

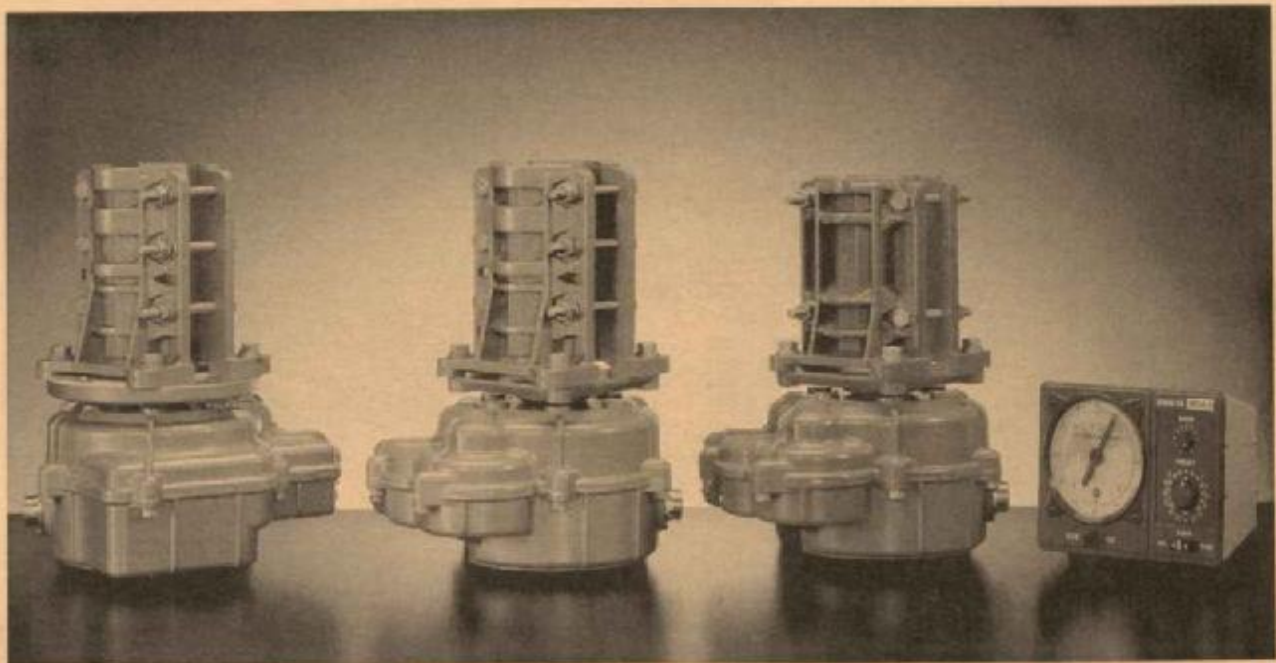
IM 826-150-05



取扱説明書
INSTRUCTION MANUAL

ROTATOR SET

RC5 - x Series



RC5B-x

RC5A-x

RC5-x

Figure 1-1. ローテーターセット RC5x, RC5x-x シリーズ

4th Edition 4-1994

1st Edition 7-1982

クリエートデザイン株式会社

Creative Design Corp.

WARRANTY

CD warrants each new products manufactured to be free from defects in material and workmanship and agrees to remedy any such defects, or to furnish a new part, in exchange for any part of any unit which under normal installation, use, and service desclooses such defect within ninety days from the date of purchase by original owner.

This warranty does not extend to any of our products which have been subjected to mis-use, neglect, accident incorrect wiring not our own, improper installation or to use in violation of instructions furnished by us. Nor does it extend to units which have been repaired or altered outside of our factory nor to accessories used therewith not of our own manufacture.

CD reserves the right to make any changes deemed necessary or desirable without advance notice or incurring any obligation to make like changes in units previously manufactured or sold. This warranty does not cover transportation or installation costs that may be incurred. CD's sole liability is the remedy of any defect for ninety days. CD is not responsible for personal injury or property damage resulting improper or careless installation or usage not intended by the manufacturer. No person is authorized to assume for us any other liability in connection with the sale of our products. All warranties are void and terminated one year after the last unit of its type and design has been manufactured by use.

You must furnish model number, date, place and proof of purchase. Such as a copy of the sales receipt to establish warranty. Your letter should include all pertinent details along with part or item numbers involved. Do not return anything until requested to do so. No warranty card is furnished. You must supply the above information.

Creative Design Corp.
4-8 Asano-cho, Kawasaki-ku, Kawasaki, Japan 210

The mast guide, speed control, and indicator of RC5x-x series rotator are applied for patents.

INTRODUCTION

This manual contains installation, operation and maintenance for the RC5A-x, RC5-x antenna rotator. From now on, a rotation gear mechanism is described as rotator and remote control indicator unit for the gear mechanism is described as indicator control for simplify a manual.

Voltage Modification

Operational voltage setting in the factory default of the controller unit is set at which is written in the label sealed in the rear panel. It can however be changable to either 120V or 230V.

To modify the voltage, replace the brown wire in the terminal located above the transformer in the indicator controller unit. Change power plug with an appropriate one that fits into user's power outlet.

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SECTION 1 INSTALLATION

1.1 UNPACKING AND INSPECTION

Be sure to check the rotator and indicator/control after unpacking, especially if there is noticeable damage to the carton. Inspect the rotor for cracks and the indicator for damaged or loose components. Use the parts list in SECTION 5 to count the accessories.

1.2 INSTALLATION AND WIREING

1.2.1 GENERAL

Description in this manual is for installation on an ordinary rooftop tower or steel tower, but the basic points made here should be observed even when installing the rotor on another sort of fixture.

1.2.2 ROTATOR INSTALLATION

The RC-5xx basically consists of a rotor and an indicator/control unit. Place the rotor on top of a flat mounting plate with the mast clamp pointing up, as shown in Fig. 1.1. The mast must be perfectly vertical. Screw the five M8x19 bolts with S-washers up through five of six holes in the mounting plate to secure the rotor. Follow the tightening sequence given in paragraph 1.4. If a mounting plate of thickness other than 1.2-4.0 mm is used, then bolts of different length must be used. Use zinc galvanized or electroplated - not stainless steel - bolts. These will minimize electrical contact with the rotor.

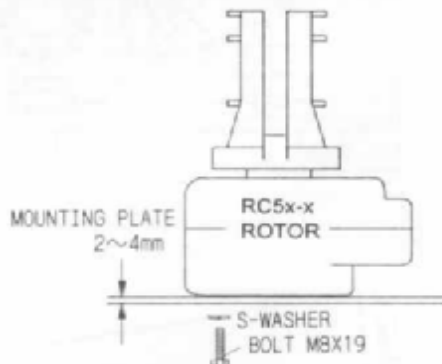


Figure 1-1. Rotor Installation

CAUTION

1. Be sure to select zinc galvanized or electroplated bolts if not using the bolts provided with the rotor set.
2. The plane of contact between the mounting plate and the rotor must be level to within 0.5mm.
3. Make bolt holes in the mounting plate no more than 9mm in diameter. Larger diameters than this will reduce fastening strength.

1.2.3 WIRING

Connect the rotor and indicator/control unit as shown in Fig. 1.2, with 7-core cable. The cable plugs into a 7-pin socket on the rotor and the seven wires are connected to a crimp contact terminal board on the indicator/control unit. Solder must be used to connect the cable to the rotor. For connection to the indicator/control unit, the wires can either be fastened by pliers or soldered to the terminal board. Make a written not of which wires are connected to which connector pins on the rotor so that they can be connected to the corresponding terminals on the indicator/control unit.

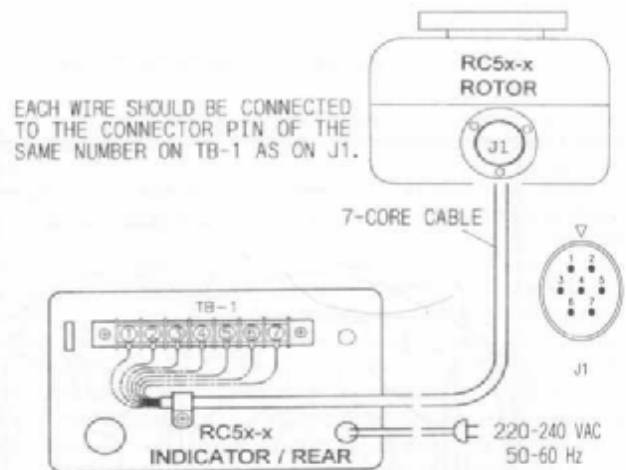


Figure 1-2. Interconnections

1.2.4 REMOTE CABLE LENGTH AND PRESET OPERATION

It may occur voltage dropping if the entire length of the remote cable is extended more than to approx. 80 to 100m, hence it consequently makes rotating power of the rotator unit reduce. Preset fraction itself in the present model does not work properly either when the longer length of control cable is being used. This is because an unnecessary noise current (ripple wave) is generated and joined together on the angle control signal cable. It needs the modification in the signal wires. One of the best countermeasure to prevent this is to use a shielded cable. Assign 5 pin to be core wire and 6 pin to be ground wire if the shielded cable is used. Refer to the following chart between the partial cross section and the cable length required.

TABLE 1-1. REMOTE CONTROL CABLE

Model No.	Cable length and section area of individual cores	
	Less Than 50m	50 Thru. 80m
RC5-x	0.75mm ²	1.25mm ²
RC5x-x	1.25mm ²	2.00mm ²

(Example of cable nomenclature: VCTF-0.5/7 means a 7-wire cable with sectional area of 0.5mm²)

1.2.5 CABLE POSITIONING

The remote control cable linking the rotor and indicator/control units should be positioned as far as possible from the coaxial antenna cable. When transmitting at over 500W, the cables should be separated by at least 20-30cm. Locating them too close to each other can produce high-frequency interference in the indicator circuit that will cause inaccurate readings. When connecting the remote control cable to the rotor, secure it to a brace on the tower or installation fixture close to the rotor so that its weight will not pull on the connector. Be sure to tape the fitting when connection work is complete. are also provided with a turning limit feature.

