket and antenna assembly to the mast using the U-bolt and 2 nuts provided.

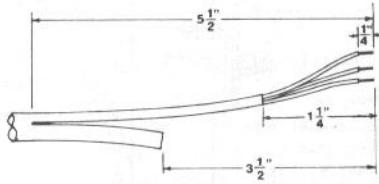
Antenna Orientation

Because of the built-in rotator, the antenna orientation is not critical; however, a double arrowhead is molded into the outer rim of the radome that indicates the center of rotation of the system. In a residential or fixed location, pointing the double arrowhead toward the TV transmitter antenna will reduce the amount of rotation required for best reception.

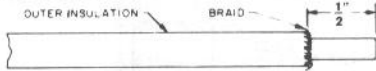
For non-fixed locations such as recreational vehicles or boats, the antenna may be installed with the double arrowheads facing in any direction. Optimum TV reception may be obtained by orienting the antenna with the built-in rotator.

Connector Assembly Instructions

Step 1: Separate coaxial and rotator cables for a length of $5\frac{1}{2}$ ". Strip back outer insulation from 3 rotator leads $1\frac{1}{4}$ " from ends. Strip inner insulation from ends exposing $\frac{1}{4}$ " bare wire.



Step 2: Cut coaxial cable $3\frac{1}{2}$ " shorter than rotator cable.

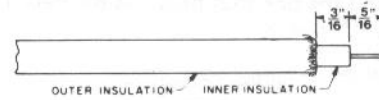


Step 3: Remove $\frac{1}{2}$ inch of outer insulation.

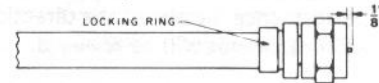
Step 4: Comb braid out straight. Bend back and cut short as shown

Step 5: Cut off exposed aluminum foil.

Step 6: Remove $\frac{5}{16}$ inch of inner insulation. Take care not to nick center conductor.



Step 7: Insert prepared end of cable into connector until center conductor protrudes approximately $\frac{1}{8}$ inch as shown. (Caution: Do not allow the inner insulation to protrude into the connector's threaded section.)



Step 8: Using a crimping tool or a pair of pliers as shown, crimp the connector locking ring.

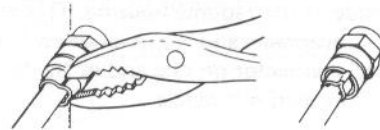


Figure 4. Installation of Connector to Shortened Cable.

Cable Installation

Tape the combination coaxial and rotator cable to the mast as shown in Fig. 3. Run the cable to the TV set location securing it every 3 to 4 feet using suitable cable clamps or U-shaped staples.

CAUTION: Clamps or staples should not press tightly against or cut through the coaxial cable. Excessive distortion of the coaxial cable may weaken the TV signal.

The cable requires a $\frac{1}{2}$ " diameter hole for entry through the wall or floor. To make it easier to insert the cable through the hole, fold the separated rotator cable back against the coaxial cable so that the coaxial connector goes through the hole first.

NOTE: If the coaxial and rotator cable assembly is too long, it may be shortened and a new connector (RCA 10GFO59) assembled to the coaxial cable as shown in Fig. 4.

POWER SUPPLY UNIT

The power supply unit may be operated from either a 120 VAC or a 12 VDC (negative ground) power source. These two voltages may be applied separately or simultaneously.

CAUTION: The 12 VDC circuitry of the 5MS550 Mini-State Antenna is designed to operate only with common negative ground systems. Use with positive ground systems will result in costly damage to the unit.

The power supply unit also serves as a junction box for cable connections. It can be mounted to the back of the TV set or to a surface behind the set.

Coaxial Cable/Rotator Wire Connections (Figure 5)

Attach the coaxial connector to the threaded receptacle on the power supply unit using care to center the inner conductor of the coaxial connector in the hole of the receptacle before tightening the nut. Slip the rotator cable through the strain relief clamp, and connect the yellow wire to Terminal 1, black wire to Terminal 2 and red wire to Terminal 3.

