IM 026-607-02

取扱説明書
INSTRUCTION MANUAL

方位・仰角ローテータシステム
AZIMUTH-ELEVATION ROTATOR SYSTEM

AER-5

1st Edition, Sept. 2006
クリエートデザイン株式会社
Creative Design Corp.

Figure 1-1. Azimuth/Elevation Rotator Set AER-5

TABLE OF CONTENTS

SECTION 1
GENERAL DESCRIPTION

1.1 INTRODUCTION

This manual describes the installation, operation, maintenance and principles of operation for the CD azimuth and elevation rotator system model AER-5.

1.2 FEATUE AND PURPOSE

AER-5 is an azimuth and elevation rotator system offering high rotating and break torque presenting with the both azimuth and elevation rotation. This rotator offers a cozy environment that enables to make it possible to track satellites or other orbiting objects if it is in use together with CD's satellite tracker either the model RAC805 or RAC825 or other equivalents. The elevation speed of AER-5 is approximately 35~150 sec./50Hz for azimuth rotation while it is 25~40 sec./50Hz for elevation rotation, so as to be designed to be able to obtain an sufficient speed effectively especially azimuth pain to meet with the use for satellite tracking purpose. By the use of a powerful and large torque of driving motor in couple with a high quality of precision large diameter of driving gear mechanism systems used in the driving mechanism, this rotator will suitably meet to those applications to rotate from small to middle size of antenna arrays for both azimuth and elevation rotation assuring large and smooth rotation power. It offers a high durability and maneuverability with high corrosion proof. Remotely control for both azimuth and elevation can be made away from the antenna site by connecting with the remote control cable between rotor and indication unit. The specification details of this AER-5 is as specified below.

SPECIFICATION:

1.2.1 Mechanical Characteristics	Azimuth	Elevation
Rotation Torque: (At 50kg Ant Installed)	6kg·m	7kg·m
Maximum Rotation Range	380° Max.	120° Max.
Brake Torque	90kg·m	100kg·m
Allowable Horizontal Load	200kg·f	
Maximum Antenna Weight	50kg	
Rotation Speed: (At Max. Speed)	35 sec. 360 °/50Hz	25 sec. 90 °/50Hz
Driving Method	Gear	Gear
Mast Diameter	ϕ48~ϕ62	
Boom Diameter	ϕ40~ϕ60	
Weight: Rotor Unit:	12kg	
Indicator Unit:	3kg	

1.2.2 Electrical Characteristics	Azimuth	Elevation
Drive Motor Horsepower Output	10W/120~240V,	25W/120~240V
Power Requirements	120, 220~240VAC. 0.6A	120, 220~240VAC. 1.2A.
Indicator Accuracy (Preset)	±4 ° (±8 °)	±4 ° (±2 °)
Continuous Operation Time	10 min.	

1.3 EQUIPMENTS REQUIRED BUT NOT SUPPLIED

The following listed equipments and tools are required for a standard installation of AER-5. These are customer furnished as they are not supplied standard.

1) 7-Conductor Cable:	Appropriate Thickness of Cable For Connecting Between Rotor Unit and Indicator Unit, Refer SEC. 1.3.1
2) Compass:	Direction Finding and Determination For Antenna
3) Standard Hands Tools:	Standard Stools Such As M8 Spanner Wrench, Cutting Prier, Cross-Head Screw Driver & Vinyl Tape etc. for Assembly, Installation and Maintenance.

1.3.1 REMOTE CABLE LENGTH AND PRESET OPERATION

It may occur a voltage dropping if the entire length of the remote cable is extended more than to approx. 80 to 100m, hence it consequently makes rotation power of the rotor unit reduce. If preset function in the preset mode is not working properly when the longer length of control cable is being used due to affection of an unnecessary noise current (ripple wave) is generated along with the cable for angle control, it might need the modification in the cable assigned for angle signal forwading wire if this is the case. The one of the solutions to prevent this is to use a shielded cable for these 2 pins of the cable. Used shielded cable (inner wire) for Pin 5 while use shield cable itself (outer cable) for Pin 6. For selecting sufficient thickness for the cable, refer to the following chart which indicates relationship partial between cross-section and length. Cable Length and Partial Cross-Section mm^2 (Power Resistant: Below 600V)

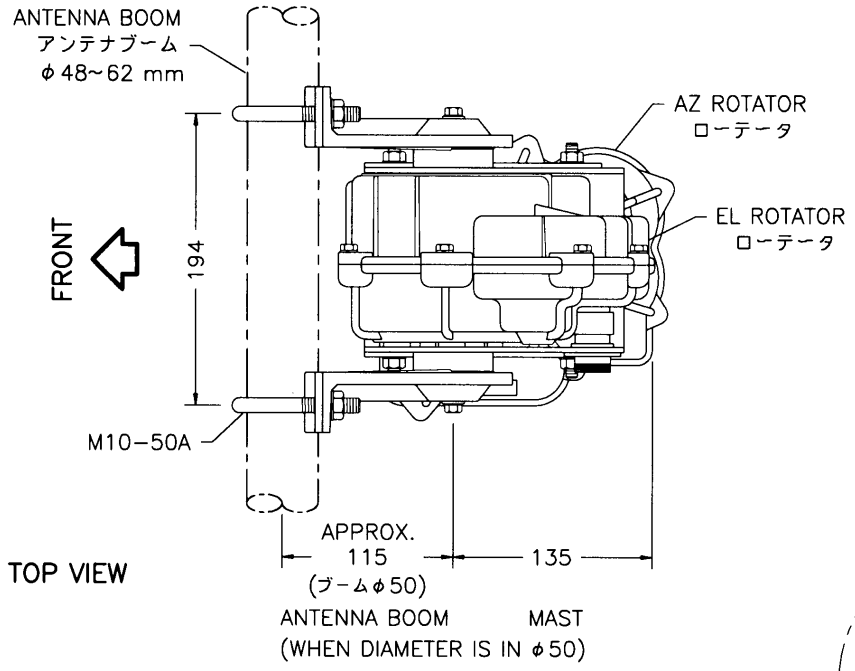
Cable Length Less Than 50m	: 0.5mm^2
50~100m	: 0.75mm^2
100~200m	: 1.25mm^2

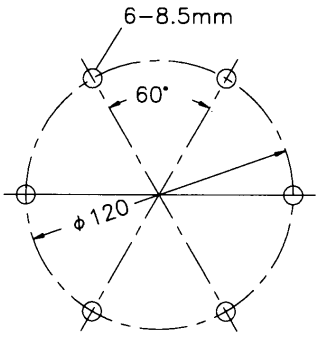
1.4 EQUIPMENT SUPPLIED

This rotator set AER-5 is supplied complete all the necessary parts that corresponds to the supply list contained in the TABLE-1 below.