1.3 INSTALLATION DIMENSIONS

Rotor and indicator/control unit dimensions are given in Fig. 1.3.

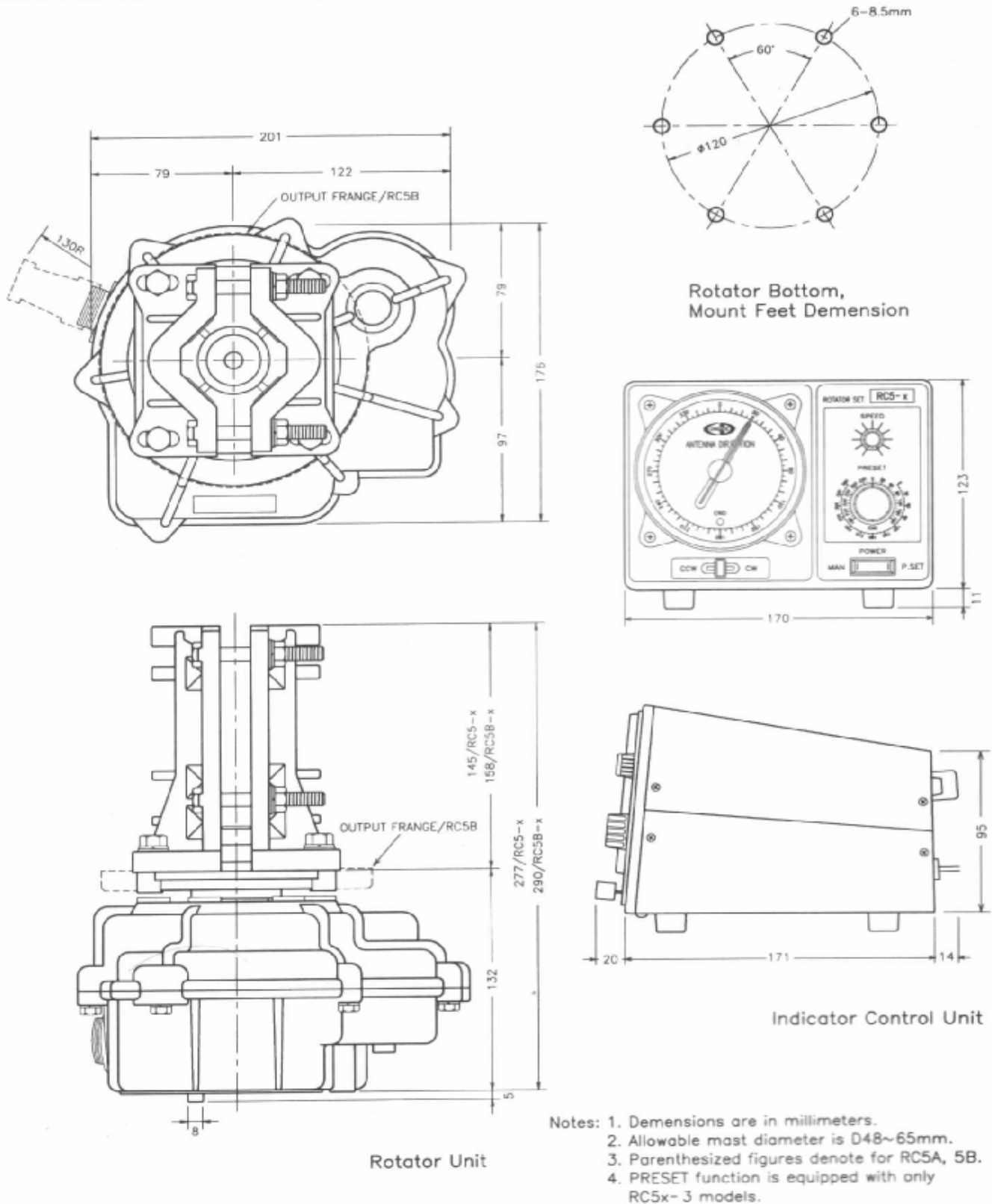


Figure 1-3. RC5x-x, Outline and Mounting Dimension

1.4 BOLT TIGHTENING SEQUENCE

Tightening the bolts in the wrong order when securing the rotor and the antenna mast will shorten the operating life of the rotor. Tighten them in the order indicated in Fig. 1.4. That is, begin with the mounting plate bolts, then tighten the bolts on the mast clamp, and then tighten flange bolts.

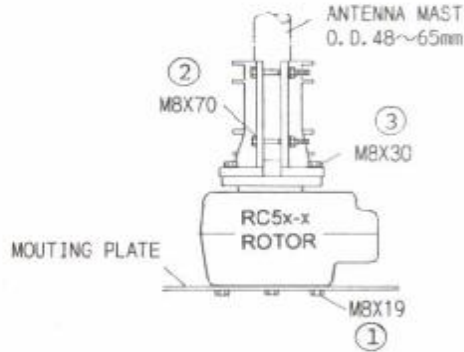


Figure 1-4. Rotor Mounting Bolts

1.5 EXAMPLE OF RC5x-x INSTALLATION

The manner in which the RC5xx is installed will affect its durability and torque. Fig. 1.5 is for installation on a typical steel tower, but the same principles apply to installation on a rooftop tower. The most important thing to keep in mind here is that the central axes of the antenna mast and rotor must be within 0.5° of each other. This is usually not much of a problem with rooftop towers, which tend to be precisely engineered. It can be a problem with large towers, though, where precision is lower and it is difficult to make structural modifications to correct for discrepancies.

ECCENTRICITY TOLERANCE: LESS THAN 0.5

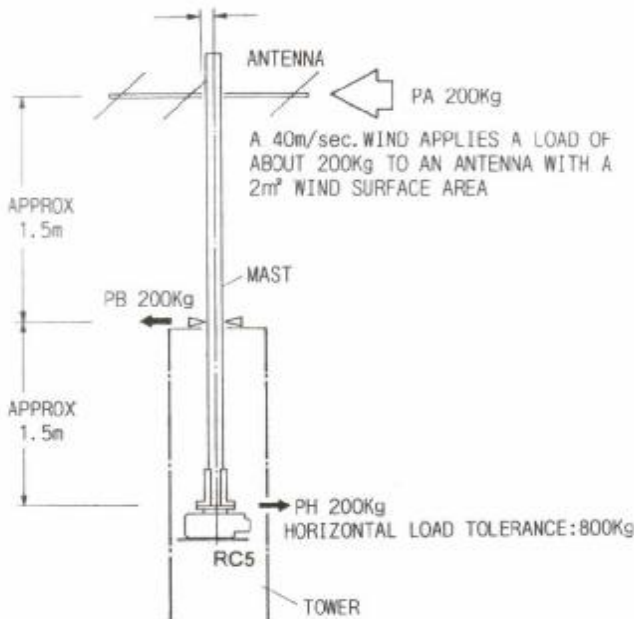


Figure 1-5. Rotor Eccentricity

Fig. 1.5 also indicates the horizontal load on an antenna with a 2m² wind surface area in a 40 m/sec. wind. Horizontal pressure on the rotor and a bearing can be reduced by increasing the distance between them. This does not affect the load on the internal gears.

1.6 MAST BEARING INSTALLATION

A bearing or similar item is usually installed at the top of an antenna tower to prevent the antenna from swaying. Such a bearing must be used for only this purpose. Using it to support any of the weight of the antenna or antenna mast would have an adverse effect on the rotor. This is not only because the rotor is more thrust-effective than the bearing but also because eccentricity arising from structural imprecision cannot be absorbed at the top of the tower and so the resultant waste force would work on the bearing and rotor. Accordingly, the fastening bolts should not be tightened to the point of holding the antenna mast when a standard bearing for "ham" radio antennas is used. With bearing having both top and bottom bolts, the top ones should be removed.

With an antenna having a wind surface area of greater than 2m² padding should be inserted between the bolts and the antenna mast. Do not tighten the bolts down directly onto the mast, as doing so will increase the danger of buckling in strong winds.

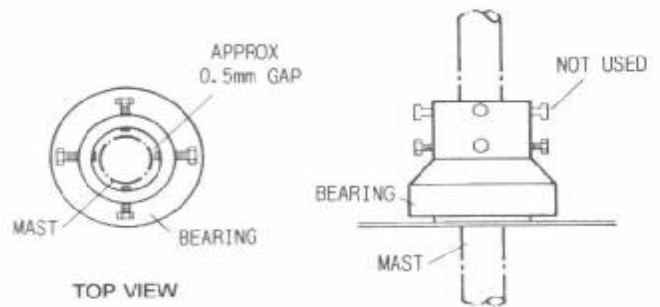


Figure 1-6. Mast Bearing Installation

INSERT PADDING IN THE GAP BETWEEN THE BOLTS AND THE MAST

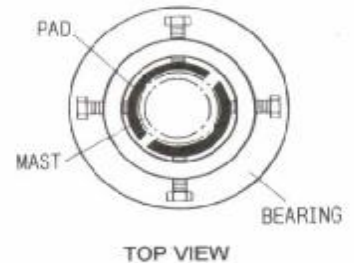


Figure 1-7. Mast Protection

1.7 PAINTING

Painting the rotor exterior and bolted joints will lengthen the life of these parts. Refer to SECTION 7 for a more detailed explanation.

SECTION 2 OPERATION

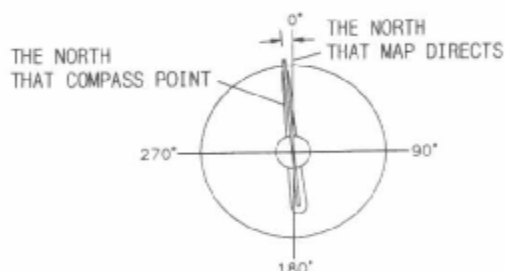
2.1 INSPECTION

Carefully check that the control cable between rotor and indicator remote is properly connected before turning on the power for the first time. Improper wiring can result in serious damage to the potentiometer in the rotor or to the indicator control unit circuitry when the power is switched on. Setting the power switch to either "MAN" or "P. SET" turns on the RC5x-3 meanwhile RC5-1 and RC5A-2 models are turned on by setting the switch to "MAN." position only.