Insert the 5-pin cable plug from the hand control unit into the mating 5-pin receptacle on the power supply unit. Connect

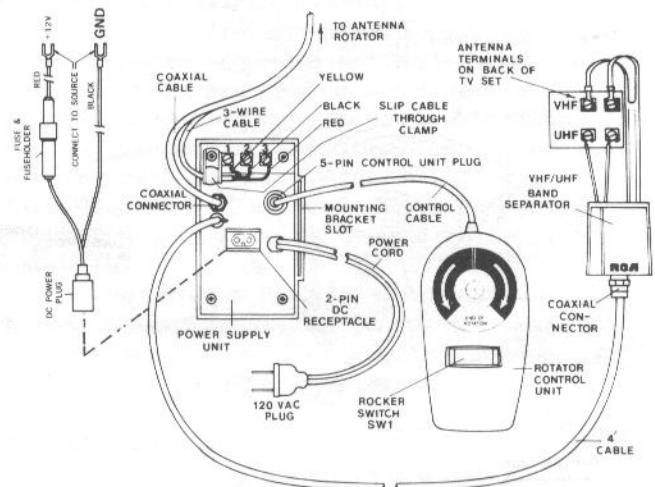


Figure 5. Antenna System Interconnections.

the band separator leads to the UHF and VHF antenna terminals of the TV set. These leads are identified on the band separator case. If the TV set has a VHF coaxial antenna receptacle, and there are no UHF stations in the area, the coaxial cable's F-connector may be unscrewed from the band separator and re-attached directly to the TV receiver's coaxial receptacle. This may help to reduce ghosts and interference in extremely difficult reception areas.

12 VDC Operation

The DC power cord supplied with the system contains an in-line protective fuse.

CAUTION: For continuous protection against fire hazard, replace fuse with only the same type 0.8 ampere/250 volt rating.

Insert the 2-pin plug of the DC power cord into the mating 2-pin DC receptacle on the power supply unit. Attach the red wire to the positive terminal and the black wire to the negative terminal of the DC source used. The power cord is supplied with spade lugs. These may be easily removed if your installation requires another type of connector.

Attach the power supply mounting bracket as shown in Figure 6 and slip the power supply onto its bracket.

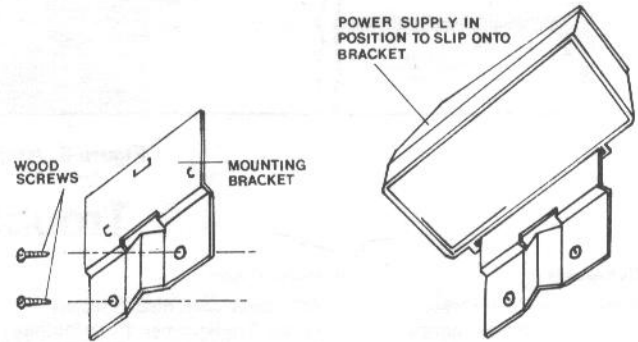


Figure 6. Power Supply Mounting.

120 VAC Operation

Insert the power cord into any convenient 120 volt AC outlet. The power cord may be left plugged in at all times because the power used is very small, about the same as that of an electric clock. The DC source, if any, may also be left plugged in, since the unit will operate from either one or both sources.

Operation

With the TV set on and a station tuned in, rotate the antenna by pressing the rocker switch located on the control unit. Pressing the right side of the switch will turn the antenna in a clockwise direction. Pressing the left side will turn it counterclockwise. Although the actual antenna movement cannot be seen, the indicator arrow on the control unit will

light, showing the direction of antenna rotation.

When the antenna has made one full turn (360 degrees), the End of Rotation light will come on.

Observe the picture while rotating the antenna first in one direction and then the other, until the best picture quality is obtained.

Circuit Description

The Mini-State 5MS550 system consists of an antenna, amplifier, rotator drive unit, rotator control unit, power supply and VHF/UHF band separator.

The VHF section of the antenna is a circularly shaped, slot tuned, broadband, unidirectional traveling wave antenna. The UHF section is a broadband multi-element array. The VHF signal is amplified and combined with the UHF signal by means of an adder circuit. The combined VHF-UHF signal travels down a coaxial cable to the power supply and through C6 to the band separator, where they are separated and transformed to 300 ohms for connection to the TV set.

The power supply provides all the operating voltages for the system. Eleven volts DC for amplifier power is supplied through the RF coaxial cable. The ground return circuit for the amplifier is via the coaxial cable shield. The power supply also provides DC voltage at socket pins 4 and 5 to energize the rotator motor and lamp circuits.

A small DC motor turns the antenna. Direction of rotation is determined by switch SW1. An end-stop switch opens the motor circuit when the antenna has rotated to its end position. Diodes D1 and D2 allow the motor to reverse and rotate off the end-stop.