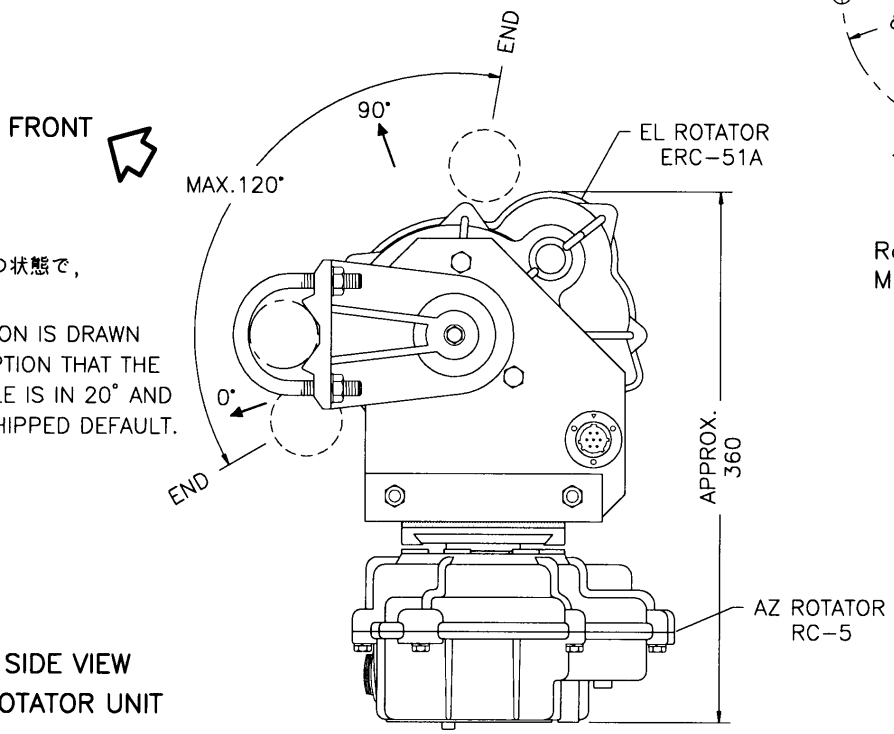
TABLE-1. AER-5 SUPPLIED PARTS LIST

ITEM	DESCRIPTION		Q'TY
1	Indicator Unit	AER-5	1
2	Rotator Unit	AER-5	1
3	Pilot Lamp	Indicacent Type 12V, 0.1A	2
4	Fuse, Glass Tube Type	2A	2
5	Connector	7P-25 Plug Type	2
6	Bolt	M8×19 W	5
7	U-Bolt	M10-50A (H=98) / W, NT	2/4
8	Spacer	M12 Nut	4
9	Y-Terminal	1.25Y-3N	14



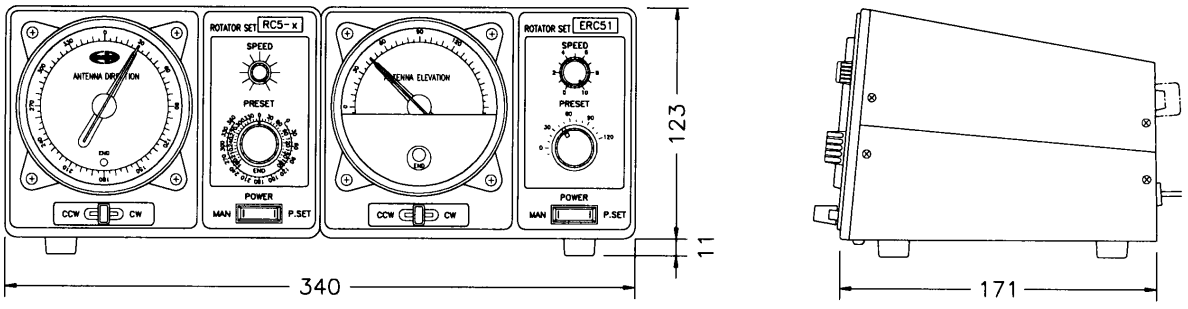


底部取付穴寸法
Rotator Bottom,
Mount Feet Demension



この図は仰角 20°の状態で，
出荷時も同じです。

THIS ILLUSTRATION IS DRAWN ON THE ASSUMPTION THAT THE ELEVATION ANGLE IS IN 20° AND THE SAME AS SHIPPED DEFAULT.



寸法値：ミリメートル
DIMENSION： MILLIMETERS

外観及び据付寸法

Figure 1−2. Azimuth Elevation Rotator, AER−5 Outline.

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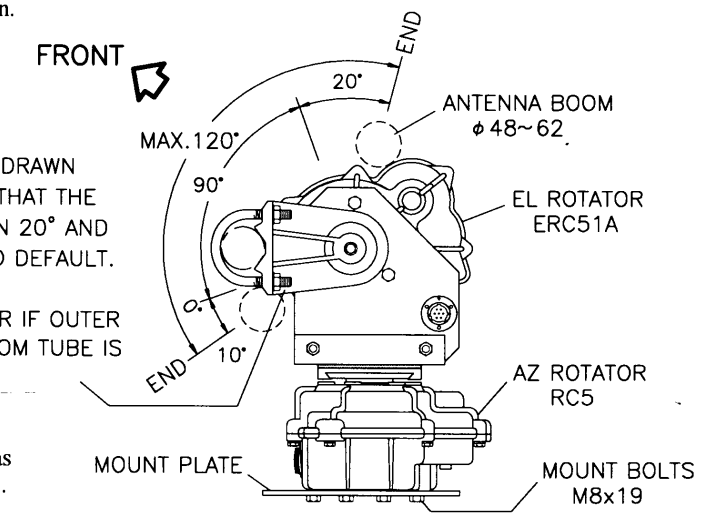
SECTION 2
INSTALLATION

2.1 GENERAL

This section explains the installation for the AER-5.

2.2 INSTALLATION

Fig. 2-1 shows an appropriate installation for the standard specification of AER-5. The rotator set is to be amounted onto a mount plate with 5 pieces of fitting bolts (M8 x 19W). In case that the thickness of the mount plate is not within the 2~4mm, it might be required to replace them with another U-bolt generally available of difference leg length instead of the attached U-bolts. If this is the case, never use a stainless U-bolt due to its strength factor and of electrolytic corrosive characteristic because stainless material do not provide a sufficient strength and is weak against electrolytic corrosion against different type of substance. If stainless steel is used, electrolilyic corrosion may occur in the mounting bolt holes of the lower housing in the rotor unit. Be sure to use a galvanized or at least chrome processed iron U-bolt, high-tension type is highly recommended. The Fig 2-1 shows rotator installation how the AER-5 is mounted on a tower of which the angle setting of the elevation rotator ERC51A is set at 20° which is the same angle as the factory setting, in the meanwhile factory setting angle for azimuth rotator RC5-3 is set at 0°. At this default rotator angle, set the antennas at angle 0° for both azimuth and elevation initially. It is ideal that the weight balance of antenna is set at center as weight gravity of antenna is not out of balance. If this is the case that an antenna is a kind of big and heavy (more than approx. 50 kg or the like) for instance, and the weight balance is greatly shifted to one sided from center of the gravity, it may be required to add a ballast exceptionally so that weight balance is becoming equally eventually. Since both remote control cable and coaxial cable simultaneously move as mast move by the rotation force of azimuth rotator, it is required to slack the cable at enough length so that the cables are be able to move freely without having any tension.



NOTES:

1) The contact surface gap between the mount plate and rotator shall be as flat and plane as possible within tolerance at less than 0.5mm.

2) The diameter of bolt hole of the rotor mount plate shall be less than ϕ 9mm. A larger hole size will decrease the hold and fixing strength of thc rotator.