2.2 DIRECTION ADJUSTMENT

2.2.1 Standard Direction Adjustment

The method of indicator adjustment of RC5-x is done by making pointer to be aligned with the antenna orientation. Usually this adjustment is performed using a magnetic compass or map fitting rotor and antenna directed to North or 0°. Turn the rotor and stop it when the pointer is under the overlay mark for magnetic 0°. Then turn and secure the antenna so that it is oriented in the direction indicated by the compass as magnetic north or 0° directed on the map. Generally it could be occurred that there is slight deviation between magnetic North and the 0° map directed. To compensate this gap, When the desired antenna orientation has been determined, the antenna can now be matched to that direction according to the overlay indication.



2.2.2 Direct Reading for Two Directions

If it is the case to wish the two directions due to any of the reason when two antennas are installed in stack for instance, it would make it possible by changing the direction of overlay so that to read the direction of one antenna by means of the direction scale in the meanwhile to read the another direction through the overlay. Loose the fitting screws of overlay and rotate the frame to the extent of that difference desired to allow direct reading of directions for the direction of another antenna alligned and refix the screws.

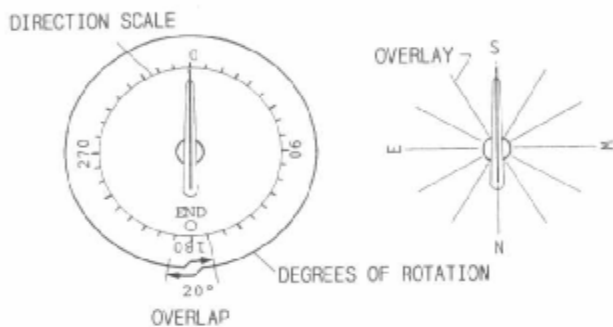


Figure 2-2. Pointer Display

2.3. ROTATION CONTROL CCW-CW

The rotation control lever is tipped toward "CW" or "CCW" to turn the antenna either clockwise or counterclockwise. This lever cannot be used with a unit equipped with the preset feature (model C5x-3) when the unit is in the present mode (power switch set to "P. SET"). Models other than the RC5-1 are provided with and RDC (reversal delay control) function to extend rotor life by preventing suddern reversals of turning direction. This feature imposes a two or three second delay when the operator reverses directions in turning the antenna. Since RC5-1 sets are not equipped with this feature, be careful not to reverse direction suddenly when rotating an antenna with this model.

2.4 SPEED CONTROL SPEED

RC5 series rotator is equipped with a circuit for varying the rotor turning speed. Turn the knob clockwise to increase the speed, counterclockwise to reduce it. Rotation is constant at high speed, regardless of antenna size, but is uneven at low speed. Turning the rotor fast is not desirable for the durability of the rotor braking mechanism, so low speed should be used when operating the rotator in strong wind or near to its rated limits.

2.5 TURNING LIMIT INDICATOR END

All RC5x models are also provided with a turning limit feature. This limits rotation in one direction to 380° in order to prevent the coaxial antenna cable from being wound onto the antenna. The redlamp lights when the pointer is reached the turning limit. Fig 2-2 shows its rotation angle.

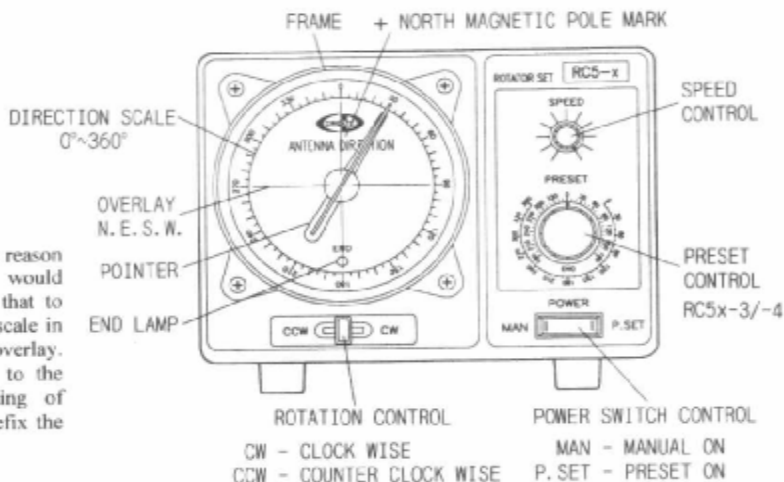


Figure 2-1. Operating Control

2.6 PRESET

Except RC5-1 and 5A-2 type, all the RC5-series models contain a preset control circuit. To use this feature, set the power switch to "P. SET." The antenna will turn automatically to the direction set in degrees on the preset dial. Manual control is not operable at this time. Since the stopping precision in the preset mode is within ±3°, the more precise rotation less than ±3° will not correspondence in the preset function.

2.7 MODIFICATION OF TURNING LIMIT

Although the rotation limit of direction scale is approximately 180°, it can be changed to another direction. If this is desirably the case that operational direction is to be most commonly used with that direction limit, it may bring more convenient accessibility in the rotation operation by modifying direction of the direction pointer by moving it 180° in different direction as the operational range of rotation limited is moved to 0° of the directional scale. (As installation of antenna direction is reversed) To reverse the direction, loose the four screws of the plastic frame and remove the frame and overlay. Remove the pointer and put it back at the 180° reverse direction, then set back the frame and overlay. Be sure to change the antenna installation direction also by 180° of reversed direction. For those models building in preset function, it is required to refix the preset knob (by using M4 hexagonal wrench) at point of 180° direction. Use yellow colored scale for reading preset direction. Now the modification is completed and preset direction for reading yellow scale line is effected and ready. Lastly but not least, be sure to begin this modification after the power is turned off.

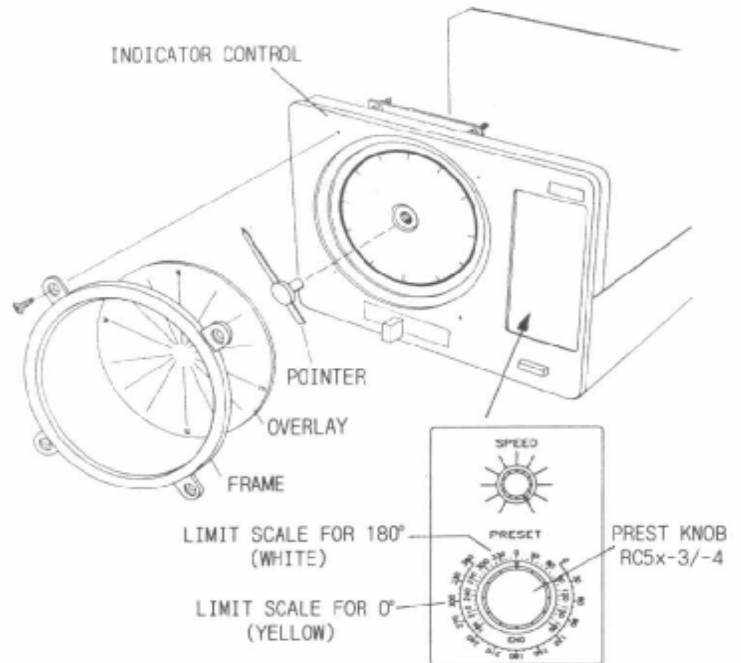


Figure 2-3. Modification of Turning Limit

SECTION 3

PRINCIPLES OF OPERATION

3.1 ELECTRICAL STRUCTURE

Fig. 3-2 shows an electrical block diagram of the RC5-series. The circuitry of rotor unit is the same with all models, while circuitry of indicator controller are different from each model, complete circuit diagrams are given.

3.1.1. INDICATOR CIRCUIT

Highly-accurate servo mechanism keeps the indicator pointer on the antenna direction. Bridging between R30 in the rotor unit and R11 in the indicator unit, the DC servo circuit amplifiers any discrepancy between the two resistances and drives the servo motor accordingly to turn the pointer, which is mounted on the motor shaft.

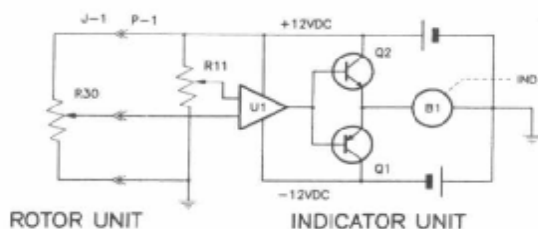


Figure 3-1. Indicator Servo Amplifier

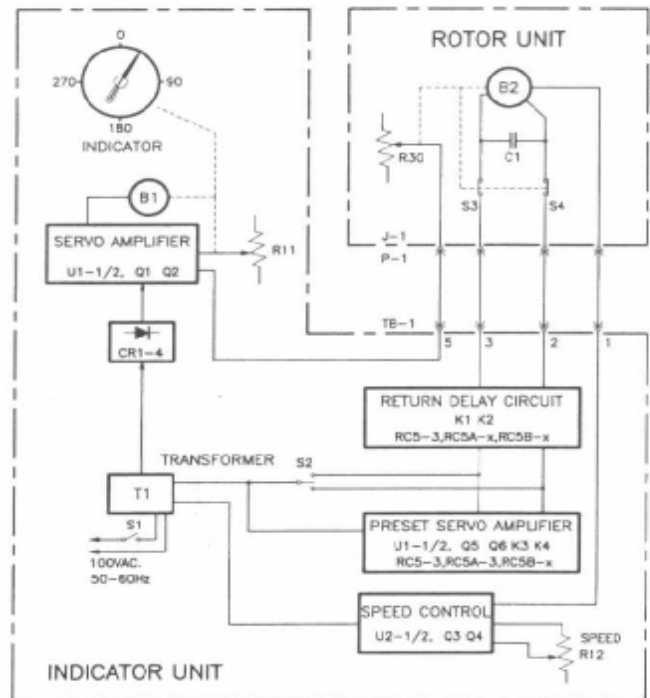


Figure 3-2. Rotator Electrical Circuitry

3.1.2 SPEED CONTROL

Fig. 3-3 illustrates the current that flows to the drive motor in the rotor unit. Turning the speed control knob causes the speed control device to vary the triac electrification time. This changes the overall speed of rotor turning by varying the periods of motor rest, not the speed at which the motor actually turns when power.