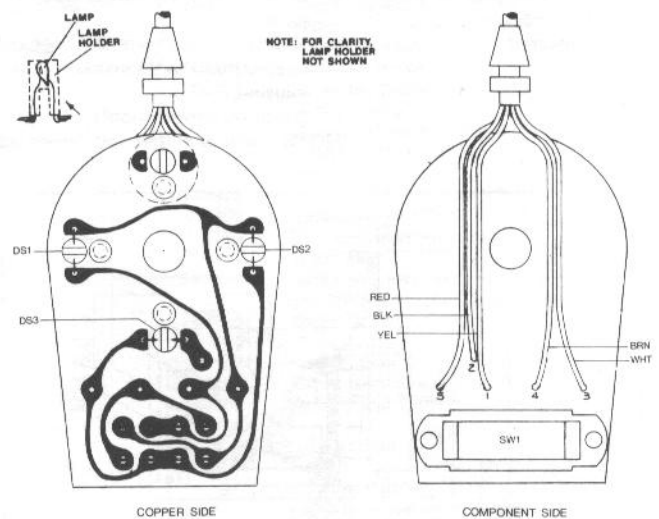


Figure 7. Control Unit Components.

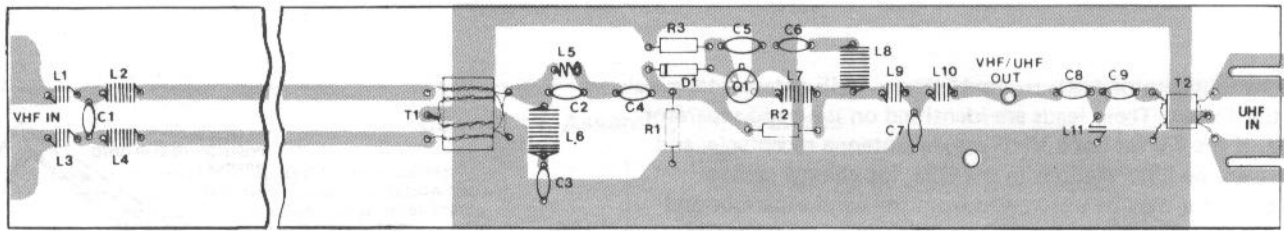


Figure 8. Amplifier Components.

Troubleshooting

Symptom

Antenna will not rotate; direction indicator lamps do not light; (120 VAC operation only)

Antenna will not rotate; direction indicator lamps do not light; (12 VDC operation only)

Antenna rotates slowly; direction indicator lamps light dimly; (120 VAC operation only)

Antenna will not rotate; direction indicator lamps light properly

Antenna at end stop; will not rotate

Antenna rotating in wrong direction; CW direction indicator arrow lights when control switch is pressed on left side and CCW direction indicator arrow lights when control switch is pressed on right side

Weak picture; no noticeable difference in picture when antenna is rotated, or when the 120 VAC and 12 VDC power cords are disconnected

Probable Cause

- AC power cord disconnected
- Power Transformer T1 defective
- Power supply diodes D1, D2, D3, D4 (Two or More) defective
- Control wire No. 4 or 5 open
- Switch SW1 defective

- DC power cord disconnected
- Fuse in DC power cord open
- Power supply diode D6 defective
- Switch SW1 defective

- Power supply diode(s) D1, D2, D3, or D4 defective

- 3-wire rotator cable open or incorrectly connected
- Defective motor
- Defective end stop switch

- End stop switch defective
- End stop diodes D1 or D2 defective

- Control cable connections 1 and 3 reversed

- Defective amplifier transistor Q1
- Open connection between antenna and amplifier
- Open or shorted coaxial lead-in cable
- Shorted or open amplifier coaxial wrap-around cable inside antenna housing.
- Defective power supply

NOTE: With amplifier and power supply

Symptom

Loss of color or snowy picture; (Channel 6 only)

Probable Cause

properly connected, voltage between L1 in power supply and ground should be approximately 11 volts DC during non-rotating operation. During rotation, this voltage may decrease slightly. During 12 VDC battery operation, if the battery is simultaneously being charged, this voltage may increase by several volts. A voltage of 16 volts or higher indicates a defective transistor or an open connection between power supply and amplifier. Very low or zero voltage may indicate a shorted C1, C2, C3, C4, or C5 capacitor, shorted coaxial cable, or short on amplifier board.