Figure 2-1. Rotator Installation and Mount Angle

2.3 REMOTE CABLE WIRING

When the installation of rotator is completed, connect 7-conductor cable between rotator unit and indicator controller. Securely connect 7-pin (plug) into receptacle (jack) of the rotator and securely fasten the ring in the rotator side, in the meanwhile connect Y-terminal hugs to the TB-1 provided in rear panel of indicator unit. It is required in advance to process each cable ends, by contacting each wire by means of soldering, to the 7-pin connector while attaching another side to terminal hugs by pressing them using a press wrench (or to process them with soldering if the pressing wrench is not available.) Be sure to take notes of the pin number and cable color assigned, for which will help to protect the unit from the accident of wrong connection. It is required to apply a self-bonding insulating tape and vinyl tape wrapping around the connector for water protection.

NOTE: Refer to the he Section 1.3.1 if it is the case that longer length of cable (approx. more than 30m) is being used.

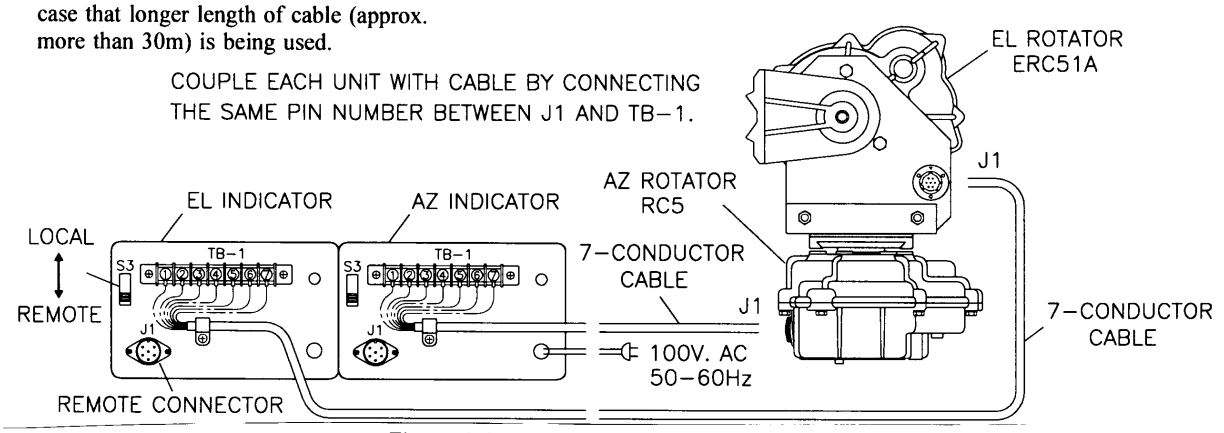


Figure 2-2. Remote Cable Wiring

2.4 INDICATOR ANGLE ADJUSTMENT

If it is raised that the range of pointer angle movement of elevation rotator is either exceeded or shortened aginst the range of rotation angle movement at 90°, the R42 variable resistor placed on the external PC board inside the indicator makes it possible to correct this adjustment as shown in Fig. 2-3. Adjustment by turning knob of R42 placed at right rear place of elevation controller box to the clockwise postion by use of a small screwdriver will add deficit angle meanwhile turning it to left position will reduce excessed the angle. Be sure to begin this adjustment at the side of 90° angle instead of 0° angle.

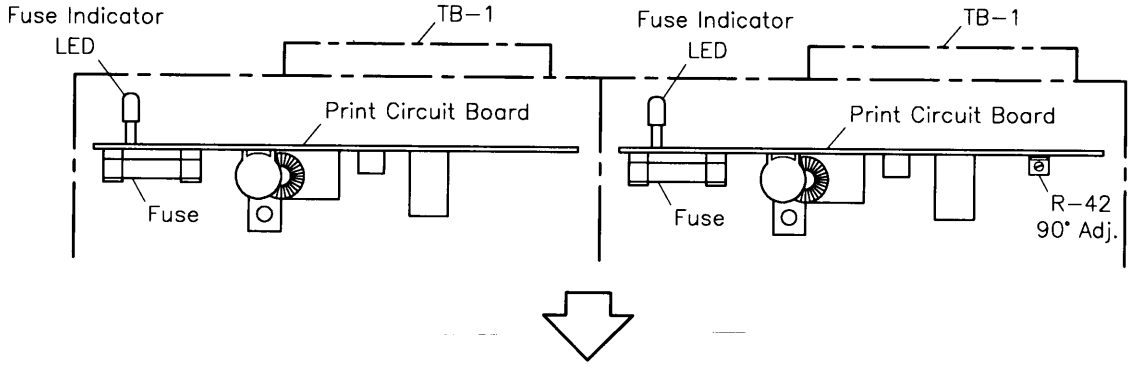


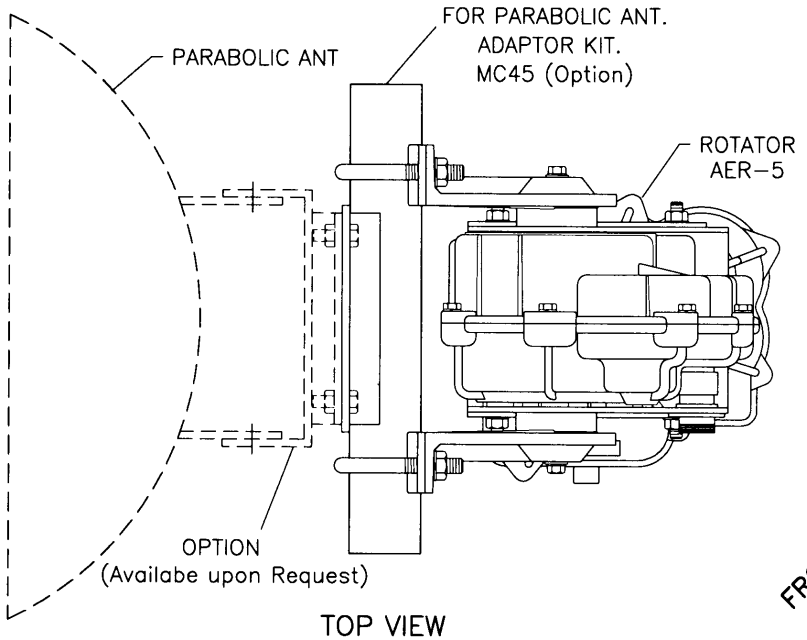
Figure 2-3. External View, Location of PC Board and R4 Resistor

2.5 CONNECTION WITH SATELLITE TRACKER RAC805/825 (Optional)

This rotator can connect with either CD's satellite tracker RAC805/RAC825 or CPU built-in equivalents of another manufacturer. It enables to control the rotator from the satellite tracker for auto-tracking the desired satellite. The connection between the rotator and the satellite tracker can be made by means of J1 connector. Refer to the TABLE-2 below for the details of each pinout, pin assignment and function of J1 connector of AER-5 (while J2 of RAC805/RAC825 is the connector to be connected with). Setting S3 slide switch in the rear panel to REMOTE position makes this unit operate in local mode and can control all the operations from the satellite tracking unit. For the details of the CD's RAC805/RAC825, refer to the manual comes with RAC805/RAC825.