Rotor rotation therefore becomes less constant as the speed is reduced. Speed control is thus different than with ordinary, rheostat systems, and maintains full torque and reliable starting even at low speeds.

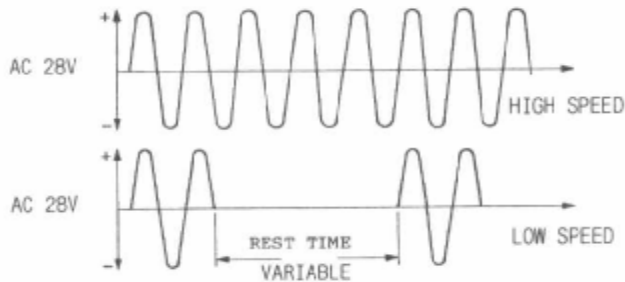


Figure 3-3. Speed Control

3.1.3. PRESET

This circuit (RC5x-3) works like the indicator circuit. It amplifies the resistance differential between the potentiometer in the rotor and that on which the preset knob is mounted and drives the CCW/CW relays accordingly.

3.1.4 RDC

The reversal delay circuit (RDC) uses a relay, capacitor and resistor to protect the rotor from shock by delaying motor response by two or three seconds when the operator reverses direction while turning the antenna. The circuit also works to stop the rotor promptly when it is turned for only a second or two.

3.2. MECHANICAL CONFIGURATION OF ROTOR UNIT

RC5 braking torque withstands external force of at least 80 kg-m, RC5A braking torque at least 200 kg-m. A cut-away view of an RC5A rotor is shown in Fig. 3-4. This rotor is designed for powerful braking during rotation and otherwise, without relying on an auxiliary braking mechanism. Gears are made of high-tensile special steel while special zinc alloy is used in the some gears of RC5 type). Other parts are aluminum or zinc alloy.

The initial gear in RC5 rotors is a 1/60 worm gear, making for quiet operation and effectively countering any backlash from the antenna.

The worm gear mechanism is enclosed in a sealed grease chamber to reduce to coefficient of friction. Broad, 30mm teeth are used on the final gear, which is the most vulnerable point in the gear assembly. Three-stage speed reduction takes the speed down at an overall rate of 1/1,800.

A potentiometer for detecting direction is linked to rotor shaft and gears. The drive motor is a high-starting-torque, AC28V capacitance motor. Limit switches S3 and S4 stop the motor to keep the rotor from turning more than 380°. Voltage is output to light the "END" lamp when one of these switches has been actuated.

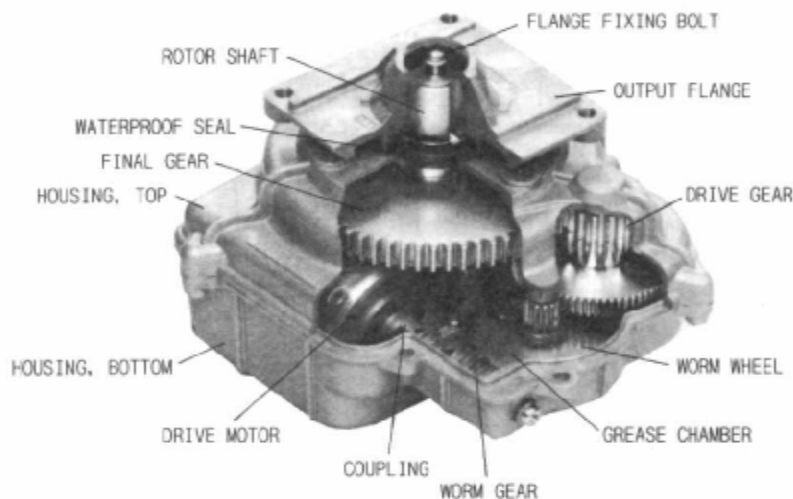


Figure 3-4. Rotor Unit, Internal Structure, RC5A-x

SECTION 4

SPECIFICATIONS

4.1 OUTLINE

The RC5/RC5A antenna rotators are for medium-sized to super-large "ham" radio antennas. Based on our mid-sized rotators for professional use antennas, these highly original and durable models offer unparalleled reliability.

4.2 ROTOR UNIT

Just like with mid-sized rotators for professional-use antennas, a separate mechanism is not used to furnish braking torque and protect the gears. Speed-reducing gears themselves withstand external torque and provide sure and steady speed reduction. The speed reduction mechanism consists of a powerful motor, a worm gear, and large-diameter, broad-toothed super gears (10-30 mm thick). These minimize backlash and noise. Moreover, consideration has been given to even the finest detail, as with the mast guide that simplifies installation.

4.3 INDICATOR CONTROL UNIT

The indicator/control unit features control circuits and design suitable for professional use. Use of an overlay on the direction indicator enables double readings for beam direction and permits the free setting of directional reference points. All models are equipped with a speed control circuit, while RC5x-2 and -3 models offer various additional functions for easier operation.

4.4 PERFORMANCE

Braking torque and rotation torque are the most important considerations in selecting an antenna rotator. Different antenna weights and mast thickness impose widely varying demands on rotators. A long-boomed antenna, for instance, will require greater braking torque than one of the same weight with a shorter boom.

Table 4-1 lists specification, including maximum torque capacity for smooth operation, and suitable antenna loads for main models. Specifications are for a wind velocity of 30 m/sec. and single antennas. Allow for the additional torque, etc. when selecting a rotator for stacked antennas. The torque figures given are maximum specifications for smooth operation. Moreover, the braking torque figures can be increased 20-30 percent for low-speed operation.

4.5 BRAKING TORQUE

Braking torque is the amount of external rotation force that the rotor can withstand without budging. Exceeding this amount of force will either break the rotor or cause it to turn. Braking torque is ordinarily expressed, like bendingmoment, as kilogram meters.

As illustrated n Fig. 4-2, braking torque of 100 kg-m means that a force of 100 kg applied 1 m from the rotor axis will neither turn nor break the rotor. Similarly, rotation torque of 10 kg-m means that starting the motor will apply a 10 kg force 1 m from the rotor axis.

Torque, then, is rotational force around a given axis. The forces that rotation torque must overcome or that braking torque must withstand are not merely a matter of wind force acting on the antenna but are a function of the inertia of both antenna mass and wind force as it acts on an eccentric antenna.

TABLE 4-1. SPECIFICATIONS

Model No.	RC5-1/-3	RC5A-2/-3	RC5B-3	RC5B-4
Rotation Torque kg.m	6	16	22	25
Brake Torque kg.m	80/90	200	250	250
Mast Size mm	48-65			
Vertical Load kg	400	700	700	700
Horizontal Load kg	800	1000	1000	1000
Rotation Speed (sec.) 50Hz	75-110			90-140
Preset Control	None/Provided	None/Provided	Provided	Provided
Required Power Note: 2	90 VA	150 VA	200 VA	200 VA
Indicator Accuracy	±4° max			±2° max
Control Cable	7-core			
Weight (Rotor Unit) kg	5	7	8.5	8.5

Notes: 1. Unit of Torque kg.m=100kg.cm
2. 120 ±10VAC, 230 ±10VAC

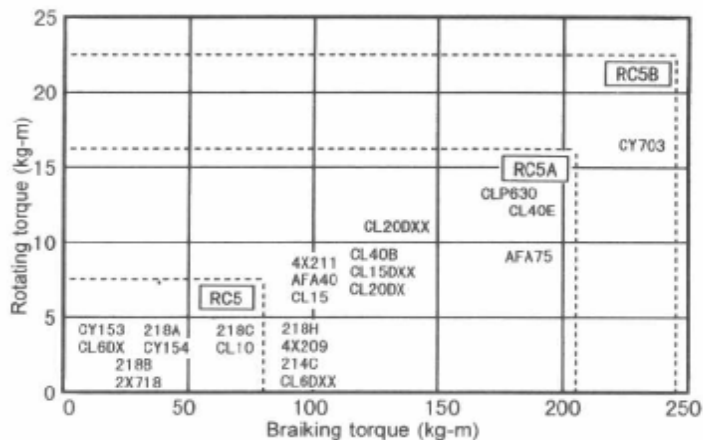
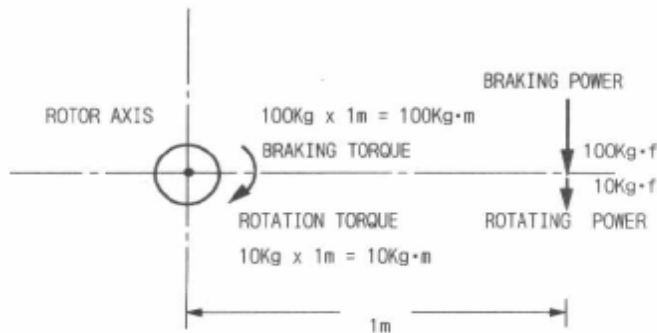


Figure 4-1. Rotor Torque with Different Antenna



BRAKING TORQUE: The force that acts axis of the rotor
ROTATING TORQUE: The force that acts outer circumference of the rotor

Figure 4-2. Braking and Rotating Torque

SECTION 5

PARTS LIST

5.1 PARTS PROVIDED WITH ROTATOR SET

The RC5xx rotator sets come complete with an indicator / control unit, rotor unit, and accessories (see Fig. 1-3). Rotator set components are listed in Table 5-1.

5.2 GROUP ASSEMBLY

Group assembly can be ordered as needed for maintenance or repairs. Main rotor and indicator / control unit components of one model are shown in Figs.5-1 through 5-6. Multiple part numbers are given where different parts are used in different models.