- Amplifier coil L5 improperly adjusted
NOTE: FM trap coil L5 was carefully adjusted at the factory. Normally it should require no further adjustment. If adjustment is necessary, L5 should be spread or compressed until the first FM trap null occurs at 96 MHz. 88 MHz will then occur outside of FM trap with nominal gain of 21 dB. (This adjustment should be made only by qualified service technicians using RF sweep equipment and crystal markers.)

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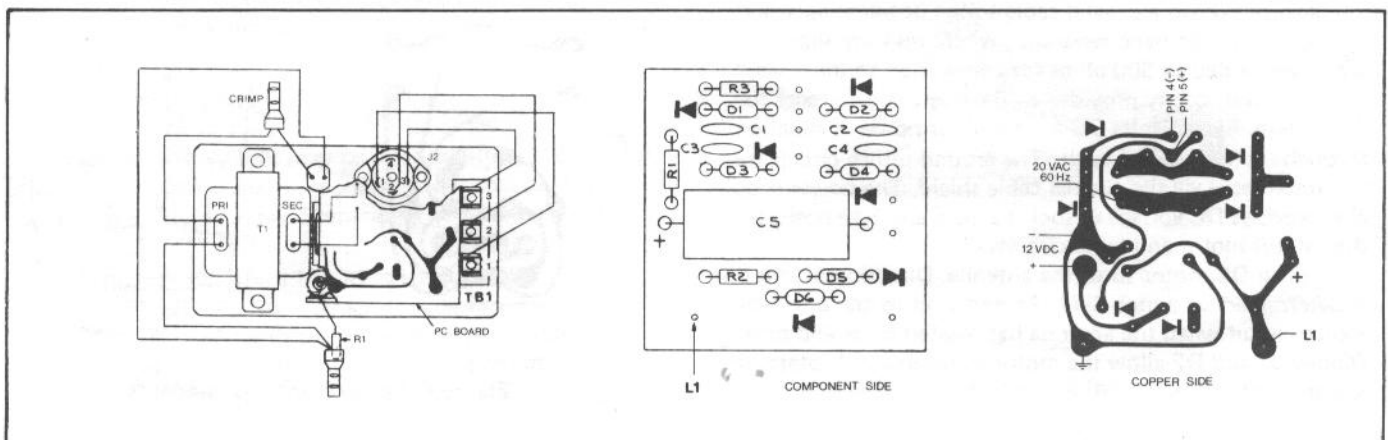


Figure 9. Power Supply Components.