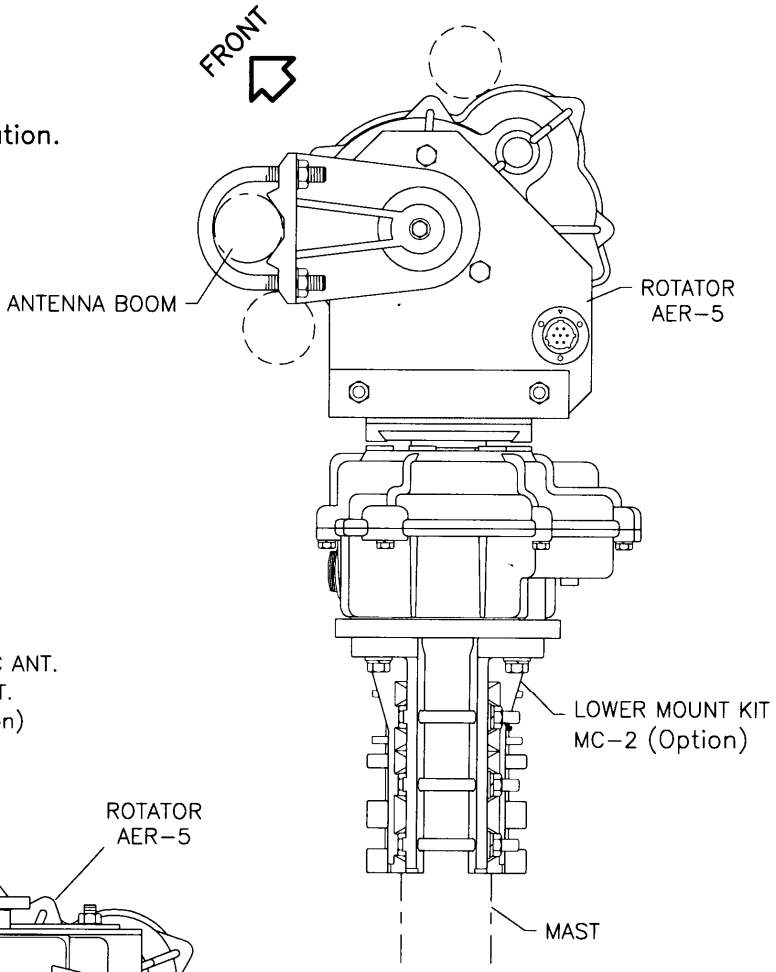
TABLE-2. Indicator Pinouts for Connecting Tracker, AER-5

Remote Connector J1, Pinout	Function and Operation
1	Rotator Positioning Data (Potentio Arm): It outputs positioning data from rotator at the voltage range 0.2~5VDC (-10°~110°) The voltage is stayed at approx. 0.5V when elevation angle of antenna is in 0°. This voltage is accordingly raised in proportion to increase of elevation angle of antenna, and it is reached to 90°, the voltage is is become at approx. 4V.
2	DOWN Data Input: Elevation rotator starts moving toward down direction when pin 2 is grounded.
3	AUX: (Not Connected)
4	DC Output (Power Supply): Power supply pin for RAC805, it outputs approx. 11VDC, 400mA.
5	UP Data Output: Elevation rotator starts moving toward toward up direction when pin 2 is grounded.
6	Low Speed Data Output: It allows to decrease the rotating speed from speed control knob of the front panel when this pin 6 is grounded. * As a method for obtaining high accuracy for stopping,, RAC805 send the command decrease the speed just before it is reached to targeted position by grounding pin 6. This enabes to obtain more accurate control.
Chassis	Ground: Uses as a ground of indicator.



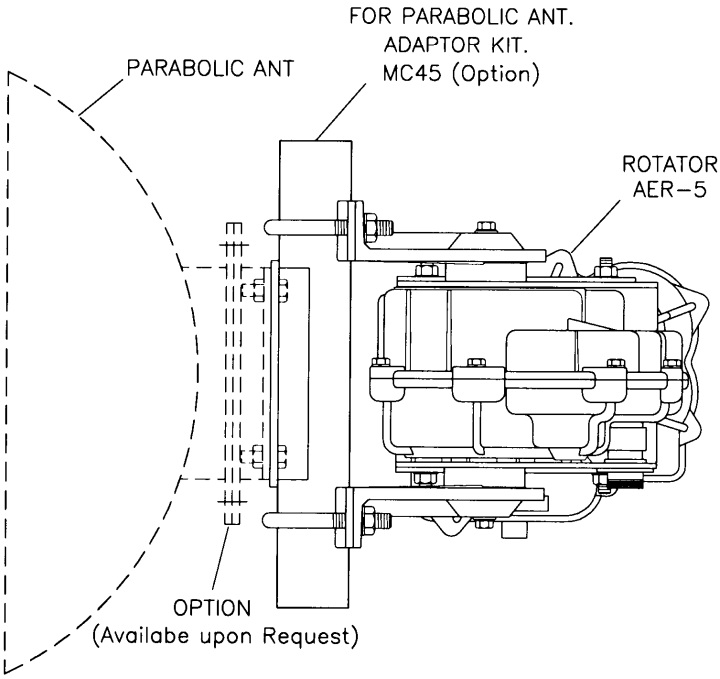
TOP VIEW

Sample of Parabolic Ant Installation.



SIDE VIEW

Sample of Mast Installation.



TOP VIEW

Sample of Parabolic Ant Installation.

寸法値：ミリメートル

DIMENSION： MILLIMETERS

Figure 2-4. Antenna and Rotator Installation.

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SECTION 3
OPERATION

3.1 INSPECTION

When wiring of the remote cable of AER-5 is down and before turning on the power, carefully check once again the cabling that the each wiring between rotor and indicator unit is properly made without wrong connection. Improper wiring can result in serious damage to the potentiometer inside the rotor or circuit devices inside the indicator control unit when the power is switched on. Setting the slide switch of LOCAL/REMOTE to the up right position for operating it in local mode while it is set to the down position for remote mode (controlling by mean of tracker for instance).

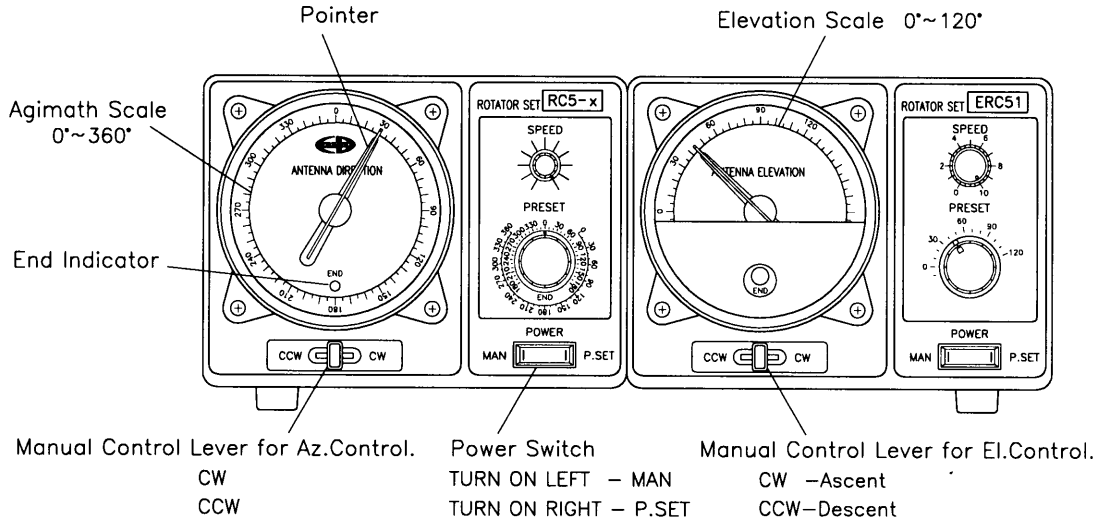

Figure 3-1. Indicator Control, AER-5 (RC5-3, ERC51) DWGR.023A

3.2 CCW-CW: MANUAL CONTROL

Rotation operation can be made manually by operation of CCW-CW control lever after setting main swtich in the MAN position while preset-operation can be made when this switch is in P. SET posion. During the preset operation is being executed when it is working in the preset mode, the operation by use of this CCW-CW lever is disabled.