TABLE 5-1. ROTATOR ASSEMBLY LIST RC5x-x.

Item	Description	Q'ty.
Indicator Controller Unit / RC5x-x		1
Rotor Unit / RC5x-x		1
MC60-1	MAST CLAMP, RC5	2
MC621	MAST CLAMP, RC5A.5B	2
D1, D2	LAMP, 18V, 0.1A	1
F 1	FUSE, 2A	1
P 1	CONNECTOR PLUG, Type 7-25	1
S 1	BOLT, M8x30, SW	4
S 2	BOLT, M8x18, SW	5
S 3	BOLT SET, M8x75, PW,SW,N	RC5/RC5A.5B 4/6
T 1	SOLDERLESS TERMINAL, Type 1.25YAS-3	7

TABLE 5-1-1. RC5x-x, ROTOR UNIT.

Item	Description
1	HOUSING, Top
2	HOUSING, Bottom
3	OUTPUT FLANGE, MC61/RC5, MC62/RC5A, MC63/RC5B
4	HEXAGON HEAD SCREW, M6x15
5	CONNECTOR, Type 7-25J
6	S3, S4, LIMIT SWITCH ASSY;
7	B2, DRIVE MOTOR, F6E10S/RC5, F7E25S/RC5A, JH7E40S/RC5B
8	COUPLING,
9	WORM GEAR, SW1-R1
10	SCREW, M6x10
11	WORM WHEEL, CG1-60R1
12	WORM MECHANISM COVER,
13	DRIVE GEAR, M2-12/M1-72
14	ROTARY SHAFT,
15	GEAR, M0.75-48
16	GEAR, M0.75-66
17	R30, POTENTIO METER 5k Ω
18	C15, CAPACITOR, 125 μ F/RC5, 180 μ F/RC5A, 325 μ F/RC5B
19	R31, RESISTER, 3.6k Ω 1/2W

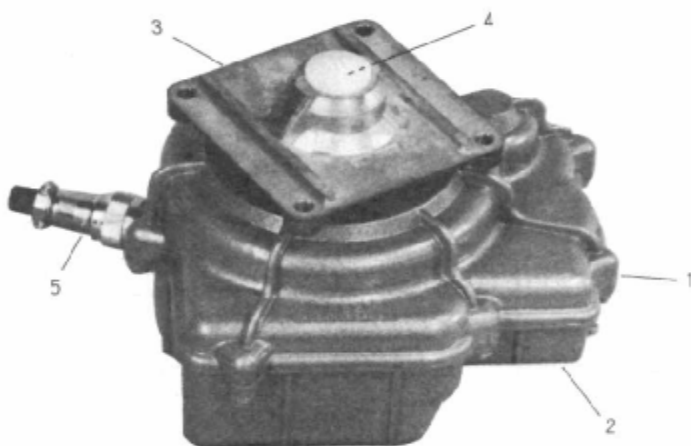
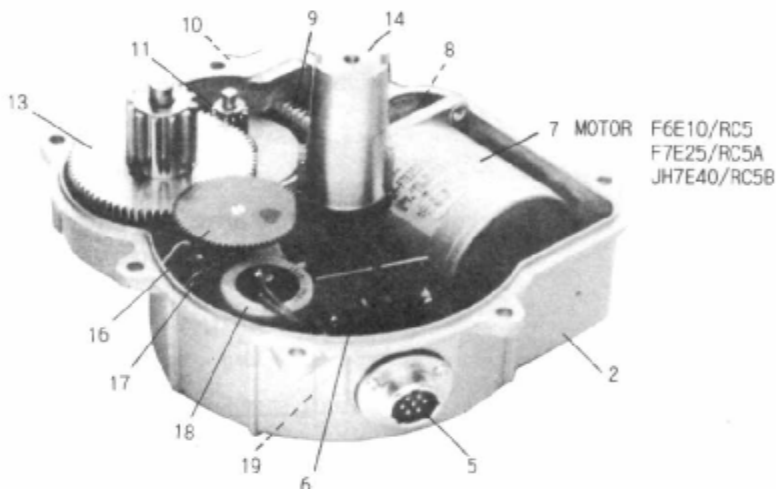


Figure 5-1. RC5A, Rotor



Note: The final gear, upper housing, and output flange are omitted in the photograph

Figure 5-2. Rotor Assembly Parts

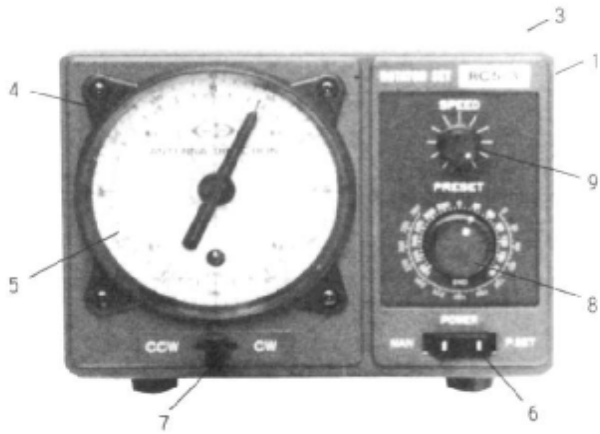


Figure 5-3. RC5-3, Indicator Control

TABLE 5-1-2. RC5x-x, INDICATOR CONTROL UNIT.

Item	Description
1	FRONT PANEL
2	CASE, Bottom
3	CASE, Top
4	OVERLAY FRAME,
5	OVERLAY, Type-1/N.E.S.W
6	S1, POWER SWITCH, BLP-51
7	S2, ROTATION SWITCH, BLA-53/RC5-1, RC5A-2
8	KNOB PRESET, BES-11
9	KNOB SPEED, BEP-01/RC5-1, RC5A-2
10	TERMINAL BOARD, BM-25
11	POWER CODE, BM-15
12	FUSE INDICATOR LED, BM-20/RC5-1, RC5A-2
13	T1, TRANSFORMER, 7P/M1105
14	R12, VARIABLE RESISTOR, Type-P368-H
15	INDICATOR ASSEMBLY; TLR114A
16	R11, POTENTIOMETER, Power, Pri 115/230vac.
17	LAMP, Incandescent 18V, 0.1A
18	LAMP, Incandescent 18V, 0.1A
19	B1, SERVO MOTOR, 1000k Ω
20	BR-5, INDICATOR AMPL CIRCUIT BOARD

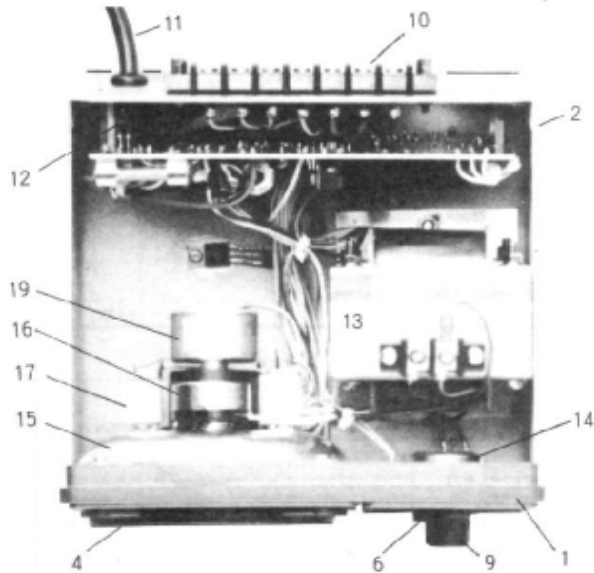


Figure 5-4. RC5-1, Indicator Control

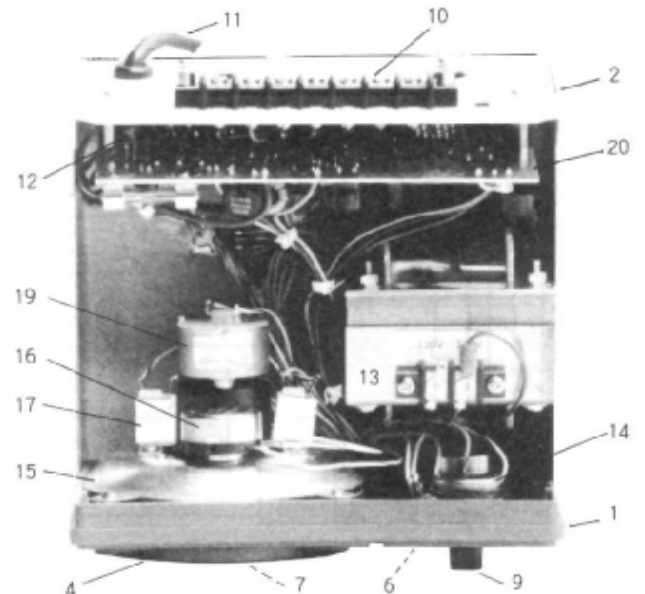
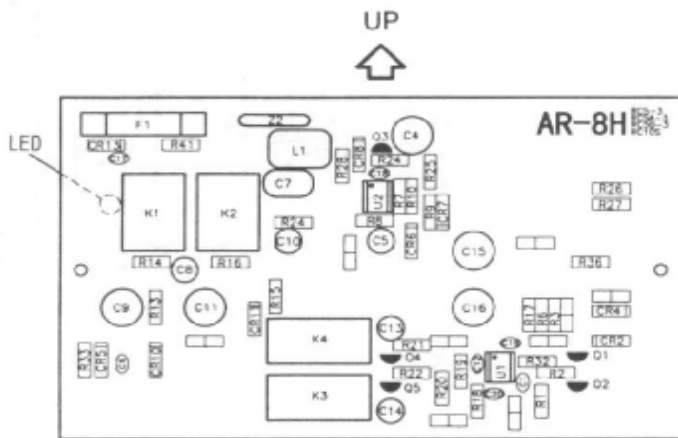


Figure 5-5. RC5A-3, RC5B Indicator Control



DETAIL-1. RC5-3, RC5A, RC5B, Print Circuit Board

SECTION 6

CIRCUIT DIAGRAM

6.1 ROTATOR CIRCUIT

Fig. 6-1 presents a circuit diagram of RC5-series of rotor. Although the circuitry is all the same in all the model, the only differences are capacity of the capacitor and motor in each model.