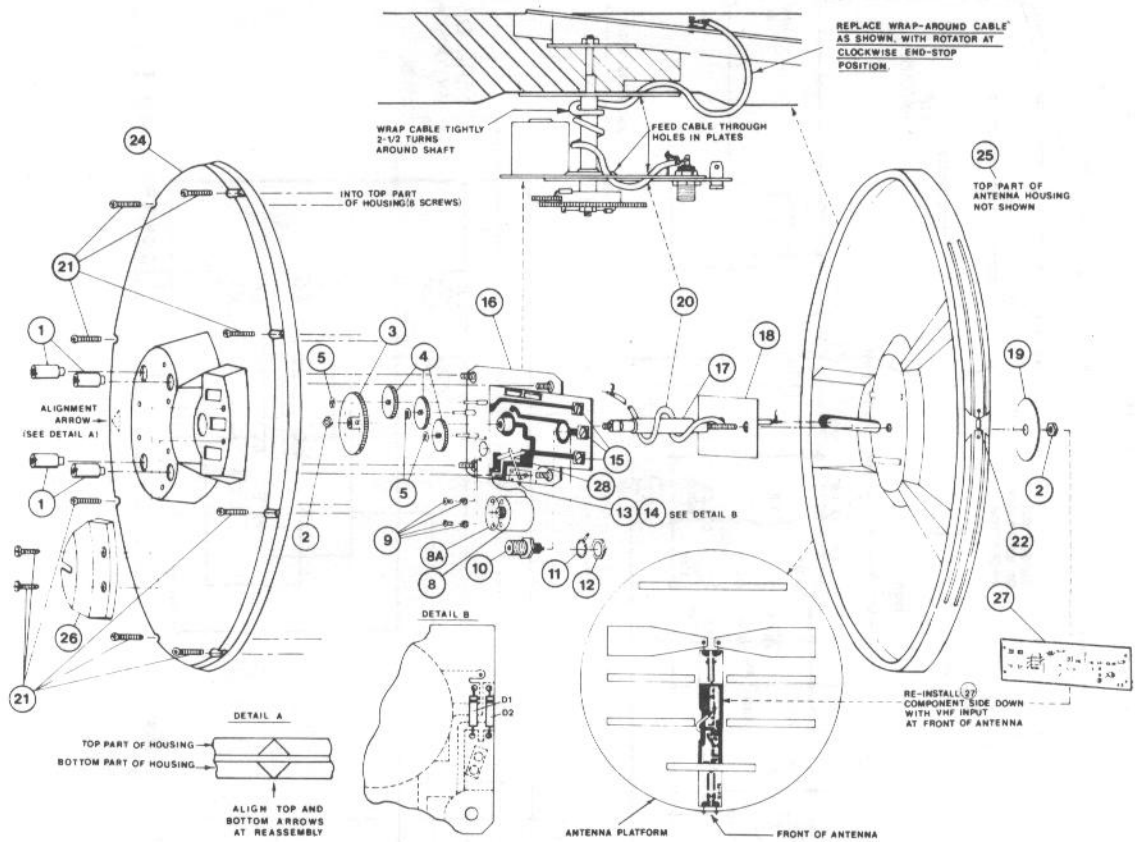


Figure 10. Antenna System Components.

Replacement Parts

Symbol	Stock No.	Description	Symbol	Stock No.	Description
		POWER SUPPLY			
(Fig. 5)	742939	Power Supply, complete	26	740749	Cover, Terminal Board
C1,2,3,4,6	740775	2000 pF 500 V ceramic	21		Screw, No. 8, self tapping, 7/8" lg
C5	742941	330 uF, electrolytic			ROTATOR UNIT
D1 to D6	231669	Diode 1N4003		742942	Rotator Drive Unit, complete (Items 1-5, 8-20)
J2	742940	Connector, 5-pin, chassis	1	740751	Insert, mounting
J3	741819	Connector, 2-pin (DC)	2	740752	Nut, self threading (2 per pkg)
L1	740739	Coil, RF choke	3	742943	Gear, Drive, with spring finger contact
R1	502515	1.5 Meg, 5% 1/2 W	4	740754	Gear, Idler
R2	502027	27 Ohms, 5% 1/2 W	5	740755	Washer, retaining (3 per pkg)
R3	502147	470 Ohms, 5% 1/2 W	8	740756	Motor, with pinion, mounting screws and washers
R4	502047	47 Ohms, 5% 1/2 W	8A	743405	Insulator, motor
T1	743404	Transformer, Power	9	740757	Screw and Washer, Motor Mtg (2 ea. per pkg)
TB1	740740	Terminal Board Ass'y, with 3 screw connectors	10		Coaxial Connector, chassis
	245347	Strain Relief, power cord	11		Washer, with solder lug
	246608	AC Power Cord	12		Nut, connector
	742937	DC Power Cord	13/D1	231669	Diode, CCW End Stop, 1N4003
		AMPLIFIER	14/D2	231669	Diode, CW End Stop, 1N4003
(Fig. 8)	741244	Amplifier, complete	15	740758	Terminal, with screw and nut (3 per pkg)
C1,8,9	423553	3 pF, 50 V ceramic	16	742944	Gear Plate Ass'y, with PC board, and Items 10,11,12,13,14,15,28
C2,4	423283	100 pF, 10% 50 V ceramic	17	740760	Shaft, Drive
C3,7	740984	10 pF, 50 V ceramic	18		Plate, Support
C5	245268	1000 pF, 50 V ceramic	19		Washer, fiber
C6	423285	2000 pF, 50 V ceramic	20	740761	Cable, coaxial wrap-around
D1	741100	Diode, 1S953	28	740762	Switch, End Stop
Q1	740727	Transistor, 2SC1424			MISCELLANEOUS
R1	227741	560 Ohms, 5% 1/2 W	(Fig. 3)	742945	Bracket, Antenna Mast Mounting; includes: 4 screws (10-32 x 1/2" lg), 4 split lock washers, 1 U-bolt, 2 nuts
R2	108866	2200 Ohms, 5% 1/2 W		740764	Leg, Mounting, hairpin type, set of 3
R3	108861	100 Ohms, 5% 1/2 W	(Fig. 5)	10G221	VHF/UHF Band Separator
		CONTROL UNIT		5MS401	30' Prefabricated Coaxial/3-Wire Rotator Cable
(Fig. 5)	742936	Control Unit, complete			
DS1,2,3	740746	Lamp, Indicator			
SW1	740743	Switch, Control			
	742938	Lens, Indicator			
	742969	Control Cable, with plug			
		ANTENNA UNIT			
22 (R1)	502136	Resistor, antenna termination, 360 Ohms, 1/2 W, ± 5%			
24	740747	Antenna Housing, bottom section			
25	740748	Antenna Housing, top section			