3.3 SPEED: SPEED CONTROL

AER-5 is equipped with a circuit for variably changing the rotation speed. Turn the speed knob clockwise increases the speed while turning it counterclockwise decrease the speed on the contrary. Rotation speed is constant at high speed, there would be no uneven or irregularity in the rotation speed regardless of antenna size, while there however might have it slightly when rotation speed is low. Rotation at high speed is preferable to turn into the desired direction, it is however recommended to rotate it at low speed when in a strong windy day for considering the durability of rotator to use long life and to protect braking mechanism.

3.4 END: END INDICATION

Maximum rotating range of elevation rotator (ERC51) of AER-5 is limited in approximately 120°. The red lamp lights when the pointer is reached to this limit. Illustration in the Fig. 2-1 shows the relation of the rotation angle the limit range of elevation rotator of ERC51.

3.5 P. SET: PRESET FUNCTION

The model AER-5 includes a preset control circuit. To use this feature, set the power switch to "P. SET" position. The antenna will turn automatically to the direction set with preset dial in degrees and automatically stop when it reaches to the set angle. Manual control by operating with CW/CCW lever is disable in preset mode. The accuracy of stopping angle in the preset mode is approximately ±3°, fine adjustment further than the ±3° is not available. (The precision of the operation with Satellite Tracker RAC805/RAC825 is within ±3°.)

3.6 REMOTE OPERATION (USE WITH SATELLITE TRACKER)

The AER-5 is operable its all the functions remotely controlled from an external device if the power switch in the front panel of controller is in "P. SET" position and the mode switch placed in the rear panel of the controller is set in the lower position. This feature can be made from satellite tracker RAC805/RAC825 etc. by connecting with a remote cable. If this is the case, these functions operable from the indicator front panel such as rotating switch and preset knob are disable.

SECTION 4
PRINCIPLE OF OPERATION

4.1 GENERAL

The rotator set AER-5 is an elevation and azimuth rotator set designed and developed for a small to middle size of antenna for elevation and azimuth rotation, of which its applicable turning speed is adjusted approximately at 0.6~0.75 rpm. AER-5 consists of a rotor unit and an indicator control unit (both elevation and azimuth control and elevation and azimuth indication). See Fig. 4-2, is electrical block diagram, and Chapter 2 in Section 4 and above explain the principle of operation for the each unit.

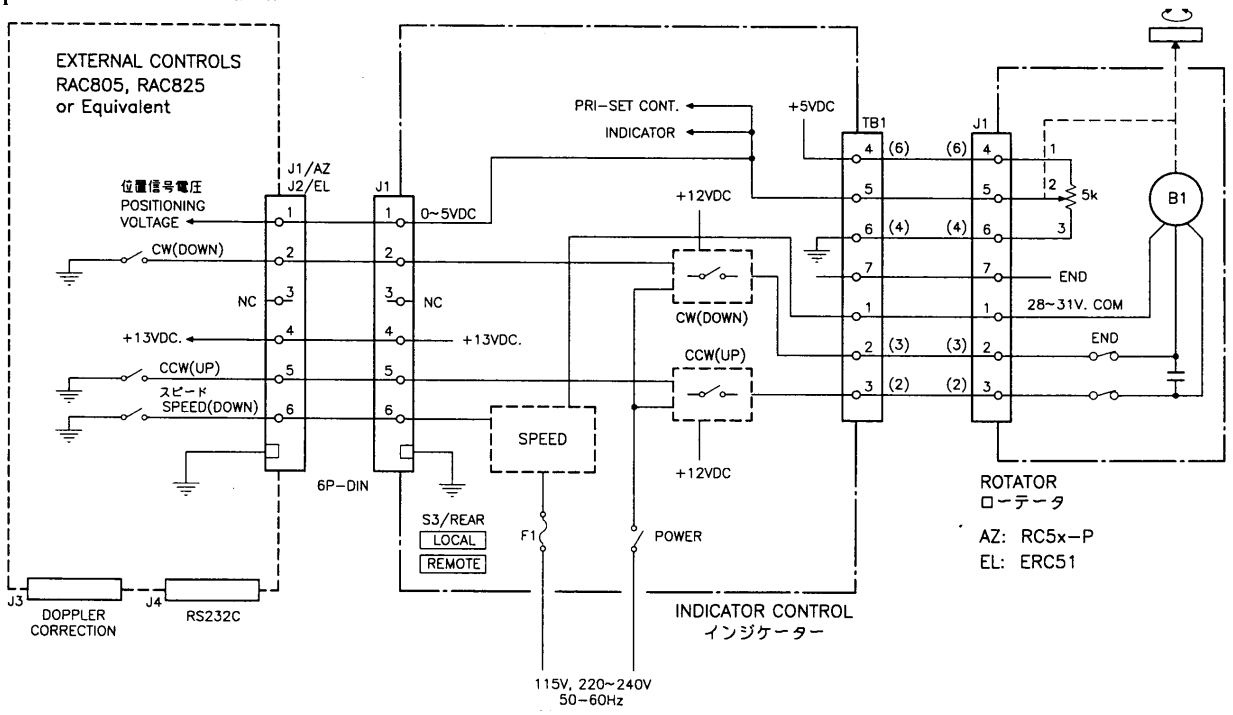

Figure 4-1. Block Diagram of Elevation Rotator System, AER-5.

4.2 ROTATOR UNIT

As illustrated the overall view of AER-5 in the Fig.1-2, install and fix the azimuth rotor unit first withe M8 bolts. Since the elevation angle of the stack boom to be installed on the elevation rotator is not obtained from by means of turning of the self-turning of the stack boom but is obtained by means of up/down movement of arm of the elevation rotator. And this causes a certain limitation in the capable weight of an antenna to be mounted on, therefore a big capacity of 28VAC capacitor type of motor which has a large inertia and torque is selected and used for the drive motor. Selected materials of super high tension gear and gear axis and aluminum die-casting materials of custom made that efficiently supporting for the speed reducing drive mechanism are used. Speed-reducing gears are used in the mechanism system of this unit and therefore is withstands external torque and provides sure and steady speed reduction that contributes to minimize backlash and noise. The worm gear mechanize section is individually constructed in a grease box isolated from another gears and it makes gear turning smooth and swift. The R30 volume potentiometer is used, outputs an analog signal for detecting an elevation angle. Also it provides with a turning limit feature that S3 and S4 limits switch limits rotation in one direction to 120°, works to stop the rotator movement promptly for not to exceed this angle. It outputs voltage for the END indicator that the red lamp lights when the pointer reaches the limit angle.