6.2 INDICATOR CIRCUIT

RC5-1 indicator circuitry is as shown in the diagram of Fig. 6-2, RC5A-3 as in Fig. 6-3. Some portions of circuitry marked in dotted-line is lacked in the RC5A-2 type of rotor controller. There have still some minor different portions in the circuitry between each model as indicated in NOTE.

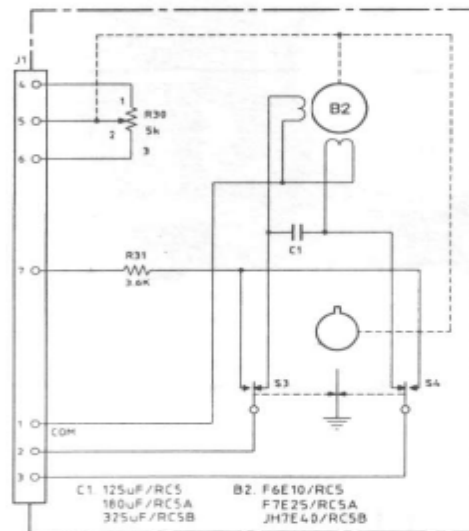


Figure 6-1. Circuit Diagram, Rotor

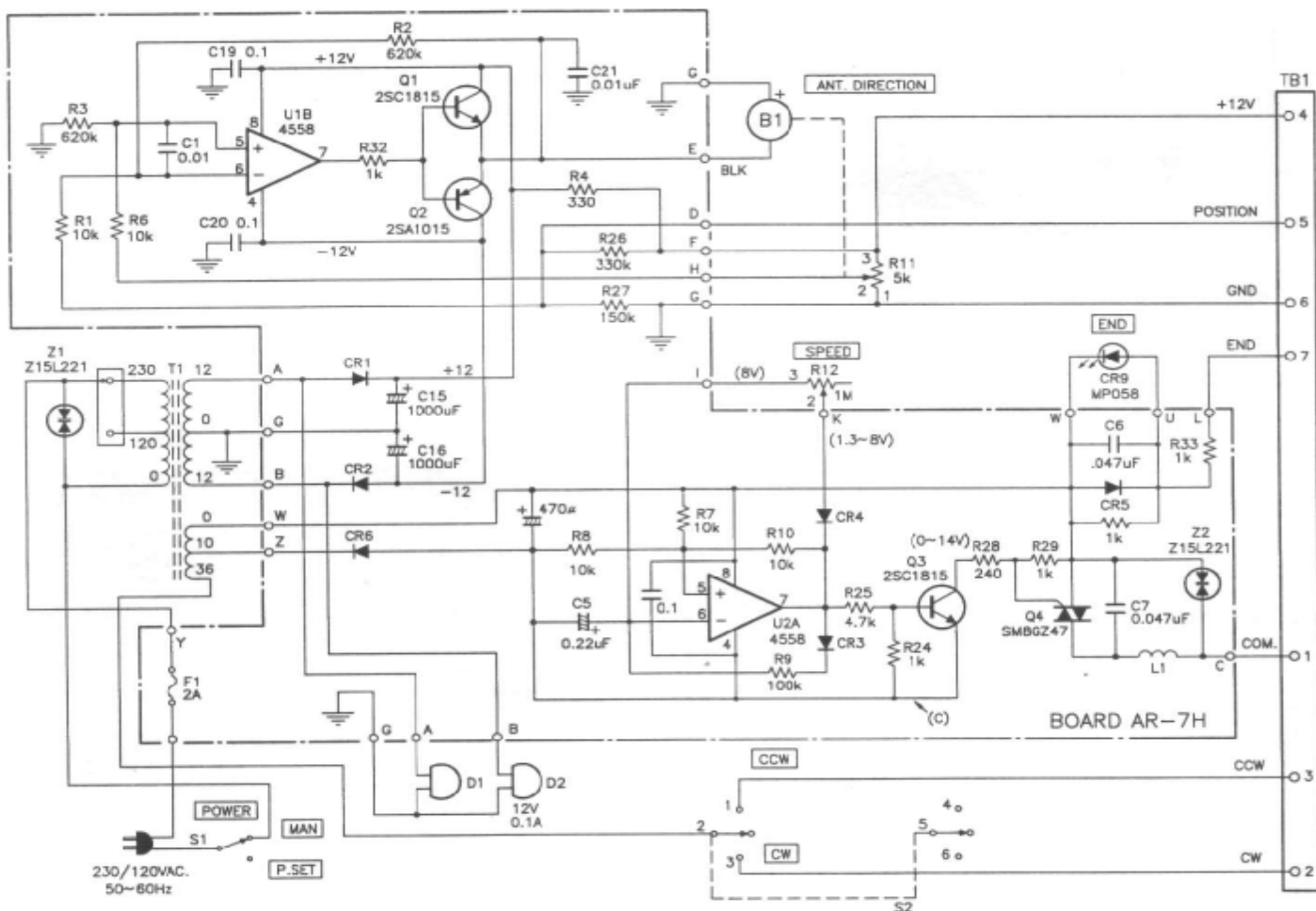
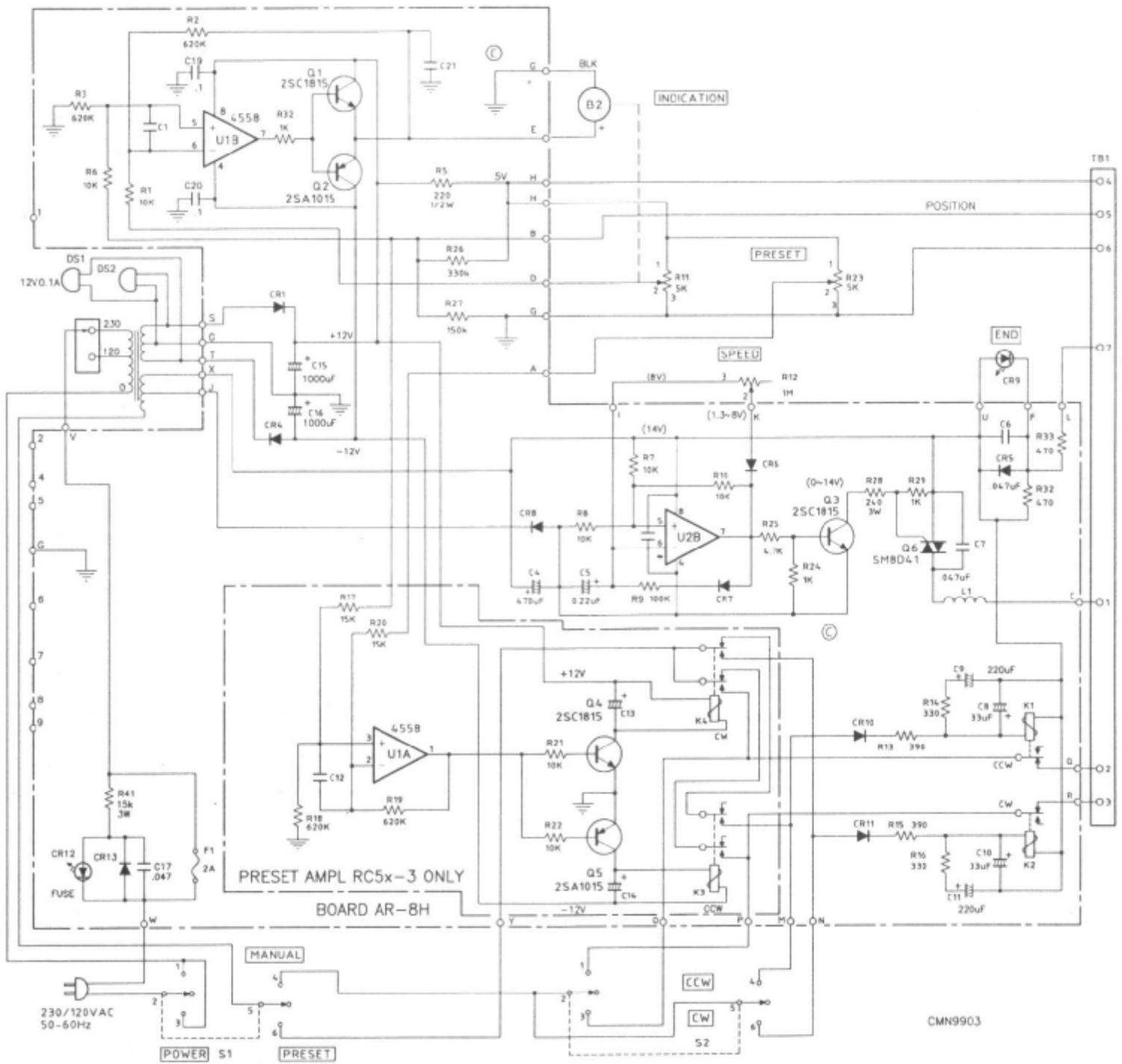


Figure 6-2. RC5-1 Indicator Control, Schematic Diagram



- Notes1. Unless otherwise indicated, all the capacitor are in uF.
 2. Unless otherwise indicated, all diode are 10D-1 type.
 3. Each Voltage Indicate Between points © and the line.

Figure 6-3. RC5-3, RC5A-3, RC5B-x Indicator Control, Schematic Diagram

SECTION 7

MAINTENANCE

7.1 ROTATOR INITIAL INSPECTION

The rotor must be regularly inspected and repaired if the rotor is to maintain a long operating life. Timing of the first rotor inspection will vary with the installation location, but it is usually desirable to conduct it around six months after installing the rotor set. This initial inspection consists of carefully examining the tightness of the external bolts used with the rotor. The cast aluminum housing undergoes more deformation in the early stages of use than would steel, and this can loosen bolts, especially when the rotor is used with a large antenna.