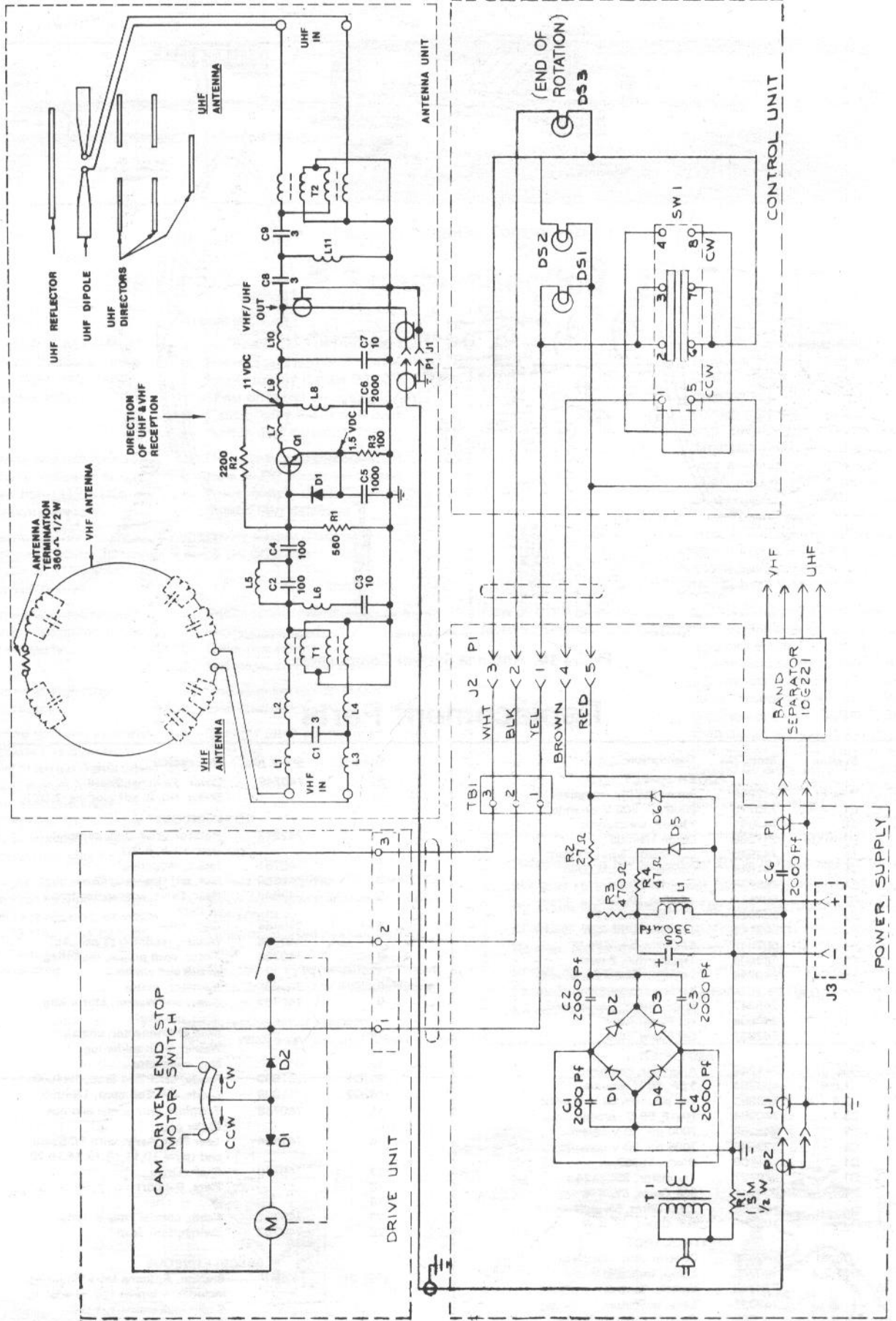


Figure 11. Antenna System Overall Schematic.



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