4.3 INDICATOR CONTROL

Fig. 4-1 shows an electrical diagram for AER-5 while the overall circuit diagram is shown in the Fig. 6-1 in the Section 6. The specification for the primary power supply standard is a single phase, 120V/220~240VAC. The operation is remotely be operable easily either manually by tipping manual lever toward right/left or presettable done in the preset operation with setting preset dial at the desired angle with the main switch in the preset position. In case of manual operation, starting drive motor and control of the elevation angle are operable by S2 switch. The indicator pointer that indicate elevation angle of rotator of ERC51 is structured by use of the precise servo motor, and it assures to offer accurate tracking of the elevation angle of the rotator. This D.C. circuit features to detect unbalancing current lag that generated from the internal circuit of R30 in rotor unit and the bridge structural circuit with R11 in the indicator control unit, and amplified this signal drive indicator servo motor. Speed control is done by R12 resister by means of varying the rotation speed of the drive motor by changing the furnishing voltage ratio of the drive motor.

4.4 REMOTE CONTROL CIRCUIT

Remote circuit is provided for controlling this model remotely by operating an external controller, such as a satellite tracking equipment, RAC805 or RAC825 for example. Setting S3A switch in upper position in the rear panel of the controller unit makes this unit work as "Remote Mode." The remote circuit outputs the positioning voltage of the rotator through indicator as shown in Fig.4-1. The function of both CW-CCW operation and the speed reduction control of the rotator motor are efficiently acquired by grounding the line electrically.

SECTION 5

PARTS LIST

5.1 STRUCTURAL PARTS

The model AER-5 consists of both indicator unit and rotor unit of including the following structural parts. Refer to this if necessity for obtaining or ordering the spare/repair parts for the AER-5 is raised. These parts described below are only typical parts used in the unit.

5.2 INDICATOR UNIT

The indicator unit of AER-5 consists of these components and its related parts listed below.

Item	Description	
1.	Front Panel	
2.	Case	Bottom
3.	Case	Upper
4.	Overlay Frame	
5.	Overlay	Type-2/AZ, Type-3/EL
6.	Power Switch	BLP-51
7.	Elevation Switch	BES-11
8.	Preset Knob	BM-25
9.	Speed Knob	BM-15
10.	Terminal Board	TB-1, 7P
11.	Power Cord	
12.	Fuse	2A
13.	Power Transformer	C-2203CT, Primary 115/230VAC.
14.	Speed Variable Resistor	R12 VR, 1M Ω
15.	Indicator Assembly Unit	
16.	Potentiometer	Potentio VR, 5k Ω
17.	Pilot Lump, Incandescent	Type 12V-0.1A
18.	Preset Volume	5k Ω
19.	Geared Servo Motor	CM0990
20.	AR-8H	Print Circuit Board

5.3 ROTOR UNIT

The rotator unit of AER-5 consists of these components and its related parts listed below.

Item	Description	
1.	Upper Housing	El., Az.
2.	Lower Housing	El., Az.
3.	7P Jack	SNS 2007 ASCMb/El., SNS 2007 RRM/Az.
4.	End Switch	S3, S4
5.	Drive Motor	25W 1.2A/El, 10W 0.6A/Az.
6.	Coupling	
7.	Worm Gear	M0.8/El., M1/Az.
8.	Bolt	M6 x 20
9.	Worm Wheel	M0.8 Z77/El., M1 Z60/Az.
10.	Worm Cover	
11.	Drive Gear	MAK-7
12.	Main Gear	ADC12
13.	Rotary Shaft	ϕ 26 x 176.5/El., ϕ 25 x 138.5/Az.
14.	Potentio Gear	M0.8 Z30/El,, M0.75 Z66/Az.
15.	Potentiometer	Potentio VR, 5k Ω
16.	Capacitor	180 μ F/El., 125 μ F/Az.
17.	Resistor	3.6k Ω/El. & Az.
18.	Rotator Mount	Z. Glv.
19.	Arm	MC65
21.	Output Flange	MC61 MAK-7d
22.	Bolt	M8 x 19 SW, N.

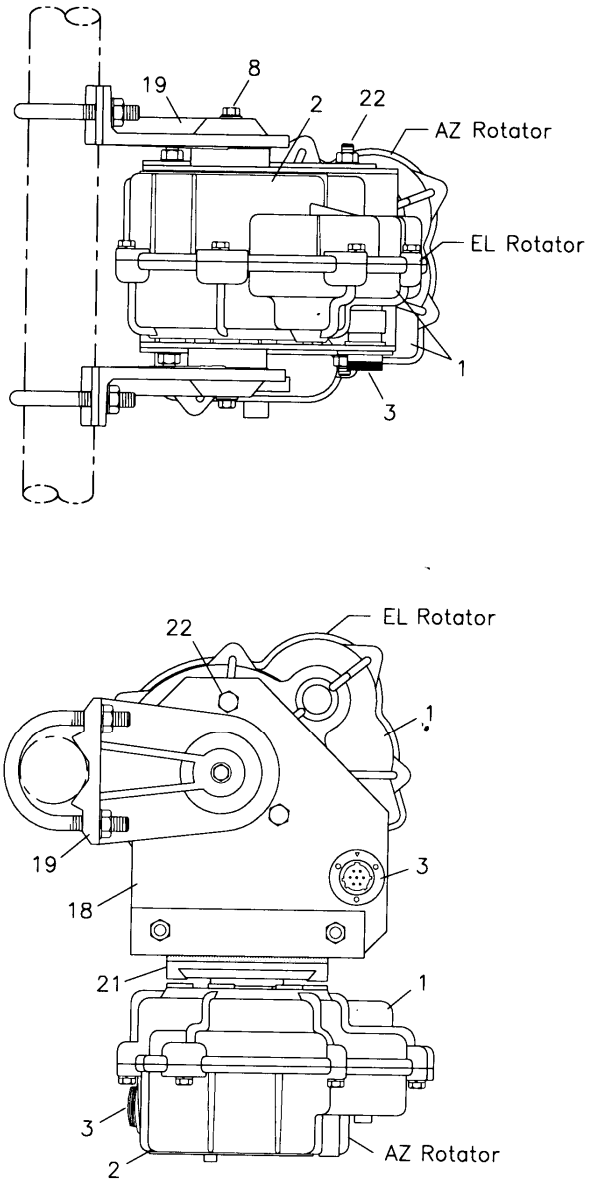

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Figure 5-4. Rotor Unit, Structural Part, AER-5

SECTION 6
CIRCUIT DIAGRAM

6.1 ROTATOR CIRCUIT

Fig.6-1, 6-2 shows the circuit diagram of the AER-5 rotor unit.

6.2 INDICATOR CIRCUIT

Fig.6-3 exhibits the circuit diagram of the AER-5 indicator control unit.