7.2 ROTATOR ANTICORROSIVE TREATMENT

Extent damage or corrosion is the next most common cause of rotor trouble after gear damage. Resistance to corrosion varies 150-200 percent from coastal locations to industrial zones to rural areas. The accumulation of windborne salt is a serious problem within about two kilometers of the ocean. In industrial zones, sulfur dioxide dissolved in rainwater is extremely corrosive. RC5x-x rotor is coated with anticorrosive paint at the factory, but regular painting is necessary to keep a unit rust-free. Ordinary anticorrosive paint for ferrous metals is best, although spray paint can also be used.

7.3 ROTOR LUBRICATION SCHEDULE

RC5x-x rotor should ideally be lubricated at about every 300 hours of operation. This means the rotor needs lubrication every couple of years when it is used for an average of a half-hour a day. However, there is no real need to lubricate the rotor unless it has slowed or unless operating noise has increased. The most critical lubrication point is the worm gear mechanism, and enclosure in optimum quality grease in a sealed chamber ensures long-term, maintenance-free lubrication of this mechanism. Special grease (e.g. Dow-Corning EM-30L) must be used when the rotor is installed where the surrounding temperature will fall below -20°C.

7.4 INDICATOR

The indicator/control unit does not require regular mechanical inspection and maintenance. Repairs and service required with this unit generally relate to the deterioration or malfunctioning of electrical parts, such as indicator lamp etc.

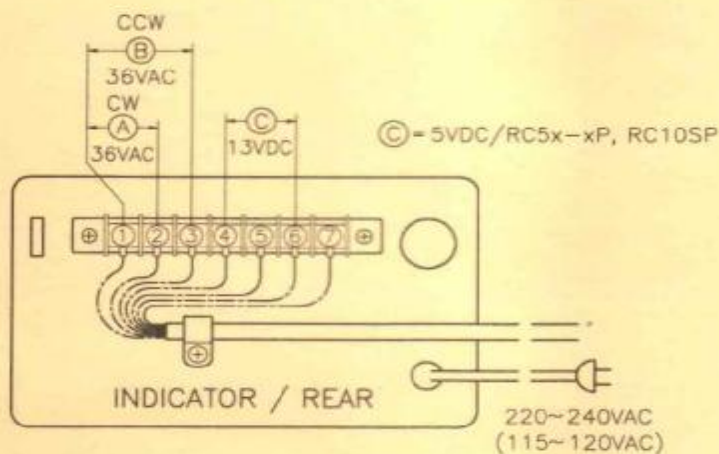
7.5 MALFUNCTION AND REPAIR

If the rotor is being operated for long periods, it is likely to have a defect in the control cable as well as internal parts used in both rotor or indicator control unit. Each of the defects can be occurred either electrically and mechanically. It is a wise and a lot help to have an oscilloscope for solving the problem by conducting and inspecting the possible hardware visually and tracing its electrical thoughts too. Refer to Table 7-1, is the typical type of symptoms troubles possibly to be raised in the rotor units and their corresponding countermeasures. Note that listed instruction includes an unproperly processed soldering. Contact CD if the problem is beyond your technical scope for having it appropriately repaired.

TABLE 7-1. TYPICAL DEFECTS AND COUNTERMEASURE

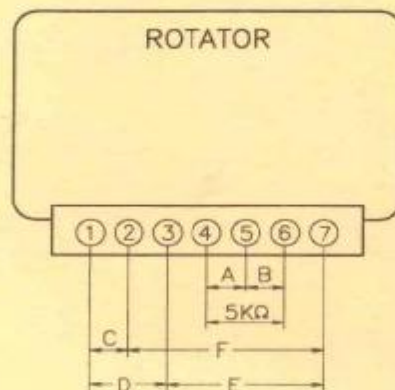
Symptoms	Inspection	Possible Defect Part and Countermeasures
1. Power can not be on. (Fuse is blown out)	Remove remote wires from indicator, then inspect the cause of the failure is whether subjected to either indicator, remote cable or rotor unit.	Indicator unit may cause the failure if fuse is blown out. If power enables on, check remote cable or check resistor value between C and D instructed in Fig. 7-2. That might be caused in either the part mentioned above.
2. Does not turn either CW and CCW direction. 3. Rotate either CW or CCW.	Check the voltage of both A and B as referred to Fig. 7-1.	Check remote cable or resistive value of C, and D as referred to Fig. 7-2, must be in trouble either one. If none of both, may be in trouble in the indicator unit.
4. Stopped the rotation on the way in rotating process.	Check to see whether the lead-out coaxial cable is twisted and tangled or not.	Attempt to amend the tangled part of coaxial cable.
5. The circuit breaker is on and the power is down when started rotation.	Remove remote cable from indicator and check to see the caused failure is raised whether in the remote cable, indicator or the rotor unit is.	The indicator unit is considered to be defective if leakage breaker is cut the power, or remote cable if not. If neither of them, it is caused in the rotor unit.
6. Indicator pointer does not move and is standstill pointing at 0° (degree).	Make a short pin No. 4-5, and 5-6 respectively of output terminal of the indicator unit and check the malfunction of indicator pointer.	The indicator unit is considered to be failure if the indicator pointer does not move in either way of short test, and remote cable is the one if not move in either way of short tests.
7. When the power is on, indicator pointer alone moves straight to CW or CCW ends. 8. Indicator pointer move unsteadily or move totterly.	Remove remote cable from indicator and check to see the caused failure is raised whether in the remote cable, indicator or the rotor unit is.	The indicator unit is considered to be failure if the pointer is still stayed at standstill position meanwhile either the remote cable or rotor unit is the one if the pointer started and stopped at 0°. Check the malfunction also as instructed in Note-3 Fig. 7-2.
9. The preset function does not work.	Rotate the unit in one(1) round and check to see whether or not pointer is moving unsteadily.	If there is not any unsteady moving found in the pointer, the indicator unit might be defective. If it is moving unsteadily, continue to check as instructed in 8) above.
10. The speed control does not function.	The indicator malfunction might be the cause of the failure.	

Note: In case that the symptom of trouble of rotor is not applicable with the condition stipulated above table or distinct part of defects is not defined yet, check to see also the voltage as instructed in Fig. 7-1 and resistive value of each pin of the terminal as stated in Fig. 7-2. Check also a water protectiveness and soldering in the connector.



- Notes:
1. Be sure to disconnect the cable to check output voltage.
 2. Speed control must be set in high speed position as the voltage at A, and B detected may be dropped down if the speed control is set in the low speed position.
 3. Each voltage is 10% tolerance.

Figure 7-1. Output Voltage of Indicator Unit



- Notes:
1. Resistor value of C and D: 6 Ω RC5 Series
3 Ω RC5A Series
2 Ω RC5B Series
 2. When END (end switch) is active, the resistor value of C and D is infinite, and resistor value of E or F are 3.6k Ω.
 3. Total resistor value of A and B is 5k Ω.
 4. Each resistor value has 20% tolerance.

Figure 7-2. Internal Resistor Value of Rotator Unit

7.6 FUSE REPLACEMENT

Replace the fuse with a new one as there might have a case that fuse is brown out if the power does not turn on. The location of the fuse is on the PCB board near the rear panel in the all models. If the fuse is brown out, the fuse indicator LED is automatically lightened in the internal indicator unit in RC5x-3, RC5A-2 models. It is visibly confirmed from the side of rear panel as shown in Fig. 7-3.

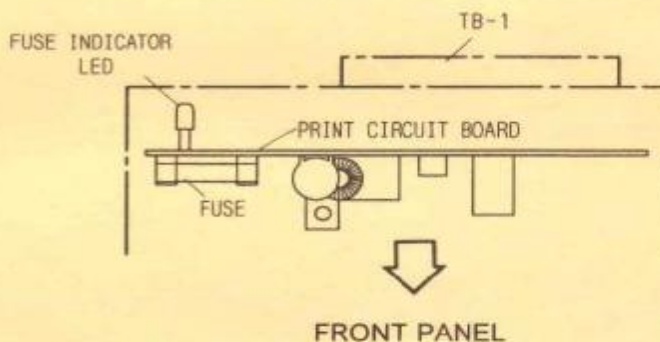


Figure 7-3. Fuse in Indicator Unit

7.7 PART REPLACEMENT

A part must be replaced with an equivalent part when it has been identified as a source of trouble. Parts not readily available elsewhere can be obtained from Creative Design. Submit orders to the point of purchase or directly to the Rotator Service Division at Creative Design Corp. Be sure to specify the rotator model number, the date of purchase, and the part numbers(s) for the needed part(s) as given on the part lists of Section 5 and circuit diagrams of Section 6.

7.8 REPAIR REQUESTS

Repairs beyond the technical scope of the rotator owner can be entrusted to Creative Design Corp. The defective unit may be sent to Creative Design either directly or via the dealer from who the rotator was purchased. In the case of repairs not covered by the warranty, we will inform the owner beforehand of how much the repair will cost. There will be a charge for repairs necessitated by operation of the rotator under conditions exceeding those specified by Creative Design, even within the warranty period. We will ordinarily repair and return units within five days, although somewhat more time is something required when needed parts have been replaced in the course of design improvements and are no longer in stock. When sending an unit directly to Creative Design Corp for repair, make certain to indicate the name and address of the purchaser, the name of the dealer that sold the rotator set, and the nature of the problem.

INSTRUCTION MANUAL

SATELLITE TRACKER CONNECTABLE ROTATOR RC5x-xP, RC10SP

1. GENERAL

This rotator set P-series is connectable with either CD's satellite tracker RAC805, or a CPU built-in other controller. From the indicator, it outputs positioning data DC voltage 0~5VDC. The rotating direction and speed are controllable by grounding signal from the tracker.

2. OPERATION IN LOCAL MODE

Setting S3 slide switch in the rear panel to upper position make this unit operate in local mode and can control all the operations from the indicator controller. Refer to the operation manual of RC5-x series and RC10S for the details of operation.

3. OPERATION IN REMOTE MODE

Setting the power switch to P.SET position and S3 slide switch in lower position enable the unit to operate in remote mode, and is able to operate from Satellite Tracker. In his case, speed control knob in the front panel is only active. The connection with the tracker is made through J1 connector. The each pin assignment and function of J1 connector is as shown in TABLE-1 below. (Connector is J2 in RAC805 side)

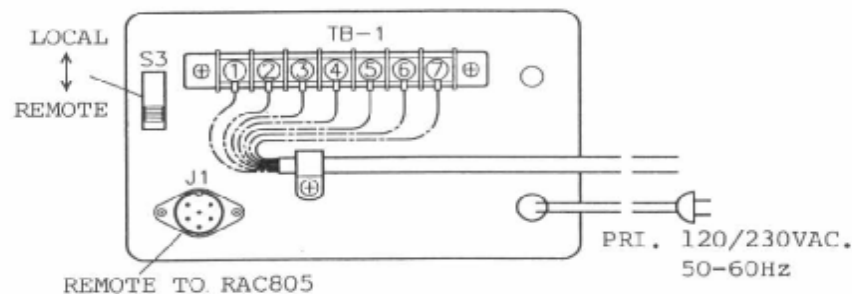


Figure 1. Rear Panel, Indicator

TABLE-1. Connecting Terminal of Indicator for Tracker

PIN NO.	FUNCTION
1)	Rotor Positioning Data (Potentio Arm): It outputs positioning data from rotor ranging from approximately. 0.1~5VDC (-180°~+180°). When antenna direction is -180°, the voltage derived is approximately. 0.1V, in the meanwhile it increases the voltage as it turns to CW direction, and approximately 5V when the direction is at +180°.
2)	CW Signal Input: When this pin 2 is grounded, rotator starts to CW direction.
3)	Aux: (Not connected.)
4)	DC Power Supply: - Power supply for RAC805, it outputs 11VDC, 400mA approx.
5)	CCW Signal Input: When this pin 5 is grounded, rotator start to CCW direction.
6)	Low Speed Signal Input: When this pin 6 is grounded, it allows to reduce the rotating speed from speed control knob of the front panel. *As a method for obtaining high accuracy for stopping, RAC805 reduce the speed just by grounding this pin 6 just before it stops at targetted position.
Chassis	Ground: Used as grounding of indicator

NOTES:

1. Both mechanical and electrical specification of the rotor are the same as the specification that of a non-computer connectable type of rotor.
2. For the details of operation in the case of connecting the rotor with CD's Satellite Tracker RAC805, refer to the operation manual that come with RAC805.

4. PRINCIPAL OF OPERATION

The electrical circuitry diagram of this rotator set is as shown in Fig 2.

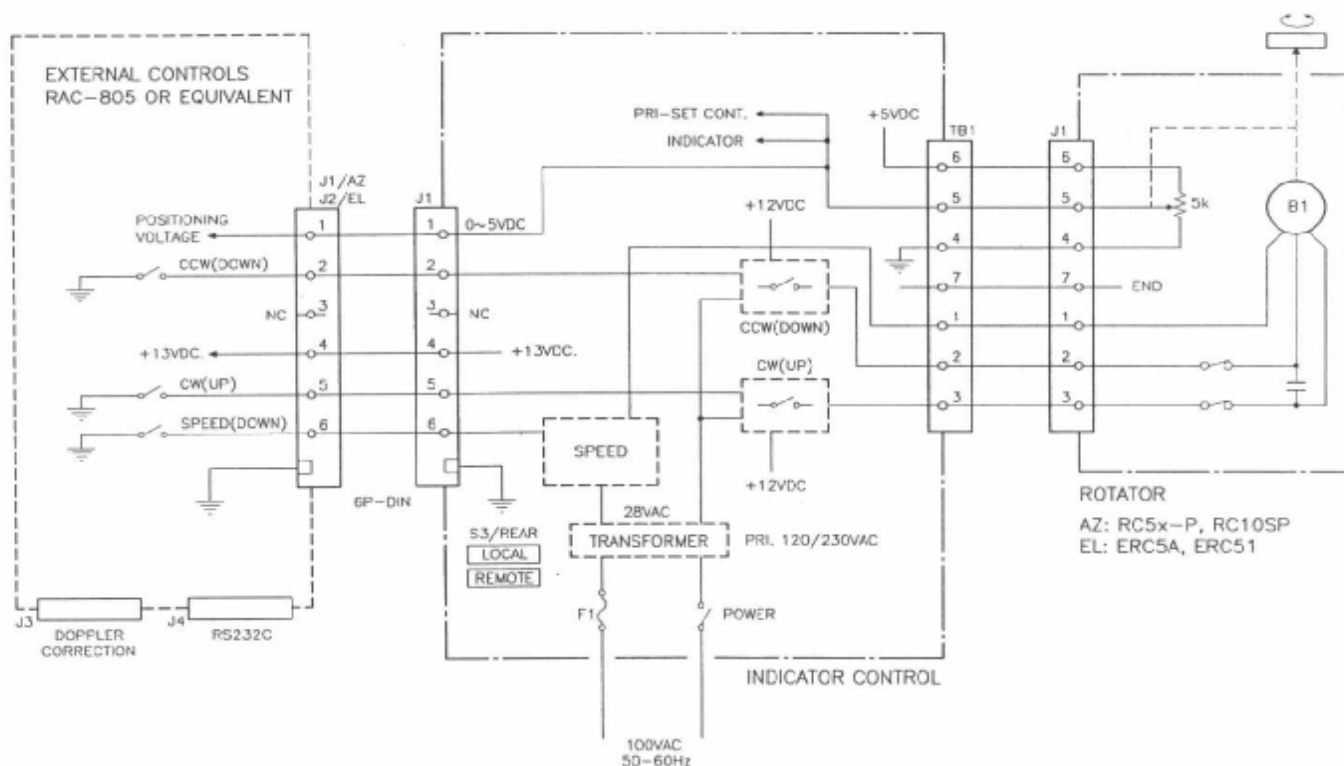


Figure 2. Circuitry Diagram RC5-xP, RC5x-xP, RC10SP

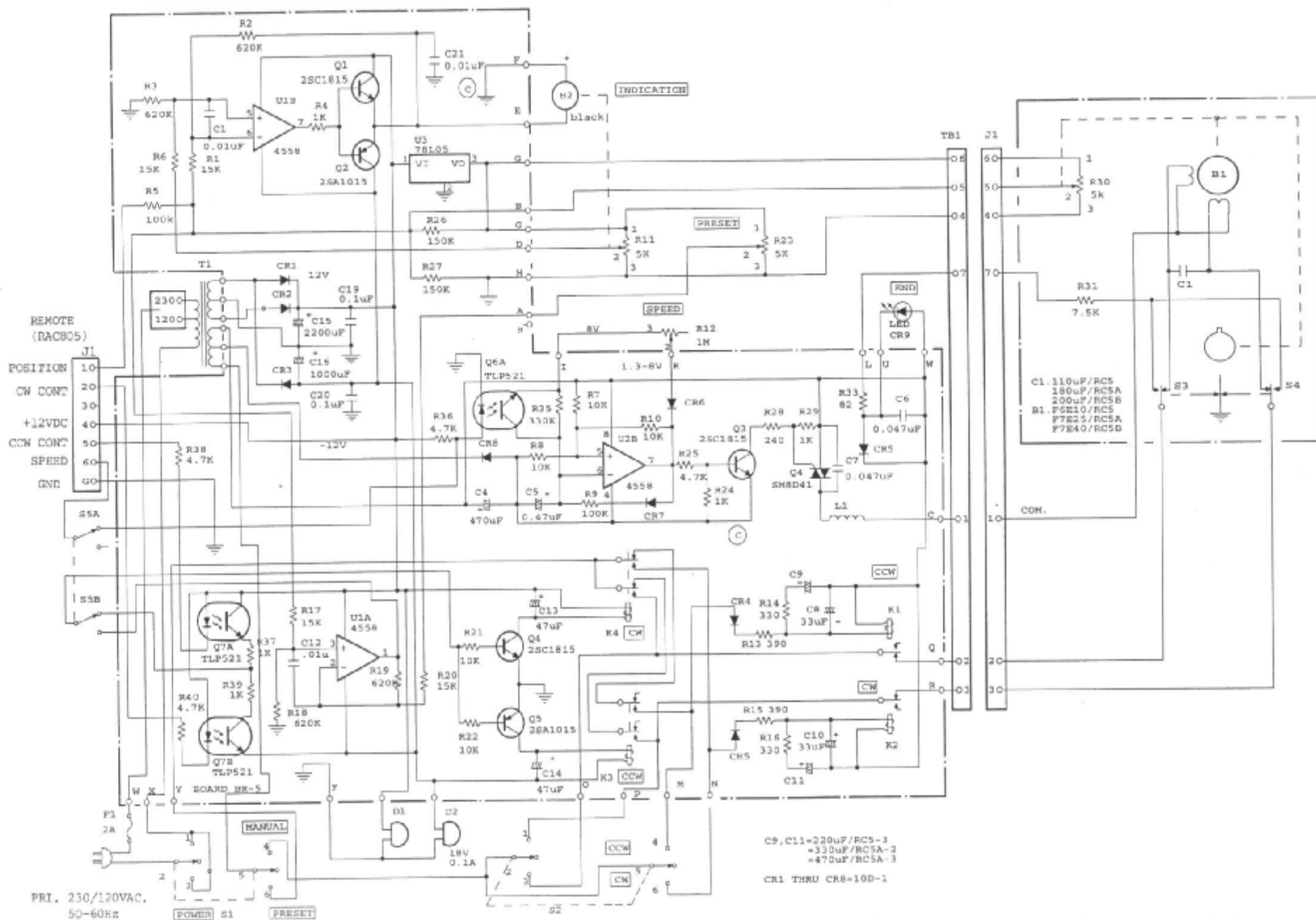


Figure 6-4. RC5-xP, Rotator and Indicator Schematic Diagram. CMN-9606