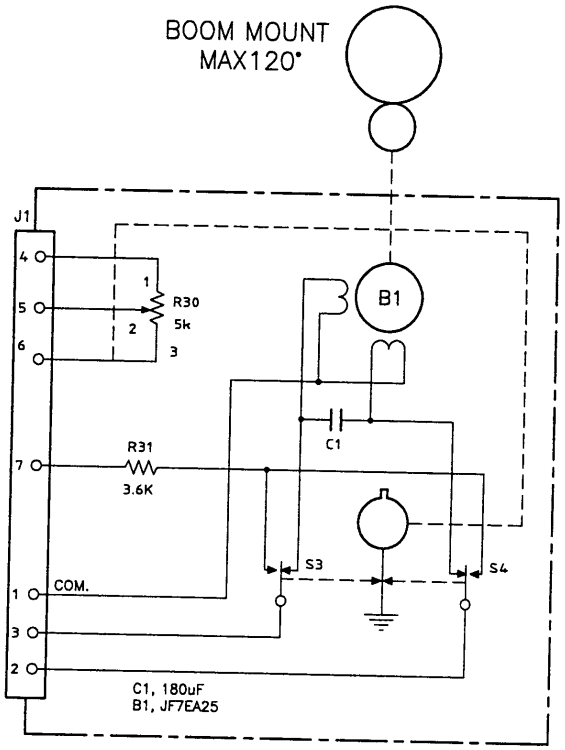


Figure 6-2. Elevation Rotator, Circuit Diagram, ERC51A.

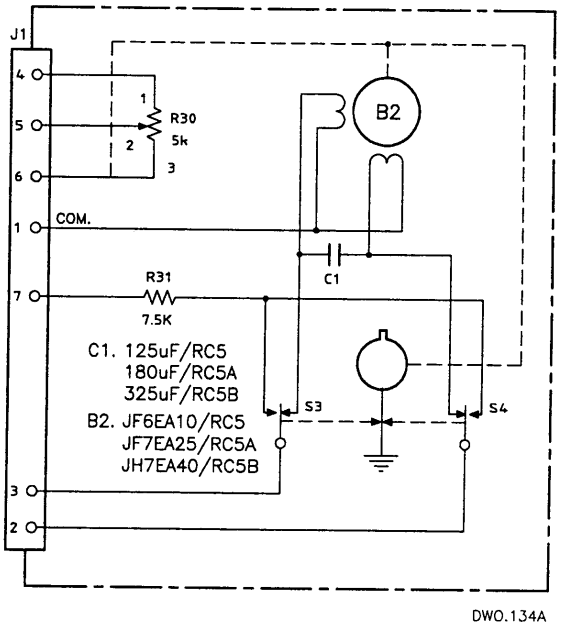
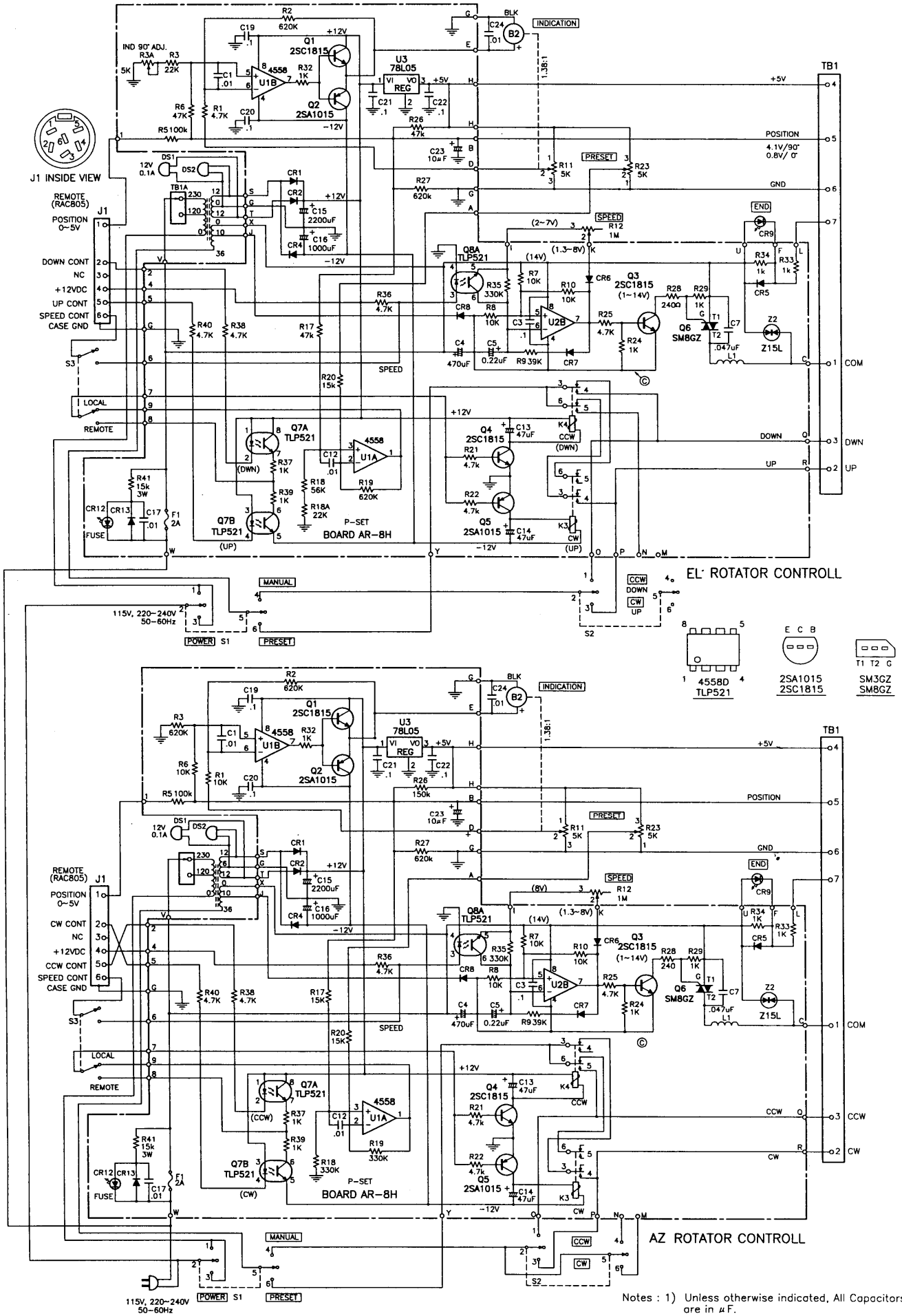


Figure 6-1. Azimuth Rotator, Circuit Diagram, RC5.



Notes : 1) Unless otherwise indicated, All Capacitors are in μF.
2) Unless otherwise indicated, Diode are 10E-1.
3) Each voltage indicated between point Ⓒ and the line.

Fig. 6-3. Indicator Controller, AER-5.

CMN-0610 DWO.012B

SECTION 7
MAINTENANCE

7.1 ROTATOR INITIAL INSPECTION

In order to maintain the rotator in in the good condition to use the rotator for a long life, it must regularly be inspected and mented if the necessary. Although suitable timing for the first rotor inspection depends on the installation location and surrounded environment, it is usually desirable to excute at six months after installation of the rotator set. This intiioal inspection consists of carefully examining the tightness of the bolts and nuts. Securely retighten if they are loosen especially in the case that the rotator is used with a large and heavy antenna.

7.2 ANTICORROSIVE TREATMENT/ROTOR UNIT

An extent of damage or corrosion is most common for cause of mulfunction or failure of rotor and this is mostly due to inferior of an external maechanical devices or breackage of the housing etc. In the aspect of corrosion, it is mostly the common that rotator is being used in a coastal locations where humit and solty air is surronded or an industrial zones where a chamical air is emitted up from chimney to the air. 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 and is effective to the condition of the rotator. Although ERC51 rotator is coasted with anticorrosive paint at the factory, making an additional regular painting is required to keep the unit being rust-free. An ordinary anticorrosive paint for ferrous metals is best, although spray paint can also be used.

7.3 LUBRICATION SCHEDULE AND GREASE FOR COLD-AREA

It is edeal to lubricate the AER-5 rotor should be made at least once in 3 years for those case in consuming rotator for 30 minits operation in average per day. This means the rotor needs lubrication every couple of years when it is used for an average of a half-hour a day. There is however no need to lubricate the rotor unless it is not found that rotation speed is becoming slow or unless otherwise operating noise has increased. The most critical lubrication point is the sealed grease chamber in where worm gear mechanism is placed that ensures long-term, maintenance-free lubrication of this mechanism for which normally it is not required to lubricate this section though. Applying special grease (e.g. Dow-Corning EM-30L) is recommended for the case that the rotor is installed in such an place where the sorrounded temperature is fallen below -20°C.

7.4 INDICATOR

Any mechanical inspection or maintenance is not particularrly required for the indicator/control unit as this unit does not consist of those components of which maechanically works. Repairs and service required with this unit generally relate to the deterioration or malfunctioning of electrical parts, such as indicator lamp etc.

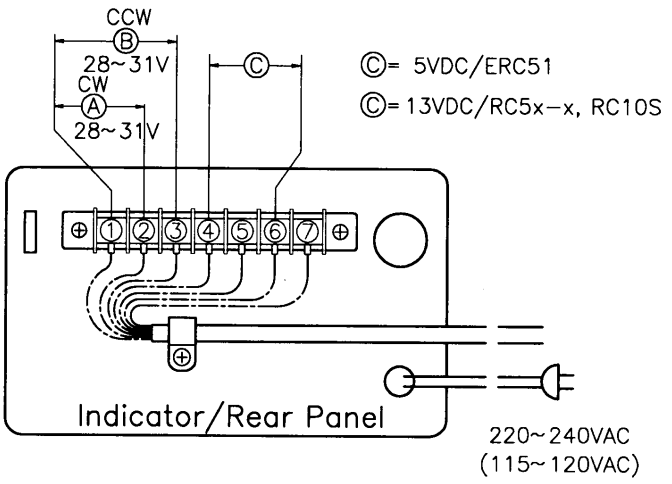
7.5 MULTIFUNCTION AND REPAIR

If the rotator 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 scsope for solving the problem by conducting and inspectioning the possible hardwares to find it both visually and electrically by tracing it inspection too. Refer to the Table 7-1, is the typical type of symptoms of troubles possibly be raised in the rotator units and their corresponding countermeasures. Note that listed instruction includes an failure caused by unproper soldering processing. Contact CD if the problem is beyond your technical scope for having it approperiate repaired.

TABLE 7-1. Typical Defects and Countermeasure

Symptoms	Inspection	Possible Defect Part and Countermeasures
1. Power can not be on. (Fuse is blow 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 blew out. If power enables on, check remote cable or check resister value between C and D instructed in Fig.7-2. That might be caused in either the part mentioned the above.
2. Does not turn neither CW and CCW direction. 3. Rotate either CW or CCW.	Check the voltage of both A and B as refferred to Fig.7-1.	Check remote cable or resistive value of C, and D as refferred to Fig.7-2, must be in trouble either one. If none of both, may by 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 braker 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 rotator unit is.	The indicator unit is considered to be defective if leakage bracker is cut the power, or remote cable if not. If neither of them, it is caused in the rotator 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 unstea dily 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 rotator unit is.	The indicator unit is considered to be failure if the pointer is still stayed at standstiilled position meanwhile either the remote cable or rotator unit is the one if the pointer started and stopped at 0°. Check the maulfunction 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 indicaior 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.	

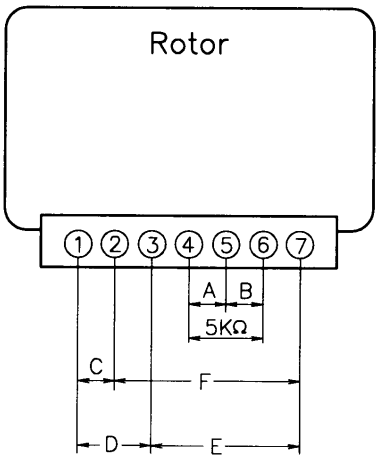
Note: In case that the symptom of trouble of rotator is not applicable with the condition stipulated above table or distinct part of defects is not defined yet, check to see also the voltage as instructed in Fig. 7-1 and resisterative value of each pin of the terminal as stated in Fig. 7-2. Check also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



NOTES:

1) To check output voltage, be sure to disconnect the cable tentatively.
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 above has 10% tolerance.

Figure 7-1. Output Voltage of Indicator Unit



NOTES:

1) Resistor value of C and D is: 3Ω/El. Rotator.
   5Ω/Az. Rotator.
2) When END (End Switch) is active, the resistor value of C and D is infinite, and resistor value of E or F are 3.6kΩ.
3) Total resistor value of A and B is 5kΩ.
4) Each resistor value above has 20% tolerance.

Figure 7-2. Internal Resistor Value of Rotator Unit

7.6 FUSE REPLACEMENT

In case the power is not turned on, there might be the case that the fuse is blown out. If this is the case replace the fuse with new one. A spare fuse is attached in the print circuit board inside the controller unit.

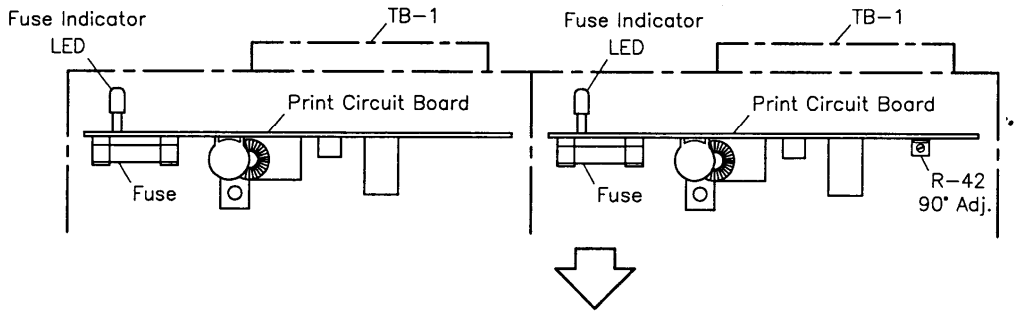


Figure 7-3. Location of the Fuse

7.7 REPLACEMENT PARTS

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 directly through the dealer directly to us. 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 5.1 and 5.3 and circuit diagrams of 6.3.

7.8 IF REPAIR IS IN NEED

Repairing thoughts on part identification and repairing know-how beyond the owner's scope can be entrusted to Creative Design Corp. The defective unit may be sent to Creative Design Corp. either direct or via the dealer at which the rotator was purchased from. In the case of repairs not covered by the warranty, we will inform the owner beforehand on how much the repair will be costed. Repair cost will be taken for the case on the repairs necessiated by mishandling or mis-operation or inevitable accident even in the case of conditions exceeding those specified by Creative Design Corp., even it is within the warranty period. We will ordinarily repair and return units within five days or more for the case sent from outside Japan, 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 unit directly to Creative Design Corp. for having it repaired, along with apparently stating the condidion and the cause of the failure of rotator, make sure to indicate the serial number of the unit, name and address of the purchaser, the name of the dealer purchased from etc.